Assessment and Evaluation of Rational Dispensing of Topical Corticosteroids by Community Pharmacists and It's Implication on Health Science Population

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In the Faculty of Pharmacy

By

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(Registration No: KLEU/Ph.D./2020-21/DO1220051)

Under the Guidance of

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OCTOBER 2024

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Sowmya Spoorthi Marripalli

ABSTRACT

Introduction and background: Topical corticosteroids abuse is quite common with varied presentations, most commonly on face is an increasing problem encountered by dermatologists in India. Lack of public awareness and the ease of obtaining topical corticosteroids without a prescription are important underlying factors. There is a need to take urgent remedial steps and increase awareness about this problem in Community Pharmacist, Health Sciences Student Population and Patients.

Aim: To assess the Knowledge, Attitude and Perception regarding topical corticosteroids in a sample of Community Pharmacist, Health Sciences Student Population and Patients.

Methods: A Prospective Knowledge, attitude and perception was assessed and evaluated using validated KAP Questionnaires pre – post and follow up among Community Pharmacist, Health Sciences Student Population and Patients using convenience sampling method after ethical committee approval.

Results: This study shows pre-test results showed significant gaps in knowledge, attitude, and practice among community pharmacists, Health science students and patients. Post-test scores demonstrated significant improvements after educational interventions, including seminars with audio-visual aids and patient counselling. Educating community pharmacists through workshops, seminars, and role plays, as well as patient counselling with educational tools, proved beneficial.

Conclusion: This study reveals a significant deficiency in knowledge, attitude, and practice among community pharmacists, health science students, and patients. Educational interventions, including seminars, workshops, and innovative tools, led to

notable improvements across all groups. Ongoing re-education programs for community pharmacists are essential for optimal patient care and rational drug dispensing. Effective patient counselling and tailored educational initiatives are crucial for bridging knowledge gaps and enhancing healthcare outcomes.

KEY WORDS:- Topical Corticosteroids, Health Science Student Population, Knowledge, Attitude and Perception, Practice, Community Pharmacists, Patients.

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LIST OF ABBREVIATIONS

SR NO	ABBREVIATION	FULL FORM
1	KAP	Knowledge ,Attitude and Perception or Practice
2	TCS	Topical Corticosteroids
3	IADVL	Indian Association of Dermatologists, Venereologists and Leprologists
4	WHO	World Health Organization
5	ANOVA	Analysis of Variance
6	ADRs	Adverse Drug Reactions
7	ICF	Informed Consent Form
8	PIS	Participant Information Sheet
9	DNA	Deoxyribonucleic acid
10	CPs	Community Pharmacists
11	MG	Medical Graduate
12	PIL	Patient Information Leaflets
13	TI	Tinea incognito
14	RIVM	National Institute for Public Health and the Environment
15	AEs	Adverse Effects
16	OPD	Out Patient Department
17	CDSCO	Central Drugs Standard Control Organization

18	ICSR	Individual Case Safety Report
19	SJS	Stevens-Johnson syndrome
20	CPE	Continuing Pharmacy Education
21	OTC	Over The Counter
22	PCOD	Polycystic Ovarian Disease
23	IBD	Inflammatory Bowel Disease
24	CG	Control Group
25	IG	Intervention Group
26	SPL	Subject Information Leaflet
27	TCs	Topical Corticosteroids
28	SPSS	Statistical Package for the Social Sciences
29	SD	Standard Deviation
30	D Pharma	Diploma in Pharmacy
31	B Pharma	Bachelor of Pharmacy
32	M Pharm	Master Of Pharmacy
33	Pharm D	Doctor of Pharmacy
34	IPA	Indian Pharmaceutical Association
35	DDC	Deputy Drugs Controller
36	HOD	Head Of Department
37	BAMS	Bachelor of Ayurvedic Medicine and Surgery
38	MBBS	Bachelor of Medicine, Bachelor of Surgery

39	BDS	Bachelor of Dental Surgery
40	CI	Confidence Interval
41	ICD	Irritant Contact Dermatitis
42	TSDF	Topical Corticosteroid dependent Face
43	UAE	United Arab Emirates

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1.INTRODUCTION

1.1 Background:

For practically all inflammatory dermatoses, topical corticosteroids (TCS) offer quick symptom relief. Because of this, it is among the most frequently prescribed topical medications, having been in use for almost 60 years. Compound F (hydrocortisone) was initially introduced by Sulzberger and Witten in 1952 .[1] Strong corticosteroids, such mometasone, fluticasone, and clobetasone, are only permitted by law to be sold in India with a prescription from a licensed medical professional. Schedule H of the Drugs and Cosmetics Rules 1945 lists all steroids; nevertheless, a footnote arbitrarily leaves off topical treatments and eye ointments, despite the fact that these medications have no oral versions.[2] This implies that for all intents and purposes, these medications are considered to be "over the counter."[3] This has to be revised immediately. When applied for as little as 15 days, topical steroids can result in significant, frequently irreversible harm, particularly to areas of thin skin like the face and groin.[4]

Table 1: National Psoriasis Foundation has a useful table showing the potency of topicalcorticosteroids.

Sl.No	Brand Name	Contents
1.	Betnovate	Betamethasone valerate 0.1%
2.	Triple combination (Skinlite, metosol plus, Elosone-htetc.)	Hydroquinone, tretinoin mometasone/ flucinolone acetonideof loxacin 0.75%, Ornidazole 2% , Terbinafine 1%, Clobetasole Propionate 0.05%
3.	Panderm plus	Clobetasol propionate 0.05%, Gentamicin sulphate 0.1%, Miconazole nitrate 2% Fluticasone propionate 0.05%
4.	Cortiwell ointment	Hydrocortisone acetate
5.	Lobate GM	Clobetasol propionate 0.05%, Gentamicin sulphate 0.1%,Miconazole nitrate2%
6.	Flutivate	Fluticasone propionate 0.05%
7.	Momate	Mometasone furoate 0.1%

In addition to treating excessive scar tissue, topical corticosteroids are used to treat a wide range of inflammatory skin diseases. For conditions such as vitiligo, atopic dermatitis, erythroderma, psoriasis, pemphigus vulgaris, eczema, and Pyoderma gangrenosum, topical corticosteroids are recommended.[5] The most commonly used medication for treating skin lesions that deteriorate and cause skin loss is topical corticosteroids.[6] Available in a variety of forms, including creams, lotions, ointments, and shampoos.[7] Abuse of topical corticosteroids causes side effects, such as oral lichen planus, papillary atrophic, erosive bullous, and sun sensitivity aggressiveness.[8] Abrupt discontinuation of the medicine is the next step.[9] Other adverse effects includes with images provided by IADVL

Figure 1: Adverse Effects Includes With Images Provided By IADVL

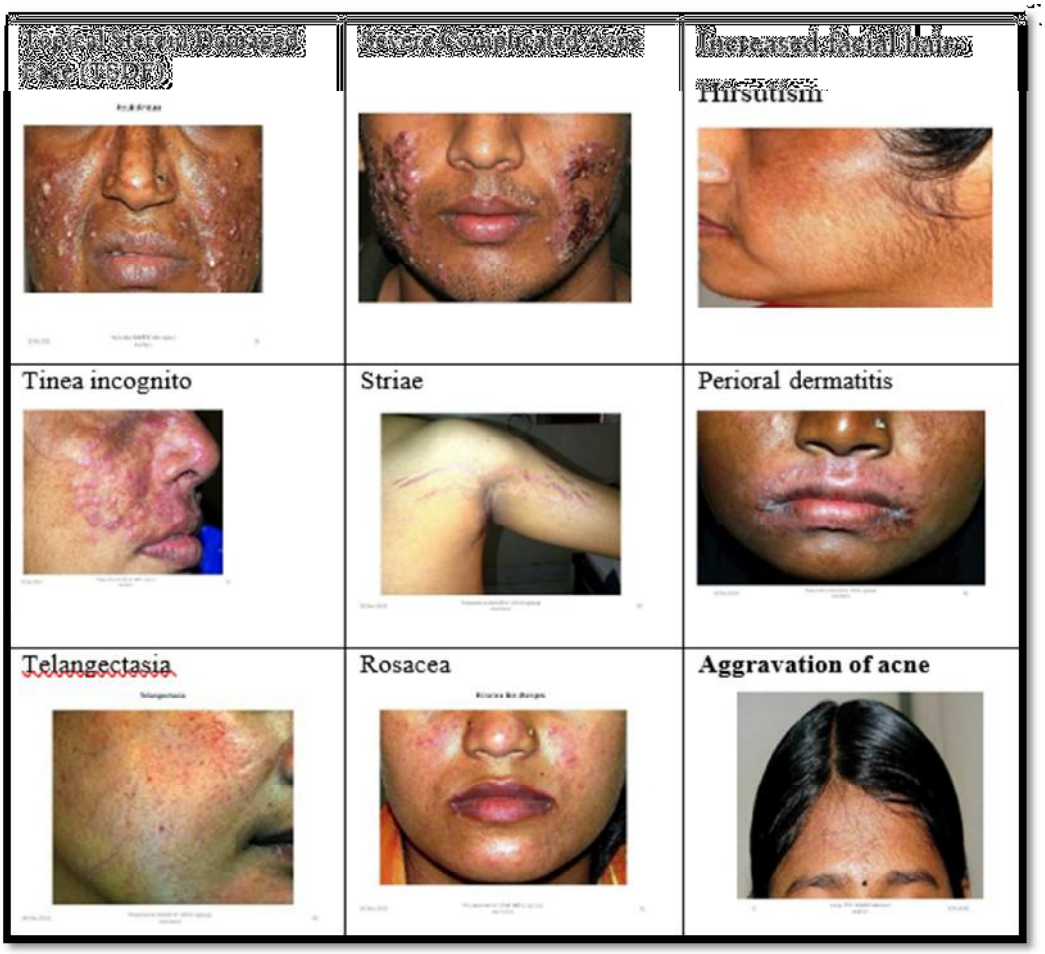


Figure 2 : Classification of Topical corticosteroids

Potency	Class	Topical corticosteroid	Formulation
Ultra high	I	Clobetasol propionate	Cream, 0.05%
		Halobetasol	Cream, 0.05%
High	II	Betamethasone dipropionate	Ointment, 0.05%
		Desoximetasone	Cream or ointment, 0.025%
		Fluocinonide	Cream, ointment or gel, 0.05%
		Halcinonide	Cream, 0.1%
		Mometasone furoate	Ointment, 0.1%
	III	Betamethasone dipropionate	Cream, 0.05%
		Betamethasone valerate	Ointment, 0.1%
		Fluticasone propionate	Ointment, 0.005%
		Triamcinolone acetonide	Ointment, 0.1%
Moderate	IV	Desoximetasone	Cream, 0.05%
		Fluocinolone acetonide	Ointment, 0.025%
		Hydrocortisone valerate	Ointment, 0.2%
		Triamcinolone acetonide	Cream, 0.1%
	V	Betamethasone dipropionate	Lotion, 0.02%
		Betamethasone valerate	Cream, 0.1%
		Fluocinolone acetonide	Cream, 0.025%
		Hydrocortisone butyrate	Cream, 0.1%
		Hydrocortisone valerate	Cream, 0.2%
		Triamcinolone acetonide	Lotion, 0.1%
Low	VI	Betamethasone valerate	Lotion, 0.05%
		Desonide	Cream, 0.05%
		Clobetasol butyrate	Cream 0,05%
		Fluocinolone acetonide	Solution, 0.01%
	VII	Hydrocortisone acetate	Cream, 1%

WHO Model Prescribing Information: Drugs Used in Skin Diseases. Classification of Topical Corticosteroids. Geneva: World Health Organization; 1997. p. 117-8. Available from: http://www.apps.who.int/medicinedocs/en/d/Jh2918e/32.html#Jh2918e. 32.1. [Last accessed on 2016 May 25]

Mechanism of action of topical corticosteroids

Topical corticosteroids have a broad range of actions, including immunosuppressive, anti- inflammatory, and anti-mitotic properties. [11] Topical corticosteroids have an anti-inflammatory impact through inhibiting the production of phospholipase A2, constricting blood vessels, and directly inhibiting inflammatory transcription factors and DNA.[12] Delivery of inflammatory mediators to the applied region is reduced when the blood vessels in the upper dermis constrict. [13] The formation of lipocortin, which inhibits phospholipase A2, also has an anti-

inflammatory impact by reducing the synthesis of prostaglandins and leukotrienes. In addition, topical corticosteroids suppress pro-inflammatory gene expression by indirectly inhibiting inflammatory transcription factors like NFkb and increasing the expression of anti- inflammatory genes directly at the DNA level.[14]

Topical corticosteroids have a significant anti-mitotic impact when treating psoriasis; it is hypothesized that lipocortin, an endogenous glucocorticoid-regulated protein, is upregulated in response to this decrease in epidermal mitosis.[15] The dermis also has an anti-mitotic function that prevents collagen formation and cell division.[16]

Topical corticosteroids have immunosuppressive effects by inhibiting humoral factors that contribute to the inflammatory response and by suppressing the maturation, differentiation, and proliferation of all immune cells.[18]

Figure 3: Mechanism of action of topical corticosteroids

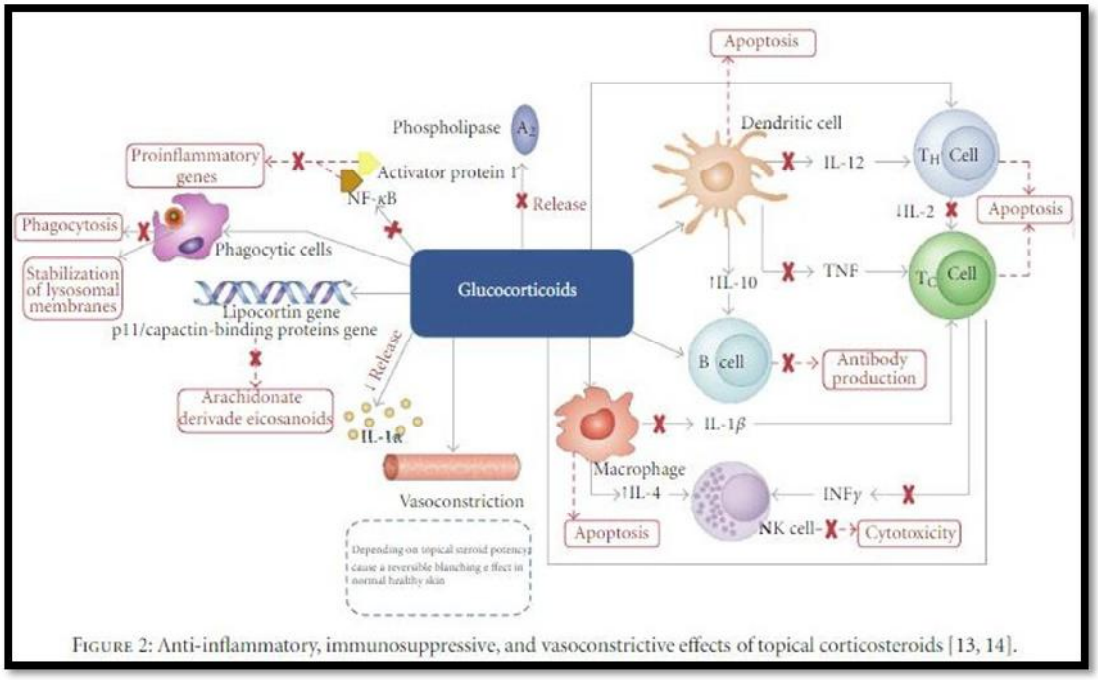


FIGURE 2: Anti-inflammatory, immunosuppressive, and vasoconstrictive effects of topical corticosteroids [13, 14].

Clinical Pharmacist's Role in Cosmetovigilance Regarding Topical Corticosteroid Abuse and Misuse

Physicians from all specialties, but mostly dermatologists, utilize topical treatments with varying concentrations of corticosteroids. These medications are especially abused and misused in India, where the majority of these medications are sold without a prescription at pharmacies and can be obtained over-the-counter.[19] The issue has been exacerbated by social media, peer pressure, and unethical marketing, and as a result, more and more people are becoming victims of topical corticosteroid abuse.[20] The extended use of these products as "fairness creams" is the most prevalent misuse and abuse of them. Severe side effects have been observed as a result, including rosacea, atrophy, acne, steroid dependency, and perioral dermatitis.[21]

Due to the extremely low doctor-to-patient ratio, patients are more likely to be duped by false information and quack medicine.[22] The detrimental effects of extended unsupervised usage may not always be explained by the busy clinician. In these cases, the clinical pharmacist can be quite helpful.[23]

A Pharm D or M Pharm in Pharmacy Practice, along with extensive training and experience to explain the potential side effects of long-term drug usage, are requirements for becoming a clinical pharmacist.[24] Because of their position at the patient-dispensing interface, they are in a prime position to anticipate and avert the risks associated with medication abuse and misuse. [25] There has also been prior research and documentation on the role of a clinical pharmacist in guiding the system in the proper direction.[26] When an undesirable incident is observed, they can also provide the appropriate guidance.[27] It is imperative that dermatologists begin to recognize the value of clinical

pharmacists and begin incorporating them more deeply into patient care.[28] As a result, the clinician has less work to do and can spend more time caring for patients.[29]

Additional actions that can be taken include counselling patients and other medical professionals, including paramedics, about the negative effects of drug use without supervision, handing out informational pamphlets, holding awareness plays and other events, and engaging in other mass media campaigns.[30] Individuals who are impacted might require sufficient care and rehabilitation, and a clinical pharmacist can be really helpful in this area as well.[31] A notification system at the clinical pharmacist level can also aid in minimizing the danger. It has been previously documented that the intervention of the clinical pharmacist in the healthcare system supports the economic aspects of treatments and conserves resources.[32]

The government has acted as a result of the pioneering work done by the IADVL's taskforce against topical steroid abuse, which focuses primarily on the face. The Government of India's decision to outlaw steroid-containing fixed drug combinations is a positive step toward the prudent usage of creams containing corticosteroids.[33] Finally, using a multifaceted disciplinary strategy, we can hope to somewhat restore the skewed image of topical steroid usage in India and other developing nations. The time will come when clinical pharmacists will prevent drug abuse and misuse and take a more proactive role in the administration of healthcare.[34]

1.2 Justification of the Study

- There has been a noticeable rise in the misuse of topical corticosteroids in the population in recent years. According to published research, evaluating community pharmacists' expertise and providing them with counselling could enhance the community's reasonable application of topical corticosteroids. This reduces the number of topical corticosteroids prescribed as over-the-counter medicine. Immediate corrective action is required, as is raising public awareness of the issue. Unlike in western countries, similar studies are very less in Indian sub-continent.

- Therefore, the aim of this research is to determine obstacles to the judicious administration of topical corticosteroids and evaluate the influence of community pharmacist education on this process.

- Abuse of topical corticosteroids is rather widespread and manifests in a variety of ways, most frequently on the face. Prompt corrective action is required, as well as raising awareness of the issue among patients utilizing topical corticosteroids and health science students.

- If I compared it to the overuse of antibiotics, I wouldn't be exaggerating if I said that it was an abuse of steroids. In the Indian Journal of Dermatology, Venereology and Leprology, a 2011 study quantifies the use of topical steroids in the treatment of dermatoses, a general word for any skin illness. Dermatoses can have a variety of origins, from fungi to bacteria, and each needs a different course of therapy. However, 15% of patients are already using topical steroids when they visit a specialist. Furthermore, up to 29% of people use it as aftershave or fairness cream.

1.3 Study objectives:

Primary objectives:

1. To Assess and Evaluate Knowledge, Attitude and Practice among Community Pharmacists on Topical Corticosteroids
2. To Assess and Evaluate Knowledge, Attitude and Perception among Health Science Student Population on Topical Corticosteroids
3. To Assess Impact of Counselling on Knowledge, Attitude and Perception among dermatology outpatients using Topical Corticosteroids

Secondary objectives:

1. To Assess Adverse Drug Reactions of Topical Corticosteroids among dermatology outpatients using Naranjo Scale

2. REVIEW OF LITERATURE

2.1 Community Pharmacists review of literature

- **Lidia Sautebin et al.** guided a study to validate the role of community pharmacy and dermatologist to provide concern regarding drug safety and reporting categories. During the time of 2006, july to 2007, june , only 40. reporting forms where generated out of which only 6, forms reported the misuse of products containing corticosteroids. The medical professionals and other health related faculty can instructed about the reporting of the adverse evets or drug reactions.[35]
- **Wiley Blackwell et al** commanded a study of increase in knowledge of patients using leaflet which consist of oral treatment with corticosteroids that are used for, effects of corticosteroids, side effects of oral treatment with corticosteroids, skin condition which are treated with corticosteroids, applying corticosteroids, side effects topical corticosteroids . this help to improve the medication adherence to the patient.[36]
- **Jaiswal et.al.** did a study to analyse the proper utilization of corticosteroids in the tertiary care teaching hospital of Bastar district. in Chhattisgarh state at central south India a research concluded the use of corticosteroids were at high stakes but not in regards of drug safety. Some report suggested that some of cases are with regard to the site of application, quantity of the corticosteroids to be dispended and the duration of the treatment.[37]
- **Jairoun A A et. al** conducted a study to evaluate community pharmacist's knowledge, attitude and practice regarding the safety and consumption of topical corticosteroids (TC). A descriptive cross-sectional study was held

among community pharmacists in the UAE. One-two-one interviews were then carried out, and the structured questionnaire used was mainly composed of two sections: demographic and socioeconomic information and the KAP regarding topical corticosteroids. The study demonstrates that there is a deficiency in the pharmacy curriculum at pharmacy training institutes in the UAE. It appears that educational courses on this topic at the UAE universities are lacking, and pharmacists in training should be offered courses regarding the rational consumption of topical corticosteroids.[38]

- **LL Farrugia et. al** conducted a cross-sectional study to evaluate the pharmacists' and general practitioners influence on patients on long term topical corticosteroids. The study was done by analyzing the reports from the patients. A total of 201 completed surveys were collected from dermatological patients and parents of pediatric dermatologic patients. The study concluded that topical corticosteroids adherence was very poor among patients and parents of pediatric patients. The study showed an increased need of educating the general practitioners and pharmacists about the use and counselling points on adherence.[39]
- **Saxon D Smith et. al** conducted a study on Pharmacist's knowledge about use of topical corticosteroids in atopic dermatitis. The study was pre and post interventional study. Australian pharmacists attending a continuing professional development conference were assessed before and after an evidence-based lecture on the use of TCS in pAD. Responses were recorded in real time on electronic keypads. The mean response rate was 86% of the 292 surveyed. Of responders, 64% recognized that treatment non-adherence was a major for failure in pAD. The post-education session assessment demonstrated a major attitude shift compared to the pre- education assessment. After

education, pharmacist would instruct parents/patients to apply TCS until the eczema is clear (27 vs 92% pre and post education, P<0.0001). The proportion that would instrucdt patients to use. TCS sparingly dropped.[40]

- **Wing Man Lau et. al** conducted a sequential mixed method approach (face-to-face semi structured interviews informed the design of a questionnaire). This study examines the relationship between community pharmacists' knowledge, attitudes and counselling behaviours in relation to topical corticosteroids and adjunct therapy in atopic eczema. The study was conducted in United Kingdom and was approved by The University Reading Research Ethical Committee. Stratified random sampling was used to invite pharmacists. 105 pharmacists completed and returned questionnaire. Pharmacists showed gaps in their knowledge on the use of topical corticosteroids in atopic eczema but had good understanding on the use of emollients. There was a significant correlation between pharmacists' attitudes to information provision and their self-reported counselling behaviour for most themes except in relation to corticosteroid safety where less advice was given. Improving attitudes to information provision should correlate with increased counselling behaviour.[41]
- **Abigail Dayang Nathan et al.** In the present study the assessment of community pharmacist counselling practices was done as they are the important part of patient counselling. A random sample of 364 registered CPs was enrolled and online survey was conducted using questionnaires on Knowledge of TCS Use, counselling practices, and perceived barriers to counselling. A majority (>90%) of the CPs mostly explained to the patients that the medication was TCS and the frequency and duration of application but only 10% correctly identified scenarios needing medical referral. Only about

half of the CPs always explained about side effects, strength, efficacy, and storage of TCS. The two main barriers were patients' negative perception of TCS (65.4%) and pharmacists' lack of time for counselling (49.7%). Counselling practice score was associated with CPs' age (aOR 0.86, 95%CI 0.78–0.94), pharmacists' recommendation on TCS use (aOR 0.11, 95%CI 0.02–0.61), and time spent on counselling (aOR 1.42, 95%CI 1.13–1.64). CPs counseling practices to their patient about the use of TCS requires improvement. Continuing education and hands-on training are needed for CPs regarding counseling about TCS use.[42]

2.2 Health Science Student Population Review of Literature

- **Abir Saraswat et al.** carried out prospective study on topical corticosteroid that determined the abuse of the drug.14.8%, of 2926, patient used topical corticosteroids of which acne and its aggravation of existing conditions were common side effects noted. Unwarranted and irrational use of steroid containing fairness cream proves to be the cohort that causes complication as for the abuse of steroid is considered.[43]
- **Arebu et al.** conducted a community-based cross-sectional study that revealed the demanding use of cosmetics in a resident, Eastern Ethiopia. Over 600, subjects were considered in which 93%, of them admitted the recent use of cosmetics which may or may not contain corticosteroid as an ingredient . the prevalence of the side effects were in higher proportion. It might trigger us to be safety concerned relating to the cosmetic abuse.[44]
- **Karalikkattil T et al.** did a cross sectional survey that evaluated knowledge, behaviour as well as attitude of pharmacy students. out of 103, responses collected the awareness of side effects as well as potent drug related problems

where appreciable. But they lacked specific class of the drug to the effect. knowledge regarding drug practices are safe in the pharmacy students practice and can play a lead role in the rational and ethical use of drugs such as corticosteroids in dermatological practice.[45]

- **Salverda et al.** did a study on Cosmetic products that contribute hugely to the occurrence of contact dermatitis. As a response to the "resolution of the Council of Europe", the National Institute for Public Health and the Environment (RIVM) situated Netherlands made a pilot study to report undesirable events/effects related to cosmetic products. As for more investigations are needed to identify the incidence of drug induced cases to the total population at risk. Such as the isothiazolinone-induced allergic contact dermatitis potential risk of copolymers/cross-polymers.[46]
- **Sharma R et al** has did a study regarding topical corticosteroids that have become available as an over the counter drugs and are widely misused for various dermatological condition. The project assessed the clinical and epidemiological aspects of the unjustified use of topical corticosteroids for facial fairness and as cosmetics. most patients prolonged use of topical corticosteroids on facial skin care purposes was recommended by non-professional individuals. The adverse event varied from minor to major. The results of this study estimated the indispensability of dermatology specialists and staffs in diagnosing treating various cutaneous disorders.[47]
- **Parul Verma et al** conducted a study to evaluate Knowledge Attitude and Practice in Medical Graduate (MG) students of a medical university in north India regarding topical corticosteroids use and to sensitize them regarding its misuse. Medical graduates commonly prescribe TCS to patients. However the basic knowledge of TCS use/misuse was not known

to many of them and many of them had prescribed TCS for non-indicated skin conditions. This highlights the importance of TCS awareness during undergraduate training.[48]

- **Berce PC et al**.in the present study topical corticosteroids Pre and Post knowledge gaps among dermatologist clinicians e 50% and 26% respectively in the treatment of atopic dermatitis and non dermatologist clinicians (62 vs. 27%, p=0.036). These beliefs and counselling practices appear modifiable, however, through post-graduate educational interventions. Collaboration of healthcare providers involved in the treatment of AD is important for the dissemination of reliable information to patients.[49]
- **Niral K. Sheth et al.** in this study the level of awareness among patients, pharmacists and general practitioners about commonly available topical steroids and its combinations were assessed using prospective questionnaire-based study seminar were conducted and questionnaires were given as pre post study. . Out of total 44 general practitioners enrolled in the study, 22 (50%) were qualified allopathic medical practitioners and22 (50%) were homeopathic/ayurvedic doctors. Superficial dermatophytosis [19 (43.18%)] was the common dermatosis seen by them. While 29 (65.90%) preferred prescribing topical steroids or its combination, rest of them preferred plain steroid creams. Out of 179 pharmacists, 74 (41.34%) did not have appropriate knowledge of topical steroids, 35 (19.55%) were not aware that steroids are isschedule “H” drugs. Commonest molecule sold over the counter was clobetasol propionate 0.05% by 74 (41.89%). The limitations of our study were small study group and short duration. : As dermatologists, it is our responsibility, to correctly educate the society, particularly the non-

dermatologist medical fraternity, about ethical and rational use of topical steroids .[50]

- **Sarathi..et..al.** prospective observational study was conducted in department of DVL at Rajah Muthiah Medical college, Tamil Nadu during the period of six months from November 2018 to April 2019. The patients were enrolled for the study based on inclusion and exclusion criteria. Totally 50 patients with adverse drug reactions (ADRs) by the abuse of TCs were enrolled for the study. It was found that TCs were abused in all ages and equally in both genders. Nearly 72% of the people used TCs for Tinea infection and 20% of the people used TCs for acne vulgaris. Very high potent TCs such as betamethasone and beclomethasone were abused by 55% of the patient. Tinea incognito (TI) was found as common ADRs by the abuse of TCs (74%). Nearly 88% of the people bought TCs from pharmacies without prescription. Sixteen brands were found as easily accessible and affordable for the patients. Medication adherence were increased by 60% after the patient counselling. This study concludes, TI was found as a common ADR in patients who abused TCs such as betamethasone, beclomethasone and clobetasol. High potent TCs should not be allowed to dispense without prescription. Withdrawal of TCs will reduce the risk of ADRs.[51]

2.3 KAP assessment on Patients

- **Shakya Shrestha et al.** performed a cross-sectional study to analyse the use , adverse effect along with various factors that may affect the drug effect and patterns in patients using corticosteroid in dermatology practice. A participation of 60 subjects in the study among which 33.30%. of the patients reported adverse effects. The study suggested that patient undergoing

corticosteroid treatment must be acquainted with understanding of corticosteroid use ,drug related problems and adverse effects leading to increased positive treatment.[52]

- **Simon M. Müller et al.** Did study an interventional and cross-sectional study that instructs on the concerns about topical corticosteroid (TCC) use in atopic dermatitis patient. Along with unique pre and post visual analogue scale utilizing the patient information an estimate of 643, outpatients afflicted with diverse skin disease were interviewed in which 41.5%. prevalence of TCC use in dermatology patients. Among which 28.3% were non adherent. Patient information and perspective help in lowering fear of topical corticosteroid.[53]
- **Nagesh et al.** a prospective study about patient perspective of topical steroids and various combinations of them to highlight the awareness about steroid abuse. An estimation of 1000, patients were taken in which 80.9 %, of them know about steroids and 61.2%. of them used steroid containing topical creams of which 51.9% of them experienced its side effects such as increased pigmentation and aggravation of the symptoms. Irrational use of steroids gives on to the varying complication of the drug in the society.[54]
- **Shatavisa Mukherjee et al.** conducted a cross sectional observational study to assess the corticosteroid use in the outpatient of dermatology. Out of 328. prescriptions analysed 86%, of the prescriptions where given topical corticosteroids to which high potent topical steroids where prescribed majorly. The intervention of dermatological practice is a necessity to cut down the irrational use of corticosteroids. To avoid polypharmacy and drug related problems prescription must maintain standard and its rationality.[55]
- **Griffiths et al** conducted a study on efficacy of corticosteroid and possible adverse effects. Several factors were analysed such as type and class of

steroids to its effects. Application and frequency are also analysed with the patient factors such as site of disease and age. The factors ,must be considered to obtain improved treatment outcome and reduce adverse effects.[56]

- **Reena Kumari et. al** conducted a prospective, cross-sectional study in ophthalmology OPD at tertiary care hospital to assess knowledge, attitude and practice of ocular topical corticosteroids self-use. A total of 56 patients of both sexes, aged between 18 and 70 years were interviewed with help of a questionnaire. The participants aged between eighteen and seventy years. Out of the 56 participants who were using eye drops, only 18 were using eye drops containing steroids with or without antibiotics or antifungals. The study shows that there is a significant number of patients using self-prescribed steroid eye drops. [57]
- **Rohini Sharma et. al** conducted a study on misuse of topical corticosteroids on facial skin. A total of 200 patients with facial dermatosis and topical corticosteroid mis-application daily over face for not less than 30 days were included in the study. This was a prospective study conducted in a tertiary care dermatology outpatient centre of the Jammu region. A detailed clinical history regarding topical corticosteroid use was taken and adverse effects was analysed. Out of 200 patients, 166 were women and 34 were men. The predominant age was 31-40 years. In most cases the prolonged use of topical corticosteroids on the face was recommended by non-professional persons. The adverse events ranged from transient to permanent. The misuse of TCS is showing an explosive upsurge in our society and increased awareness needs to be spread among people. Moreover stringent policies are required regarding their distribution and prescription.

- **Ibrahim Al-Omair1 et.al** conducted a study on Topical corticosteroids (TCS) are widely prescribed for the treatment of dermatological diseases. Patients concerns and fear regarding the TCS are found to interfere with their compliance toward the treatment, resulting in relapses and poor outcome. The present study aimed to assess the patients' origin and prevalence of TCS phobia, their knowledge about corticosteroids and their compliance toward the treatment. TCS phobia was found widespread among patients with dermatological diseases. Most fears were related to safety issues. These fears were found to affect patient's behaviors, and hence their compliance toward the treatment. Providing public awareness and health education programs addressing the adverse effects of TCS and steps to avoid or decrease their usage could play a pivotal role in reducing TCS phobia.[59]
- **Fawwaz Freih Alshammrie et. al** The use of topical steroids for an extended period of time causes rosacea like dermatitis with varying clinical manifestations. Multiple mechanisms for such reactions have been hypo the sized, including rebound vasodilation and proinflammatory cytokine release. In the current study, the incidence of steroid induced rosacea and other side effects of steroids in the Hail population of the Kingdom of Saudi Arabia will be evaluated. Methods: A descriptive cross sectional study was conducted from January 2022 to April 2022. The study included 399 patients. Among them there were 341 females and 214 from the age group 40-59 years. There were 163 participants responded to the study questionnaire. The frequently mentioned side effect associated with using cortisone was Telangiectasia (13.5%), followed by acne (12.9%) and hypopigmentation (9.2%). The most common symptom associated with the use of cortisone was skin dryness (44.4%), followed by erythema (38.9%), and burning or stinging sensation

(22.2%). Long term use of cortisone (>1 month) was significantly associated with Telangiectasia (p=0.044) in comparison to those who did not know about the side effects of cortisone (p=0.021).Using topical corticosteroids excessively can lead to rosacea like symptoms and various other side effects in people who have never been diagnosed with the condition.[60]

- **Gogula Archana Reddy et al.,** Corticosteroids have become a mainstay of pharmacotherapy in dermatology because of their anti-inflammatory and immunosuppressive properties. However, misuse and sudden cessation of these drugs may render a patient to develop numerous adverse effects (AEs). Adverse drug reactions (ADRs) are important causes of mortality in both hospitalized and ambulatory patients. Early detection, evaluation, and monitoring of ADRs are essential to reduce harm to patients. Therefore, to achieve optimum benefit with the least AEs, safe and effective use of these agents is very crucial. To examine the corticosteroid use pattern, to assess the frequency of misuse and the associated AEs that are encountered in dermatological practice. A prospective observational study was conducted in the dermatology department of a tertiary care teaching hospital, Warangal for a period of six months. All patients using at least one corticosteroid either topically or systemically were included in the study. Informed consent was taken from patients. A total of 151 participants were included in the study. Among them, 56% of females developed ADRs compared with males (44%). Among patients using topical corticosteroids (TCs), the most frequently reported ADRs include facial erythema (7.31%), acne (17.07%), and hyperpigmentation of the face (2.43%). The AEs associated with oral corticosteroids include weight gain (19.51%) and taenia corporis (19.5%). Corticosteroids have extreme importance in dermatological practice. However,

inappropriate and prolonged users render a patient to develop several AEs. Precise drug regimens and proper patient counselling can help in minimizing and managing the AEs associated with inappropriate use.[61]

- **Varshney et al.,** Topical corticosteroids are one of the most widely prescribed class of topical drugs. They have been abused in developing countries as they provide rapid symptomatic relief in inflammatory dermatoses. This study was done to find the risk factors related to topical corticosteroids abuse and consequences thereof. Methods: A hospital- based cross-sectional study was conducted in the dermatology OPD from July 2017 to June 2018. All patients were enquired for topical steroid abuse in the last 3 months and were interviewed via structured proforma. Of 2032 patients abusing steroids, 1365 (67.2%) patients were recorded with adverse effects of topical corticosteroids. The majority (60.78%) were from urban areas. 20.9% were abusing topical steroids for more than 12 months. The most common abused steroid formulation was mixed combination consisting of steroids, anti-fungals and anti-bacterials (47.9%). Fungal infection (59.5%) and acne (15.3%) were the most common indications of steroid abuse. Quacks (31.9%) and pharmacists (26.8%) were the most common prescribers of these topicals. Most common adverse effects of topical corticosteroid abuse were tinea incognito (41.1%), steroid-induced acne/ aggravation of acne vulgaris (18.2%) and telangiectasia (14.1%). As this study was conducted at a tertiary care hospital, it does not accurately reflect the prevailing situation in the community. Conclusion: We found that the most common source of abuse was non-prescription and it was mainly due to easy availability of mixed combinations of steroid containing creams. The adverse effects of topical corticosteroids are related to duration to their use. Hence, they must be used

only for specific indications under a close watch of a qualified medical practitioner.[62]

- **Vatsala Maheshwari et al.,** Topical steroids are most commonly being used today. Mostly these are being misused due to lack of awareness of their adverse effects. Malpractice and easy availability of these agents also responsible for their abuse. To Evaluate Topical Steroid abuse in various parameters according to CDSCO ADR forms. Objectives : This study was conducted to know the extent of abuse of topical steroid ,along with clinical profile and mode of accessibility in dermatology department of a teaching institute of tertiary health care centre of central India. First 200 patients of adverse drug reaction attending dermatology department were screened according to ICSR form of CDSCO in a period of December 2015 to November 2016 and 181 patients of them who gave history of topical steroid application were further analyzed. Most commonly affected people belong to age of 21 to 30 years (41.98%),Tinea incognito (58%) was the commonest manifestation of steroid abuse, Tinea (58%)was the most common indication of steroid application, self medication (46.40%) was most common mode of steroid accessibility, betamethasone (61.87%) was most commonly applied topical steroid. Self medication and over the counter drug use were most common mode of steroid accessibility both can be controlled by making strict health regulatory policies. Simultaneously health education program must be targeted to young population who are more vulnerable to steroid abuse to make them aware regarding harmful effects of unguided or misguided use of topical steroid.[63]

- **Dubey..et..al.,** cutaneous adverse drug reactions (ADRs) affect 2-3% of hospitalized patients. These reactions can arise as a result of immunologic or non- immunologic mechanisms. Extremes of age, female sex, previous history of ADRs and environmental factors are the major risk factors. The severity of the cutaneous ADRs may vary from a mild itching to a life-threatening Stevens-Johnson syndrome (SJS). In general, most are usually mild and respond to topical treatment. Different skin diseases and cutaneous manifestation of systemic diseases should be ruled out before diagnosing a cutaneous ADR. In order to establish the causal relationship between the offending drug and the reaction, causality assessment should be carried out. The Naranjo algorithm is widely used to determine the causality of an ADR. The cessation of the offending agent, along with the use of systemic and topical steroids, antipruritic agents and oral antihistamines may be helpful in the management. Patients with extensive skin involvement should be cared for as burns patients. High risk patients should be counselled regarding the possibility of developing a cutaneous ADR during the course of treatment and the strategies to be followed upon occurrence of a cutaneous ADR. [64,65]

3. MATERIALS AND METHODS

3.1 Study site:

The study was conducted at Community Pharmacies in Belagavi city, KLE University Belagavi and Dermatology department of KLE's Dr. Prabhakar Kore Hospital and MRC & Dr. Prabhakar Kore Charitable Hospital, Nehru Nagar, Belagavi

3.2 Study Population:

- Community Pharmacists
- Health Science Students of KLE University
- Topical Corticosteroids misused outpatients in dermatology department.

3.3 Sample Size

Proportion Allocation Method

Stratified Sampling

95% Confidence interval

12% allowable error, 10% attrition

$$\frac{Z^2 1\text{-}\alpha/2 * SD^2 * 1.1}{(12\% \text{ of SD})2}$$

$$\frac{1.96^2 * 1.1}{(0.12)^2} = 293.4 = 294$$

a) Patient flow = 300 per year

$$= \frac{300}{900} * 294 = 98$$

b) Students = 250 estimated prevalence

$$= \frac{250}{900} * 294 = 82$$

c) Community Pharmacist = 356 total Present in Belagavi City

$$= \frac{356}{900} * 294 = 116$$

3.4 Study Period:

One year six months (July 2021 to December 2022)

3.5 Study design:

This was Prospective randomized controlled study where the participants were randomized into two groups i.e. interventional or study group and control group in health Science students

Prospective**,** Pre-Post Study in Community Pharmacist and patients.

3.6 Study outcomes measures:

Primary outcomes:

- Promoting rational dispensing of topical corticosteroids among community pharmacists.
- Increase the awareness about topical corticosteroids among undergraduate students.
- To improve knowledge, attitude and perception about topical corticosteroids among patients.

3.7 Eligibility Criteria:

Inclusion criteria for community pharmacists

- Registered Community Pharmacist in Belagavi city who were willing to give content to undergo CPE (Continuing Pharmacy Education).

Inclusion criteria for Health Science Student population –

- Health Science Student Population of KLE University with Past history of Topical corticosteroid use as OTC.
- Health Science Students having acne, itching, skin infections, want to know more about topical corticosteroids, obsession with fair skin or skin related issues on face and were willing to give consent.

Inclusion criteria for Patients –

- Patients who are using with topical corticosteroid and were willing to give consent.
- Patients who give history of TCS use on face for more than one month due to any reason.
- Patient of age ≥ 18 years of Age with either sex.

Exclusion criteria –

Exclusion criteria for health science student population

- Health Science Students already using systemic corticosteroids for various conditions like PCOD, IBD etc.

Exclusion criteria for patients

- Patients diagnosed cases of Cushing's syndrome, PCOD.
- Patients on systemic corticosteroids.
- Patient diagnosed with terminally ill (life expectancy < 12 months) co-morbid conditions (stage IV cancer, psychiatry condition).
- Special population like pregnant and lactating women.

3.8 Study procedure:

1. Approval from the ethics committee was obtained before conducting the study. CTRI Registration number CTRI/2022/05/0427773
2. KAP questionnaires were prepared by referring to various primary, secondary, and tertiary sources.
3. Permission was obtained from the British Association of Dermatologists to use their Patient Information Leaflet (Subject Information Leaflet).
4. Questionnaires were self-designed based on the content of the Subject Information Leaflet and also be validated. A pilot study was conducted prior to conduct of the main study where the questionnaire was validated and reliability was found to be good (Cronbach's alpha i.e., $\alpha \geq 0.9$).
5. The validated KAP questionnaires were be used to identify the Knowledge, Attitude and perception of Community pharmacist, Students and Patients.
6. Community pharmacist, Students, Patients were enrolled in the study after obtaining written informed consent.
7. All the relevant information were collected in a specially designed data collection.
8. The Community Pharmacist, Students and patients were assessed for the knowledge, Attitude and Perception level using pre-validated tools.

9. Enrolled Community Pharmacists were screened and administered KAP questionnaires as a pre-test to assess knowledge, attitude, and perception after obtaining informed consent.
10. The Community Pharmacist were requesting to attend presentation and educational intervention by a clinical pharmacist. (Educational intervention includes the additional Information offered by the Clinical Pharmacist about Topical Corticosteroid. The pharmacist were analysed the Knowledge level from the Pre-test conducted by using KAP Questionnaires and were provided the Pharmacist education and counselling on various aspects of Topical Corticosteroids , including potency of topical corticosteroids and its common side effects, need for adherence to drug therapy. The student were provided with the validated SIL (Subject Information Sheet), after one month follow-up were taken using same KAP Questionnaires by electronic means).
11. The enrolled Students were randomly assigned to the two groups viz-intervention group (IG) and the Control group (CG).
12. The Control group were receiving Subject Information Leaflet without Counselling by the Clinical Pharmacist.
13. The intervention group received the Counselling through Webinar and educational intervention by a clinical pharmacist. (Educational intervention includes the additional care offered by the Clinical Pharmacist. The pharmacist will analyse the student drug therapy if any, and will provide the Student education and counselling on various aspects of Topical Corticosteroids, including diseases, drugs and its common side effects, need for adherence to drug therapy, and need and measures for lifestyle modification. The student

were provided with the validated SIL, monthly reminder regarding the drug therapy by electronic means if any)

14. All the enrolled students in both of the groups were be called on follow up, and the responses on the knowledge level, Attitude, and perception about Topical Corticosteroids of the Students were be recorded. (A total of two times KAP Questionnaire will be administered, i.e., baseline, after post responses and 1st month).
15. The enrolled Patients after screening them and obtaining Informed Consent they were administered with KAP questionnaires as pre-test to assess knowledge, Attitude and Perception about Topical Corticosteroids.
16. The Patients received the standard care by the physician and educational intervention by a clinical pharmacist. (Educational intervention includes the additional care offered by the Clinical Pharmacist. The pharmacist will analyse the patient drug therapy, and will provide the patient education and counselling on various aspects of Topical Corticosteroids, including disease, drugs and its common side effects, need for adherence to drug therapy, and need and measures for lifestyle modification. The patient provided with the PIL.
17. All the enrolled patients will be called on follow up, and the responses on the knowledge level, attitude, and the Perception of the patients will be recorded. (A total of two follow-ups, i.e., Pre-Test, Post-Test , 1st month follow-up.
18. All the responses were checked and validated for the complete and relevant information during the data collection. Incomplete responses will be excluded from the study.

3.9 Data Analysis: Analysis of data will be done by using appropriate statistical tests. The descriptive statistic will be used to express the demographic as a percentage, and frequency, by using Microsoft Excel and SPSS (Version 22.00). The score of knowledge, attitude and practice or perception will be expressed as mean ± SD. The Anova, Dependent T test were used to assess the impact of educating community pharmacist, Students and Patients on the knowledge level ,attitude and perception.

3.9.1 CHI-SQUARE TEST

The chi-square test (χ^2) is another workhorse in statistics, designed for analysing categorical data. It helps assess whether the observed distribution of data differs from what we expected, potentially revealing relationships between variables.

Significance**:**

Similar to the t-test, the chi-square value indicates the discrepancy between observed and expected frequencies. A higher chi-square value suggests a larger difference. But, to determine statistical significance, we compare the chi-square statistic to a critical value from a chi-square distribution table. This critical value depends on the chosen significance level (often 0.05) and the degrees of freedom (calculated based on the number of categories and any constraints on the data).

3.9.2 Z TEST

The z-value, unlike the t-value, doesn't directly involve hypothesis testing but plays a crucial role in understanding how individual data points deviate from the average within a normally distributed dataset.

Significance**:**

The z-score tells you how many standard deviations a particular data point falls above or below the mean.

- A z-score of 0 indicates the data point is exactly at the population mean.
- Positive z-scores (e.g., +1, +2.5) signify values greater than the mean by the corresponding number of standard deviations.
- Negative z-scores (e.g., -1.8, -3) represent values less than the mean by the corresponding standard deviations.

3.9.3 MANN WHITNEY U TEST

The Mann-Whitney U test, also known as the Wilcoxon rank-sum test, is a non-parametric test used to compare the medians of two independent groups. It doesn't rely on assumptions about the data following a specific distribution (like normal distribution).

Significance:

The Mann-Whitney U statistic itself doesn't directly tell you about significance. Here's how to assess significance:

- Look-up Tables: You can find pre-calculated critical values in tables based on your sample sizes (n1 and n2). If the absolute value of U (smaller value from calculations) is less than the critical value at your chosen significance level (usually 0.05), you can reject the null hypothesis (no difference in medians) and conclude a statistically significant difference between the medians of the two groups.

- p-value: Statistical software can calculate the exact p-value associated with the observed U. A low p-value (typically less than 0.05) indicates a statistically significant difference in medians.

3.9.4 WILCOXON PAIRED TEST

The Wilcoxon signed-rank test, unlike the previous tests you mentioned, is a non-parametric test used for comparing two paired sets of data. It doesn't rely on assumptions about the data following a specific distribution (like normal distribution).

Significance:

The Wilcoxon signed-rank test uses these summed ranks to determine if there's a statistically significant difference between the two paired samples. There are two main approaches:

- Look-up Tables: You can find pre-calculated critical values in tables based on sample size. If the absolute value of the difference between the positive and negative rank sums is greater than the critical value, you can reject the null hypothesis (no difference) and conclude significance.
- Calculation of p-value: Statistical software can calculate the exact p-value associated with the observed rank sums. A low p-value (typically less than 0.05) indicates a statistically significant difference.

2.9.5 T TEST

There are two main types of t-tests used to compare the means of two groups: dependent and independent. They differ based on how the data is collected.

Dependent Samples t-test (paired t-test)

This is used when you have paired data, meaning the same subjects or units are measured before and after a treatment, or on two different conditions.

Significance:

- Similar to other t-tests, the t-statistic is compared to a critical value from a t-distribution table based on the chosen significance level (usually 0.05) and degrees of freedom (n-1).
- A high absolute value of t with a low p-value (associated with the t-distribution) indicates a statistically significant difference between the means of the paired data.

Independent Samples t-test

This is used when you have independent data, meaning the two groups being compared are completely separate, with no connection between the subjects or units in each group.

There are two variations of the independent samples t-test formula depending on whether the variances of the two groups are assumed to be equal (homoscedasticity) or unequal (heteroscedasticity).

Significance:

- Similar to the dependent t-test, the calculated t-value (either from the formula for equal variances or Welch's t-test for unequal variances) is compared to a critical value from a t-distribution table based on the chosen significance level and appropriate degrees of freedom (calculated based on the sample sizes).

- A high absolute value of t with a low p-value indicates a statistically significant difference between the means of the two independent groups.

3.8.6 ONE WAY ANOVA

One-way ANOVA (analysis of variance) is a statistical test used to compare the means of **more than two groups** and assess whether there's a statistically significant difference between them.

Significance:

The key test statistic in one-way ANOVA is the **F-ratio**:

F = MSB / MSE

- This ratio compares the variance between groups (MSB) to the variance within groups (MSE). A higher F-ratio suggests a greater influence of group membership on the variable compared to the variation within each group.

- To assess significance, the calculated F-ratio is compared to a critical value obtained from an F-distribution table. This critical value depends on the chosen significance level (usually 0.05), the number of groups (k), and the degrees of freedom associated with the mean squares (k-1 for MSB and N-k for MSE).

- If the F-ratio is greater than the critical value, you reject the null hypothesis (which states there's no difference between the group means) and conclude that there's a statistically significant difference between at least two of the group means.

Important Note:

- One-way ANOVA helps identify a significant difference among the means, but it doesn't pinpoint which specific groups differ from each other. Further tests (like post-hoc tests) might be needed to determine which group means are statistically different from each other.

3.10 Study Materials:

- Community Pharmacist information sheet and informed consent form
- Student information sheet and Student Informed consent form
- Patient information sheet and informed consent form
- Data collection forms
- Subject information leaflet
- Pre-validated questionnaire for Knowledge Attitude Perception.

3.11 Methodology Flow charts

Figure 4: Schematic Diagram of Methodology for Dermatology Community Pharmacist

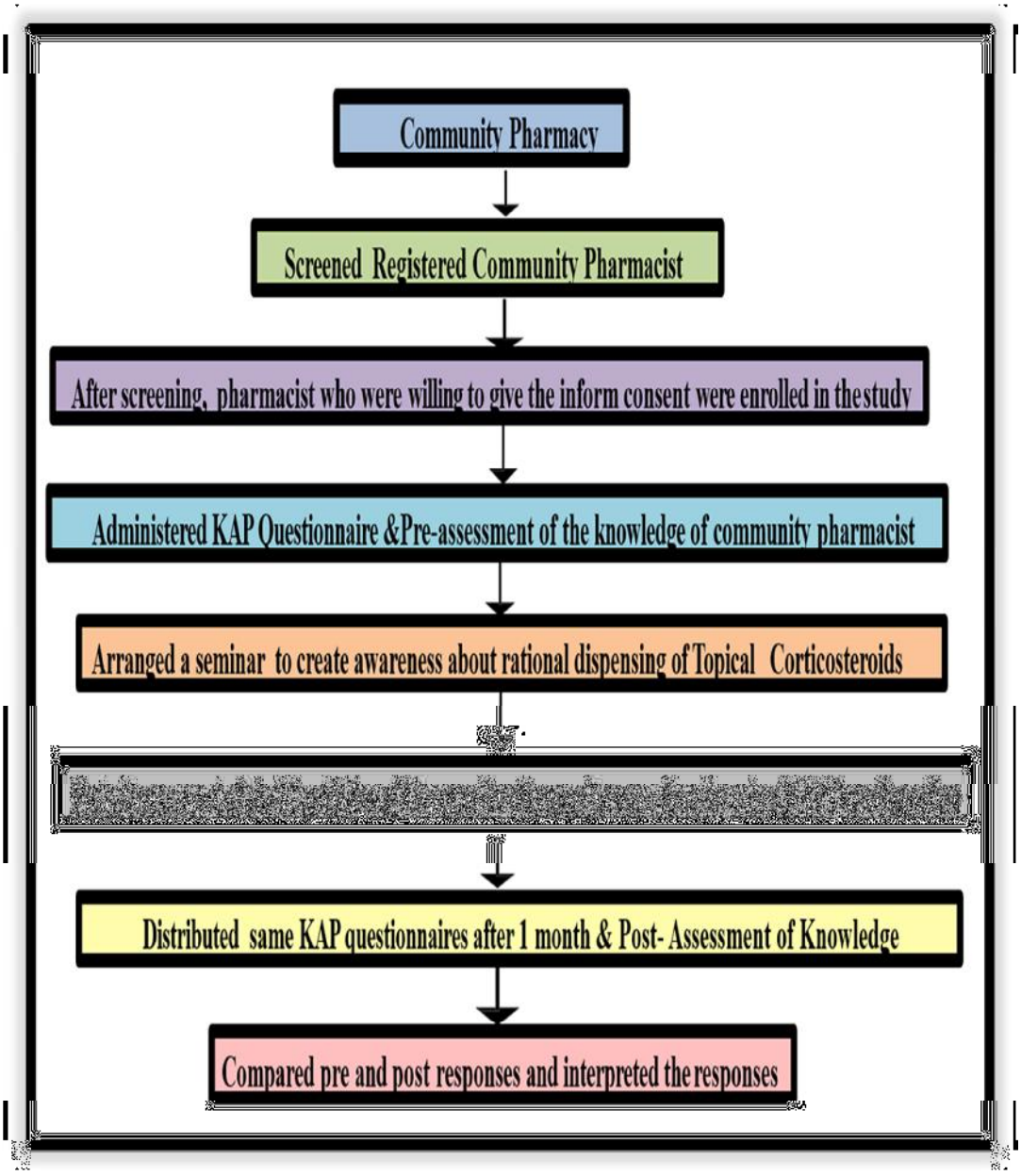


Figure 5 : Schematic Diagram of Methodology for Health Science Students.

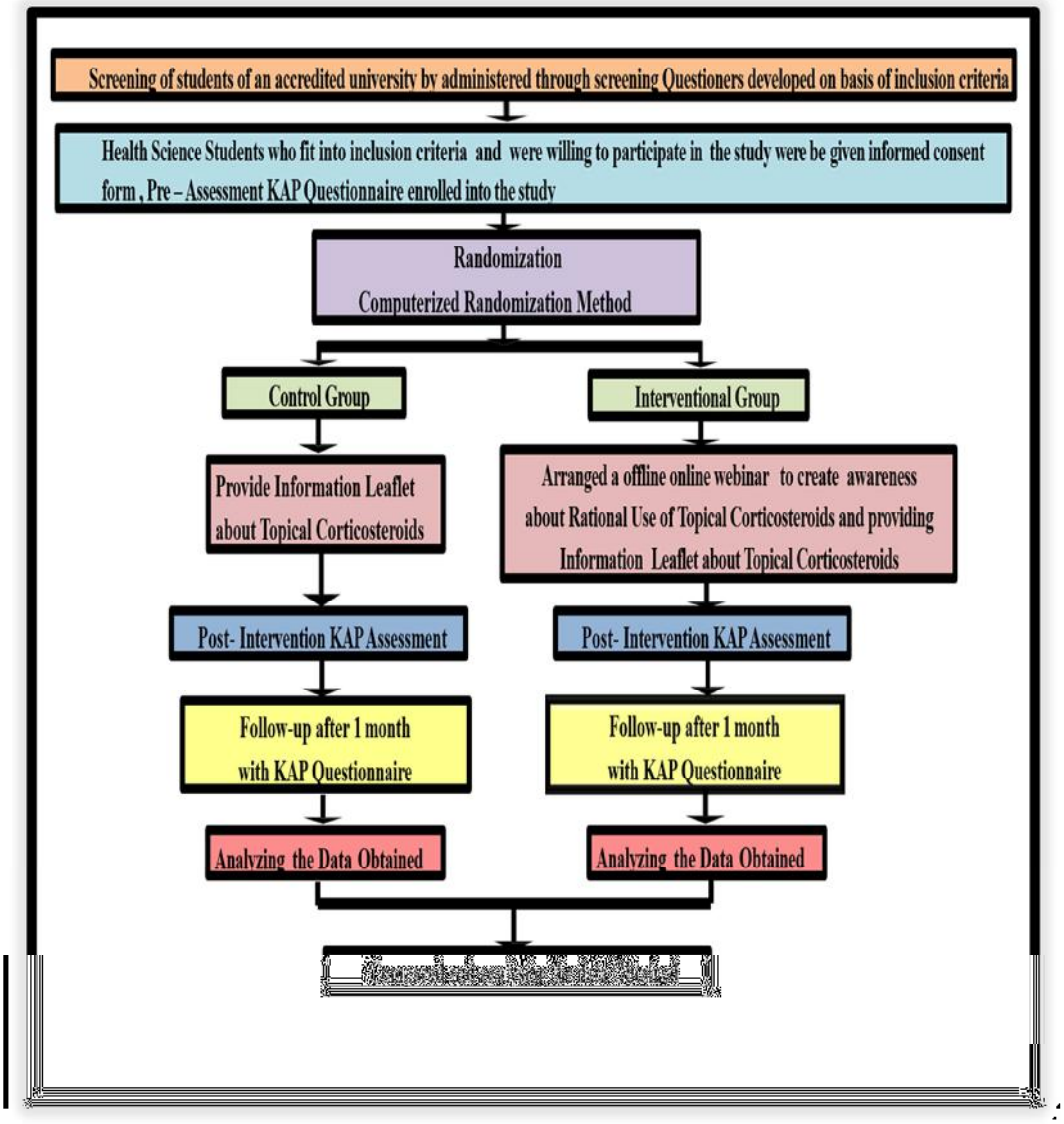
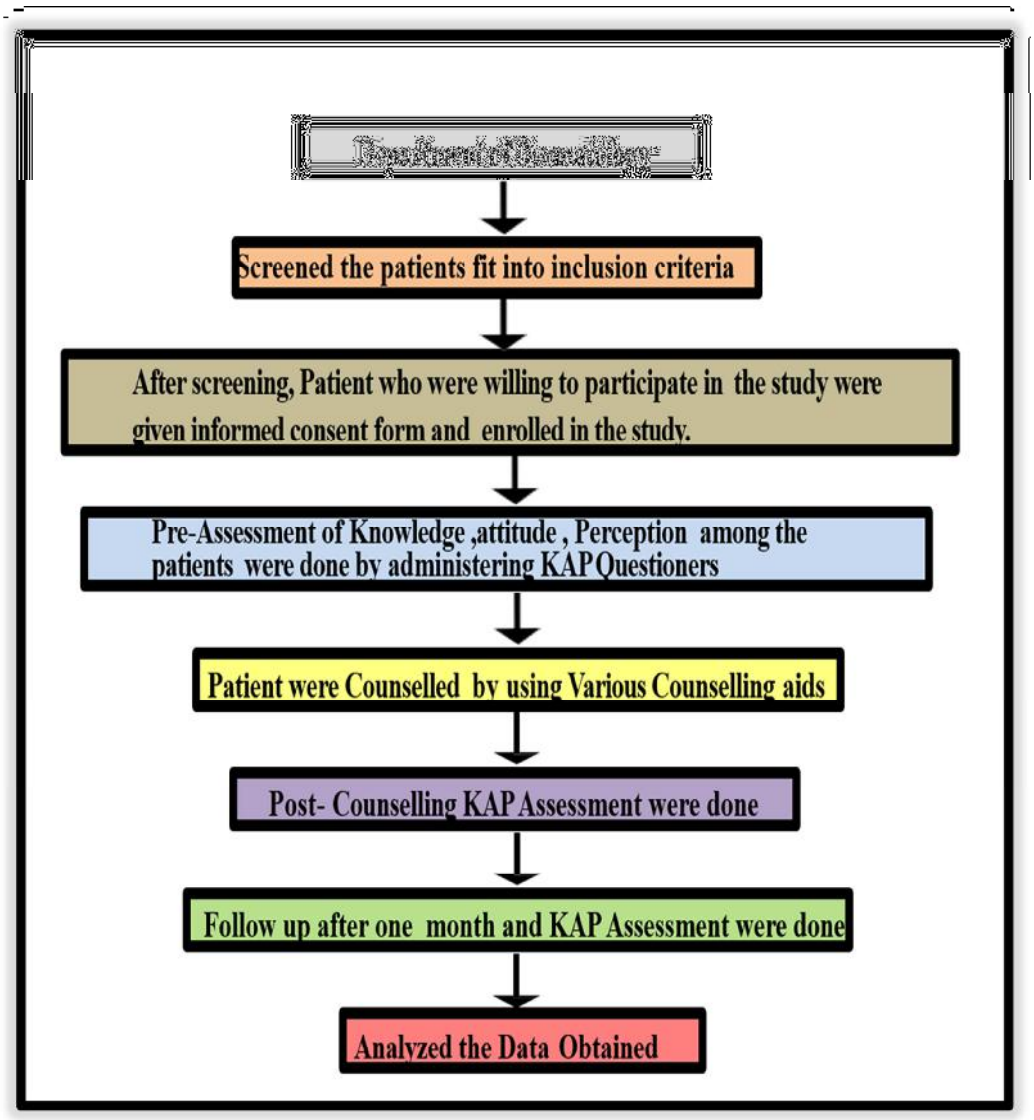


Figure 6 : Schematic Diagram of Methodology for Dermatology Patients.



4. RESULTS

4.1 Community Pharmacists Results

The study included 208 respondents with a mean age of 36.84 years (SD 10.94). Age distribution was as follows: 21-30 years (34.6%), 31-40 years (27.4%), 41-50 years (27.4%), and 51 years and older (10.6%). The gender breakdown was 81% male and 19% female. Regarding qualifications, 77.9% held a D Pharma, 15.9% a Pharma B, and 6.3% had other qualifications. Experience levels varied, with 38.0% having 1 year or less, 17.8% with 2-5 years, 17.3% with 6-10 years, 19.2% with 11-15 years, 7.7% with 16-20 years. The mean professional experience was 12.95 years (SD 10.29).

4. 1. 1 Table: 2 Demographic profile of pharmacists enrolled in the training program for this study.

Demographic profile	No of respondents	% of respondents
Age groups		
21-30yrs	72	34.6
31-40yrs	57	27.4
41-50yrs	57	27.4
>=51yrs	22	10.6
Mean	36.84	
SD	10.94	
Gender		
Male	169	81
Female	39	19
Qualifications		
D Pharma	162	77.9
B Pharma	33	15.9
Others	13	6.3
Experience		
<=1yr	79	38.0
2-5yrs	37	17.8
6-10yrs	36	17.3
11-15yrs	40	19.2
16-20yrs	16	7.7
Mean	12.95	
SD	10.29	
Total	208	100.00

4. 1. 2 The community pharmacist awareness program on topical corticosteroids was conducted according to the predetermined methodology

On the occasion of world pharmacist day KLE College of Pharmacy, KAHER (KLE Academy of Higher Education and Research) Belagavi in association with IPA local branch Belagavi and under auspices of District Drug Control department Belagavi celebrated world pharmacist day on 26th September 2022 at KLE Centenary convention centre, Dr.H.B. Rajshekhar Hall. Over a population of 500 students and 220 community pharmacists have attended this celebration.

Mr. Deepak Gaikwad, Deputy Drugs Controller presided over the function as the chief guest and highlighted on the role of pharmacist in community service. Prof. (Dr.) Sunil S. Jalalpure, Principal, KLE College of Pharmacy, Belagavi addressed the gathering and expressed the service rendered by the pharmacists . Prof. (Dr.) M.S. Ganachari, Registrar, KAHER, Belagavi highlighted on the overview of world pharmacist's day program. Assistant Drugs Controllers Mr. Mallikarjun K. S, Mr. Ajay Mudagal, Mr. K. Manohar, Mr. Raghu Ram, Drugs Inspector Mr. Renu Prasad presided over the function. Dr. Sowmya Spoorthi. M being a research scholar as part of my research work presented a presentation on misuse of topical corticosteroids with entitled topic "Awareness on Topical corticosteroids misuse" . Invited all the community pharmacists enrolled in my study who answered pre-test questionnaire and after continuous education program post-test questionnaire was given.

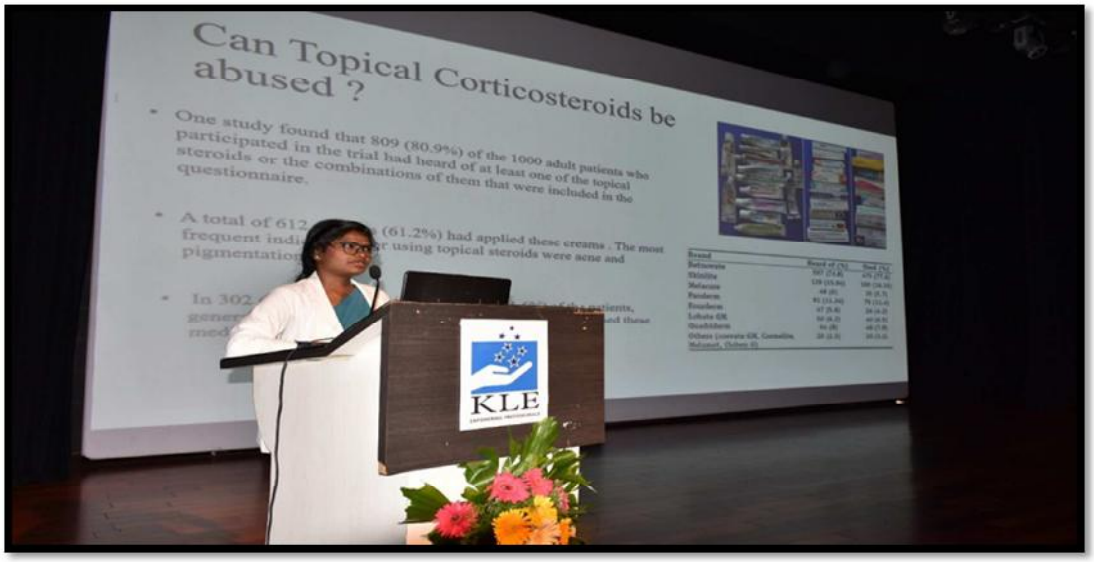
4.1.2.2 Figure : 7 Invitation for Community Pharmacist

4.1.2.3 Figure 8 : Inauguration of world pharmacist day program by Mr. Deepak Gaikwad DDC, Belagavi

Inauguration of world pharmacist day program by Mr. Deepak Gaikwad DDC, Belagavi District, Dr. Anil Korabu District TB Officer, Dr. Sunil S Jalalpure, Principal KLE College of Pharmacy, Dr. M. S. Ganachari Registrar KAHER and Assistant Drugs Controllers Mr. Mallikarjun K. S, Mr. Ajay Mudagal, Mr. K. Manohar, Mr. Raghu Ram, Drugs Inspector Mr. Renu Prasad.

4.1.2.4 Figure 9 : Prof. (Dr.) M.S. Ganachari, HOD Dept of Pharmacy practice, Registrar, KAHER, Belagavi highlighted on the overview of world pharmacist's day program.

4.1.2.5 Figure 10 : Prof. (Dr.) Sunil S. Jalalpure, Principal, KLE College of Pharmacy, Belagavi addressed the gathering and expressed the service rendered by the pharmacists.



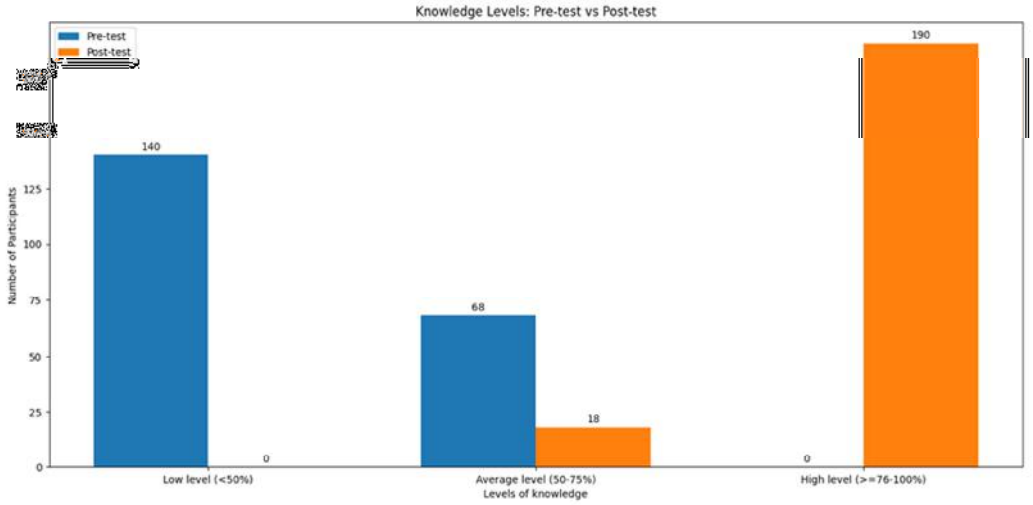
4.1.2.6 Figure 11 : Dr. Sowmya Spoorthi. M, Research scholar delivered talk on misusage of topical corticosteroids with entitled topic "Awareness on Topical corticosteroids misuse".

4.1.2.7 Figure 12 : Newspaper article extract

4.1.3 Table 3 : Comparison Of Pre-Test And Post-Test Levels Of Knowledge After Intervention

Levels of knowledge	Pre-test		Post-test	
	No	%	No	%
Low level (<50%)	140	67.30	0	0.00
Average level (50-75%)	68	32.70	18	8.65
High level (>=76-100%)	0	0.00	190	91.34
Total	208	100.00	208	100.00
Wilcoxon matched pairs test, Z=8.9372, p<0.001, HS				

Figure 13 : Comparison Of Pre-Test And Post-Test Levels Of Knowledge After Intervention

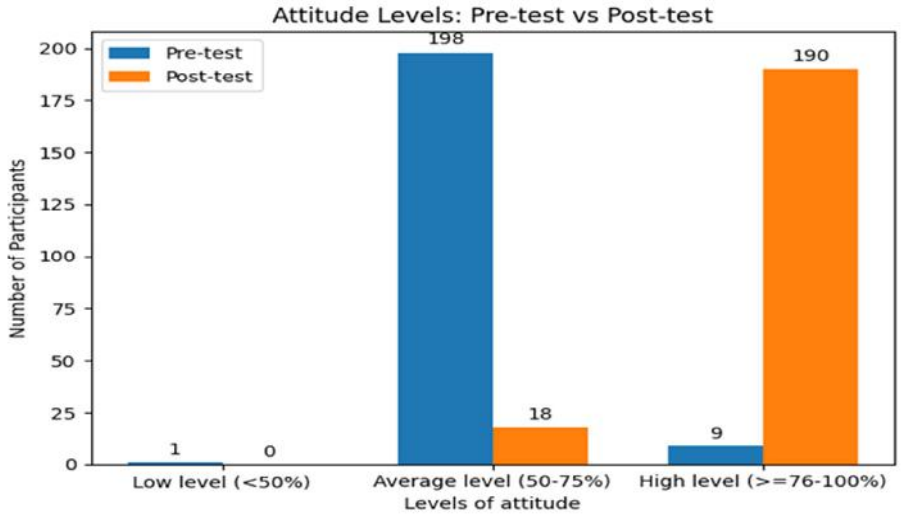


Before the intervention, 67.3% of participants had low knowledge levels (<50%), 32.7% had average knowledge levels (50-75%), and none had high knowledge levels (≥76%). After the intervention, 91.34% achieved high knowledge levels, 8.65% had average knowledge levels, and none remained at low levels. The Wilcoxon matched pairs test indicated a significant.

4.1.4 Table 4 : Comparison Of Pre-Test And Post-Test Levels Of Attitude After Intervention

Levels of attitude	Pre-test		Post-test	
	No	%	No	%
Low level (<50%)	1	0.48	0	0.00
Average level (50-75%)	198	95.19	18	8.65
High level (>=76-100%)	9	4.32	190	91.34
Total	208	100.00	208	100.00
Wilcoxon matched pairs test, Z=8.4630, p<0.001, HS				

Figure 14 : Comparison Of Pre-Test And Post-Test Levels Of Attitude After Intervention

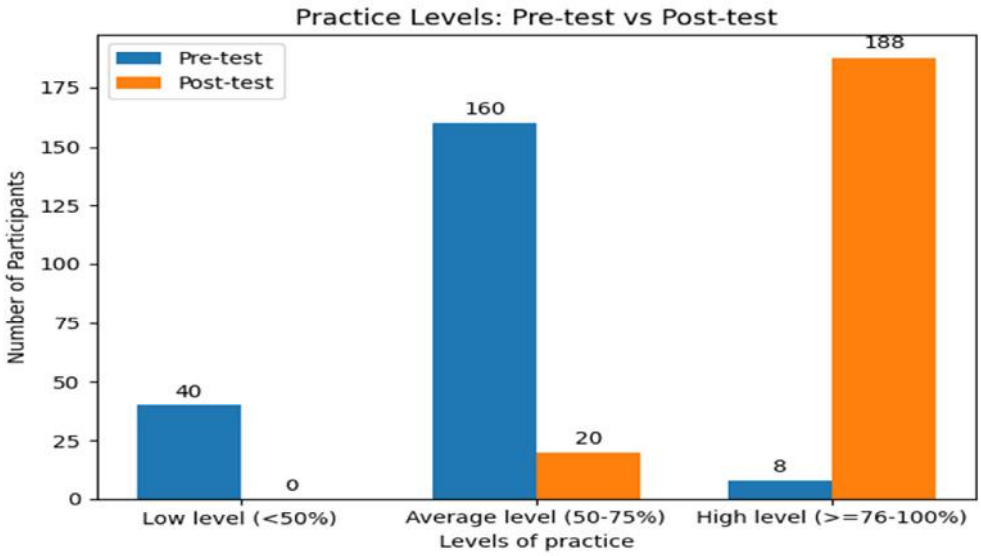


Before the intervention, 0.48% of participants had low attitude levels (<50%), 95.19% had average levels (50-75%), and 4.32% had high levels (≥76%). After the intervention, 91.34% achieved high attitude levels, 8.65% had average levels, and none had low levels. The Wilcoxon matched pairs test showed a significant improvement (Z=8.4630, p<0.001, highly significant).

4.1.5 Table 5 : Comparison Of Pre-Test And Post-Test Levels Of Practice After Intervention

Levels of practice	Pre-test		Post-test	
	No	%	No	%
Low level (<50%)	40	19.23	0	0.00
Average level (50-75%)	160	76.92	20	9.61
High level (>=76-100%)	08	3.84	188	90.38
Total	208	100.00	208	100.00
Wilcoxon matched pairs test, Z=8.1008, p<0.001, HS				

Figure 15 : Comparison Of Pre-Test And Post-Test Levels Of Practice After Intervention

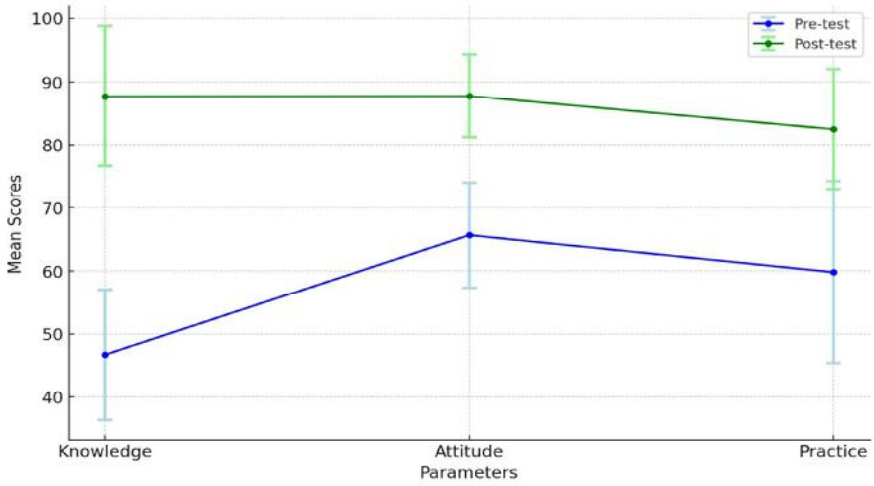


Before the intervention, 19.23% of participants had low practice levels (<50%), 76.92% had average levels (50-75%), and 3.84% had high levels (≥76%). After the intervention, 90.38% achieved high practice levels, 9.61% had average levels, and none remained at low levels. The Wilcoxon matched pairs test indicated a significant improvement (Z=8.1008, p<0.001, highly significant).

4.1.6 Table 6: Comparison of Mean Pretest and Post-Test Scores Of Knowledge, Attitude And Practice by Independent T Test after intervention

Parameters	Time points	Mean	SD	Mean Diff.	SD Diff.	t-value	P-value
Knowledge	Pre-test	46.70	10.33				
	Post-test	87.74	11.03	-41.04	14.90	-29.6713	<0.001, HS
Attitude	Pre-test	65.70	8.38				
	Post-test	87.79	6.56	-22.09	8.26	-28.7882	<0.001, HS
Practice	Pre-test	59.83	14.45				
	Post-test	82.50	9.50	-22.67	14.41	-16.9487	<0.001, HS

Figure 16 : Comparison Of Mean Pretest, Post-Test And Follow Up Scores Of Knowledge, Attitude And Practice By Independent T Test

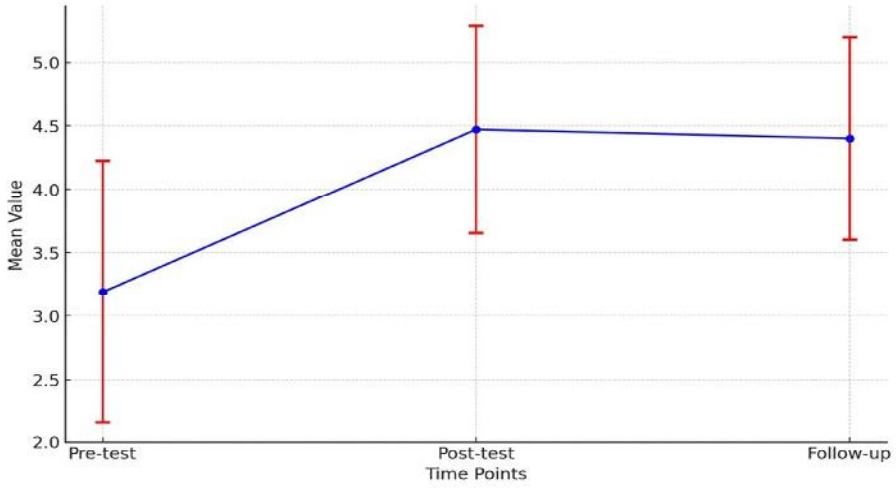


The mean pre-test scores for knowledge, attitude, and practice were 46.70 (SD = 10.33), 65.70 (SD = 8.38), and 59.83 (SD = 14.45), respectively. Post-test mean scores increased to 87.74 (SD = 11.03) for knowledge, 87.79 (SD = 6.56) for attitude, and 82.50 (SD = 9.50) for practice. The improvements were significant, with mean differences of -41.04 (SD = 14.90, t = -29.6713, $p < 0.001$) for knowledge, -22.09 (SD = 8.26, t = -28.7882, $p < 0.001$) for attitude, and -22.67 (SD = 14.41, t = -16.9487, $p < 0.001$) for practice.

4.1.7 Table 7 : Comparison Of Pre-Test, Post-Test And Follow-Up Knowledge Scores By Dependent T Test

Time points	Mean	SD	Mean Diff.	SD Diff.	t-value	P-value
Pre-test	3.19	1.035	-1.284	1.263	-14.657	<0.001, HS
Post-test	4.47	.816				
Pre-test	3.19	1.035	-1.280	1.248	-14.837	<0.001, HS
Follow-up	4.40	.798				

Figure 17 : Comparison Of Mean , Values With Standard Deviation At Pre-Test, Post-Test And Follow-Up Knowledge Scores

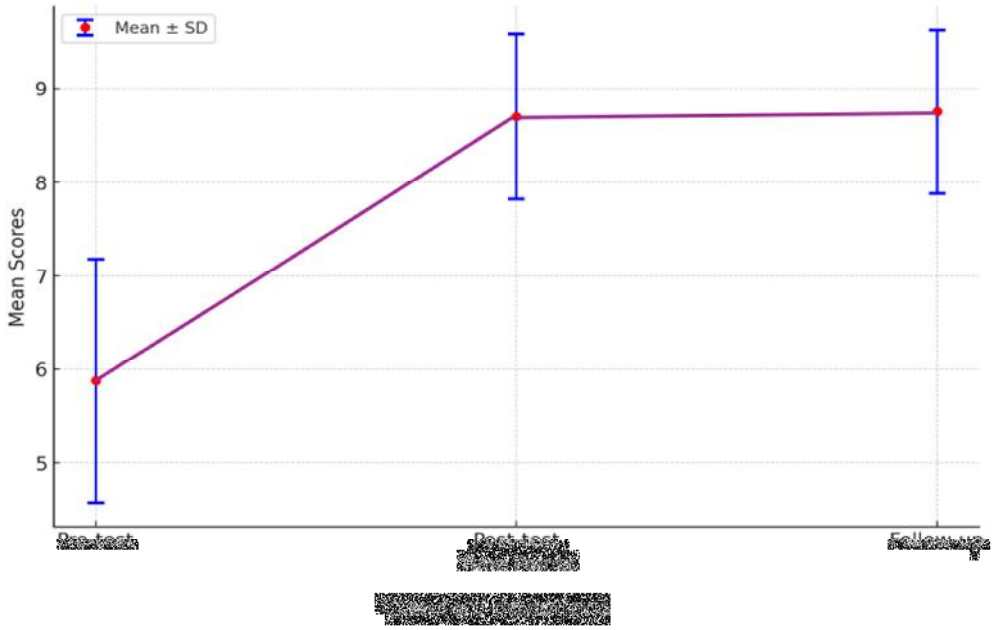


The mean pre-test score was 3.19 (SD = 1.035), which improved to a post-test mean score of 4.47 (SD = 0.816). The mean difference was -1.284 (SD = 1.263), with a t-value of -14.657, indicating a highly significant improvement ($p < 0.001$). Additionally, another pre-test comparison showed a mean difference of -1.280 (SD = 1.248) with a t-value of -14.837, also highly significant ($p < 0.001$).

4.1.8 Table 8: Comparison Of Pre-Test, Post-Test, And Follow-Up Attitude Scores By Dependent T Test

Time points	Mean	SD	Mean Diff.	SD Diff.	t-value	P-value
Pre-test	5.88	1.306	-2.861	1.433	-28.794	<0.001, HS
Post-test	8.70	.878				
Pre-test	5.88	1.306	-2.860	1.453	-28.396	<0.001, HS
Follow-up	8.75	.872				

Figure 18 : Comparison Of Mean , Values With Standard Deviation At Pre-Test, Post-Test And Follow-Up Attitude Scores

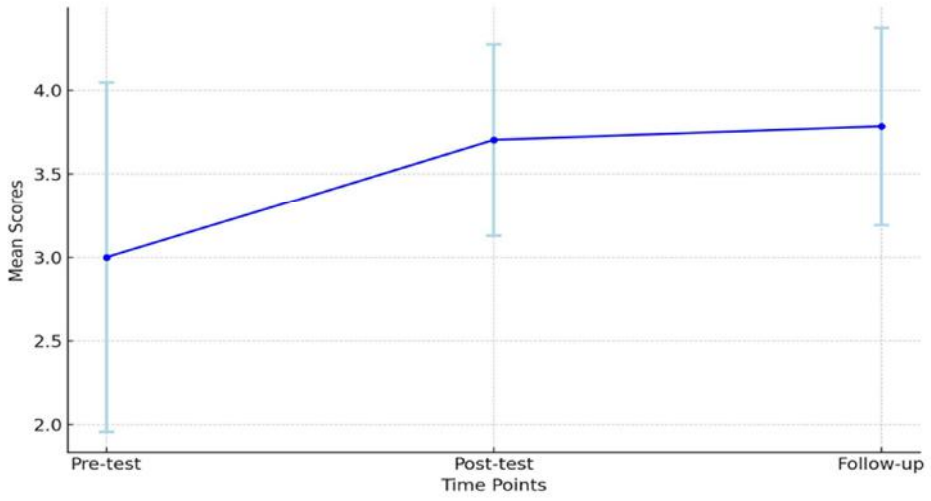


The mean pre-test score was 5.88 (SD = 1.306), which increased to a post-test mean score of 8.70 (SD = 0.878), with a mean difference of -2.861 (SD = 1.433) and a t-value of -28.794, showing a highly significant improvement ($p < 0.001$). Additionally, comparing the pre-test to the follow-up, the mean difference was -2.860 (SD = 1.453) with a t-value of -28.396, also indicating a highly significant improvement ($p < 0.001$).

4.1.9 Table 9: Comparison Of Pre-Test, Post-Test, And Follow-Up Practice Scores By Dependent T Test

Time points	Mean	SD	Mean Diff.	SD Diff.	t-value	P-value
Pre-test	3.00	1.045	-.779	.983	-11.433	<0.001, HS
Post-test	3.70	.572				
Pre-test	3.00	1.045	-.780	.978	-11.490	<0.001, HS
Follow-up	3.78	.589				

Figure 19 : Comparison Of Mean , Values With Standard Deviation At Pre-Test, Post-Test And Follow-Up Practice Scores



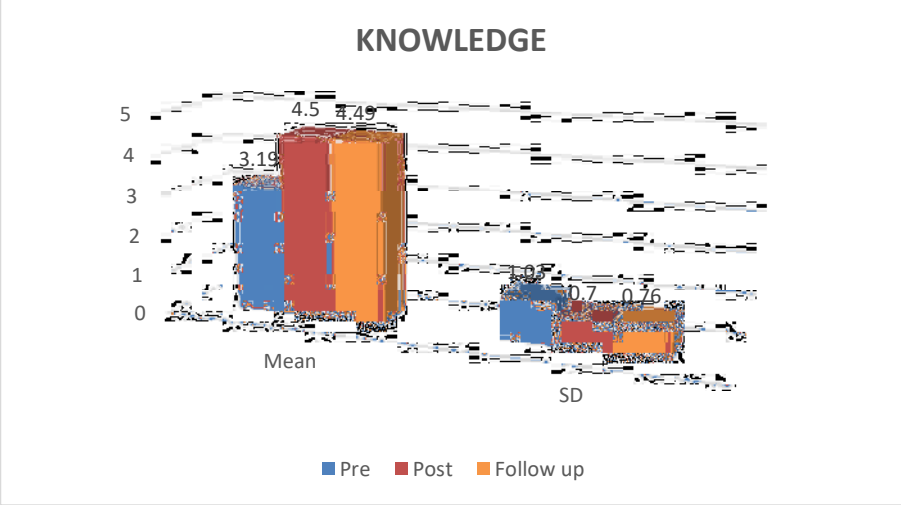
The mean pre-test score was 3.00 (SD = 1.045), which increased to 3.70 (SD = 0.572) in the post-test, with a mean difference of -0.779 (SD = 0.983) and a t-value of -11.433, indicating a highly significant improvement ($p < 0.001$). Comparing the pre-test to the follow-up, the mean difference was -0.780 (SD = 0.978) with a t-value of -11.490, also showing a highly significant improvement ($p < 0.001$).

Repeated measures of ANOVA test for KNOWLEDGE

4.1.10 Table 10 : Descriptive Statistics Of Repeated Measured Of ANOVA Test For Knowledge

Time	Mean	SD
Pre	3.19	1.03
Post	4.50	0.70
Follow up	4.49	0.76

Figure 20 : Mean And Standard Deviation For The Repeated Measures On Knowledge Score Scale



The above table shows the mean and standard deviation for the repeated measures on Knowledge score scale. The mean time for participants in the pre-intervention phase was 3.19 (SD = 1.03), which increased to 4.50 (SD = 0.70) post-intervention. This effect was maintained during the follow-up period, with a mean time of 4.49 (SD = 0.76).

4.1.10.1 Table 11: Multivariant Tests for Knowledge Variable

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	p-value	Partial Eta Squared
Knowledge	Pillai's Trace	.567	134.888	2.000	206.000	.001	.567
	Wilks' Lambda	.433	134.888	2.000	206.000	.001	.567

A repeated measures ANOVA determined that mean for Knowledge statistically significantly between time points (F = 134.888, P < 0.001). Post hoc tests using the Bonferroni correction revealed changes from pre to follow up time period (3.19 ± 1.03 vs 4.49 ± 0.76, respectively), which was statistically significant (p = 0.001). Therefore, we can conclude that a higher statistically significant improvement in Knowledge as compared to pre stage. The multivariate test for knowledge showed significant effects (Pillai's Trace = .567, F(2, 206) = 134.888, p = .001; Wilks' Lambda = .433, F(2, 206) = 134.888, p = .001).

4.1.10.2 Table 12 : Mauchly's Test Of Sphericity For Knowledge Variable

Mauchly's Test of Sphericity							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Knowledge	.146	396.301	2	.000	.539	.540	.500

We follow Mauchly's test for the sphericity assumption. As a rule of thumb, sphericity is assumed if p-value > 0.05. For our data, p-value = 0.001 so sphericity is not met so we use other parameters for further results

4.1.10.3 Table 13: Tests of Within-Subjects Effects For Knowledge Variable

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Knowledge	Sphericity Assumed	237.167	2	118.583	243.640	.000	.541
	Greenhouse-Geisser	237.167	1.079	219.847	243.640	.000	.541
	Huynh-Feldt	237.167	1.080	219.608	243.640	.000	.541
	Lower-bound	237.167	1.000	237.167	243.640	.000	.541

From this table we are able to discover the F value for the Knowledge, its associated significance level and effect size ("Partial Eta Squared"). We can report that when using an ANOVA with repeated measures with a Sphericity not assumed, the mean scores for score were statistically significantly different as F-values were significant with p-value < 0.05.

A repeated measures ANOVA with a Greenhouse-Geisser determined that mean value is differed statistically significantly between time points as F-values were significant with p-value < 0.05 in the group. Post hoc tests using the Bonferroni correction revealed an improvement in scores from pre stage to follow up stage which was statistically significant (p < 0.05)

4.1.10.4 Table 14: Tests Of Between-Subjects Effects Of Knowledge Variable Differences Among Pre-Test , Post-Test And Follow-Up.

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	10282.194	1	10282.194	8863.243	.000	.977
Error	240.139	207	1.160			

Tests of Between-Subjects Effects shows the significant difference among the three time frames as the p-value is less than 5% level.

4.1.10.5 Table 15: ANOVA Post Hoc Pairwise Comparisons test for pre-test , post-test and follow-up scores

Pairwise Comparisons						
(I) Knowledge	(J) Knowledge	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Pre	Post	-1.317*	.081	.000	-1.512	-1.122
	Follow up	-1.298*	.085	.000	-1.502	-1.094
Post	Pre	1.317*	.081	.000	1.122	1.512
	Follow up	.019	.019	.955	-.027	.066
Follow up	Pre	1.298*	.085	.000	1.094	1.502
	Post	-.019	.019	.955	-.066	.027

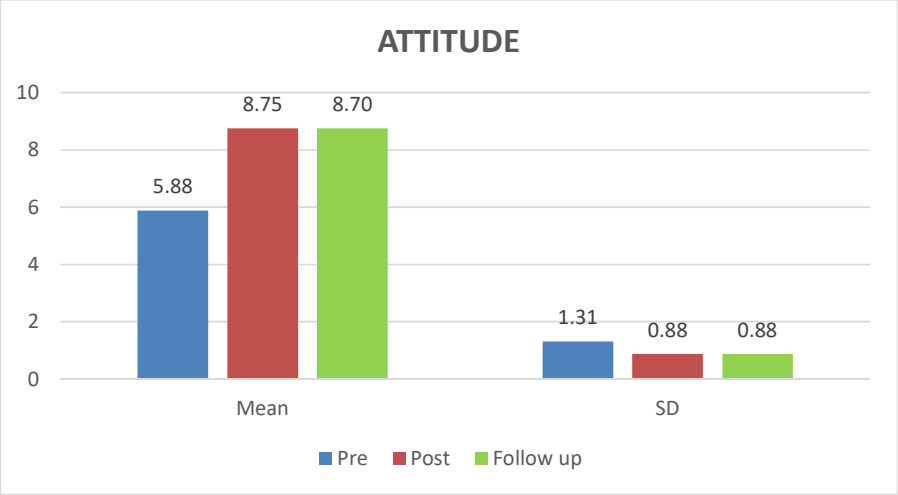
Based on the repeated measures of ANOVA Post Hoc Pairwise Comparisons test as well as the within subject test results, it is concluded that there is significant difference among the time frames from pre to follow up as p-values are significant at 5% level.

4.1.11 Repeated measures of ANOVA test for ATTITUDE

Table 16 : Descriptive Statistics For Attitude Variable

Time	Mean	SD
Pre	5.88	1.31
Post	8.75	0.88
Follow up	8.70	0.88

Figure 21 : Mean And Standard Deviation For The Repeated Measures On Attitude Score Scale



The above table shows the mean and standard deviation for the repeated measures on attitude score scale

4.1.11.1 Table 17: Multivariate Tests For Attitude Scores

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Attitude	Pillai's Trace	.800	829.080	1.000	207.000	.000	.800
	Wilks' Lambda	.200	829.080	1.000	207.000	.000	.800

A repeated measures ANOVA determined that mean for Attitude statistically significantly between time points (F = 829.080, P < 0.001). Post hoc tests using the Bonferroni correction revealed changes from pre to follow up time period (5.88 ± 1.31 vs 8.75 ± 0.88, respectively), which was statistically significant (p = 0.001). Therefore, we can conclude that a higher statistically significant improvement in Attitude as compared to pre stage.

4.1.11.2 Table 18 : Mauchly's Test of Sphericity for Attitude Variable.

Mauchly's Test of Sphericity							
Measure: Time							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Attitude	.000	.	2	0.001	.500	.500	.500

We follow Mauchly's test for the sphericity assumption. As a rule of thumb, sphericity is assumed if p-value > 0.05. For our data, p-value = 0.001 so sphericity is not met so we use other parameters for further results

4.1.11.3 Table 19 : Tests Of Within-Subjects Effects Within Pre-Test , Post-Test And Follow-Up Attitude Scores

Tests of Within-Subjects Effects							
Measure: Time							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Attitude	Sphericity Assumed	1134.696	2	567.348	829.080	.000	.800
	Greenhouse-Geisser	1134.696	1.000	1134.696	829.080	.000	.800

From this table we are able to discover the F value for the Attitude, its associated significance level and effect size ("Partial Eta Squared"). We can report that when using an ANOVA with repeated measures with a Sphericity not assumed, the mean scores for score were statistically significantly different as F-values were significant with p-value < 0.05.

A repeated measures ANOVA with a Greenhouse-Geisser determined that mean value is differed statistically significantly between time points as F-values were significant with p-value < 0.05 in the group. Post hoc tests using the Bonferroni correction revealed an improvement in scores from pre stage to follow up stage which was statistically significant (p < 0.05)

4.1.11.4 Table 20 : Tests Of Between-Subjects Effects Of Attitude Variable

Differences Among Pre-Test , Post-Test And Follow-Up

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	37883.083	1	37883.083	20163.184	.000	.990
Error	388.917	207	1.879			

Tests of Between-Subjects Effects shows the significant difference among the three time frames as the p-value is less than 5% level.

4.1.12.5 Table 21 : ANOVA Post Hoc Pairwise Comparisons Test For Pre-Test , Post-Test And Follow-Up Scores Of Attitude Scores

Pairwise Comparisons						
(I) Attitude	(J) Attitude	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Pre	Post	-2.861*	.099	.000	-3.100	-2.621
	Follow up	-2.861*	.099	.000	-3.100	-2.621
Post	Pre	2.861*	.099	.000	2.621	3.100
	Follow up	.000	.000	.	.000	.000
Follow up	Pre	2.861*	.099	.000	2.621	3.100
	Post	.000	.000	.	.000	.000

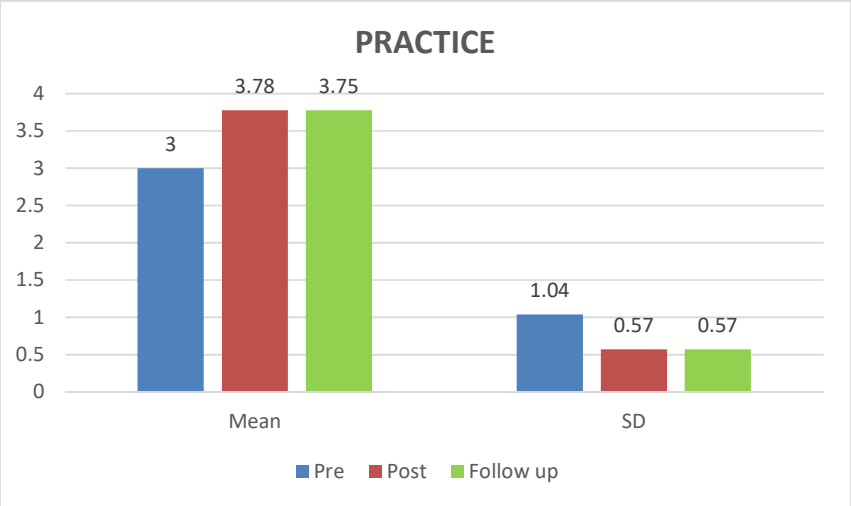
Based on the repeated measures of ANOVA Post Hoc Pairwise Comparisons test as well as the within subject test results, it is concluded that there is significant difference among the time frames from pre to follow up as p-values are significant at 5% level

4.1.12 Repeated Measures Of Anova Test For Practice

Table 22 : Descriptive Statistics Of Practice Scores

Time	Mean	SD
Pre	3.00	1.04
Post	3.78	0.57
Follow up	3.75	0.57

Figure 22: The Mean And Standard Deviation For The Repeated Measures On Know Practice Ledge Score Scale



The above table shows the mean and standard deviation for the repeated measures on Know practice ledge score scale

4.1.12.1 Table 23 : Multivariate Tests for Practice Variable

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Practice	Pillai's Trace	.387	130.702	1.000	207.000	.000	.387
	Wilks' Lambda	.613	130.702	1.000	207.000	.000	.387

A repeated measures ANOVA determined that mean for Practice statistically significantly between time points (F = 130.702, P < 0.001). Post hoc tests using the Bonferroni correction revealed changes from pre to follow up time period (3.00 ± 1.04 vs 3.78 ± 0.57, respectively), which was statistically significant (p = 0.001). Therefore, we can conclude that a higher statistically significant improvement in Practice as compared to pre stage

4.1.12.2 Table 24: Mauchly's Test of Sphericity For Practice Scores

Mauchly's Test of Sphericity							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Practice	.000	.	2	0.001	.500	.500	.500

We follow Mauchly's test for the sphericity assumption. As a rule of thumb, sphericity is assumed if p-value > 0.05. For our data, p-value = 0.001 so sphericity is not met so we use other parameters for further results

4.1.12.2 Table 25: Tests Of Within-Subjects Effects Within Pre-Test , Post-Test And Follow-Up Practice Scores

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Practice	Sphericity Assumed	84.115	2	42.058	130.702	.000	.387
	Greenhouse-Geisser	84.115	1.000	84.115	130.702	.000	.387

From this table we are able to discover the F value for the Practice, its associated significance level and effect size ("Partial Eta Squared"). We can report that when using an ANOVA with repeated measures with a Sphericity not assumed, the mean scores for score were statistically significantly different as F-values were significant with p-value < 0.05.

A repeated measures ANOVA with a Greenhouse-Geisser determined that mean value is differed statistically significantly between time points as F-values were significant with p-value < 0.05 in the group. Post hoc tests using the Bonferroni correction revealed an improvement in scores from pre stage to follow up stage which was statistically significant (p < 0.05)

4.1.12.3 Table 26 : Tests Of Between-Subjects Effects Of Practice Variable Differences Among Pre-Test , Post-Test And Follow-Up.

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	7728.231	1	7728.231	7003.031	.000	.971
Error	228.436	207	1.104			

Tests of Between-Subjects Effects shows the significant difference among the three time frames as the p-value is less than 5% level.

4.1.12.4 Table 27: ANOVA Post Hoc Pairwise Comparisons Test For Pre-Test. Post-Test And Follow-Up Scores Of Practice Scores

Pairwise Comparisons						
(I) Practice	(J) Practice	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Pre	Post	-.779*	.068	.000	-.943	-.614
	Follow up	-.779*	.068	.000	-.943	-.614
Post	Pre	.779*	.068	.000	.614	.943
	Follow up	.000	.000	.	.000	.000
Follow up	Pre	.779*	.068	.000	.614	.943
	Post	.000	.000	.	.000	.000

Based on the repeated measures of ANOVA Post Hoc Pairwise Comparisons test as well as the within subject test results, it is concluded that there is significant difference among the time frames from pre to follow up as p-values are significant at 5% level

4.1.13 Table 28 : ANOVA test for Age categories and Knowledge, Attitude, Practice

Variable	Group status	Sum of Squares	Mean Square	F	p-value
Knowledge	Between Groups	7.212	2.404	**5.286**	**.002**
	Within Groups	92.783	.455		
	Total	99.995			
Attitude	Between Groups	6.000	2.000	**2.658**	**.049**
	Within Groups	153.495	.752		
	Total	159.495			
Perception	Between Groups	1.658	.553	1.704	.167
	Within Groups	66.169	.324		
	Total	67.827			

Significant differences between groups were observed for the Knowledge variable ($F(1, 28) = 5.286$, $p = .002$), with Between Groups sum of squares totaling 7.212 and Within Groups sum of squares totaling 92.783, contributing to a total of 99.995. For Attitude, group differences were also significant ($F(1, 28) = 2.658$, $p = .049$), with Between Groups sum of squares at 6.000 and Within Groups sum of squares at 153.495, totaling 159.495. Conversely, no significant differences between groups were found for Perception ($F(1, 28) = 1.704$, $p = .167$), with Between Groups sum of squares totaling 1.658 and Within Groups sum of squares totaling 66.169, amounting to a total of 67.827. The above table shows that there is a variation or difference between and within the groups across Age categories w.r.t. Knowledge, Attitude since p-value is less than 5% level

4.1.14 Table 29: ANOVA test for qualification categories and Knowledge, Attitude, Practice

Variable	Group status	Sum of Squares	Mean Square	F	p-value
Knowledge	Between Groups	.546	.273	.562	.571
	Within Groups	99.450	.485		
	Total	99.995			
Attitude	Between Groups	1.163	.581	.753	.472
	Within Groups	158.332	.772		
	Total	159.495			
Perception	Between Groups	.266	.133	.403	.669
	Within Groups	67.561	.330		
	Total	67.827			

There were no significant differences observed between groups for any of the variables: Knowledge ($F(1, 28) = 0.562$, $p = .571$), Attitude ($F(1, 28) = 0.753$, $p = .472$), or Perception ($F(1, 28) = 0.403$, $p = .669$). For Knowledge, Between Groups sum of squares was .546 and Within Groups sum of squares was 99.450, with a total of 99.995. Attitude showed Between Groups sum of squares at 1.163 and Within Groups sum of squares at 158.332, totaling 159.495. Perception had Between Groups sum of squares of .266 and Within Groups sum of squares of 67.561, totaling 67.827. The above table shows that there is no variation or difference between and within the groups across qualification categories w.r.t. Knowledge, Attitude, Perception since p-value is more than 5% level

4.1.15 Table 30 : Independent test across gender and Knowledge, Attitude, Practice

Variable	Gender	Mean	SD	t-value	p-value
Knowledge	Female	4.47	0.71	-1.361	0.175
	Male	4.64	0.63		
Attitude	Female	8.81	0.85	**2.261**	**0.025**
	Male	8.46	0.94		
Perception	Female	3.80	0.57	1.361	0.175
	Male	3.67	0.58		

Gender differences were examined across three variables. For Knowledge, females (M = 4.47, SD = 0.71) scored slightly lower than males (M = 4.64, SD = 0.63), but this difference was not statistically significant (t(28) = -1.361, p = 0.175). In terms of Attitude, females (M = 8.81, SD = 0.85) demonstrated significantly higher scores compared to males (M = 8.46, SD = 0.94), with a significant t-value of 2.261 (p = 0.025). Similarly, for Perception, females (M = 3.80, SD = 0.57) showed slightly higher scores than males (M = 3.64, SD = 0.67), although this difference did not reach statistical significance (t(28) = 1.361, p = 0.175). Overall, while gender differences were not significant for Knowledge and Perception, they were notable for Attitude, where females reported more positive attitudes compared to males. The above table shows that there is no difference between the groups across Gender categories w.r.t. Knowledge, Perception since p-value is more than 5% level

4.1.16 Table 31: ANOVA test for experience categories and Knowledge, Attitude, Practice

Variable	Group status	Sum of Squares	Mean Square	F	p-value
Knowledge	Between Groups	4.723	1.181	**2.516**	**.043**
	Within Groups	95.273	.469		
	Total	99.995			
Attitude	Between Groups	4.749	1.187	1.558	.187
	Within Groups	154.746	.762		
	Total	159.495			
Perception	Between Groups	.623	.156	.471	.757
	Within Groups	67.204	.331		
	Total	67.827			

The above table shows that there is no variation or difference between and within the groups across experience categories w.r.t. Attitude, Perception since p-value is more than 5% level

The above table shows that there is a variation or difference between and within the groups across qualification categories w.r.t. Knowledge since p-value is less than 5% level.

The ANOVA results indicate varying levels of significance across the variables examined. For Knowledge, there was a significant difference between groups ($F(1, 28) = 2.516$, $p = .043$), with Between Groups sum of squares of 4.723 and Within

Groups sum of squares of 95.273, contributing to a total of 99.995. Attitude did not show a significant difference between groups ($F(1, 28) = 1.558$, $p = .187$), with Between Groups sum of squares at 4.749 and Within Groups sum of squares at 154.746, totalling 159.495. Similarly, Perception also did not demonstrate a significant difference between groups ($F(1, 28) = 0.471$, $p = .757$), with Between Groups sum of squares totalling 0.623 and Within Groups sum of squares totalling 67.204, amounting to a total of 67.827. In conclusion, while there was a significant group difference observed for Knowledge, no significant differences were found for Attitude and Perception in this analysis.

4.2 Health Science Student Population Results

The study included 520 health science students in total. They were divided using the computer randomization approach into two groups: the case (260) and the control (260). The age bracket

26.54% (69) of the health science student population in the case group were between the ages of 18 and 20, and 73.46% (191) were between the ages of 21 and 30. In contrast, 31.15% (81) of the population of health science students in the control group was between the ages of 18 and 20, and 68.85% (179) was between the ages of 21 and 30. In this instance, 31.92% (83) of the 260 health science students were male and 68.08% (177) were female. On the other hand, 29.62% (77) and 70.38% (183) of the control group were men. Undergraduate students constitute the majority of participants in cases 81.92% (213) and 80.38% (209), respectively, with diploma students following in case 12.69% (33) and 11.15% under control (29). The postgraduate student in case 5.38% (14) and control 8.46% (22) were the minor participants. Pharmacy accounts for 29.23% (76) of the total course enrollment in the case, followed by Ayurveda (20.77%), Physiotherapy (13.18%), Nursing (11.92%), Medical Auxiliary Course (9.62%), BDS 8.08% (21) and MBBS 7.31% (19). Nursing (21.54% (56), Medical Auxiliary Course (8.46% (22) and other courses are in the control group. Table 32 describes the demographic characteristics of the population of students studying health sciences.

4.2.1 Table 32 : Comparison of cases and controls with profile

Profile	Cases	%	Controls	%	Total	%	χ^2	p-value
Age groups								
18 – 20	69	26.54	81	31.15	150	28.85	1.3490	0.2450
21 – 30	191	73.46	179	68.85	370	71.15		
Gender								
Male	83	31.92	77	29.62	160	30.77	0.3250	0.5690
Female	177	68.08	183	70.38	360	69.23		
Educational Qualification								
Diploma	33	12.69	29	11.15	62	11.92	2.0740	0.3550
Undergraduate	213	81.92	209	80.38	422	81.15		
Postgraduate	14	5.38	22	8.46	36	6.92		
Courses								
Pharmacy	76	29.23	42	16.15	118	22.69	18.1770	0.0060*
Nursing	31	11.92	56	21.54	87	16.73		
Physiotherapy	34	13.08	37	14.23	71	13.65		
BAMS	54	20.77	56	21.54	110	21.15		
MBBS	19	7.31	25	9.62	44	8.46		
BDS	21	8.08	22	8.46	43	8.27		
Allied Course	25	9.62	22	8.46	47	9.04		
Total	260	100.00	260	100.00	520	100.00		

*$p<0.05$

4.2.2 The student awareness program on topical corticosteroids for the case group was conducted according to the predetermined methodology.

This likely involved several key steps: Planning, Preparation of Educational Materials, Delivery of Educational Content, Engagement and Interaction, Addressing Questions and Concerns, Evaluation, Follow-up.

The seminar on "Awareness on Misuse of Topical Corticosteroids for Cosmetic Purpose" was organized with the support of the INDIAN ASSOCIATION OF DERMATOLOGISTS, VENEREOLOGISTS AND LEPROLOGISTS (IADVL). The seminar utilized audiovisual materials prepared by the association to enhance the learning experience for approximately 280 students.

Both online and offline modes were employed to accommodate participants from different constituents of KAHER (KLE Academy of Higher Education and Research). The seminar likely incorporated a range of audio and visual elements, such as presentations, videos, animations, and slides, to effectively convey the information and engage the audience.

The audio video visuals provided by IADVL would have been carefully curated to ensure accuracy, relevance, and comprehensibility, covering various aspects of topical corticosteroids, including their appropriate use, potential risks, and the dangers of misuse for cosmetic purposes.

By leveraging these audiovisual resources, the seminar aimed to deliver a comprehensive and impactful educational experience, fostering greater awareness and understanding among the participants regarding the responsible use of topical corticosteroids. The inclusion of both online and offline students underscores the commitment to reaching maximum enrolled case participants. attaching photographs of the seminar

Figure 23 : Dr. Sowmya Spoorthi. M, Research scholar delivered talk on misusage of topical corticosteroids with entitled topic "Awareness on Topical corticosteroids misuse for cosmetic purpose ".

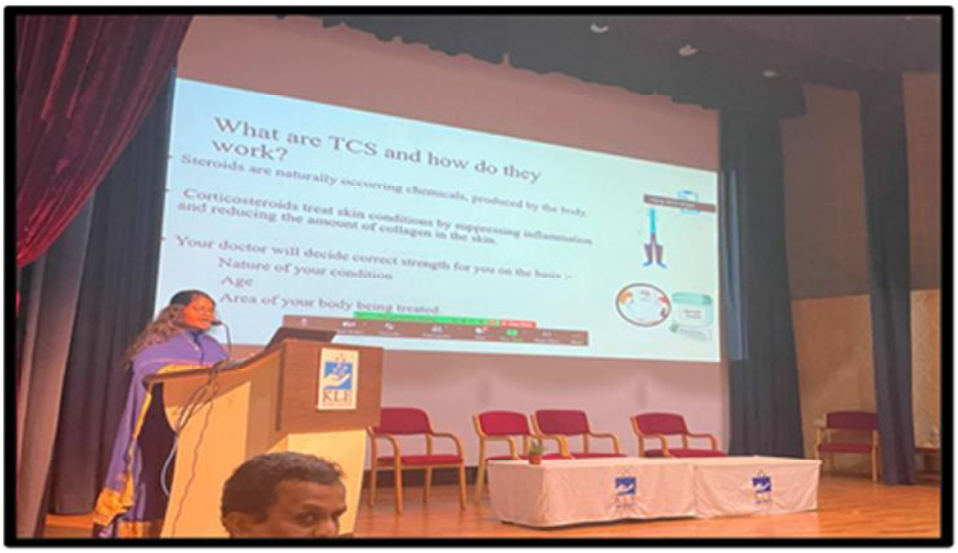


Figure 24 Dr. Sowmya Spoorthi. M, Research scholar delivered talk on misusage of topical corticosteroids with entitled topic "Awareness on Topical corticosteroids misuse for cosmetic purpose " Why TCS how do they work.

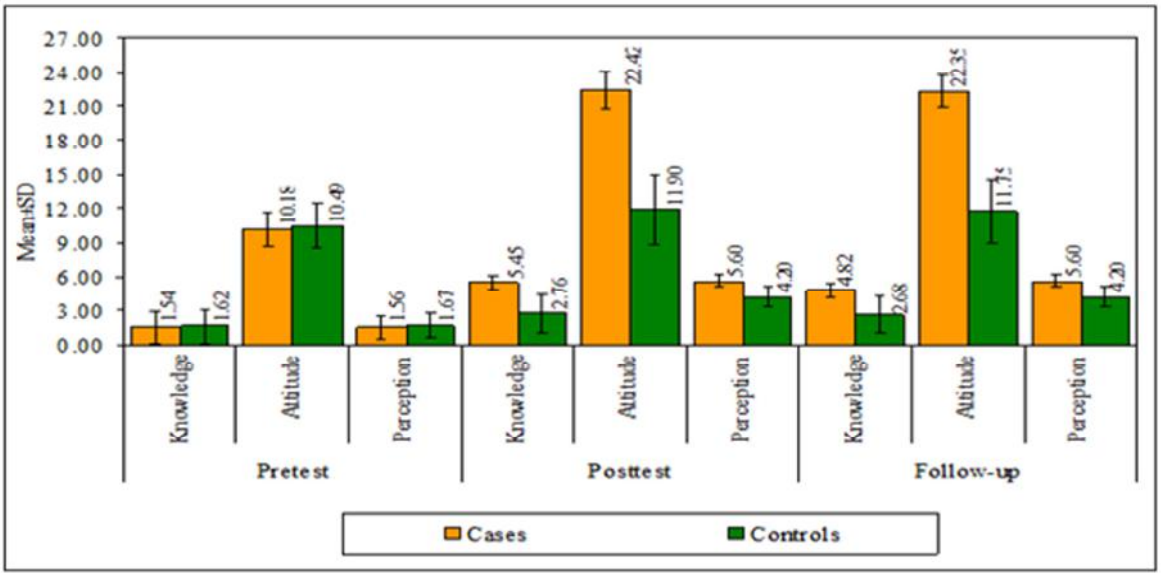
Figure 25 : Using Audio Video Visuals

4.2.3 : Table 33 : Comparison of cases and controls with pretest and follow up levels of knowledge, attitude and perception

Profile	Cases	%	Controls	%	Total	%	χ^2	p-value
Pretest knowledge								
Below average	231	88.85	226	86.92	457	87.88	0.4520	0.5020
Average	29	11.15	34	13.08	63	12.12		
Follow up knowledge								
Below average	6	2.31	170	65.38	176	33.85	234.8650	0.0001*
Average	235	90.38	76	29.23	311	59.81		
Above average	19	7.31	14	5.38	33	6.35		
Pretest attitude								
Inadequate	241	92.69	237	91.15	478	91.92	0.4140	0.5200
Moderate	19	7.31	23	8.85	42	8.08		
Follow up attitude								
Inadequate	0	0.00	211	81.15	211	40.58	466.5440	0.0001*
Moderate	2	0.77	37	14.23	39	7.50		
Adequate	258	99.23	12	4.62	270	51.92		
Pretest perception								
Below average	211	81.15	202	77.69	413	79.42	0.9530	0.3290
Average	49	18.85	58	22.31	107	20.58		
Follow up perception								
Below average	0	0.00	6	2.31	6	1.15	229.6170	0.0001*
Average	9	3.46	168	64.62	177	34.04		
Above average	251	96.54	86	33.08	337	64.81		
Total	260	100.00	260	100.00	520	100.00		

*$p<0.05$

Figure 26 : Comparison of cases and controls with pretest and follow up levels of knowledge, attitude and perception



In the pretest assessment, 88.85% of cases and 86.92% of controls demonstrated below-average knowledge, with no significant difference between the groups ($\chi2$ = 0.4520, p = 0.5020). At follow-up, there was a notable shift, with only 2.31% of cases but 65.38% of controls exhibiting below-average knowledge, showing a significant difference ($\chi2$ = 234.8650, p < 0.0001). Conversely, in the pretest, 92.69% of cases and 91.15% of controls showed inadequate attitudes, without significant disparity ($\chi2$ = 0.4140, p = 0.5200). However, at follow-up, no cases but 81.15% of controls had inadequate attitudes, signifying a significant difference ($\chi2$ = 466.5440, p < 0.0001). Regarding perception, no substantial difference was observed between cases (81.15% below average) and controls (77.69% below average) in the pretest ($\chi2$ = 0.9530, p = 0.3290). Yet, at follow-up, a significant contrast emerged, with 0% of cases but 2.31% of controls showing below-average perception ($\chi2$ = 229.6170, p < 0.0001). Overall, significant shifts in knowledge, attitude, and perception were evident between cases and controls at follow-up, emphasizing the impact of intervention.

4.2.4: Table 34 : Comparison of cases and controls with mean pretest, posttest and follow up scores of knowledge, attitude and perception by independent t test

Parameters	Time points	Cases		Controls		t-value	p-value
		Mean	SD	Mean	SD		
Knowledge	Pretest	1.54	1.41	1.62	1.48	-0.6361	0.5250
	Posttest	5.45	0.62	2.76	1.71	23.8563	0.0001*
	Follow-up	4.82	0.58	2.68	1.64	19.8004	0.0001*
	Pretest to posttest	3.91	1.52	1.14	2.29	16.3045	0.0001*
	Pretest to follow up	3.28	1.47	1.06	2.26	13.2340	0.0001*
Attitude	Pretest	10.18	1.49	10.49	1.98	-2.0316	0.0427
	Posttest	22.42	1.60	11.90	3.05	49.1801	0.0001*
	Follow-up	22.35	1.43	11.75	2.77	54.8524	0.0001*
	Pretest to posttest	12.23	2.08	1.41	2.72	50.9951	0.0001*
	Pretest to follow up	12.17	1.98	1.26	2.69	52.6696	0.0001*
Perception	Pretest	1.56	1.03	1.67	1.05	-1.1835	0.2372
	Posttest	5.60	0.56	4.20	0.88	21.5615	0.0001*
	Follow-up	5.60	0.56	4.20	0.88	21.5615	0.0001*
	Pretest to posttest	4.03	1.14	2.53	1.23	14.4327	0.0001*
	Pretest to follow up	4.03	1.14	2.53	1.23	14.4327	0.0001*

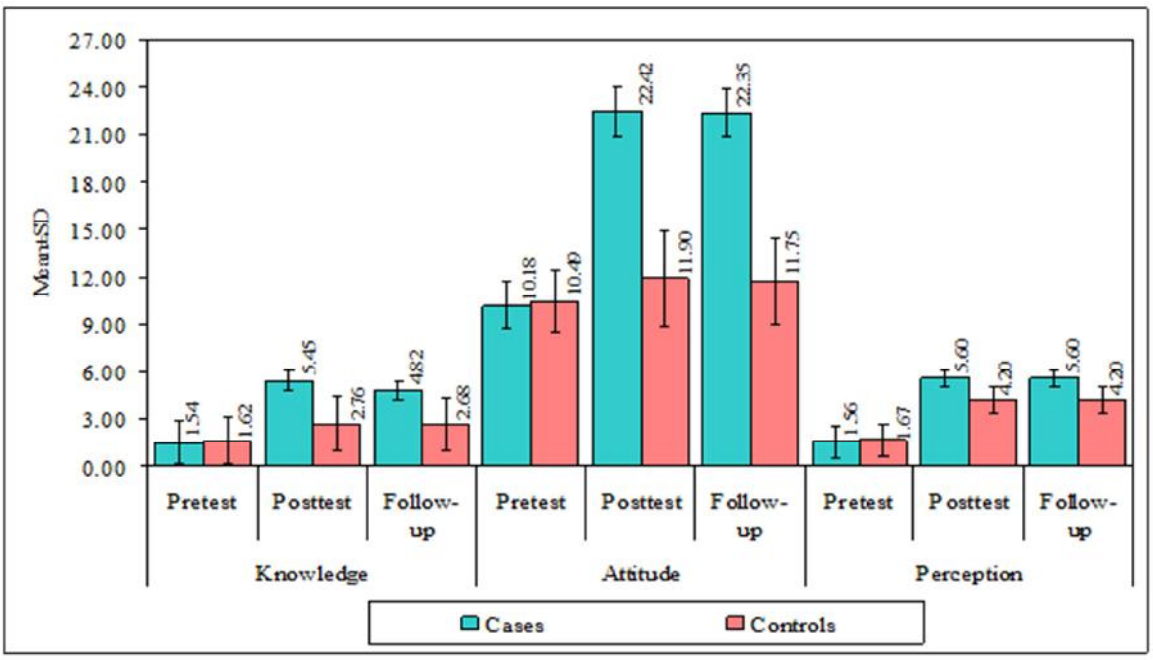
*$p<0.05$

The mean pretest knowledge scores for cases and controls were 1.54 (SD = 1.41) and 1.62 (SD = 1.48) respectively, showing no significant difference ($t = -0.6361$, $p = 0.5250$). However, at posttest and follow-up, cases had significantly higher knowledge scores compared to controls, with t-values of 23.8563 and 19.8004 respectively (both $p < 0.0001$). The difference in mean scores from pretest to posttest and follow-up was also significant for both cases and controls (all $p < 0.0001$).

In terms of attitude, the mean pretest scores for cases and controls were 10.18 (SD = 1.49) and 10.49 (SD = 1.98) respectively, with a significant difference ($t = -2.0316$, $p = 0.0427$). At posttest and follow-up, cases exhibited substantially higher attitude scores compared to controls, with t-values of 49.1801 and 54.8524 respectively (both $p < 0.0001$). The change in mean scores from pretest to posttest and follow-up was also significant for both cases and controls (all $p < 0.0001$).

For perception, the mean pretest scores for cases and controls were 1.56 (SD = 1.03) and 1.67 (SD = 1.05) respectively, with no significant difference ($t = -1.1835$, $p = 0.2372$). However, at posttest and follow-up, cases had significantly higher perception scores compared to controls, with t-values of 21.5615 for both time points (both $p < 0.0001$). The change in mean scores from pretest to posttest and follow-up was significant for both cases and controls (all $p < 0.0001$).

Figure 27 : Comparison of cases and controls with mean pretest, posttest and follow up scores of knowledge, attitude and perception



4.2.5 Table 35: Comparison of pretest, posttest and follow up scores of knowledge, attitude and perception in cases by dependent t test

Variables	Time points	Mean	SD	Mean Diff.	SD Diff.	% of change	t-value	p-value
Knowledge	Pretest	1.54	1.41					
	Posttest	5.45	0.62	-3.91	1.52	-253.61	-41.6140	0.0001*
	Pretest	1.54	1.41					
	Follow-up	4.82	0.58	-3.28	1.47	-212.47	-35.9320	0.0001*
Attitude	Pretest	10.18	1.49					
	Posttest	22.42	1.60	-12.23	2.08	-120.17	-94.9230	0.0001*
	Pretest	10.18	1.49					
	Follow-up	22.35	1.43	-12.17	1.98	-119.49	-98.9490	0.0001*
Perception	Pretest	1.56	1.03					
	Posttest	5.60	0.56	-4.03	1.14	-258.37	-57.2290	0.0001*
	Pretest	1.56	1.03					
	Follow-up	5.60	0.56	-4.03	1.14	-258.37	-57.2290	0.0001*

*$p<0.05$

The mean pretest knowledge score for cases was 1.54 with a standard deviation (SD) of 1.41. Upon comparing with posttest and follow-up scores, a significant decrease was observed, with mean differences of -3.91 (SD diff. = 1.52) and -3.28 (SD diff. = 1.47) respectively. These changes represented percentage decreases of 253.61% and 212.47% respectively, both of which were statistically significant ($t = -41.6140$ and $t = -35.9320$, $p < 0.0001$).

Similarly, for attitude, the mean pretest score was 10.18 (SD = 1.49). Posttest and follow-up scores showed significant increases, with mean differences of -12.23 (SD diff. = 2.08) and -12.17 (SD diff. = 1.98) respectively. These changes corresponded to percentage decreases of 120.17% and 119.49% respectively, both of which were statistically significant ($t = -94.9230$ and $t = -98.9490$, $p < 0.0001$).

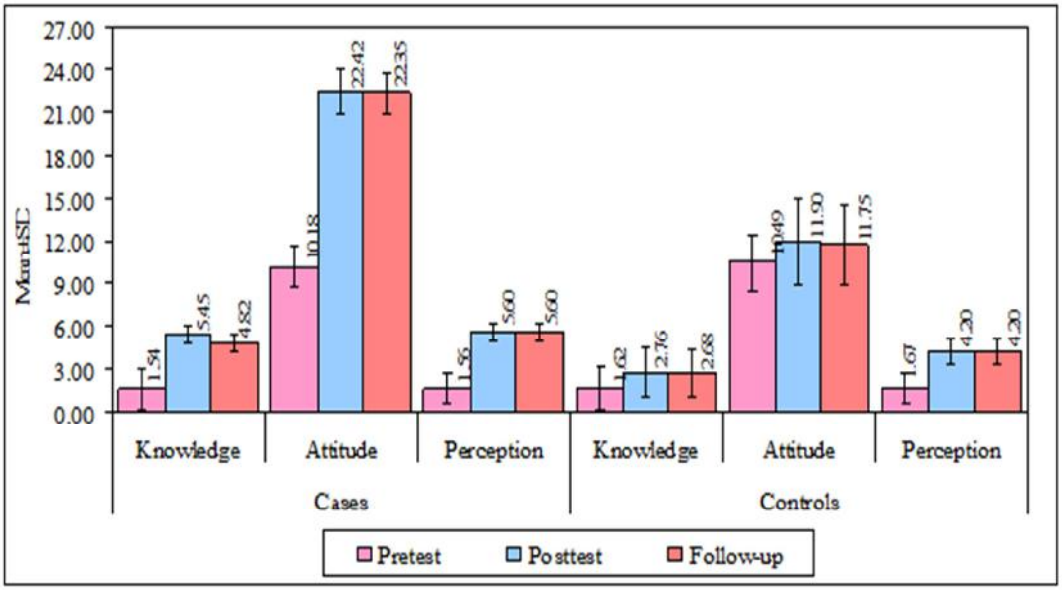
Regarding perception, the mean pretest score was 1.56 (SD = 1.03). Posttest and follow-up scores demonstrated significant decreases, with mean differences of -4.03 (SD diff. = 1.14) for both time points. These changes represented percentage decreases of 258.37% and were statistically significant ($t = -57.2290$, $p < 0.0001$).

4.2.6 Table 36: Comparison of pretest, posttest and follow up scores of knowledge, attitude and perception in controls by dependent t test

Variables	Time points	Mean	SD	Mean Diff.	SD Diff.	% of change	t-value	p-value
Knowledge	Pretest	1.62	1.48					
	Posttest	2.76	1.71	-1.14	2.29	-70.14	-8.0316	0.0001*
	Pretest	1.62	1.48					
	Follow-up	2.68	1.64	-1.06	2.26	-65.40	-7.5620	0.0001*
Attitude	Pretest	10.49	1.98					
	Posttest	11.90	3.05	-1.41	2.72	-13.42	-8.3437	0.0001*
	Pretest	10.49	1.98					
	Follow-up	11.75	2.77	-1.26	2.69	-12.02	-7.5740	0.0001*
Perception	Pretest	1.67	1.05					
	Posttest	4.20	0.88	-2.53	1.23	-151.84	-33.1913	0.0001*
	Pretest	1.67	1.05					
	Follow-up	4.20	0.88	-2.53	1.23	-151.84	-33.1913	0.0001*

*$p<0.05$

Figure: 28 Comparison of pretest, posttest and follow up scores of knowledge, attitude and perception in cases and controls



In controls, the mean pretest knowledge score was 1.62 with a standard deviation (SD) of 1.48. Posttest and follow-up scores revealed significant decreases, with mean differences of -1.14 (SD diff. = 2.29) and -1.06 (SD diff. = 2.26) respectively. These changes represented percentage decreases of 70.14% and 65.40% respectively, both of which were statistically significant ($t = -8.0316$ and $t = -7.5620$, $p < 0.0001$).

For attitude, the mean pretest score was 10.49 (SD = 1.98). Posttest and follow-up scores demonstrated significant decreases, with mean differences of -1.41 (SD diff. = 2.72) and -1.26 (SD diff. = 2.69) respectively. These changes corresponded to percentage decreases of 13.42% and 12.02% respectively, both of which were statistically significant ($t = -8.3437$ and $t = -7.5740$, $p < 0.0001$).

Regarding perception, the mean pretest score was 1.67 (SD = 1.05). Posttest and follow-up scores showed significant decreases, with mean differences of -2.53 (SD diff. = 1.23) for both time points. These changes represented percentage decreases of 151.84% and were statistically significant ($t = -33.1913$, $p < 0.0001$).

4.2.7 Table 37 : Comparison of profile with levels of pretest knowledge scores in cases

Profile	Below average	%	Average	%	Total	%	χ^2	p-value
Age groups								
18 – 20	65	94.20	4	5.80	69	26.54	2.7200	0.0990
21 – 30	166	86.91	25	13.09	191	73.46		
Gender								
Male	78	93.98	5	6.02	83	31.92	3.2370	0.0720
Female	153	86.44	24	13.56	177	68.08		
Educational Qualification								
Diploma	29	87.88	4	12.12	33	12.69	15.3030	0.0001*
Undergraduate	194	91.08	19	8.92	213	81.92		
Postgraduate	8	57.14	6	42.86	14	5.38		
Courses								
Pharmacy	66	86.84	10	13.16	76	29.23	4.5260	0.6060
Nursing	29	93.55	2	6.45	31	11.92		
Physiotherapy	33	97.06	1	2.94	34	13.08		
BAMS	48	88.89	6	11.11	54	20.77		
MBBS	16	84.21	3	15.79	19	7.31		
BDS	18	85.71	3	14.29	21	8.08		
Allied Course	21	84.00	4	16.00	25	9.62		
Total	231	88.85	29	11.15	260	100.00		

*$p<0.05$

The distribution of pretest knowledge scores among cases was examined based on various demographic and educational profiles. For age groups, a higher percentage of individuals aged 18-20 (94.20%) fell into the "below average" category compared to those aged 21-30 (86.91%), although this difference was not statistically significant ($\chi 2 = 2.7200$, $p = 0.0990$). In terms of gender, a higher proportion of males (93.98%) were categorized as "below average" compared to females (86.44%), with a marginal p-value of 0.0720 ($\chi 2 = 3.2370$).

Educational qualification showed significant differences, with a larger percentage of individuals with diplomas (87.88%) falling into the "below average" category compared to undergraduates (91.08%) and postgraduates (57.14%) ($\chi 2 = 15.3030$, $p < 0.0001$). However, no significant differences were observed based on courses pursued ($\chi 2 = 4.5260$, $p = 0.6060$), although nursing and physiotherapy courses had higher percentages of individuals categorized as "below average."

Overall, the analysis revealed that educational qualification significantly influenced pretest knowledge scores among cases, with individuals holding diplomas more likely to have scores categorized as "below average" compared to undergraduates and postgraduates.

4.2.8 Table 38 : Comparison of profile with levels of pretest attitude scores in cases

Profile	Below average	%	Average	%	Total	%	χ^2	p-value
Age groups								
18 – 20	67	97.10	2	2.90	69	26.54	2.6960	0.1010
21 – 30	174	91.10	17	8.90	191	73.46		
Gender								
Male	77	92.77	6	7.23	83	31.92	0.0010	0.9730
Female	164	92.66	13	7.34	177	68.08		
Educational Qualification								
Diploma	33	100.00	0	0.00	33	12.69	187.9180	0.0001*
Undergraduate	208	97.65	5	2.35	213	81.92		
Postgraduate	0	0.00	14	100.00	14	5.38		
Courses								
Pharmacy	72	94.74	4	5.26	76	29.23	4.2350	0.6450
Nursing	28	90.32	3	9.68	31	11.92		
Physiotherapy	30	88.24	4	11.76	34	13.08		
BAMS	50	92.59	4	7.41	54	20.77		
MBBS	19	100.00	0	0.00	19	7.31		
BDS	20	95.24	1	4.76	21	8.08		
Allied Course	22	88.00	3	12.00	25	9.62		
Total	241	92.69	19	7.31	260	100.00		

*$p<0.05$

The analysis of pretest attitude scores among cases, categorized by various demographic and educational profiles, revealed several notable trends. Firstly, regarding age groups, there was no significant difference in attitude scores between individuals aged 18-20 and 21-30 ($\chi2 = 2.6960$, $p = 0.1010$). Similarly, no significant difference was observed in attitude scores based on gender distribution ($\chi2 = 0.0010$, $p = 0.9730$).

However, educational qualification showed significant disparities in attitude scores among cases. Notably, individuals with diplomas displayed exclusively below-average attitudes (100.00%), contrasting with undergraduates and postgraduates (97.65% and 100.00% respectively) who predominantly exhibited below-average attitudes as well ($\chi2 = 187.9180$, $p < 0.0001$).

Regarding courses pursued, no significant differences were observed in attitude scores among cases across various disciplines ($\chi2 = 4.2350$, $p = 0.6450$).

Overall, while age groups and gender did not significantly influence attitude scores among cases, a striking association was found between educational qualification and attitudes, with individuals holding diplomas more likely to exhibit below-average attitudes.

4.2.9 Table 39 : Comparison of profile with levels of pretest perception scores in cases

Profile	Below average	%	Average	%	Total	%	χ^2	p-value
Age groups								
18 – 20	64	92.75	5	7.25	69	26.54	8.2630	0.0040*
21 – 30	147	76.96	44	23.04	191	73.46		
Gender								
Male	67	80.72	16	19.28	83	31.92	0.0150	0.9030
Female	144	81.36	33	18.64	177	68.08		
Educational Qualification								
Diploma	33	100.00	0	0.00	33	12.69	40.4570	0.0001*
Undergraduate	175	82.16	38	17.84	213	81.92		
Postgraduate	3	21.43	11	78.57	14	5.38		
Courses								
Pharmacy	65	85.53	11	14.47	76	29.23	4.2210	0.6470
Nursing	27	87.10	4	12.90	31	11.92		
Physiotherapy	26	76.47	8	23.53	34	13.08		
BAMS	44	81.48	10	18.52	54	20.77		
MBBS	14	73.68	5	26.32	19	7.31		
BDS	17	80.95	4	19.05	21	8.08		
Allied Course	18	72.00	7	28.00	25	9.62		
Total	211	81.15	49	18.85	260	100.00		

*$p<0.05$

The examination of pretest perception scores among cases, categorized by various demographic and educational profiles, revealed significant associations. Firstly, concerning age groups, a notable difference was observed, with a higher percentage of individuals aged 18-20 exhibiting below-average perceptions compared to those aged 21-30 ($\chi2 = 8.2630$, $p = 0.0040$*). However, no significant difference was found in perception scores based on gender distribution ($\chi2 = 0.0150$, $p = 0.9030$).

Educational qualification displayed a significant impact on perception scores among cases. Notably, individuals with diplomas exclusively demonstrated below-average perceptions (100.00%), contrasting with undergraduates (82.16%) and postgraduates (21.43% average perceptions), with a significant p-value of 0.0001* ($\chi2 = 40.4570$).

Regarding courses pursued, no significant differences were observed in perception scores among cases across various disciplines ($\chi2 = 4.2210$, $p = 0.6470$).

Overall, while gender did not significantly influence perception scores among cases, age groups and educational qualification displayed significant associations, particularly with individuals aged 18-20 and those holding diplomas more likely to exhibit below-average perceptions.

4.2.10 Table 40 : Comparison of profile with levels of pretest knowledge scores in controls

Profile	Below average	%	Average	%	Total	%	χ^2	p-value
Age groups								
18 – 20	78	96.30	3	3.70	81	31.15	9.0940	0.0030*
21 – 30	148	82.68	31	17.32	179	68.85		
Gender								
Male	64	83.12	13	16.88	77	29.62	1.3940	0.2380
Female	162	88.52	21	11.48	183	70.38		
Educational Qualification								
Diploma	29	100.00	0	0.00	29	11.15	14.9330	0.0010*
Undergraduate	183	87.56	26	12.44	209	80.38		
Postgraduate	14	63.64	8	36.36	22	8.46		
Courses								
Pharmacy	38	90.48	4	9.52	42	16.15	6.3070	0.3900
Nursing	47	83.93	9	16.07	56	21.54		
Physiotherapy	30	81.08	7	18.92	37	14.23		
BAMS	49	87.50	7	12.50	56	21.54		
MBBS	25	100.00	0	0.00	25	9.62		
BDS	19	86.36	3	13.64	22	8.46		
Allied Course	18	81.82	4	18.18	22	8.46		
Total	226	86.92	34	13.08	260	100.00		

*$p<0.05$

The analysis of pretest knowledge scores among controls, categorized by various demographic and educational profiles, revealed significant associations. Firstly, concerning age groups, a notable difference was observed, with a higher percentage of individuals aged 18-20 exhibiting below-average knowledge compared to those aged 21-30 ($\chi2 = 9.0940$, $p = 0.0030$*). However, no significant difference was found in knowledge scores based on gender distribution ($\chi2 = 1.3940$, $p = 0.2380$).

Educational qualification displayed a significant impact on knowledge scores among controls. Notably, individuals with diplomas exclusively demonstrated below-average knowledge (100.00%), contrasting with undergraduates (87.56%) and postgraduates (63.64% average knowledge), with a significant p-value of 0.0010* ($\chi2 = 14.9330$).

Regarding courses pursued, no significant differences were observed in knowledge scores among controls across various disciplines ($\chi2 = 6.3070$, $p = 0.3900$).

Overall, while gender did not significantly influence knowledge scores among controls, age groups and educational qualification displayed significant associations, particularly with individuals aged 18-20 and those holding diplomas more likely to exhibit below-average knowledge.

4.2.11 Table 41 : Comparison of profile with levels of pretest attitude scores in controls

Profile	Below average	%	Average	%	Total	%	χ^2	p-value
Age groups								
18 – 20	79	97.53	2	2.47	81	31.15	5.9340	0.0150*
21 – 30	158	88.27	21	11.73	179	68.85		
Gender								
Male	68	88.31	9	11.69	77	29.62	1.0960	0.2950
Female	169	92.35	14	7.65	183	70.38		
Educational Qualification								
Diploma	28	96.55	1	3.45	29	11.15	248.0260	0.0001*
Undergraduate	209	100.00	0	0.00	209	80.38		
Postgraduate	0	0.00	22	100.00	22	8.46		
Courses								
Pharmacy	38	90.48	4	9.52	42	16.15	4.0300	0.6730
Nursing	49	87.50	7	12.50	56	21.54		
Physiotherapy	32	86.49	5	13.51	37	14.23		
BAMS	53	94.64	3	5.36	56	21.54		
MBBS	24	96.00	1	4.00	25	9.62		
BDS	20	90.91	2	9.09	22	8.46		
Allied Course	21	95.45	1	4.55	22	8.46		
Total	237	91.15	23	8.85	260	100.00		

*$p<0.05$

The analysis of pretest attitude scores among controls, categorized by various demographic and educational profiles, revealed significant associations. Firstly, concerning age groups, a notable difference was observed, with a higher percentage of individuals aged 18-20 exhibiting below-average attitudes compared to those aged 21-30 ($\chi2 = 5.9340$, $p = 0.0150$*). However, no significant difference was found in attitude scores based on gender distribution ($\chi2 = 1.0960$, $p = 0.2950$).

Educational qualification displayed a significant impact on attitude scores among controls. Notably, individuals with diplomas exclusively demonstrated below-average attitudes (96.55%), contrasting with undergraduates (100.00%) and postgraduates (100.00% average attitudes), with a highly significant p-value of 0.0001* ($\chi2 = 248.0260$).

Regarding courses pursued, no significant differences were observed in attitude scores among controls across various disciplines ($\chi2 = 4.0300$, $p = 0.6730$).

Overall, while gender did not significantly influence attitude scores among controls, age groups and educational qualification displayed significant associations, particularly with individuals aged 18-20 and those holding diplomas more likely to exhibit below-average attitudes.

4.2.12 Table 42 : Comparison of profile with levels of pretest perception scores in controls

Profile	Below average	%	Average	%	Total	%	χ^2	p-value
Age groups								
18 – 20	70	86.42	11	13.58	81	31.15	5.1710	0.0230*
21 – 30	132	73.74	47	26.26	179	68.85		
Gender								
Male	62	80.52	15	19.48	77	29.62	0.5050	0.4780
Female	140	76.50	43	23.50	183	70.38		
Educational Qualification								
Diploma	29	100.00	0	0.00	29	11.15	62.0160	0.0001*
Undergraduate	170	81.34	39	18.66	209	80.38		
Postgraduate	3	13.64	19	86.36	22	8.46		
Courses								
Pharmacy	37	88.10	5	11.90	42	16.15	6.9160	0.3290
Nursing	45	80.36	11	19.64	56	21.54		
Physiotherapy	30	81.08	7	18.92	37	14.23		
BAMS	40	71.43	16	28.57	56	21.54		
MBBS	19	76.00	6	24.00	25	9.62		
BDS	14	63.64	8	36.36	22	8.46		
Allied Course	17	77.27	5	22.73	22	8.46		
Total	202	77.69	58	22.31	260	100.00		

*$p<0.05$

The examination of pretest perception scores among controls, categorized by various demographic and educational profiles, revealed significant associations. Firstly, concerning age groups, a notable difference was observed, with a higher percentage of individuals aged 18-20 exhibiting below-average perceptions compared to those aged 21-30 ($\chi 2 = 5.1710$, $p = 0.0230$*). However, no significant difference was found in perception scores based on gender distribution ($\chi 2 = 0.5050$, $p = 0.4780$).

Educational qualification displayed a significant impact on perception scores among controls. Notably, individuals with diplomas exclusively demonstrated below-average perceptions (100.00%), contrasting with undergraduates (81.34%) and postgraduates (13.64% average perceptions), with a highly significant p-value of 0.0001* ($\chi 2 = 62.0160$).

Regarding courses pursued, no significant differences were observed in perception scores among controls across various disciplines ($\chi 2 = 6.9160$, $p = 0.3290$).

Overall, while gender did not significantly influence perception scores among controls, age groups and educational qualification displayed significant associations, particularly with individuals aged 18-20 and those holding diplomas more likely to exhibit below-average perceptions.

4.2.13 Table 43: Logistic regression analysis of pretest levels of knowledge, attitude and perception by profile in cases

Profile	Knowledge levels				Attitude levels				Perception levels			
	Adj. OR	95% CI for OR		p-value	Adj. OR	95% CI for OR		p-value	Adj. OR	95% CI for OR		p-value
		Lower	Upper			Lower	Upper			Lower	Upper	
Age groups												
18 – 20	1				1				1			
21 – 30	0.37	0.12	1.19	0.0950	1.10	0.13	9.68	0.9290	0.39	0.14	1.07	0.0680
Gender												
Male	2.37	0.95	5.92	0.0650	2.35	0.44	12.72	0.3200	1.19	0.60	2.38	0.6210
Female	1				1				1			
Educational Qualification												
Diploma	1				1				1			
Undergraduate	0.13	0.04	0.49	0.0020*	-	-	-	0.9970	-	-	-	0.9980

Postgraduate	0.08	0.03	0.23	0.0001*	0.00	0.00	0.02	0.0001*	0.19	0.08	0.44	0.0001*
Courses												
Pharmacy	0.31	0.06	1.66	0.1720	9.04	0.49	165.67	0.1380	0.63	0.18	2.21	0.4660
Nursing	0.12	0.01	1.02	0.0520	9.54	0.65	141.03	0.1010	1.40	0.49	4.01	0.5320
Physiotherapy	0.74	0.23	2.35	0.6060	6.38	0.49	82.97	0.1570	1.10	0.42	2.91	0.8480
BAMS	1.43	0.32	6.45	0.6430	-	-	-	0.9990	2.08	0.58	7.48	0.2610
MBBS	0.94	0.20	4.31	0.9340	1.99	0.04	95.55	0.7280	1.10	0.29	4.10	0.8890
BDS	1.01	0.26	3.94	0.9840	11.87	0.71	199.98	0.0860	1.74	0.56	5.35	0.3370
Allied Course	1				1				1			

*$p<0.05$

The logistic regression analysis examined the association between pretest levels of knowledge, attitude, and perception with different demographic and educational profiles among cases.

Age groups showed a significant association with knowledge levels, where individuals aged 21-30 had lower odds (Adjusted Odds Ratio (Adj. OR) = 0.37, 95% CI: 0.12-1.19, p = 0.0950) compared to those aged 18-20. However, no significant associations were found with attitude or perception levels.

Gender exhibited a marginally significant association with knowledge levels, with males having higher odds compared to females (Adj. OR = 2.37, 95% CI: 0.95-5.92, p = 0.0650). No significant associations were observed with attitude or perception levels based on gender.

Educational qualification displayed significant associations with all three outcomes. Undergraduates had significantly lower odds of knowledge (Adj. OR = 0.13, 95% CI: 0.04-0.49, p = 0.0020*), while postgraduates had significantly lower odds of both knowledge and attitude (Adj. OR = 0.08, 95% CI: 0.03-0.23, p = 0.0001* for knowledge; Adj. OR = 0.00, 95% CI: 0.00-0.02, p = 0.0001* for attitude) compared to individuals with diplomas.

Courses pursued exhibited varied associations with the outcomes. Notably, nursing students showed significantly higher odds of attitude compared to those in pharmacy (Adj. OR = 9.54, 95% CI: 0.65-141.03, p = 0.1010). Additionally, individuals pursuing postgraduate courses had significantly lower odds of knowledge compared to those in pharmacy (Adj. OR = 0.00, 95% CI: 0.00-0.02, p = 0.0001*).

Overall, age, gender, educational qualification, and courses pursued demonstrated varied associations with pretest levels of knowledge, attitude, and perception among cases, highlighting the importance of considering demographic and educational factors in understanding these outcomes

Table: Logistic regression analysis of pretest levels of knowledge, attitude and perception by profile in cases

4.2.14 Table 44 : Logistic regression analysis of pretest levels of knowledge, attitude and perception by profile in controls

Profile	Knowledge levels				Attitude levels				Perception levels			
	Adj.OR	95% CI for OR		p-value	Adj. OR	95% CI for OR		p-value	Adj. OR	95% CI for OR		p-value
		Lower	Upper			Lower	Upper			Lower	Upper	
Age groups												
18 – 20	1				1				1			
21 – 30	0.29	0.08	1.00	0.0500*	-	-	-	-	0.81	0.36	1.82	0.6070
Gender												
Male	0.65	0.29	1.46	0.2970	-	-	-	-	1.90	0.82	4.40	0.1330
Female												
Educational Qualification												
Diploma	1				1				1			
Undergraduate	-	-	-	0.9980	-	-	-	-	-	-	-	0.9980

Postgraduate	0.37	0.15	0.94	0.0360*	-	-	-	-	0.05	0.02	0.15	0.0001*
Courses												
Pharmacy	0.74	0.24	2.23	0.5910	-	-	-	-	1.81	0.52	6.28	0.3510
Nursing	0.79	0.25	2.50	0.6910	-	-	-	-	1.70	0.45	6.37	0.4320
Physiotherapy	0.56	0.17	1.83	0.3370	-	-	-	-	4.69	1.33	16.50	0.0160*
BAMS	0.00	0.00	.	0.9980	-	-	-	-	3.82	0.83	17.65	0.0860
MBBS	0.70	0.15	3.25	0.6460	-	-	-	-	5.97	1.35	26.41	0.0190*
BDS	1.05	0.24	4.54	0.9450	-	-	-	-	3.25	0.68	15.60	0.1410
Allied Course	1				1				1			

*$p<0.05$

The logistic regression analysis explored the relationship between pretest levels of knowledge, attitude, and perception and various demographic and educational factors among controls.

Age groups showed a marginally significant association with knowledge levels, where individuals aged 21-30 had lower odds (Adjusted Odds Ratio (Adj. OR) = 0.29, 95% CI: 0.08-1.00, p = 0.0500*) compared to those aged 18-20. No significant associations were observed with attitude or perception levels.

Gender did not exhibit a significant association with knowledge or attitude levels. However, females showed higher odds of perception compared to males (Adj. OR = 1.90, 95% CI: 0.82-4.40, p = 0.1330).

Educational qualification displayed significant associations with knowledge and perception levels. Postgraduates had significantly lower odds of knowledge (Adj. OR = 0.37, 95% CI: 0.15-0.94, p = 0.0360*) and perception (Adj. OR = 0.05, 95% CI: 0.02-0.15, p = 0.0001*) compared to those with diplomas. No significant associations were observed with attitude levels.

Courses pursued exhibited varied associations with the outcomes. Physiotherapy students had significantly higher odds of perception compared to those in pharmacy (Adj. OR = 4.69, 95% CI: 1.33-16.50, p = 0.0160*), while MBBS students had significantly higher odds of perception compared to pharmacy students (Adj. OR = 5.97, 95% CI: 1.35-26.41, p = 0.0190*).

Overall, age, educational qualification, and courses pursued demonstrated varied associations with pretest levels of knowledge, attitude, and perception among controls, highlighting the importance of considering these factors in understanding these outcomes.

4.3 Patients Results

The demographic profile of the respondents is as follows: Among the 100 participants, 25% are aged 18-21 years, 71% are aged 22-40 years, and 4% are aged 41-50 years. The gender distribution is 47% male and 53% female. In terms of educational status, 11% have a primary education, 30% have a secondary education, 56% are graduates, and 3% have postgraduate degrees. Regarding economic status, 16% are poor, 49% are fair, and 35% are good. Marital status shows that 20% are single and 80% are married. Lastly, 65% of the respondents reside in rural areas, while 35% live in urban areas. As shown in Table 45.

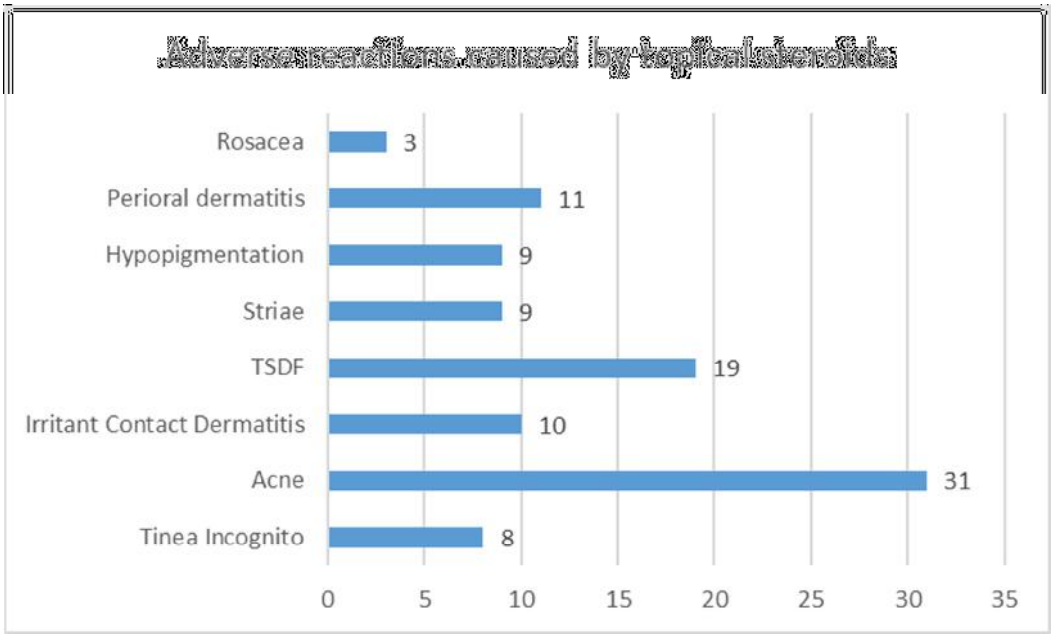
4.3.1: Table 45: Demographic profile of Study Patients

Demographic profile	No of respondents	% of respondents
Age groups		
AGE	Frequency	Percent
18- 21yrs	25	25.0
22-40yrs	71	71.0
41-50yrs	4	4.0
Gender		
Male	47	47.0
Female	53	53.0
EDUCATIONAL STATUS		
Primary	11	11.0
Secondary	30	30.0
Graduate	56	56.0
Post-graduation	3	3.0
ECONOMIC STATUS		
Poor (Low Income Group)	16	16.0
Fair (Middle Income Group)	49	49.0
Good (High Income Group)	35	35.0
MARITAL STATUS		
Single	20	20.0
Married	80	80.0
RESIDENCE		
Rural	65	65.0
Urban	35	35.0
Total	100	100.00

4.3.2 : Table 46: Adverse reactions caused by topical steroids

Adverse reactions caused by topical steroids	Frequency	Percent
Tinea Incognito	8	8.0
Acne	31	31.0
Irritant Contact Dermatitis	10	10.0
TSDF	19	19.0
Striae	9	9.0
Hypopigmentation	9	9.0
Perioral dermatitis	11	11.0
Rosacea	3	3.0
Total	100	100.0

Figure 29 : Adverse reactions caused by topical steroids among patients

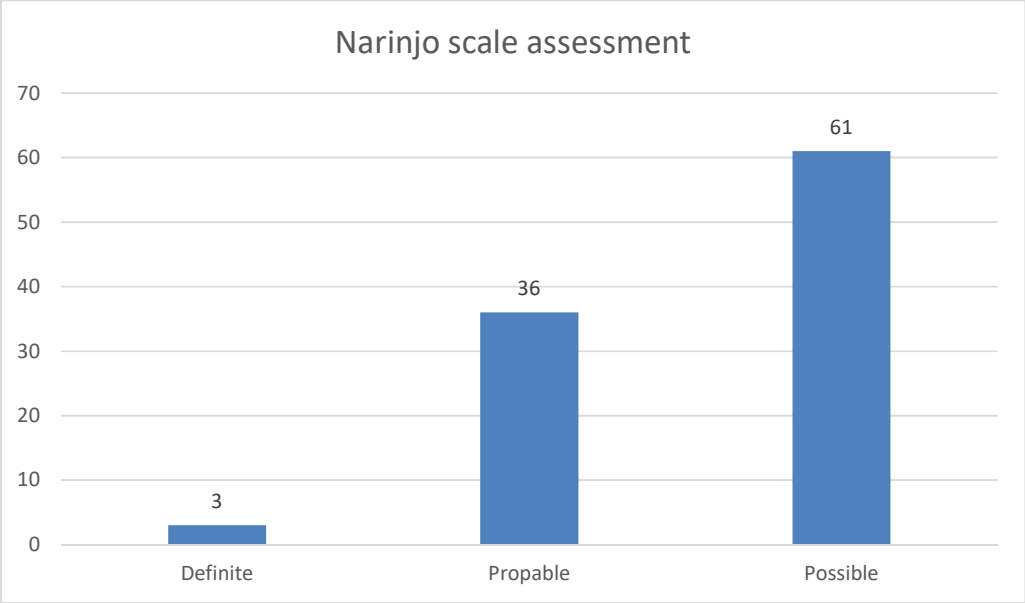


The frequency distribution of adverse reactions caused by topical steroids is as follows: Tinea Incognito affects 8 individuals (8.0%), Acne affects 31 individuals (31.0%), Irritant Contact Dermatitis affects 10 individuals (10.0%), TSDF (Topical Steroid Damaged Face) affects 19 individuals (19.0%), Striae affects 9 individuals (9.0%), Hypopigmentation affects 9 individuals (9.0%), Perioral Dermatitis affects 11 individuals (11.0%), and Rosacea affects 3 individuals (3.0%). This data outlines the various adverse reactions observed, with acne being the most common and rosacea the least common among the reported conditions.

4.3.3 Table 47 : Naranjo scale assessment

Naranjo scale assessment	Frequency	Percent
Definite	3	3.0
Probable	36	36.0
Possible	61	61.0
Total	100	100.0

Figure 30 : Naranjo scale assessment

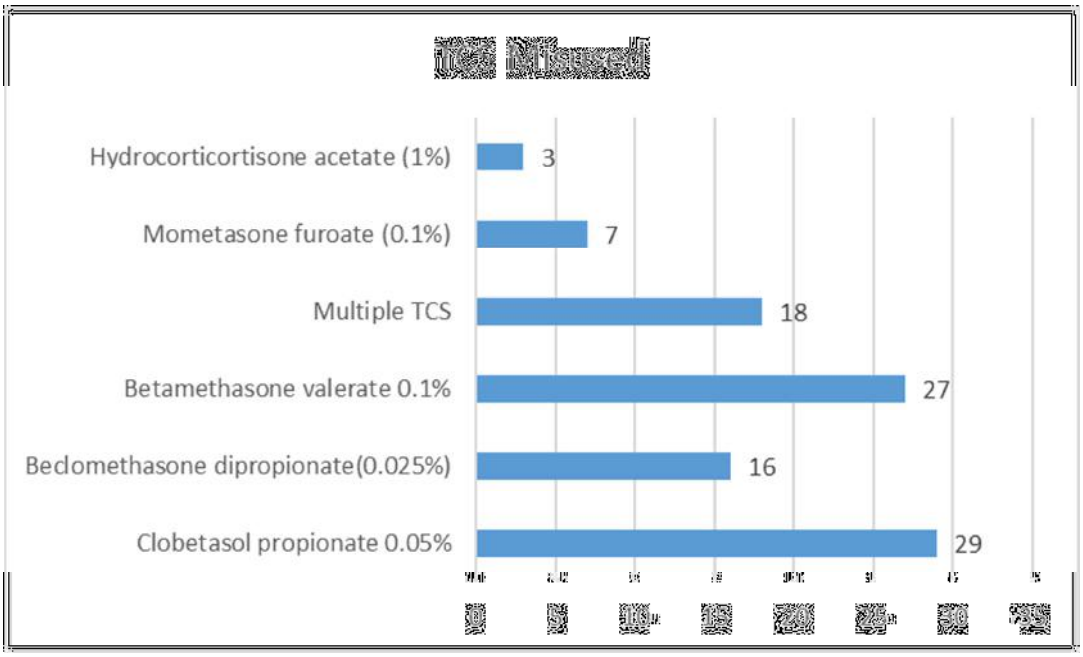


The Naranjo scale assessment results indicate that among the participants, 3 individuals (3.0%) were classified as having a definite outcome, 36 individuals (36.0%) had a probable outcome, and 61 individuals (61.0%) had a possible outcome. This distribution illustrates the varying degrees of certainty regarding the assessed outcomes, with the majority falling under the possible category.

4.3.4 Table 48 :Topical Corticosteroids misused

TCS Misused	Frequency	Percent
Clobetasol propionate 0.05%	29	29.0
Beclomethasone dipropionate(0.025%)	16	16.0
Betamethasone valerate 0.1%	27	27.0
Multiple TCS	18	18.0
Mometasone furoate (0.1%)	7	7.0
Hydrocorticortisone acetate (1%)	3	3.0
Total	100	100.0

Figure 31 : Topical Corticosteroids misused

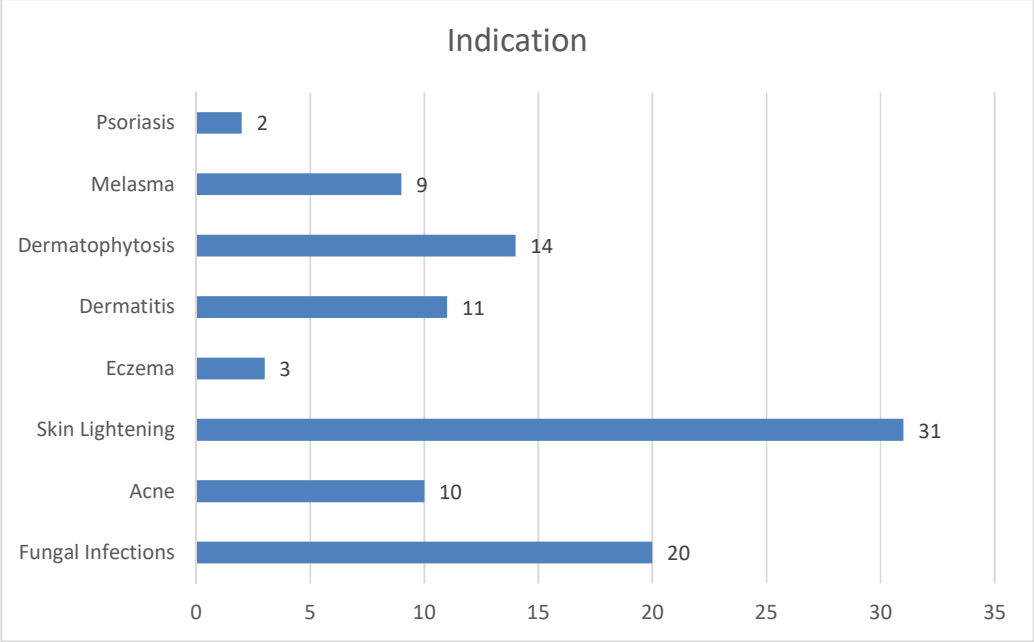


The data on the misuse of topical corticosteroids (TCS) reveals that among the respondents, Clobetasol propionate 0.05% was misused by 29 individuals (29.0%), Beclomethasone dipropionate (0.025%) by 16 individuals (16.0%), Betamethasone valerate 0.1% by 27 individuals (27.0%), Multiple TCS by 18 individuals (18.0%), Mometasone furoate (0.1%) by 7 individuals (7.0%), and Hydrocortisone acetate (1%) by 3 individuals (3.0%). This distribution highlights the prevalence of misuse across various types of topical corticosteroids, with Clobetasol propionate 0.05% being the most commonly misused among the reported types.

4.3.5 Table 49 : Indications for Topical Corticosteroids misused

Indication	Frequency	Percent
Fungal Infections	20	20.0
Acne	10	10.0
Skin Lightening	31	31.0
Eczema	3	3.0
Dermatitis	11	11.0
Dermatophytosis	14	14.0
Melasma	9	9.0
Psoriasis	2	2.0
Total	100	100.0

Figure 32 : Indications for Topical Corticosteroids misused

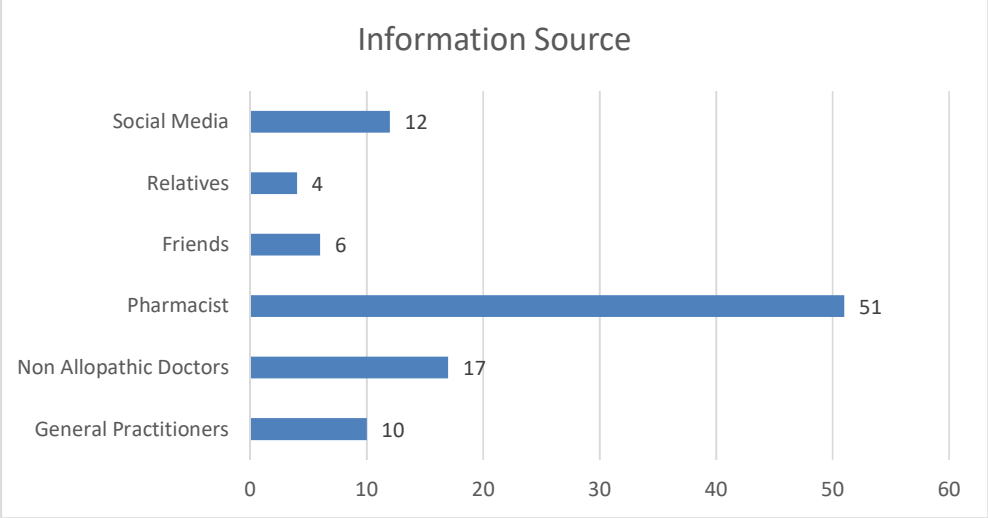


The indication distribution among respondents shows that fungal infections were indicated by 20 individuals (20.0%), acne by 10 individuals (10.0%), skin lightening by 31 individuals (31.0%), eczema by 3 individuals (3.0%), dermatitis by 11 individuals (11.0%), dermatophytosis by 14 individuals (14.0%), melasma by 9 individuals (9.0%), and psoriasis by 2 individuals (2.0%). This data delineates the diverse range of skin conditions for which topical corticosteroids were indicated, with skin lightening being the most frequently indicated indication.

4.3.6 Table 50 : Information Sources for usage of Topical Corticosteroids

Information Source	Frequency	Percent
General Practitioners	10	10.0
Non Allopathic Doctors	17	17.0
Pharmacist	51	51.0
Friends	6	6.0
Relatives	4	4.0
Social Media	12	12.0
Total	100	100.0

Figure 33 : Information Sources for usage of Topical Corticosteroids

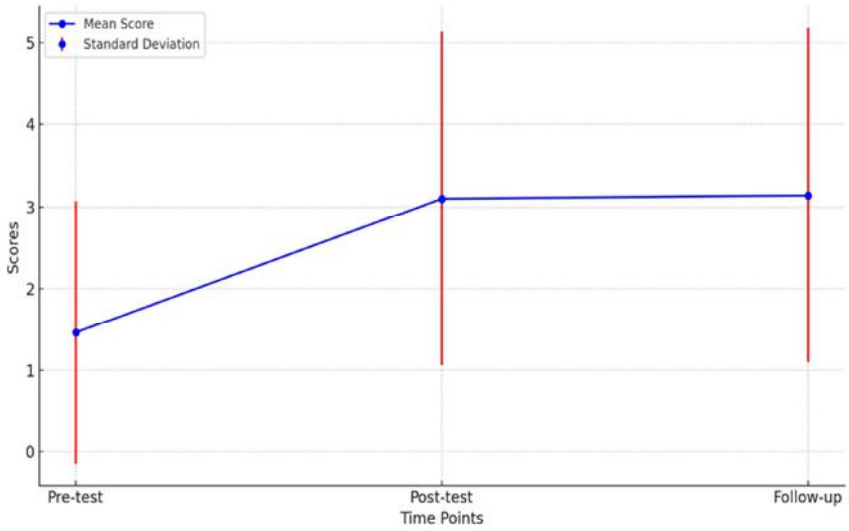


The distribution of information sources among respondents indicates that 10 individuals (10.0%) obtained information from General Practitioners, 17 individuals (17.0%) from Non-Allopathic Doctors, 51 individuals (51.0%) from Pharmacists, 6 individuals (6.0%) from Friends, 4 individuals (4.0%) from Relatives, and 12 individuals (12.0%) from Social Media. This data reveals the varied sources from which individuals acquired information about topical corticosteroids, with pharmacists being the most frequently accessed sources

4.3.7 Table 51 :Comparison of pre-test, post-test and follow-up knowledge scores by dependent t test

Time points	Mean	SD	Mean Diff.	SD Diff.	t-value	P-value
Pre-test	1.46	1.611	-1.680	2.029	-8.278	<0.001, HS
Post-test	3.10	2.035				
Pre-test	1.46	1.611	-1.681	2.029	-8.279	<0.001, HS
Follow-up	3.14	2.039				

Figure 34 :Comparison of pre-test, post-test and follow-up knowledge scores by dependent t test

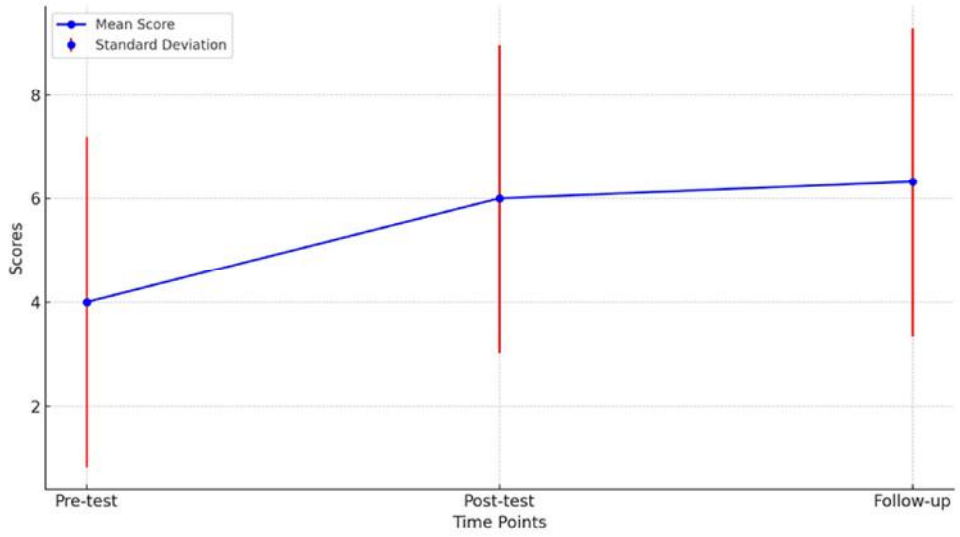


At the pre-test time point, participants had a mean score of 1.46 (SD = 1.611), which significantly decreased by a mean difference of -1.680 (SD difference = 2.029) at the post-test time point (t(1) = -8.278, p < 0.001, HS). Similarly, at the follow-up time point, the mean score remained high at 3.14 (SD = 2.039), reflecting a significant decrease from the pre-test score of 1.46 (SD = 1.611) by a mean difference of -1.681 (SD difference = 2.029, t(1) = -8.279, p < 0.001, HS).

4.3.8 Table 52 : Comparison of pre-test, post-test, and follow-up attitude scores by dependent t test

Time points	Mean	SD	Mean Diff.	SD Diff.	t-value	P-value
Pre-test	4.00	3.188	-2.32	3.09	-7.506	<0.001, HS
Post-test	6.00	2.967				
Pre-test	4.00	3.188	-2.32	3.09	-7.506	<0.001, HS
Follow-up	6.32	2.969				

Figure 35 : Comparison of pre-test, post-test, and follow-up attitude scores by dependent t test

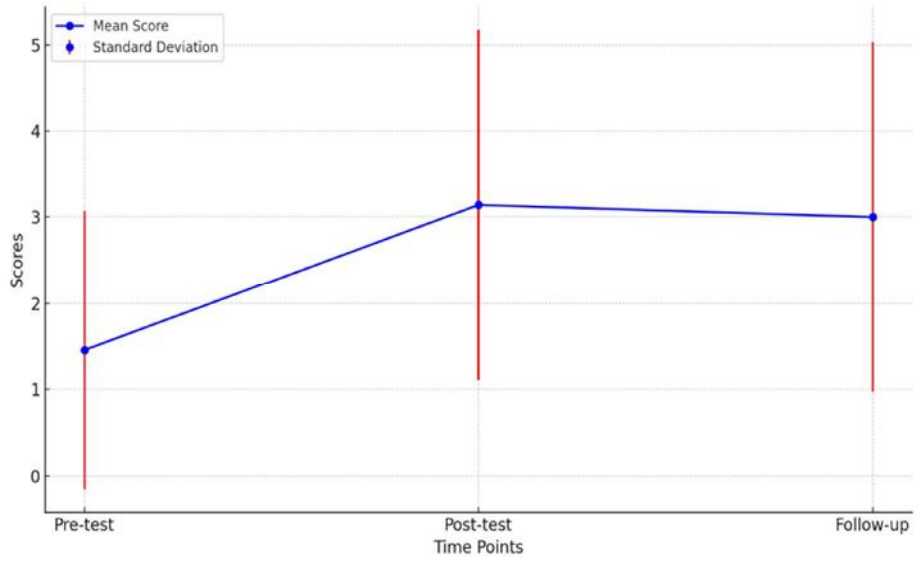


Participants scored an average of 4.00 (SD = 3.188) at the pre-test, which significantly increased by a mean difference of 2.32 (SD difference = 3.09) at both the post-test (M = 6.00, SD = 2.967, t(1) = -7.506, p < 0.001, HS) and the follow-up (M = 6.32, SD = 2.969, t(1) = -7.506, p < 0.001, HS) time points.The study showed a significant improvement in scores from the pre-test to both the post-test and follow-up assessments, indicating a sustained positive effect over time.

4.3.9 Table 53 : Comparison of pre-test, post-test, and follow-up perception scores by dependent t test

Time points	Mean	SD	Mean Diff.	SD Diff.	t-value	P-value
Pre-test	1.46	1.611	-1.680	2.029	-8.278	<0.001, HS
Post-test	3.14	2.035				
Pre-test	1.46	1.611	-1.680	2.029	-8.278	<0.001, HS
Follow-up	3.00	2.034				

Figure 36 : Comparison of pre-test, post-test, and follow-up perception scores by dependent t test



Participants scored an average of 1.46 (SD = 1.611) at the pre-test, showing a significant increase by a mean difference of -1.680 (SD difference = 2.029) at both the post-test (M = 3.14, SD = 2.035, t(1) = -8.278, p < 0.001, HS) and follow-up (M = 3.00, SD = 2.034, t(1) = -8.278, p < 0.001, HS) assessments.

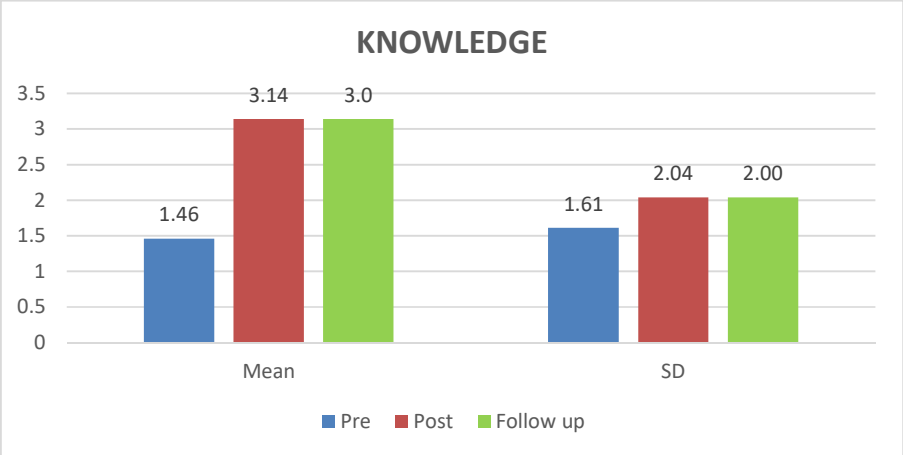
4.3.10 Repeated measures of ANOVA test for KNOWLEDGE

Descriptive Statistics Of Repeated Measured Of ANOVA Test For Knowledge

4.3.10 Table 54: The Mean and Standard Deviation For The Repeated Measures On Knowledge Score Scale

Time	Mean	SD
Pre	1.46	1.61
Post	3.14	2.04
Follow up	3.00	2.00

Figure 37 : The Mean And Standard Deviation For The Repeated Measures On Knowledge Score Scale



The above table shows the mean and standard deviation for the repeated measures on Knowledge score scale. The mean time for participants in the pre-intervention phase was 1.46 (SD = 1.61), which increased to 3.14 (SD = 2.04) post-intervention. This increase was maintained during the follow-up period, with a mean time of 3.14 (SD = 2.04). This data suggests a notable increase in time across the post-intervention and follow

4.3.10.1 Table 55: Multivariant Tests For Knowledge Variable

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	p-value	Partial Eta Squared
Knowledge	Pillai's Trace	.409	68.525	1.000	99.000	.001	.409
	Wilks' Lambda	.591	68.525	1.000	99.000	.000	.409

A repeated measures ANOVA determined that mean for Knowledge statistically significantly between time points (F = 68.525, P < 0.001). Post hoc tests using the Bonferroni correction revealed changes from pre to follow up time period (1.46 ± 1.61 vs 3.14 ± 2.04, respectively), which was statistically significant (p = 0.001). Therefore, we can conclude that a higher statistically significant improvement in Knowledge as compared to pre stage.

4.3.10.2 Table 56 : Mauchly's Test Of Sphericity For Knowledge Variable

Mauchly's Test of Sphericity							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Knowledge	.000	.	2	0.001	.500	.500	.500

We follow Mauchly's test for the sphericity assumption. As a rule of thumb, sphericity is assumed if p-value > 0.05. For our data, p-value = 0.001 so sphericity is not met so we use other parameters for further results.

4.3.10.3 Table 57 : Tests Of Within-Subjects Effects For Knowledge Variable

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Knowledge	Sphericity Assumed	188.160	2	94.080	68.525	.000	.409
	Greenhouse-Geisser	188.160	1.000	188.160	68.525	.000	.409
	Huynh-Feldt	188.160	1.000	188.160	68.525	.000	.409
	Lower-bound	188.160	1.000	188.160	68.525	.000	.409

From this table we are able to discover the F value for the Knowledge, its associated significance level and effect size ("Partial Eta Squared"). We can report that when using an ANOVA with repeated measures with a Sphericity not assumed, the mean scores for score were statistically significantly different as F-values were significant with p-value < 0.05.

A repeated measures ANOVA with a Greenhouse-Geisser determined that mean value is differed statistically significantly between time points as F-values were significant with p-value < 0.05 in the group. Post hoc tests using the Bonferroni correction revealed an improvement in scores from pre stage to follow up stage which was statistically significant (p < 0.05)

4.3.10.4 Table 58 : Tests Of Between-Subjects Effects Of Knowledge Variable Differences Among Pre-Test , Post-Test And Follow-Up.

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	1996.920	1	1996.920	245.560	.000	.713
Error	805.080	99	8.132			

Tests of Between-Subjects Effects shows the significant difference among the three time frames as the p-value is less than 5% level

4.3.10.5 Table 59 : ANOVA Post Hoc Pairwise Comparisons test for pre-test , post-test and follow-up scores

Pairwise Comparisons						
(I) Knowledge	(J) Knowledge	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Pre	Post	-1.680*	.203	.000	-2.174	-1.186
	Follow up	-1.680*	.203	.000	-2.174	-1.186
Post	Pre	1.680*	.203	.000	1.186	2.174
	Follow up	.000	.000	.	.000	.000
Follow up	Pre	1.680*	.203	.000	1.186	2.174
	Post	.000	.000	.	.000	.000

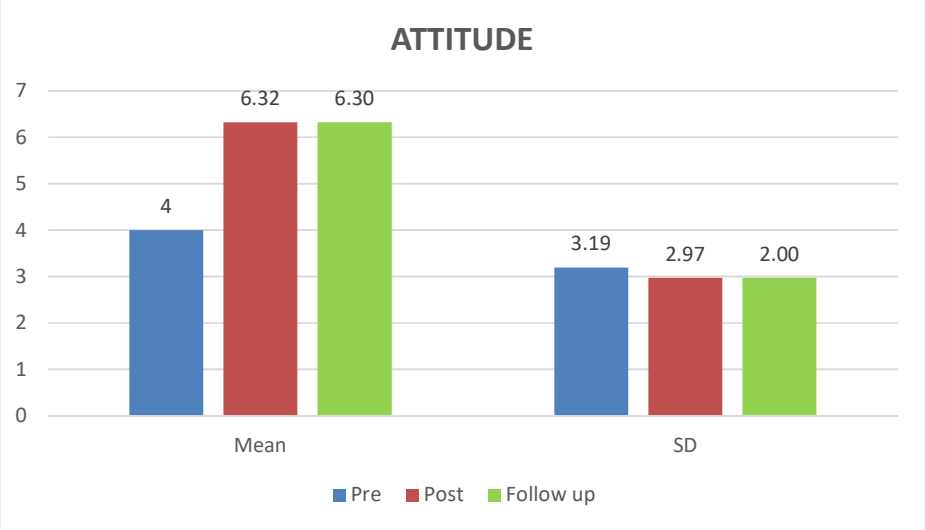
Based on the repeated measures of ANOVA Post Hoc Pairwise Comparisons test as well as the within subject test results, it is concluded that there is significant difference among the time frames from pre to follow up as p-values are significant at 5% level.

4.3.11 Repeated measures of ANOVA test for ATTITUDE

4.3.11 Table 60 : Descriptive Statistics For Attitude Variable

Time	Mean	SD
Pre	4.00	3.19
Post	6.32	2.97
Follow up	6.30	2.00

Figure 38: Mean And Standard Deviation For The Repeated Measures On Attitude Score Scale



The above table shows the mean and standard deviation for the repeated measures on attitude score scale. The mean time for participants in the pre-intervention phase was 4.00 (SD = 3.19), which increased to 6.32 (SD = 2.97) post-intervention. This increase was maintained during the follow-up period, with a mean time of 6.32 (SD = 2.97). These findings suggest a significant increase in time across the post-intervention and follow-up periods compared to the pre-intervention phase.

4.3.11.1 Table 61: Multivariate Tests For Attitude Scores

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	p-value	Partial Eta Squared
Attitude	Pillai's Trace	.363	56.342	1.000	99.000	.001	.363
	Wilks' Lambda	.637	56.342	1.000	99.000	.001	.363

A repeated measures ANOVA determined that mean for Attitude statistically significantly between time points (F = 56.342, P < 0.001). Post hoc tests using the Bonferroni correction revealed changes from pre to follow up time period (4.00 ± 3.19 vs 6.32 ± 2.97, respectively), which was statistically significant (p = 0.001). Therefore, we can conclude that a higher statistically significant improvement in Attitude as compared to pre stage.

4.3.11.2 Table 62: Mauchly's Test of Sphericity for Attitude Variable

Mauchly's Test of Sphericity							
Measure: Time							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Attitude	.000	.	2	0.001	.500	.500	.500

We follow Mauchly's test for the sphericity assumption. As a rule of thumb, sphericity is assumed if p-value > 0.05. For our data, p-value = 0.001 so sphericity is not met so we use other parameters for further results.

4.3.11.3 Table 63 : Tests Of Within-Subjects Effects Within Pre-Test , Post-Test And Follow-Up Attitude Scores

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	p-value	Partial Eta Squared
Attitude	Sphericity Assumed	358.827	2	179.413	56.342	.001	.363
	Greenhouse-Geisser	358.827	1.000	358.827	56.342	.001	.363

From this table we are able to discover the F value for the Attitude, its associated significance level and effect size ("Partial Eta Squared"). We can report that when using an ANOVA with repeated measures with a Sphericity not assumed, the mean scores for score were statistically significantly different as F-values were significant with p-value < 0.05.

A repeated measures ANOVA with a Greenhouse-Geisser determined that mean value is differed statistically significantly between time points as F-values were significant with p-value < 0.05 in the group. Post hoc tests using the Bonferroni correction revealed an improvement in scores from pre stage to follow up stage which was statistically significant (p < 0.05)

4.3.11.4 Table 64 : Tests Of Between-Subjects Effects Of Attitude Variable Differences Among Pre-Test , Post-Test And Follow-Up.

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	p-value	Partial Eta Squared
Intercept	9229.653	1	9229.653	431.208	0.001	.813
Error	2119.013	99	21.404			

Tests of Between-Subjects Effects shows the significant difference among the three time frames as the p-value is less than 5% level.

4.3.11.5 Table 65 : ANOVA Post Hoc Pairwise Comparisons Test For Pre-Test , Post-Test And Follow-Up Scores Of Attitude Scores

Pairwise Comparisons						
(I) Attitude	(J) Attitude	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Pre	Post	-2.320*	.309	.001	-3.073	-1.567
	Follow up	-2.320*	.309	.001	-3.073	-1.567
Post	Pre	2.320*	.309	.001	1.567	3.073
	Follow up	.000	.000	.	.000	.000
Follow up	Pre	2.320*	.309	.001	1.567	3.073
	Post	.000	.000	.	.000	.000

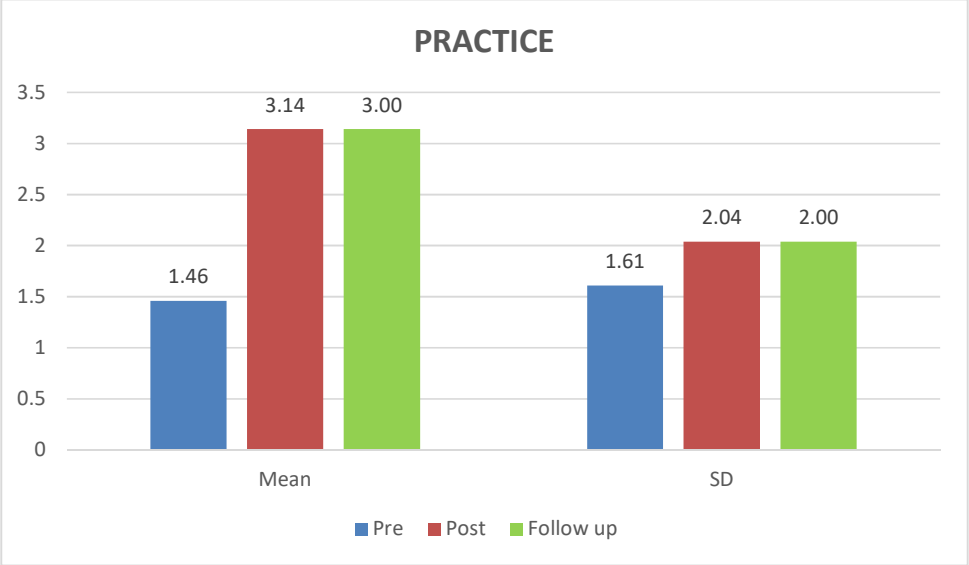
Based on the repeated measures of ANOVA Post Hoc Pairwise Comparisons test as well as the within subject test results, it is concluded that there is significant difference among the time frames from pre to follow up as p-values are significant at 5% level

Repeated measures of ANOVA test for Perception

4.3.12 Table 66 : Descriptive Statistics Of Perception Scores

Time	Mean	SD
Pre	1.46	1.61
Post	3.14	2.04
Follow up	3.00	2.00

Figure 39 : The Mean And Standard Deviation For The Repeated Measures On Know Perception Ledge Score Scale



The above table shows the mean and standard deviation for the repeated measures on Know Perception ledge score scale

The mean time taken by participants in the pre-intervention phase was 1.46 (SD = 1.61), which increased to 3.14 (SD = 2.04) post-intervention. This increase in time was sustained during the follow-up period, with a mean time of 3.14 (SD = 2.04). These results suggest a significant prolongation in time from pre-intervention to post-intervention and follow-up phases.

4.3.12.1 Table 67: Multivariate Tests for Perception Variable

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	p-value	Partial Eta Squared
Perception	Pillai's Trace	.409	68.525	1.000	99.000	.001	.409
	Wilks' Lambda	.591	68.525	1.000	99.000	.001	.409

A repeated measures ANOVA determined that mean for Perception statistically significantly between time points (F = 68.525, P < 0.001). Post hoc tests using the Bonferroni correction revealed changes from pre to follow up time period (1.46 ± 1.61 vs 3.14 ± 2.04, respectively), which was statistically significant (p = 0.001). Therefore, we can conclude that a higher statistically significant improvement in Perception as compared to pre stage

4.3.12.2 Table 68 : Mauchly's Test of Sphericity of Perception Scores

Mauchly's Test of Sphericity							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Perception	.000	.	2	0.001	.500	.500	.500

We follow Mauchly's test for the sphericity assumption. As a rule of thumb, sphericity is assumed if p-value > 0.05. For our data, p-value = 0.001 so sphericity is not met so we use other parameters for further results

4.3.12.3 Table 69 : Tests Of Within-Subjects Effects Within Pre-Test , Post-Test And Follow-Up Perception Scores

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Perception	Sphericity Assumed	188.160	2	94.080	68.525	.000	.409
	Greenhouse-Geisser	188.160	1.000	188.160	68.525	.000	.409

From this table we are able to discover the F value for the Perception, its associated significance level and effect size ("Partial Eta Squared"). We can report that when using an ANOVA with repeated measures with a Sphericity not assumed, the mean scores for score were statistically significantly different as F-values were significant with p-value < 0.05.

A repeated measures ANOVA with a Greenhouse-Geisser determined that mean value is differed statistically significantly between time points as F-values were significant with p-value < 0.05 in the group. Post hoc tests using the Bonferroni correction revealed an improvement in scores from pre stage to follow up stage which was statistically significant (p < 0.05)

4.3.12.4 Table 70 : Tests Of Between-Subjects Effects Of Perception Variable Differences Among Pre-Test , Post-Test And Follow-Up.

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	p-value	Partial Eta Squared
Intercept	1996.920	1	1996.920	245.560	.000	.713
Error	805.080	99	8.132			

Tests of Between-Subjects Effects shows the significant difference among the three time frames as the p-value is less than 5% level.

4.3.12.5 Table 71: ANOVA Post Hoc Pairwise Comparisons Test For Pre-Test , Post-Test And Follow-Up Scores Of Perception Scores

Pairwise Comparisons						
(I) Perception	(J) Perception	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Pre	Post	-1.680*	.203	.000	-2.174	-1.186
	Follow up	-1.680*	.203	.000	-2.174	-1.186
Post	Pre	1.680*	.203	.000	1.186	2.174
	Follow up	.000	.000	.	.000	.000
Follow up	Pre	1.680*	.203	.000	1.186	2.174
	Post	.000	.000	.	.000	.000

Based on the repeated measures of ANOVA Post Hoc Pairwise Comparisons test as well as the within subject test results, it is concluded that there is significant difference among the time frames from pre to follow up as p-values are significant at 5% level

4.3.13 Table 72 : ANOVA test for Age categories and Knowledge, Attitude, Perception

Variable	Group status	Sum of Squares	Mean Square	F	p-value
Knowledge	Between Groups	1.540	.770	.183	0.833
	Within Groups	408.500	4.211		
	Total	410.040			
Attitude	Between Groups	10.202	5.101	.574	0.565
	Within Groups	861.558	8.882		
	Total	871.760			
Perception	Between Groups	1.540	.770	.183	0.833
	Within Groups	408.500	4.211		
	Total	410.040			

The above table shows that there is no variation or difference between and within the groups across Age categories w.r.t. Knowledge, Attitude, Perception since p-value is more than 5% level. For Knowledge, there were no significant differences between groups ($F(1, \infty) = 0.183$, $p = 0.833$), with Between Groups sum of squares at 1.540 and Within Groups sum of squares at 408.500, totaling 410.040. For Attitude, group differences were not significant ($F(1, \infty) = 0.574$, $p = 0.565$), with Between Groups sum of squares of 10.202 and Within Groups sum of squares of 861.558, totaling 871.760. Similarly, for Perception, no significant differences between groups were observed ($F(1, \infty) = 0.183$, $p = 0.833$), with Between Groups sum of squares totaling 1.540 and Within Groups sum of squares totaling 408.500, amounting to a total of 410.040.

4.3.14 Table 73 : Independent test across gender and Knowledge, Attitude, Perception

Variable	Gender	Mean	SD	t-value	p-value
Knowledge	Female	3.52	2.02	2.059	0.042
	Male	2.70	1.97		
Attitude	Female	6.88	2.61	2.061	0.042
	Male	5.68	3.19		
Perception	Female	3.52	2.02	2.059	0.042
	Male	2.70	1.97		

The above table shows that there is a difference between the groups across Gender categories w.r.t. Knowledge, Attitude, Perception since p-value is less than 5% level. In examining gender differences across three variables, females consistently exhibited significantly higher scores compared to males. Specifically, for Knowledge, females (M = 3.52, SD = 2.02) scored higher than males (M = 2.70, SD = 1.97), with a significant t-value of 2.059 (p = 0.042). Similarly, in Attitude, females (M = 6.88, SD = 2.61) had significantly higher scores than males (M = 5.68, SD = 3.19), with a t-value of 2.061 (p = 0.042). Likewise, in Perception, females (M = 3.52, SD = 2.02) outscored males (M = 2.70, SD = 1.97), with a significant t-value of 2.059 (p = 0.042). These findings suggest consistent gender differences favoring females across Knowledge, Attitude, and Perception measures in the study.

4.3.15 Table 74: ANOVA test for education categories and Knowledge, Attitude, Perception

Variable	Group status	Sum of Squares	Mean Square	F	p-value
Knowledge	Between Groups	6.743	2.248	.535	.659
	Within Groups	403.297	4.201		
	Total	410.040			
Attitude	Between Groups	21.079	7.026	.793	.501
	Within Groups	850.681	8.861		
	Total	871.760			
Perception	Between Groups	6.743	2.248	.535	.659
	Within Groups	403.297	4.201		
	Total	410.040			

The above table shows that there is no variation or difference between and within the groups across education categories w.r.t. Knowledge, Attitude, Perception since p-value is more than 5% level. The ANOVA results indicate that there were no significant differences observed between groups for any of the variables: Knowledge ($F(1, \infty) = 0.535$, $p = 0.659$), Attitude ($F(1, \infty) = 0.793$, $p = 0.501$), or Perception ($F(1, \infty) = 0.535$, $p = 0.659$). For Knowledge, the Between Groups sum of squares was 6.743 and the Within Groups sum of squares was 403.297, resulting in a total of 410.040. Similarly, Attitude showed a Between Groups sum of squares of 21.079 and Within Groups sum of squares of 850.681, totalling 871.760. Perception had a Between Groups sum of squares of 6.743 and Within Groups sum of squares of 403.297, amounting to a total of 410.040. These findings suggest that there were no statistically significant differences observed between the groups across all measured variables.

4.3.16 Table 75 : ANOVA test for Economic status categories and Knowledge, Attitude, Perception

		Sum of Squares	Mean Square	F	p-value
Knowledge	Between Groups	3.139	1.569	.374	.689
	Within Groups	406.901	4.195		
	Total	410.040			
Attitude	Between Groups	11.063	5.532	.623	.538
	Within Groups	860.697	8.873		
	Total	871.760			
Perception	Between Groups	3.139	1.569	.374	.689
	Within Groups	406.901	4.195		
	Total	410.040			

The above table shows that there is no variation or difference between and within the groups across Economic status categories w.r.t. Knowledge, Attitude, Perception since p-value is more than 5% level. There were no significant differences found between groups for Knowledge ($F(1, \infty) = 0.374$, $p = 0.689$), Attitude ($F(1, \infty) = 0.623$, $p = 0.538$), or Perception ($F(1, \infty) = 0.374$, $p = 0.689$). Specifically, for Knowledge, the Between Groups sum of squares was 3.139 and the Within Groups sum of squares was 406.901, resulting in a total of 410.040. Similarly, Attitude had a Between Groups sum of squares of 11.063 and Within Groups sum of squares of 860.697, totalling 871.760. Perception showed a Between Groups sum of squares of 3.139 and Within Groups sum of squares of 406.901, amounting to a total of 410.040. These findings indicate that there were no statistically significant differences observed between groups across all measured variables.

4.3.17 Table 76 : Independent test across marital status and Knowledge, Attitude, Perception

Variable	Marital	Mean	SD	t-value	p-value
Knowledge	Single	3.80	1.77	1.635	0.105
	Married	2.98	2.07		
Attitude	Single	7.20	2.73	1.492	0.139
	Married	6.10	3.00		
Perception	Single	3.80	1.77	1.635	0.105
	Married	2.98	2.07		

The above table shows that there is no difference between the groups across Marital categories w.r.t. Knowledge, Attitude, Perception since p-value is more than 5% level. The comparison between marital statuses showed no statistically significant differences in Knowledge (t (1) = 1.635, p = 0.105), where singles (M = 3.80, SD = 1.77) had slightly higher mean scores compared to married individuals (M = 2.98, SD = 2.07). Similarly, for Attitude, no significant differences were found (t (1) = 1.492, p = 0.139), with singles (M = 7.20, SD = 2.73) showing slightly higher mean scores than married individuals (M = 6.10, SD = 3.00). Perception scores also showed no significant differences between singles (M = 3.80, SD = 1.77) and married individuals (M = 2.98, SD = 2.07) (t (1) = 1.635, p = 0.105). These results suggest that marital status did not significantly affect the scores in Knowledge, Attitude, or Perception measures in this study.

4.3.18 Table 77: Independent test across Residence and Knowledge, Attitude, Perception

Variable	Residence	Mean	SD	t-value	p-value
Knowledge	Rural	3.20	2.05	0.400	0.690
	Urban	3.03	2.04		
Attitude	Rural	6.57	2.73	1.146	0.254
	Urban	5.86	3.36		
Perception	Rural	3.20	2.05	0.400	0.690
	Urban	3.03	2.04		

The above table shows that there is no difference between the groups across Residence categories w.r.t. Knowledge, Attitude, Perception since p-value is more than 5% level. There were no statistically significant differences observed between rural and urban residents in Knowledge (t (1) = 0.400, p = 0.690), Attitude (t(1) = 1.146, p = 0.254), or Perception (t(1) = 0.400, p = 0.690). In Knowledge, rural residents (M = 3.20, SD = 2.05) and urban residents (M = 3.03, SD = 2.04) showed similar mean scores. Likewise, for Attitude, rural residents (M = 6.57, SD = 2.73) and urban residents (M = 5.86, SD = 3.36) had comparable mean scores. Similarly, in Perception, there were no significant differences between rural residents (M = 3.20, SD = 2.05) and urban residents (M = 3.03, SD = 2.04). These results indicate that residence location did not significantly impact scores in Knowledge, Attitude, or Perception measures in this study.

4.3.19 Images of Patients' Adverse Drug Reactions

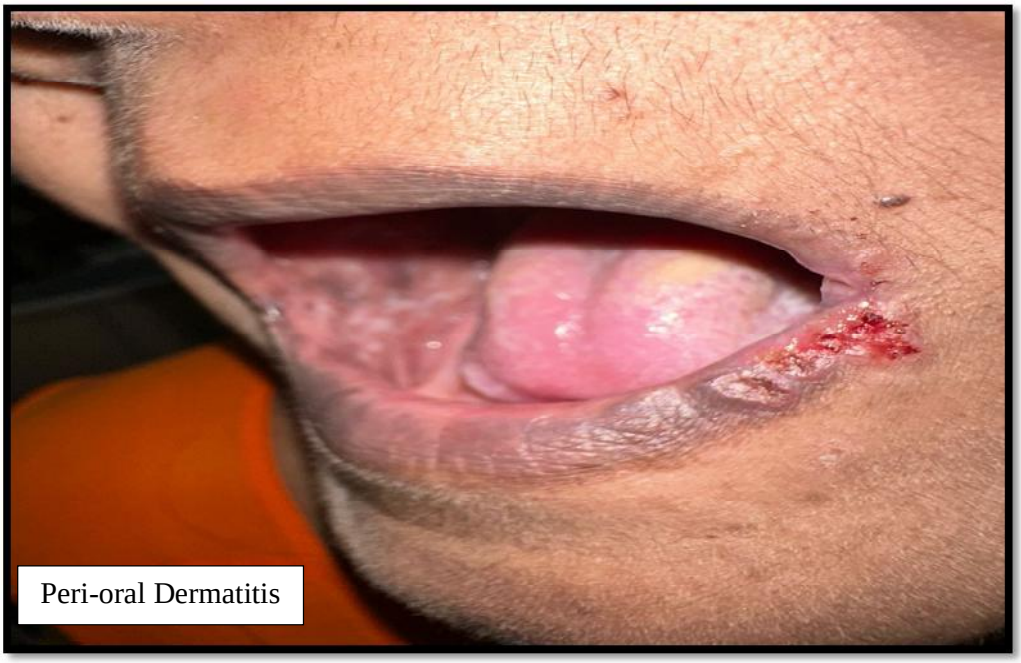


Figure 40: Peri-oral Dermatitis

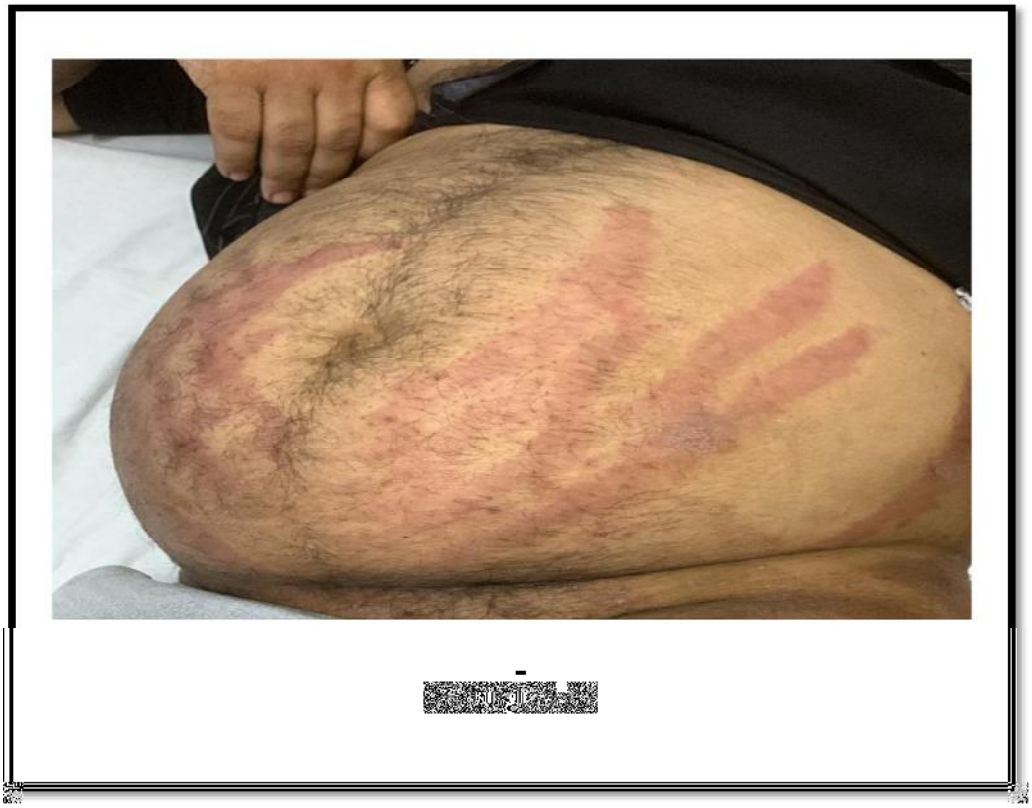


Figure 41 : Striea

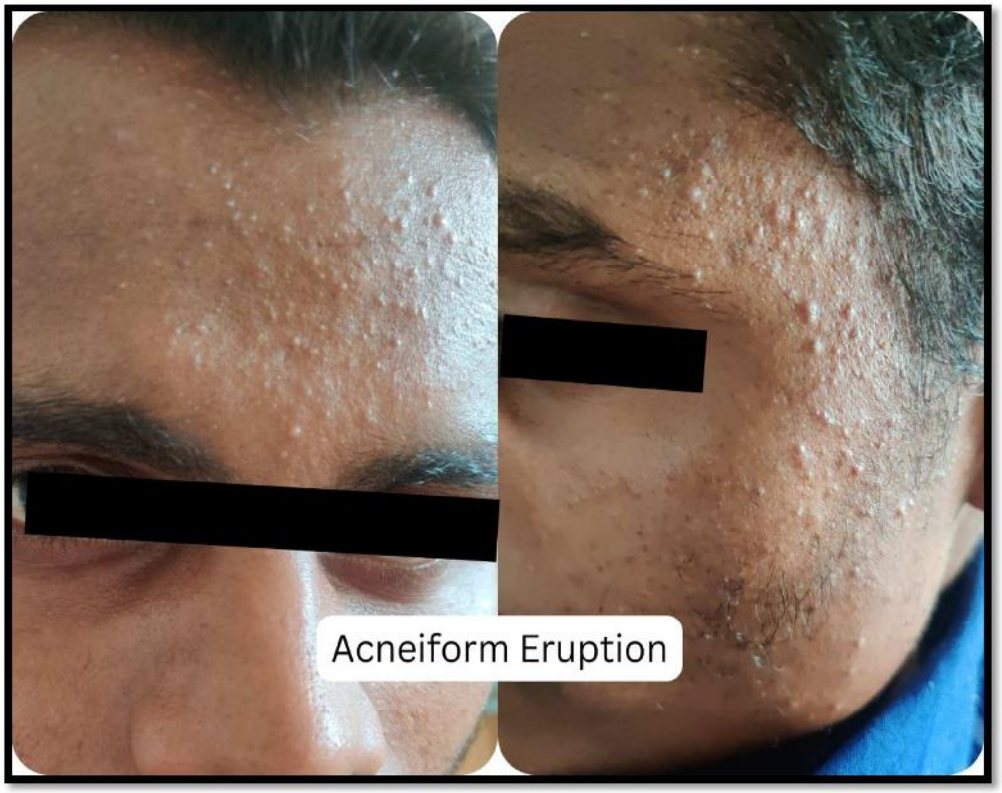


Figure 42 : Acneiform Eruption

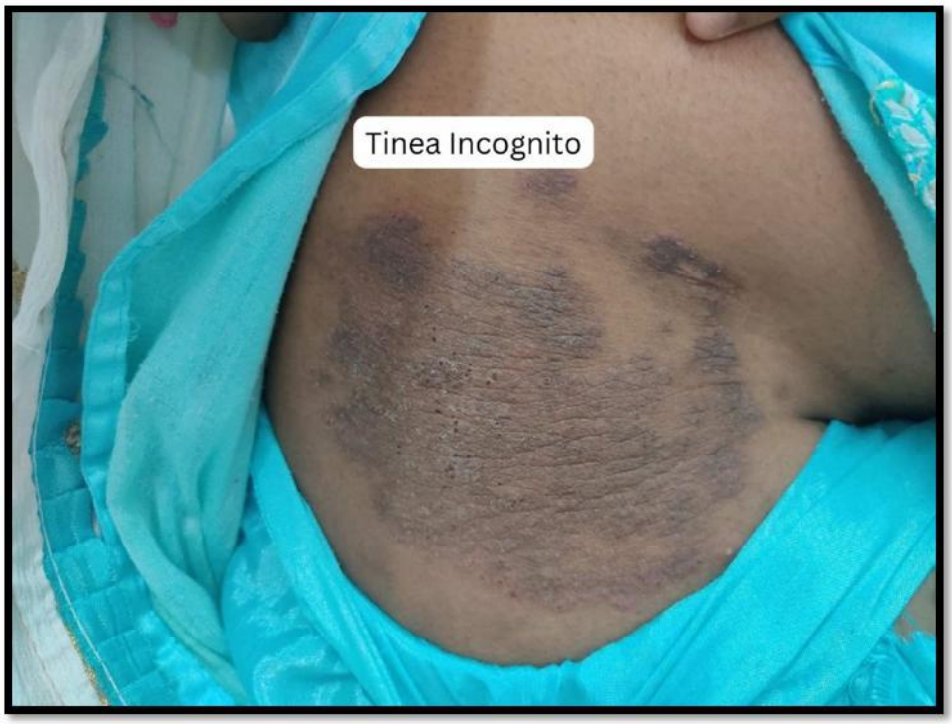


Figure 43 : Tinea Incognito

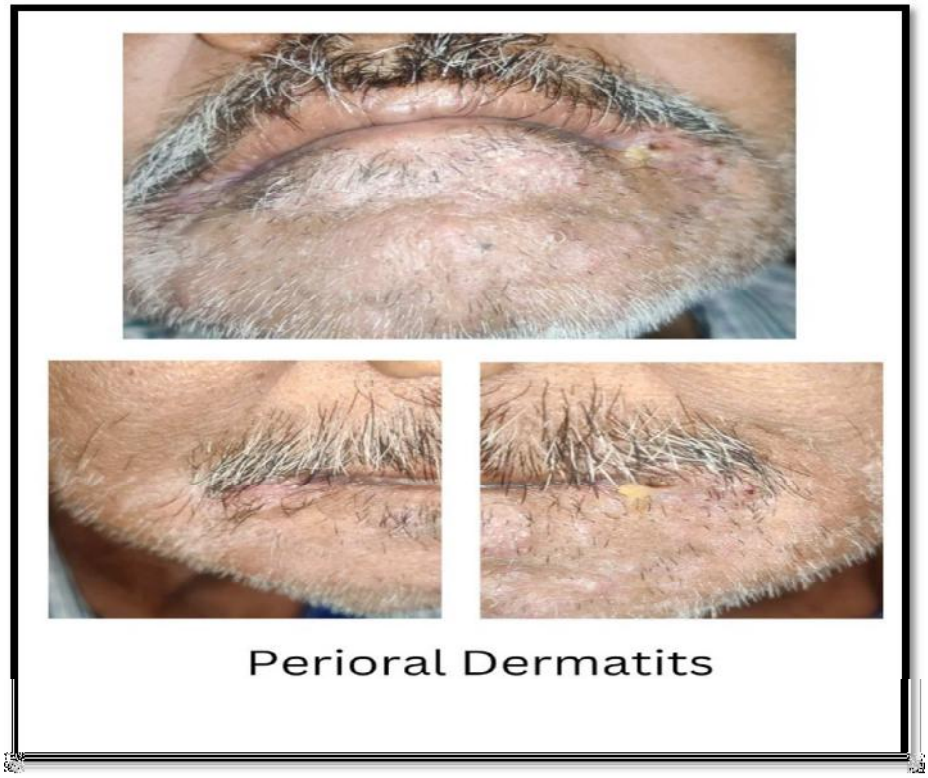


Figure 44 : Perioral Dermatitis

Figure 45 : Irritant Contact Dermatitis

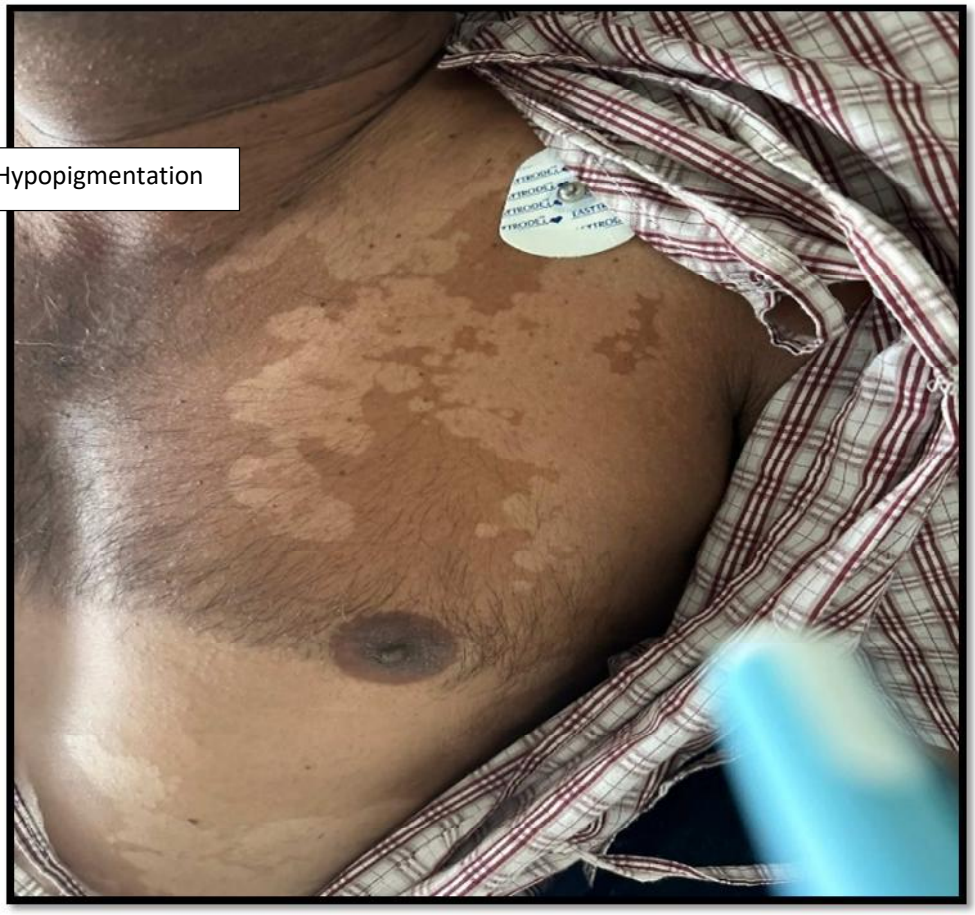


Figure 46 : Hypopigmentation

5. DISCUSSION

5.1 Community Pharmacists

In a country like India where people have very less information about drug like topical corticosteroid, pharmacists have a key role in educating them and minimize their irrational use.[76-77] For this, community pharmacists should be well knowledgeable regarding its indication, potential side effects and other drug related information.[78-79] Lack of knowledge can lead to misleading information while counselling.[80-81] In our study, we tried to assess and educate community pharmacists about corticosteroids.[41]

In a similar study conducted by **Jairuon et al**., analyzed the pharmacy curriculum regarding topical corticosteroid use and safety, revealed that some community pharmacists who participated in their study do not have a detailed understanding regarding the indications of topical corticosteroids similarly in our study pre-test mean scores indicates low level 3.19 knowledge scores around 4.50 which shows many community pharmacists are having less knowledge on topical corticosteroids.[38-82]

In a study conducted by **Karalikkattil et al.,** among pharmacy students, it showed that there was a significant difference in the information related to the side effects and classes of topical corticosteroids. In our study only 72% of the community pharmacists have knowledge about the side effects of corticosteroids and only 59% of the community pharmacists know about the classes of topical corticosteroids.

This highlights that there is a need to co **Lau et al.,** showed that 63% of the pharmacists did not know the potency grading of the corticosteroids. Data from our study shows that only 29% of the community pharmacists have knowledge about the potency of corticosteroids. This percentage has increased to 74% in the post study data collected after educating them Lau et al., also showed that the community pharmacists did not counsel the patient regularly regarding corticosteroids, where as our study demonstrated that only 41% of the pharmacists regularly counselled the patients.[41-83]

Kang et al., concluded that the frequency of sales without prescription was 68.5%, where as our data showed a 63% rate of without prescription sales by the community pharmacist. Our study also shows that among 208 samples only 3 community pharmacist reported patient having topical corticosteroid side effects and none of them reported to these side effects to higher authorities. This number is much less when compared to the study by **Kang et al.,** 18.5% of the community pharmacist reported topical corticosteroid side effects. Similarly, Kang M J al. also showed a 48.9% rate of patient counselling was done by the community pharmacist, where as our study shows that 70% of the patients were counselled by the community pharmacist. Among the participants of our study 77.9% where D Pharm graduates which could be the reason for poor knowledge about topical corticosteroids.[84-85]**Mahdy et al.,** in their study they tested the knowledge, attitude and practices of topical corticosteroids use in patients in the UAE and found poor results, which is similar to the findings of our study were also majority of the community pharmacist showed low to average regarding topical corticosteroid use.[86-87]

Smith et al., in a study tested pharmacists' knowledge about use of topical corticosteroids in atopic dermatitis and found that non-adherence in the treatment was major factor for its failure. They also compared pre and post continuing professional education behaviour amongst the pharmacists which showed marked improvement in the form that the number of pharmacists advising patients to stop medications pre-maturely decreased whereas the numbers of those advising to continue until the full remission increased. This finding is similar to the findings of our study where we compared knowledge, attitude, and practices of the community pharmacists' pre and post education with the study material and found that there is a significant improvement in the KAP of community pharmacists in the post and followup education category irrespective of their experience in the field.[31]

5.2 Health Science Student Population

Awareness on topical corticosteroids among the health science students is one of the better implementing education choices which improves the practice in treating common people who abuse the topical corticosteroids. [66] Among all the literature that is currently available, studies on topical steroid usage only include demographic information, are cross- sectional studies, and do not include follow-up studies. Although topical corticosteroids are ideal advised for particular illnesses and for particular lengths of time, this regimen is rarely followed. Its overuse and misuse have reached epidemic proportions, as is the situation in India. It will be extremely concerning if the population of health science students, who are an important part of the medical community and who should be strongly opposed to the idea of drug abuse, use topical corticosteroids on themselves for cosmetic reasons.[67] Since not all health science students will become dermatologists and there aren't enough

dermatologists to treat everyone, learning about topical steroids should be part of the curriculum.

In a study conducted by Muthukumar and Ganapathy, among the majority of dentistry students concluded that they were knowledgeable with topical corticosteroid formulation, its use, and adverse effects. similarly in our study the health science students of both case and control groups were having pre-test knowledge low awareness in parameters such as application, usage, side effects about the topical corticosteroids but in the post test the knowledge about topical corticosteroids had been improved in case and remains same in control group.[68]

In another study conducted by **Alsukait et al.** among the physicians had shown low knowledge as similar to our study in pre-test. In our study the knowledge of the health science students was improved after educating, lack of adequate dermatology instruction in undergraduate curriculum may be to responsible for knowledge gaps regarding topical corticosteroids.[69]

Topical corticosteroids are classified as schedule-H pharmaceuticals under the 1945 drugs and Cosmetics Rules, which prohibits the purchase of these medications without a valid prescription from a licensed physician. [70] In our study the health science students of both case and control groups were having pre-test attitude on schedule-H drugs awareness was less but after educating in the post test attitude case group was improved regarding schedule-H awareness on topical corticosteroids. [71]

In a survey conducted by **Berce et al.,** on Family medicine providers, pharmacists interns and dermatology residents perception towards topical corticosteroids appears low which was modifiable characterized by significant

improvements in overall knowledge and beliefs following participation in an evidence-based instructional session on the proper use of topical corticosteroids. [49] Similarly in our study regarding perception towards topical corticosteroids both case and control groups were having pre-test perception on topical corticosteroids was low but in post test case group got improved and control group remains same.[48]

According to one of the surveys conducted by Parul Verma, Pathania S et al., there is a significant gap in the knowledge, attitude, and practice of topical corticosteroids among medical graduates. This gap can be filled with appropriate undergraduate training, as our study demonstrates a significant improvement in KAP following instruction using educational tools such as student information leaflets, audio visuals, and seminars.[48] In this study, we focused on the students with the objective to find out about their knowledge, attitudes, and perceptions about topical steroids topical corticosteroids and to make them educated about steroid abuse and misuse.[40-73]

In a study conducted by **Saxon D Smith et al.,** concludes there is a significant knowledge gaps about the use and safety of TCS among pharmacists similarly in our study pharmacy students also lacking knowledge gaps about the use and safety of TCS. So, it is our responsibility to educate medical fraternity on safety use of Topical Corticosteroids. Pharmacy students should be educated as they will be future community pharmacists who can educate the patients about TCS safety usage. [72-74]

In a study conducted by **Ashley N Millard et al.,** concludes an interprofessional practice gap found between dermatologists and pharmacists.[75] Similarly, in our study the pre-test and post-test shows improvement in knowledge, attitude and perception on topical corticosteroids. The collaborative education and

communication between the health science student groups is necessary required about application and adverse effects of topical corticosteroids.[75]

5.3 Patients

Totally 100 patients with ADRs by the abuse of topical corticosteroids were enrolled for the study. All of them abused topical corticosteroids more than a month. It was found that topical corticosteroids were abused in all ages and mostly in the age group in between 22-40yrs and all most equally in both genders but slightly more in males . Nearly 56% of the people were graduates (most of them were students).Most of them are having fair economic status (49%).Most of them are married (80%). Most of the people were from rural area (65%).[88]

The patients with ADRs may higher when compared with similar studies and it may possible because we only included the patients with ADRs by the abuse of topical corticosteroids. Gender, duration of the TCs abuse, literacy, economic status, marital status and residence of the patients were nearly similar to other studies.[51]

Nearly 31% of the people used TCs for skin lightening , (20%) for fungal infections like tinea corporis and tinea cruris and 14% of the people used topical corticosteroids for dermatophytosis, 11% for dermatitis , 10% acne vulgaris. Others (9%) topical corticosteroids used for melasma, 3% for eczema and 2% for psoriasis. Similar studies conclude that most of the patients (±50%) were used TCs for skin lightening, acne and dermatophytosis Very high potent TCs such as Clobetasol propionate 0.05% and beclomethasone were abused by 29% and 27% of the patient. It was nearly similar in some studies and some studies were conclude that clobetasol was commonly abused by a greater number (≥50%) of patients.

ADRs were found from the patients with the abuse of topical corticosteroids were Tinea Incognito affects 8 individuals (8.0%), Acne affects 31 individuals (31.0%), Irritant Contact Dermatitis affects 10 individuals (10.0%), TSDF (Topical Steroid Damaged Face) affects 19 individuals (19.0%), Striae affects 9 individuals (9.0%), Hypopigmentation affects

9 individuals (9.0%), Perioral Dermatitis affects 11 individuals (11.0%), and Rosacea affects 3 individuals (3.0%). This data outlines the various adverse reactions observed, with acne being the most common and rosacea the least common among the reported conditions. Acne form eruptions, tinea and telangiectasia was the most common ADRs in some others studies (±40%).[48]

The Naranjo scale assessment results indicate that among the participants, 3 individuals (3.0%) were classified as having a definite outcome, 36 individuals (36.0%) had a probable outcome, and 61 individuals (61.0%) had a possible outcome. This distribution illustrates the varying degrees of certainty regarding the assessed outcomes, with the majority falling under the possible category similar to other studies like Rathi et al.[89]

The distribution of information sources among respondents indicates that 10 individuals (10.0%) obtained information from General Practitioners, 17 individuals (17.0%) from Non-Allopathic Doctors, 51 individuals (51.0%) from Pharmacists, 6 individuals (6.0%) from Friends, 4 individuals (4.0%) from Relatives, and 12 individuals (12.0%) from Social Media. This data reveals the varied sources from which individuals acquired information about topical corticosteroids, with pharmacists being the most frequently accessed source similar to Sarathi R et al., where Nearly 88% of the people bought TCs from pharmacies without prescription.[41]

In a study conducted by **Mahdi Al Dhafiri et al.,** among the majority of patients concluded that they were not knowledgeable with topical corticosteroid formulation, its use, and adverse effects. similarly in our study the patients were having pre-test knowledge low awareness in parameters such as application, usage, side effects about the topical corticosteroids but in the post test and follow-up the knowledge about topical corticosteroids had been improved . In our study the knowledge of the patients was improved after educating, lack of adequate patient counselling in patients may be to responsible for knowledge gaps regarding topical corticosteroids.[90]

Basak et al., and Meena et al., have shown that lesser awareness regarding side effects of topical corticosteroids similarly in our study the attitude and perception of the patients were low in pre test scores and significantly improved in post test , follow-up scores after counselling patients using Patient information leaflet.[88]

6.SUMMARY

The study aimed to assess the knowledge, attitude, and perception (KAP) regarding topical corticosteroids among community pharmacists, health sciences students, and patients. This is in response to the prevalent abuse of topical corticosteroids in India, particularly on the face, which poses a growing challenge for dermatologists. Key factors contributing to this issue include a lack of public awareness and the ease of obtaining these potent medications without a prescription. Addressing this problem necessitates urgent remedial steps to enhance awareness among community pharmacists, health sciences students, and patients. The study employed a prospective design, using validated KAP questionnaires to evaluate participants' knowledge, attitudes, and practices before and after an educational intervention, with a follow-up assessment. Participants were selected through convenience sampling, and ethical committee approval was obtained.

The pre-test results revealed significant gaps in knowledge, attitudes, and practices among all groups. Community pharmacists often lacked comprehensive understanding of the appropriate use and potential side effects of topical corticosteroids. Health sciences students displayed inadequate knowledge of the pharmacology and safe application of these medications, while patients were largely unaware of the risks associated with improper use and frequently utilized these medications without proper guidance. Following the educational interventions, which included seminars with audio-visual aids, patient counselling sessions, and interactive workshops, post-test scores demonstrated significant improvements in KAP across all groups. Community pharmacists showed enhanced understanding and improved dispensing practices, health sciences students exhibited better knowledge and

attitudes, and patients became more aware and cautious in their use of topical corticosteroids.

The follow-up assessments indicated that the improvements were sustained over time, although continuous education and reinforcement were deemed necessary to maintain high levels of knowledge and safe practices. The study concludes that there is a crucial need for ongoing educational programs to ensure optimal patient care and rational drug dispensing. Continuous re-education for community pharmacists is essential to prevent the misuse of topical corticosteroids. Additionally, effective patient counselling and tailored educational initiatives are vital for bridging knowledge gaps and improving healthcare outcomes. This comprehensive approach to education and awareness can significantly mitigate the abuse of topical corticosteroids and enhance the overall health and well-being of patients.

7.CONCLUSION

In conclusion, this study underscores the critical need for targeted educational interventions within various healthcare sectors. Our findings demonstrate a notable deficiency in knowledge, attitude, and practice among community pharmacists, health science students, and patients alike. However, through the implementation of educational seminars, workshops, and innovative tools such as audio-visual aids and information leaflets, significant improvements were observed across all groups. It is evident that ongoing re-education programs, particularly for practicing community pharmacists, are essential for ensuring the delivery of optimal patient care and rational drug dispensing practices. Furthermore, our study highlights the effectiveness of patient counselling in enhancing patient understanding and perception. Urgent action is warranted to address these knowledge gaps and increase awareness within the general public. Thus, the implementation of educational initiatives tailored to each respective group is crucial for bridging these gaps and promoting better healthcare outcomes.

7.1 LIMITATION OF THE STUDY

- The study was restricted in the urban area of the Belagavi.
- Hospital pharmacists were not included in this study.
- The recruitment process focused exclusively on the health science student cohort, while recognizing a potential need for heightened awareness among students from non-health science disciplines regarding the misuse of topical corticosteroids.
- Within this study, exclusively individuals exhibiting misuse of topical corticosteroids were enrolled, highlighting the imperative for comprehensive patient counselling to be administered universally among those employing topical corticosteroids, elucidating appropriate application quantities and delineating essential guidelines and precautions associated with their topical usage.

7.2 FUTURE DIRECTIONS

The necessity of extending evaluation efforts to talukas and rural regions is underscored by the heightened accessibility of community pharmacies in those locales, thereby warranting targeted interventions to address topical corticosteroid misuse. Implementation of compulsory continuing pharmacy education programs for community pharmacists focusing on topical corticosteroid dispensing is advocated to enhance their proficiency and effectively mitigate the prevalence of abuse across India.

The imperative for the implementation of comprehensive awareness initiatives addressing topical corticosteroid abuse within collegiate settings arises from the recognition of the prevalent misuse and associated health risks, advocating for the utilization of audio-visual aids to enhance understanding and promote responsible medication practices among students.

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ANNEXURE – I - ETHICAL CLEARANCE LETTER

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Formerly known as KLE University)
(Deemed-to-be-University established u/s 3 of the UGC Act, 1956)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
JNMC Campus, Nehru Nagar, Belagavi-590 010, Karnataka State, India
☎: 0831-2444444 FAX: 0831-2493777 Web: http://www.kledeemeduniversity.edu.in E-mail: info@kledeemeduniversity.edu.in

Ref.No.KAHER/EC/21-22/023 29th July 2021

To,
Dr.Sowmya Spoorthi.M
Full time Ph.D. Research Scholar,
2020-21Batch, Faculty of Pharmacy,
KAHER, Belagavi.

Dear Research Scholar,

The KAHER Ethics Committee on Human Subjects for Ph.D. Research Project met on **the 7th and 8th June, 2021** to consider your application for approval of the research project **"Assessment and evaluation of rational dispensing of topical corticosteroids by community pharmacists and its implications on health science population"**

As there are no ethical issues involved in your proposed research project, the committee has provided approval for this research project.

You are requested to report to Ethical Committee of the following:

1. Any deviation from or change of the protocol.
2. Any changes in study documents.

(Dr. Sheetal U. Harakuni)
Member-Secretary
Ethical Committee (Human) for Ph. D. Research
KAHER, Belagavi.

(Dr. B.C. Kotintot)
Chairman
Ethical Committee (Human) for Ph. D. Research
KAHER, Belagavi.

CC to:

- Special Officer to Hon. Vice Chancellor, KAHER, Belagavi
- The Registrar, KAHER, Belagavi.
- The Director Research Foundation, KAHER, Belagavi.
- The Director Academic Affairs, KAHER, Belagavi.

ANNEXURE – II - PERMISSION LETTERS

Date: 24/08/2021

To
Medical Director & Chief Executive
KLEs Dr. Prabhakar Kore Hospital and MRC
Nehrunagar, Belagavi – 590010

Through,
Principal,
KLE College of Pharmacy,
Nehrunagar, Belagavi – 590010

Sub: Application for permission to conduct Ph. D dissertation work in the department of dermatology in KLEs Dr. Prabhakar Kore Hospital & MRC, Belagavi -590010

Respected Sir,

With respect to the above cited subject, Dr. Sowmya Spoorthi .M, full time research scholar of Doctor of Philo ophy (Ph. D) in pharmacy, under the guidance of Prof. (Dr.) M. S. Ganachari, would ike to take your permission to conduct Ph. D dissertation work from October 2021 to January 2023 in the department of Dermatology in KLEs Dr. Prabhakar Kore Hospital & MRC. A copy of ethical approval and protocol has been attached for your reference. The title of the project is mentioned below:

Title: Assessment And Evaluation of Rational Dispensing Of Topical Corticosteroids By Community Pharmacists And It's Implication On Health Science Population.

Kindly permit the same and do the needful.

Thanking you,

Yours sincerely,

Research Guide
Prof. (Dr.) M. S. Ganachari
Head of the Department
Dept. of Pharmacy Practice
KLE College of Pharmacy,
Nehrunagar, Belagavi – 590010

COLLEGE OF PHARMACY BELAGAVI 590 010.

Principal
KLE College of Pharmacy,
Nehrunagar, Belagavi - 590010

PRINCIPAL
KLE College of Pharmacy
BELAGAVI - 10.

Prof. & Head
Dept. of Pharmacy Practice
KLE College of Pharmacy, Belgaum

CC to: HOD, Department of Dermatology, KLEs Dr. Prabhakar Kore Hospital and MRC, Nehru Nagar, Belagavi

Permitted 26/10/2021

Date:24/08/2021

To
Medical Superintendent
KLEs Dr. Prabhakar Kore Charitable Hospital
Nehrunagar, Belagavi – 590010

Through,
Principal,
KLE College of Pharmacy,
Nehrunagar, Belagavi – 590010

Sub: Application for permission to conduct Ph. D dissertation work in the department of dermatologyin KLEs Dr. Prabhakar Kore Charitable Hospital, Belagavi -590010

Respected Sir,

With respect to the above cited subject, Dr. Sowmya Spoorthi .M, full time research scholar of Doctor of Philosophy (Ph. D) in pharmacy, under the guidance of Prof. (Dr.) M. S. Ganachari, would like to take your permission to conduct Ph. D dissertation work from October 2021 to January 2023 in the department of Dermatology in KLEs Dr. Prabhakar Kore Hospital & MRC. A copy of ethical approval has been attached for your reference. The detail of the project is mentioned below:

Title: Assessment And Evaluation of Rational Dispensing Of Topical Corticosteroids By Community Pharmacists And It's Implication On Health Science Population.

Kindly permit the same and do the needful

Thanking you,

Yours sincerely,

Research Guide
Prof. (Dr.) M. S. Ganachari
Head of the Department
Dept. of Pharmacy Practice
KLE College of Pharmacy,
Nehrunagar, Belagavi - 590010

Prof. M. S. Ganachari
Prof. & Head
Department of Pharmacy Practice
KLE College of Pharmacy, Belgaum

KLE COLLEGE OF PHARMACY BELAGAVI 590 010.

Principal
KLE College of Pharmacy,
Nehrunagar, Belagavi - 590010

PRINCIPAL
KLE College of Pharmacy
BELAGAVI - 10.

CC to: HOD, Department of Dermatology , KLEs Dr. Prabhakar Kore Charitable Hospital, Nehru Nagar, Belagavi

24/8/21

ANNEXURE – III – VALIDATION CERTIFICATES

Certificate for Validity of KAP Questionnaires for Community Pharmacists

This is to certify that Dr. Sowmya Spoorthi. M of Ph.D. scholar working on her dissertation topic: **"Assessment and Evaluation of Rational Dispensing of Topical Corticosteroids by Community Pharmacists and It's Implication on Health Science Population** " India for the partial fulfilment of her Ph.D. has given her KAP Questionnaires for Community Pharmacists for validity.

I have gone through the content enclosed here in terms of its relevance and have given my suggestions for KAP Questionnaires for Community Pharmacists. I have found it to be valid for conducting the research.

SL.No	Name	Designation	Signature
1)	Dr Bhavana R Doshi	Prof & Head,	Dr. Bhavana R. Doshi Consultant Dermatologist Reg. No. MAH2005000045 KLES Dr. Prabhakar Kore H
2)	Dr VIJAYA V. SAJJAN	Associate Professor	Dr. Vijaya V. Sajjan Consultant Dermatologist Reg. No. 45868 KLES Dr. Prabhakar Kore Hospital & MRC, Belagavi-590 010
3)	Dr. Sharada V. Goudagaon	Assistant Professor	Dr. Sharada Goudagaon Consultant Dermatologist Reg. No. 45868 KLES Dr. Prabhakar Kore Hospital & MRC, Belagavi-590 010
4.	Dr. S. Pal Krishan Reddy	Senior Resident	Dr. S. PAL KISHAN REDDY Consultant Dermatologist KMC Reg. No. 132800 KLES Dr. Prabhakar Kore Hosp MRC, Nehru Nagar, BELAGAVI
5.	Dr. Veena Ganiger	Assistant professor	Dr. VEENA GANIGER Consultant Dermatologist KMC Reg No 119479 KLES Dr. Prabhakar Kore Hospital & MRC, Nehru Nagar, Belagavi-10.

Certificate for Validity of KAP Questionnaires for Health Science Student Population

This is to certify that Dr. Sowmya Spoorthi. M of Ph.D. scholar working on her dissertation topic: **"Assessment and Evaluation of Rational Dispensing of Topical Corticosteroids by Community Pharmacists and It's Implication on Health Science Population"** India for the partial fulfilment of her Ph.D. has given her KAP Questionnaires for health science student population for validity.

I have gone through the content enclosed here in terms of its relevance and have given my suggestions for KAP Questionnaires for health science student population. I have found it to be valid for conducting the research.

SL.No	Name	Designation	Signature
1	Dr Bhavana R Doshi	Prof & Head Dept of Dermatology	Dr. Bhavana R. Doshi Consultant Dermatologist Reg. No. MAH20050000457KT KLES Dr. Prabhakar Kore Hos
2	Dr VIJAYA V. SAJJAN	ASSOCIATE PROFESSOR	Dr. Vijaya Sajjan Consultant Dermatologist Reg. No. 56709 KLES Dr. Prabhakar Kore Hospital & MRC, Belagavi - 590 010
3.	Dr. Sharada-V. Goudagaon	Assistant Professor	Dr. Sharada Goudagaon Consultant Dermatologist Reg. No. 2016866 KLES Dr. Prabhakar Kore Hospital & MRC, Belagavi - 590 010
4.	Dr. S. Pallishan Reddy	Senior Resident	Dr. S. PAL KISHAN REDDY Consultant Dermatologist KMC Reg. No. 132800 KLES Dr. Prabhakar Kore Hospital & MRC, Nehru Nagar, BELAGAVI - 10.
5.	Dr. Veena Ganiger	Assistant Professor	Dr. VEENA GANIGER Consultant Dermatologist KMC Reg No 119479 KLES Dr. Prabhakar Kore Hospital & MRC, Nehru Nagar, Belagavi-10.

Certificate for Validity of KAP Questionnaires for Dermatology Outpatients

This is to certify that Dr. Sowmya Spoorthi. M of Ph.D. scholar working on her dissertation topic: **"Assessment and Evaluation of Rational Dispensing of Topical Corticosteroids by Community Pharmacists and It's Implication on Health Science Population"** India for the partial fulfilment of her Ph.D. has given her KAP Questionnaires for dermatology outpatients for validity.

I have gone through the content enclosed here in terms of its relevance and have given my suggestions for KAP Questionnaires for dermatology outpatients. I have found it to be valid for conducting the research.

SL.No	Name	Designation	Signature
1)	Dr Bhavana R Doshi	Prof & head Dept of Dermatology	
2)	Dr VIJAYA. V. SAJJAN	ASSOCIATE PROFESSOR	
3)	Dr. Sharada-V. Goudagaon	Assistant Professor	
4.	Dr. Pal Kishan Reddy	Senior Resident	
5.	Dr. Veena Ganiger	Assistant professor	

Dr. Bhavana R. Doshi
Consultant Dermatologist
Reg. No. MAH20050000457KT
KLES Dr. Prabhakar Kore Hosp

Dr. Vijaya Sajjan
Consultant Dermatologist
Reg. No. 55705
KLES Dr. Prabhakar Kore Hospital &
MRC, Belagavi - 590 010

Dr. Sharada Goudagaon
Consultant Dermatologist
Reg. No. 116866
KLES Dr. Prabhakar Kore Hospital &
MRC, Belagavi - 590 010

Dr. S. PAL KISHAN REDDY
Consultant Dermatologist
KMC Reg. No. 132800
KLES Dr. Prabhakar Kore Hospital &
MRC, Nehru Nagar, BELAGAVI - 10.

Dr. VEENA GANIGER
Consultant Dermatologist
KMC Reg No 119479
KLES Dr. Prabhakar Kore Hospital &
MRC, Nehru Nagar, Belgavi-10.

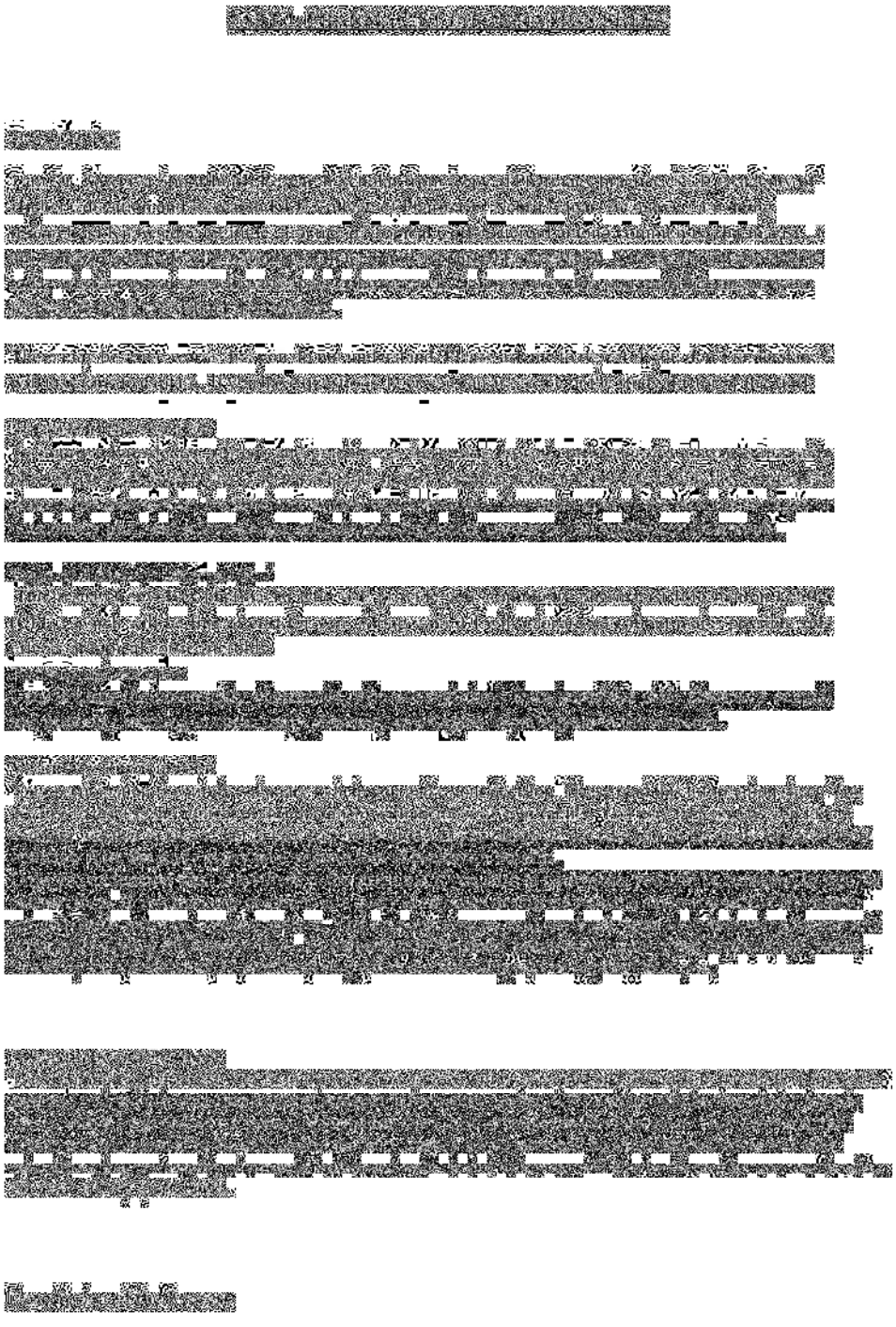
ANNEXURE – IV - INFORMED CONSENT FORM

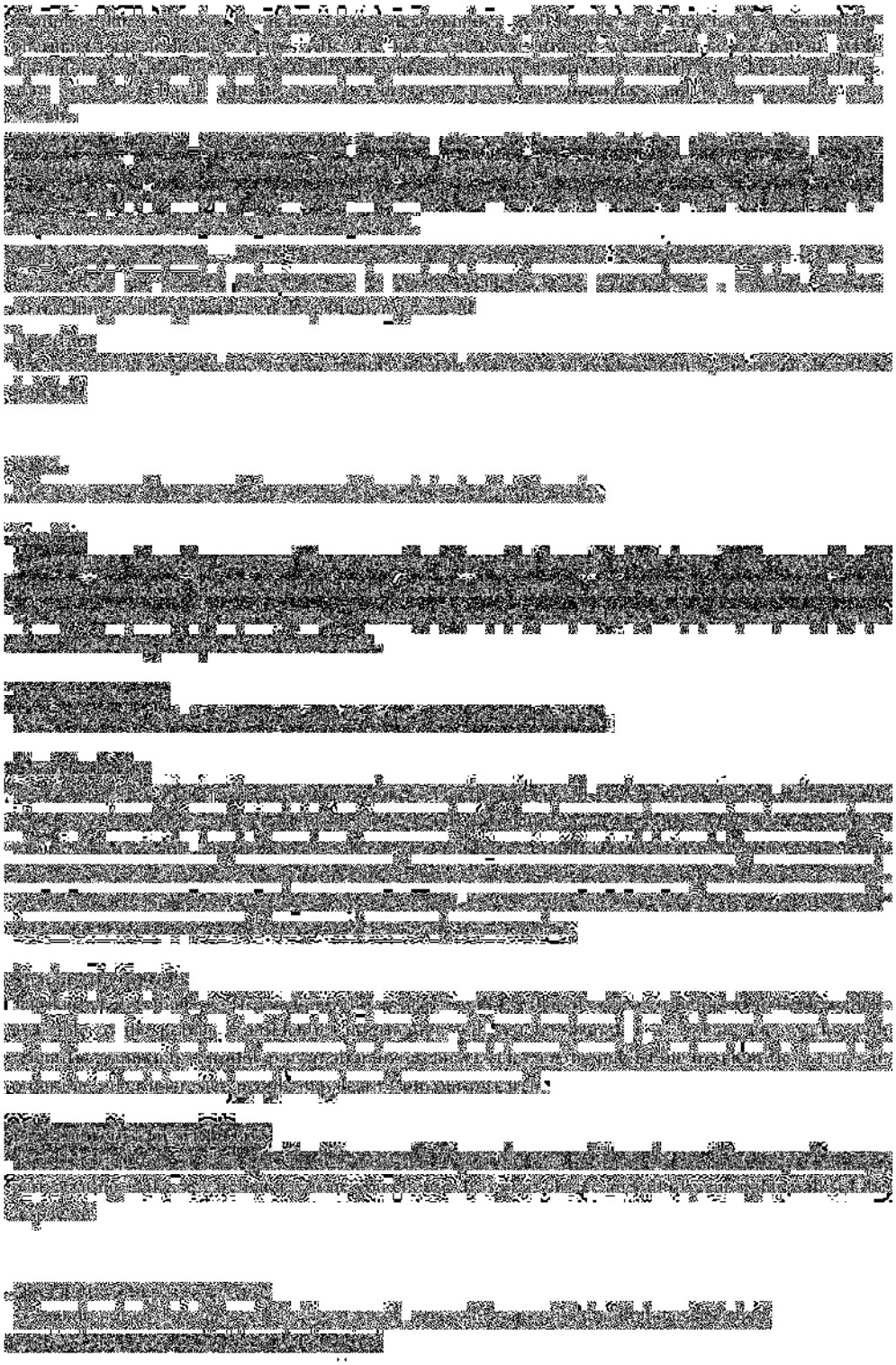
(ENGLISH, KANNADA, HINDI)

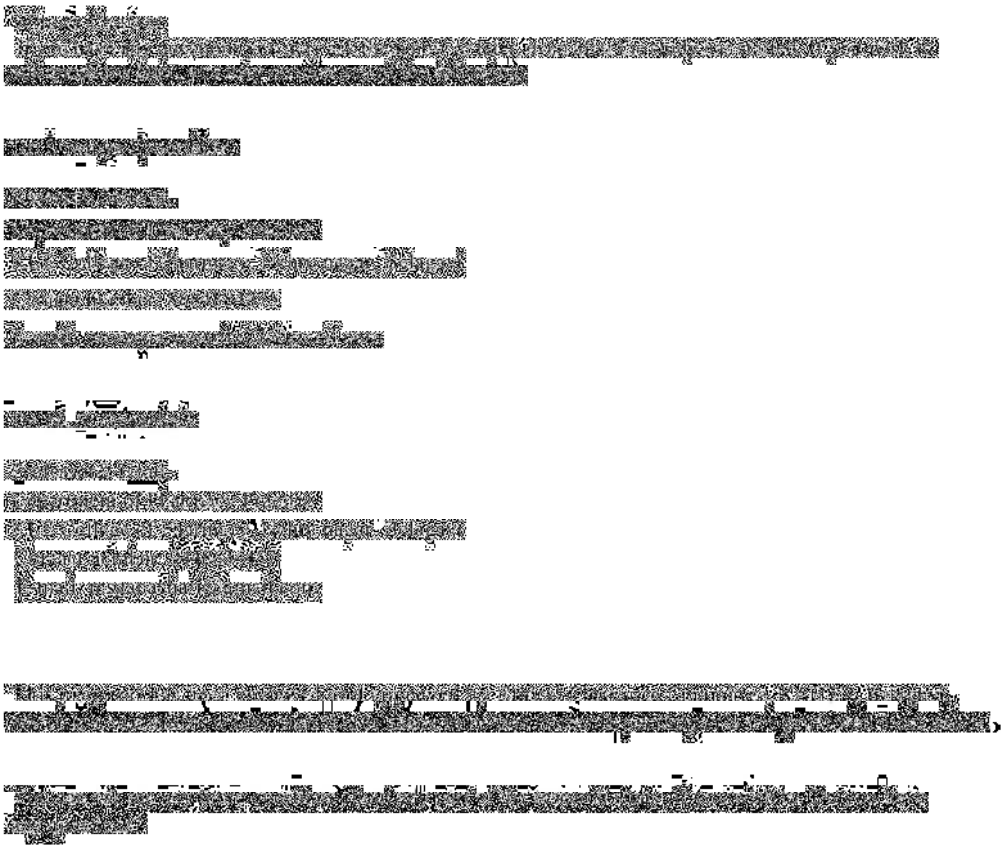
KLE College of Pharmacy,
A Constituent unit of
K.L.E. Academy of Higher Education and Research
J.N.M.C. Campus, Nehru Nagar Belagavi -590010 Karnataka, India.
Department of Pharmacy Practice

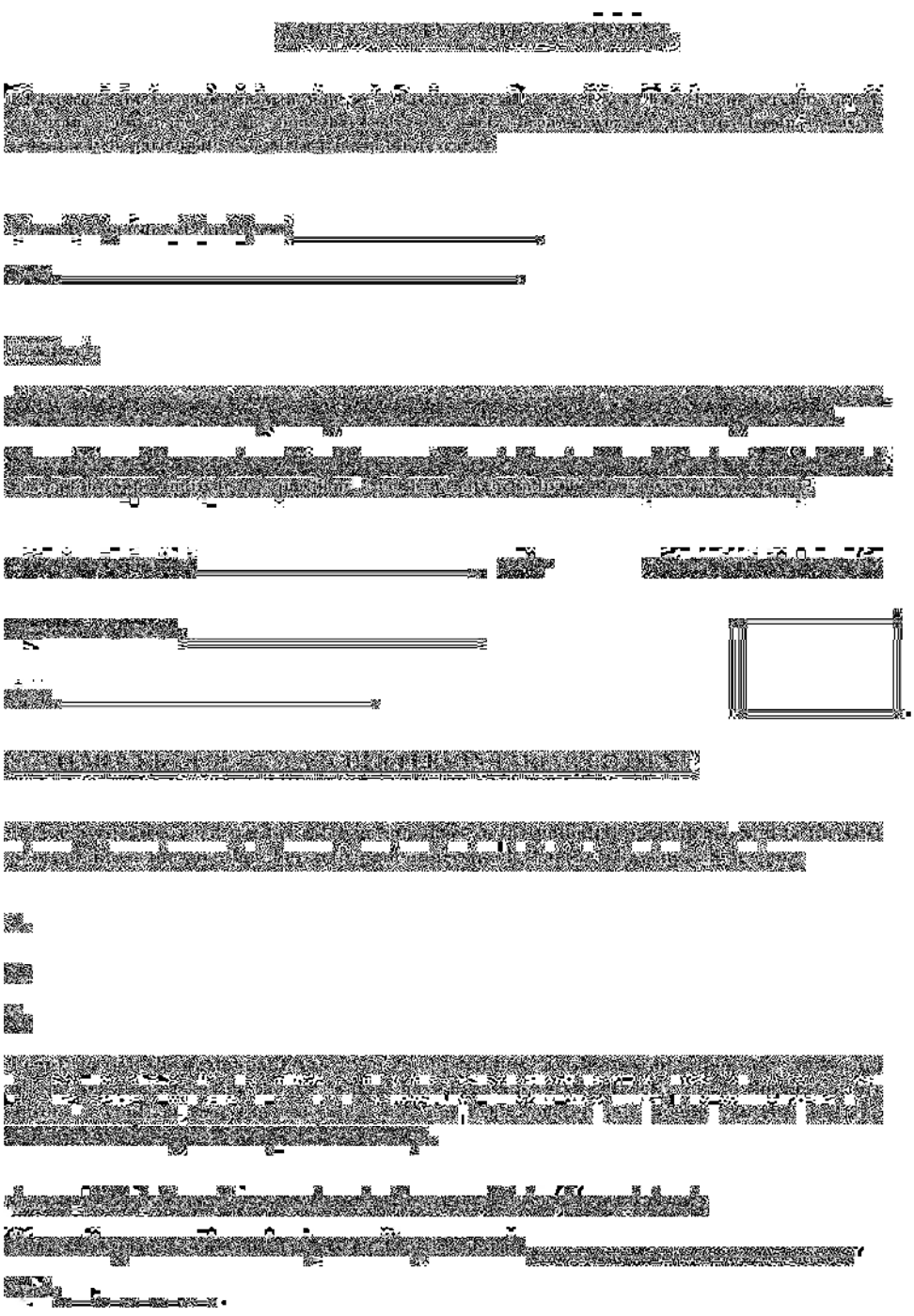
INFORMED CONSENT FORM

[redacted]









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Department of Pharmacy Practice

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ಯೋಜನೆಯ ಶೀರ್ಷಿಕೆ "ಸಮುದಾಯ ಫಾರ್ಮಾ ಔಷಧಿಕಾರರಿಂದ ಸಾಮಯಿಕ ಕಾರ್ಟಿಕೊಸ್ಟೆರಾಯ್ಡ್‌ಗಳ
ತರ್ಕಬದ್ಧ ವಿತರಣೆಯ ಮೌಲ್ಯಮಾಪನ ಮತ್ತು ಆರೋಗ್ಯ ವಿಜ್ಞಾನ ಜನಸಂಖ್ಯೆಯ ಮೇಲೆ ಅದರ ಪರಿಣಾಮ

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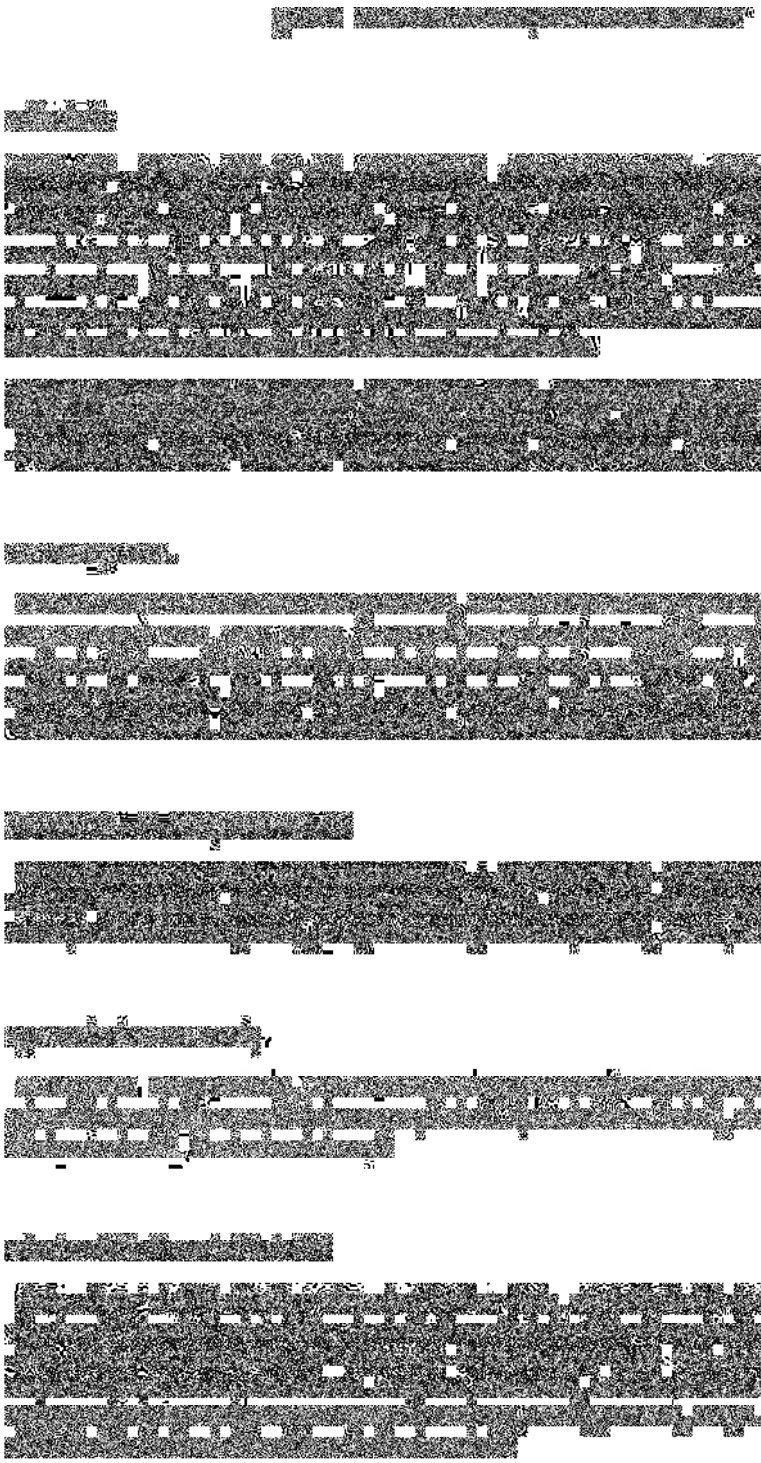

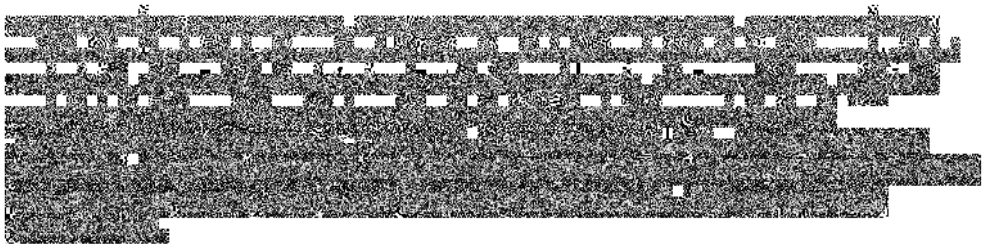

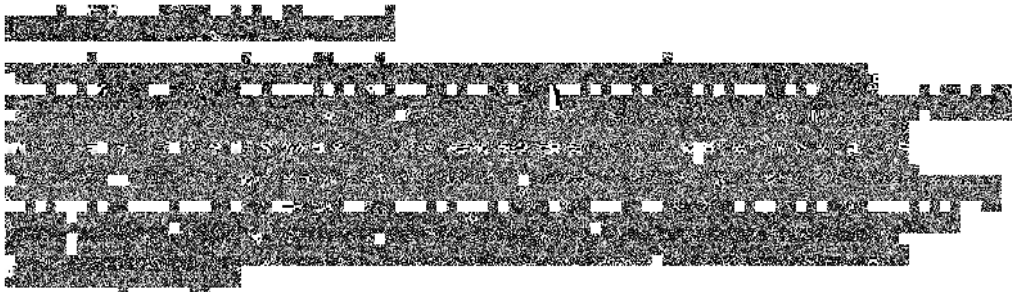

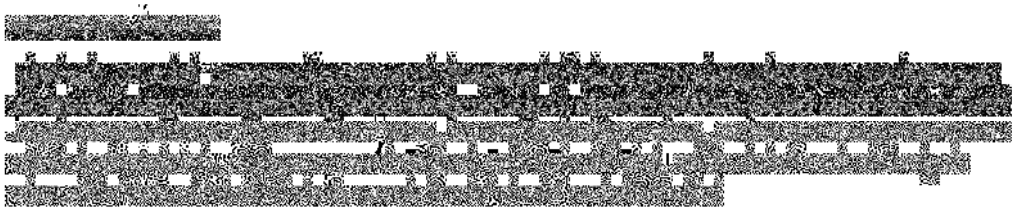

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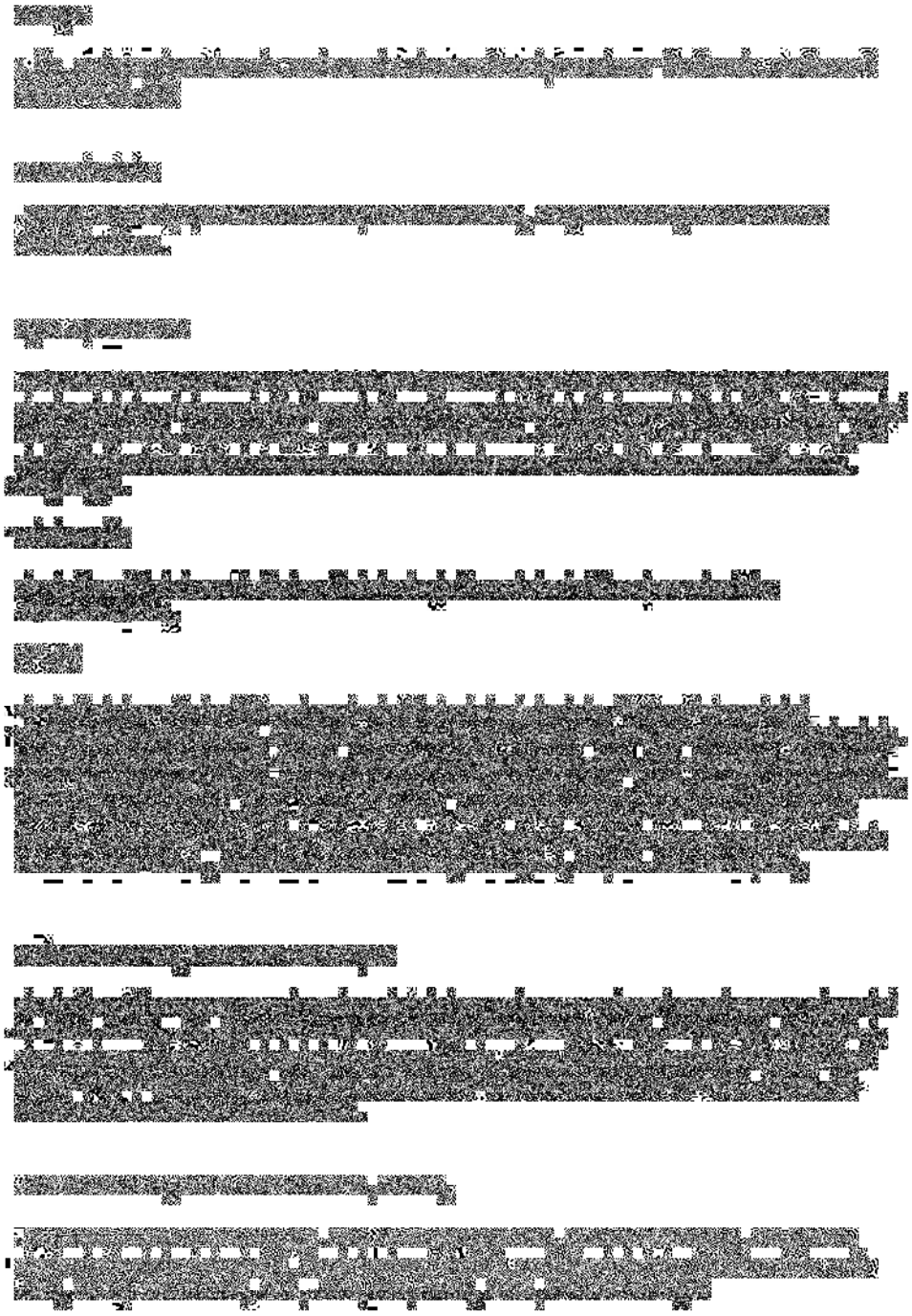

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ಡಾ.ಎಂ.ಎಸ್.ಗಣಾಚಾರಿ

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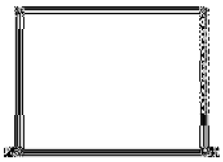

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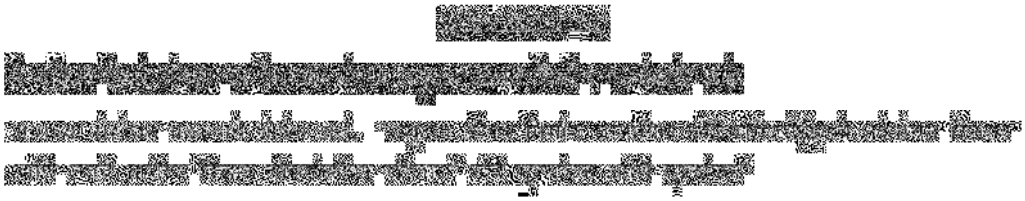
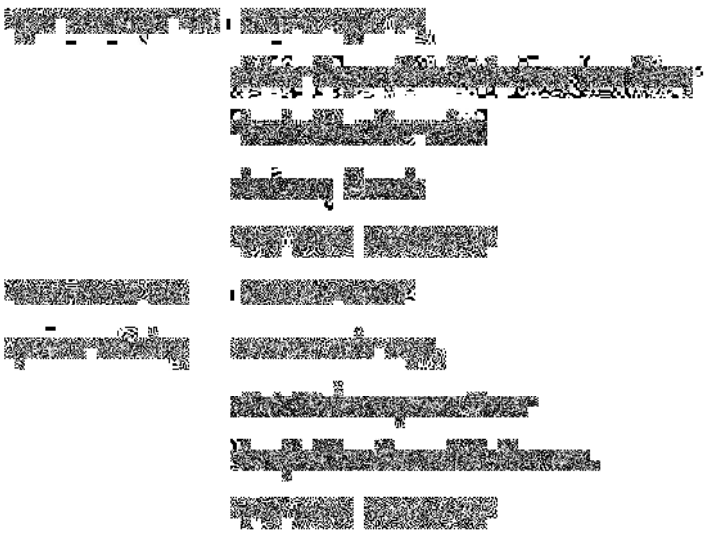
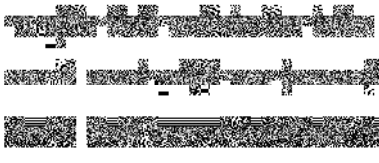
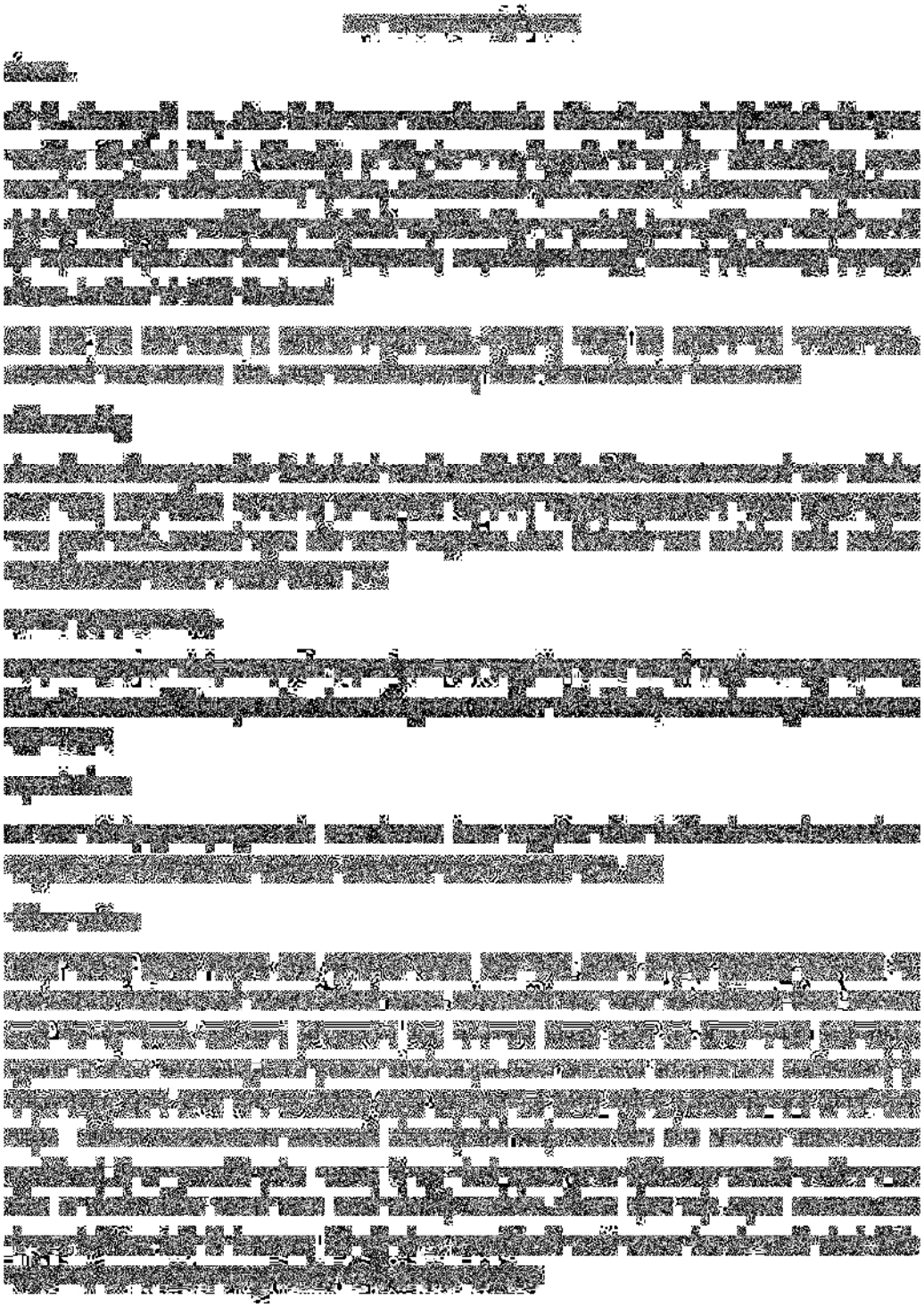
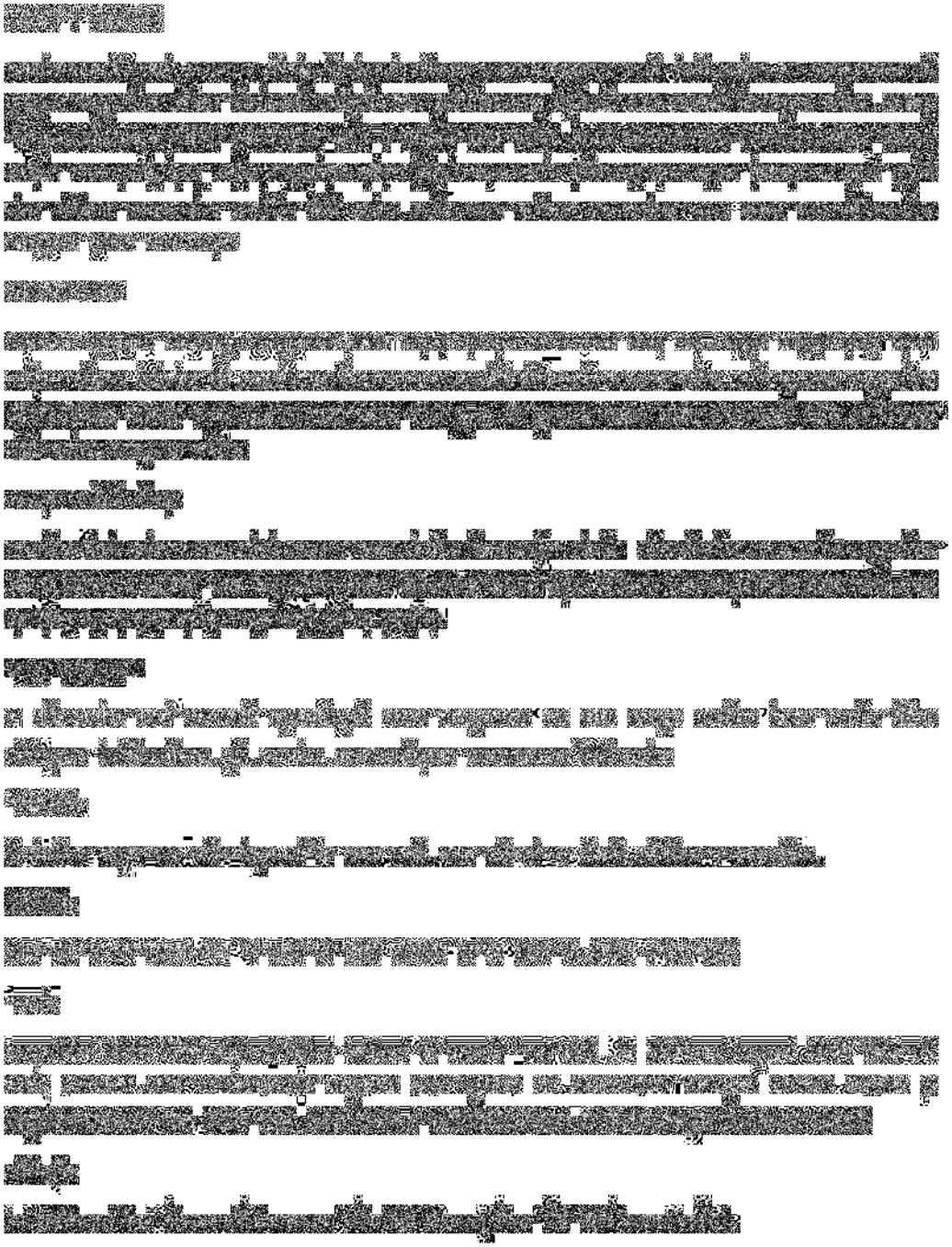
औषध निर्माणशास्त्र सराव विभाग

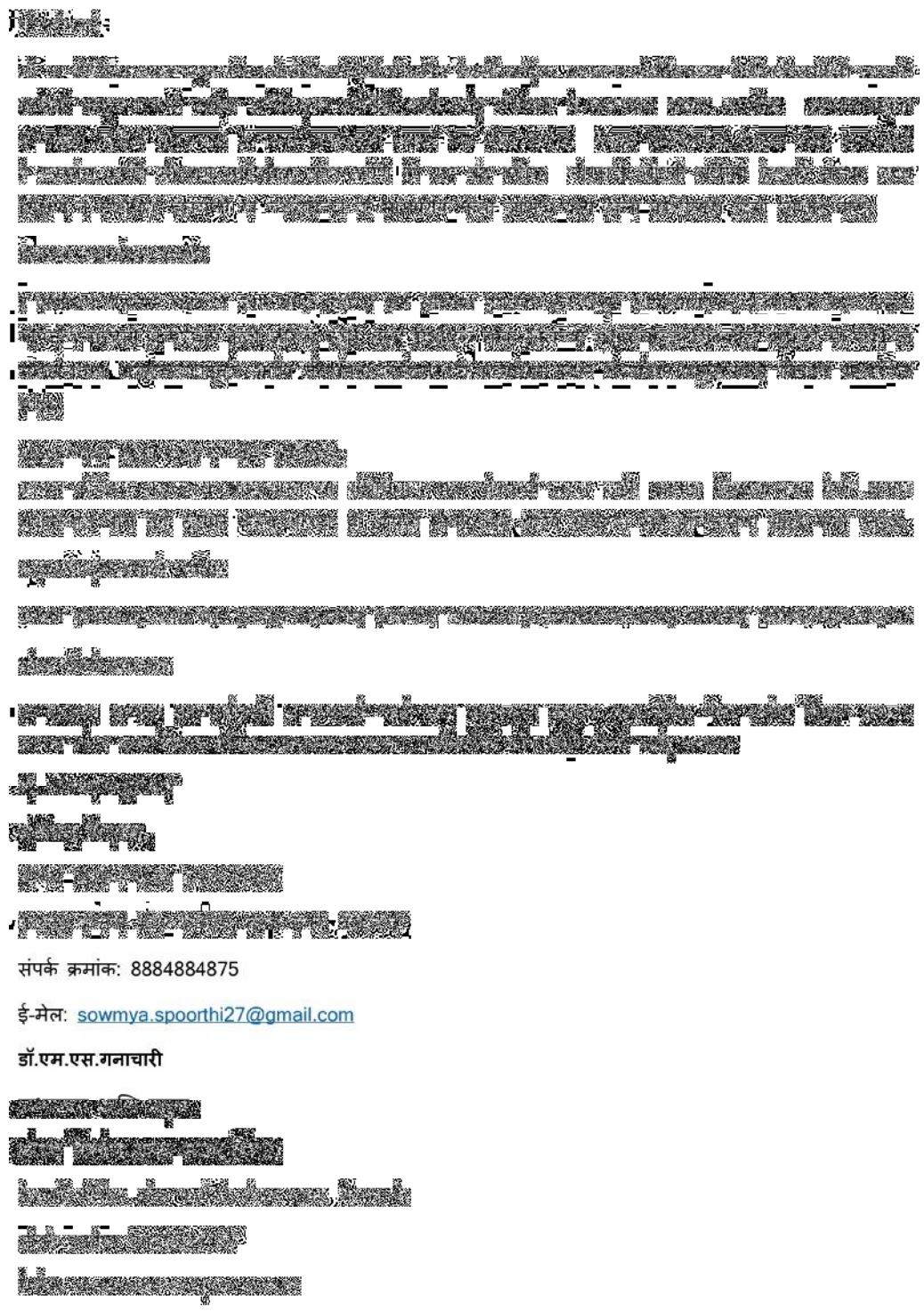












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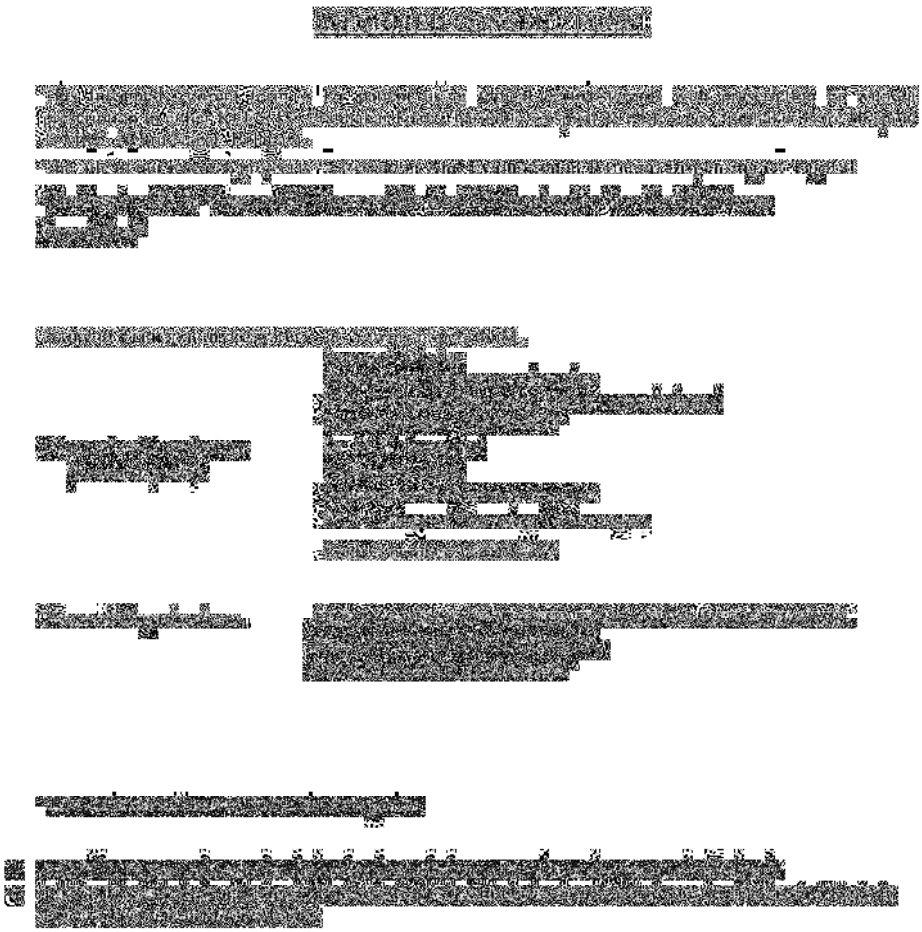

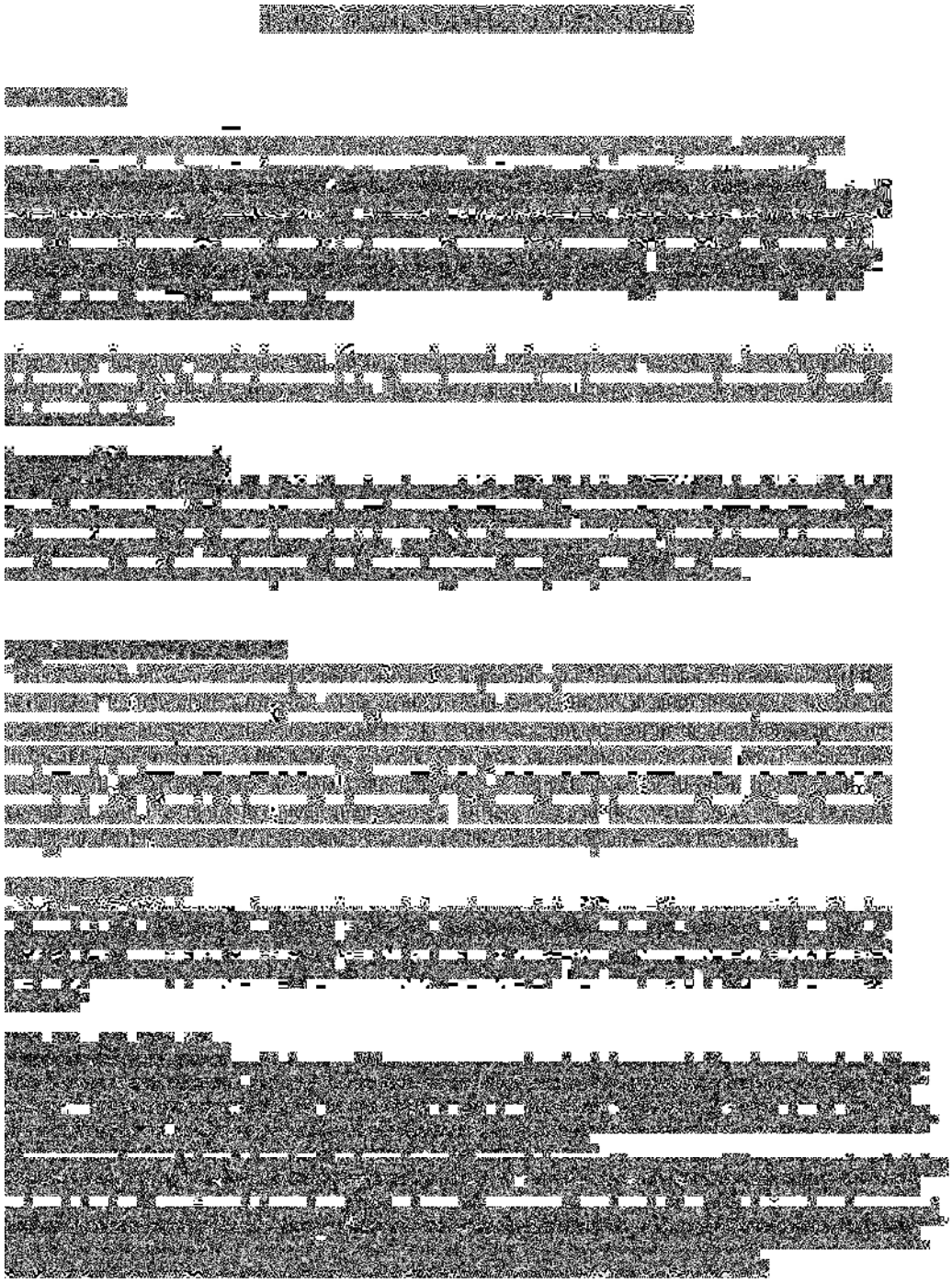

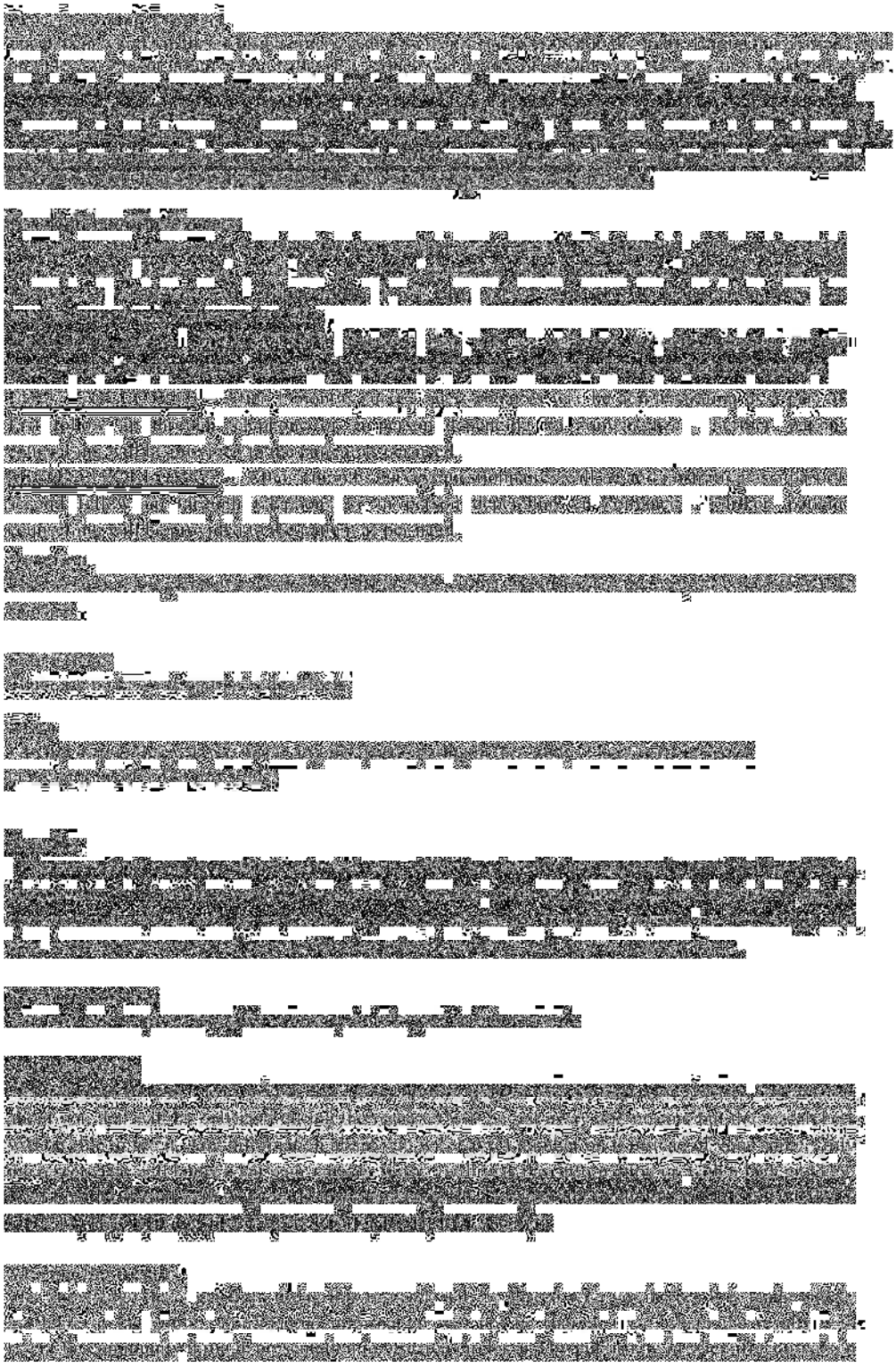

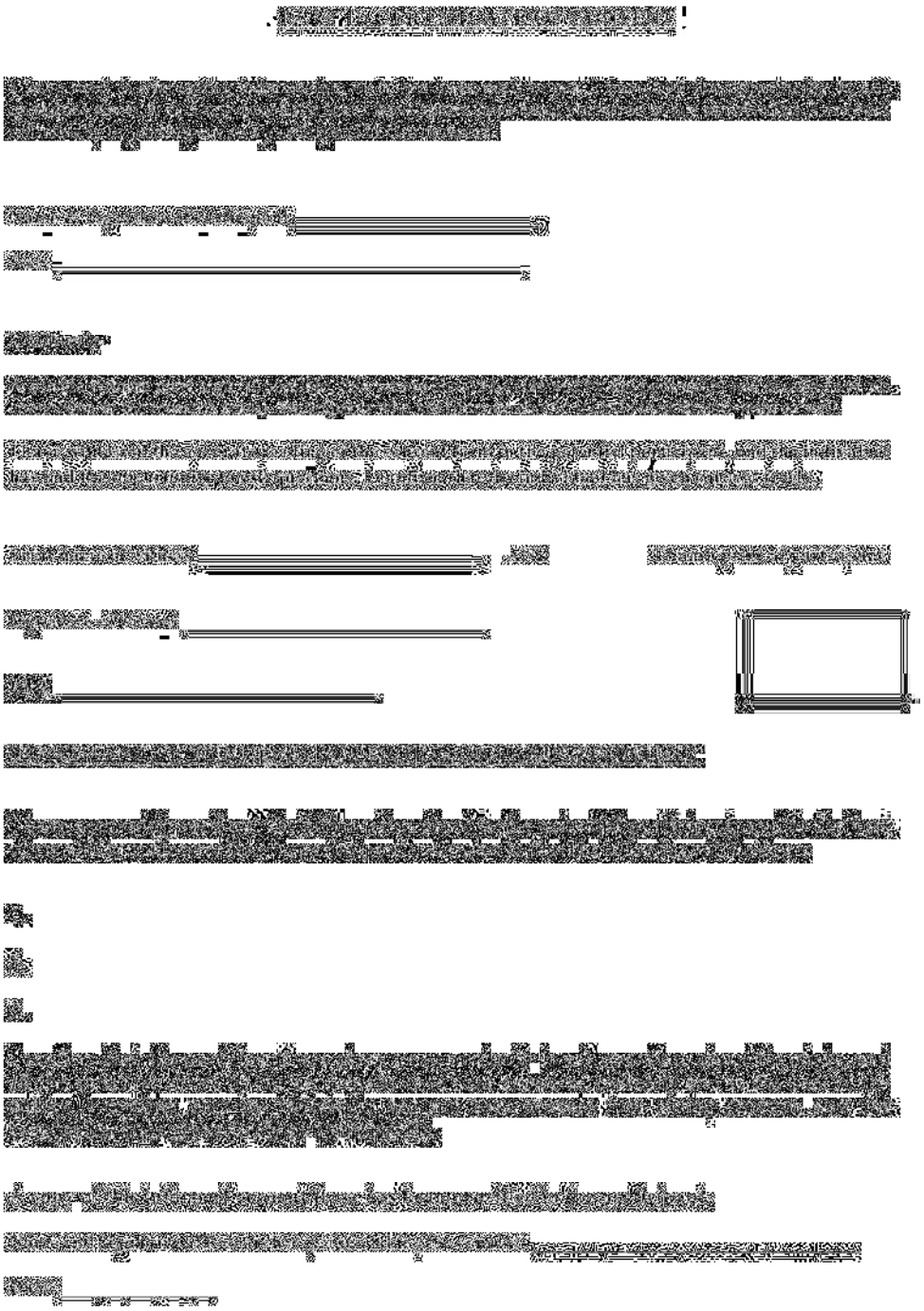

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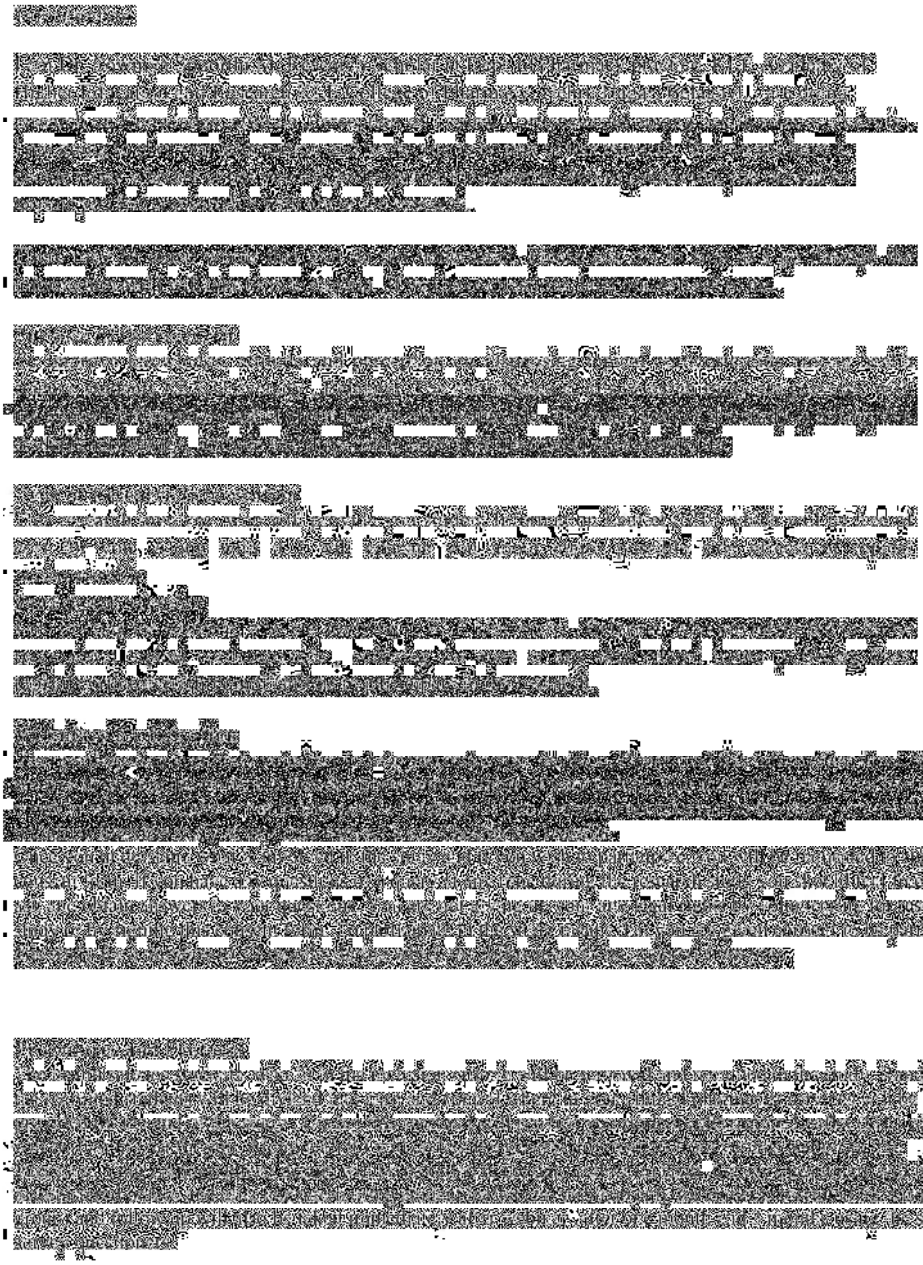

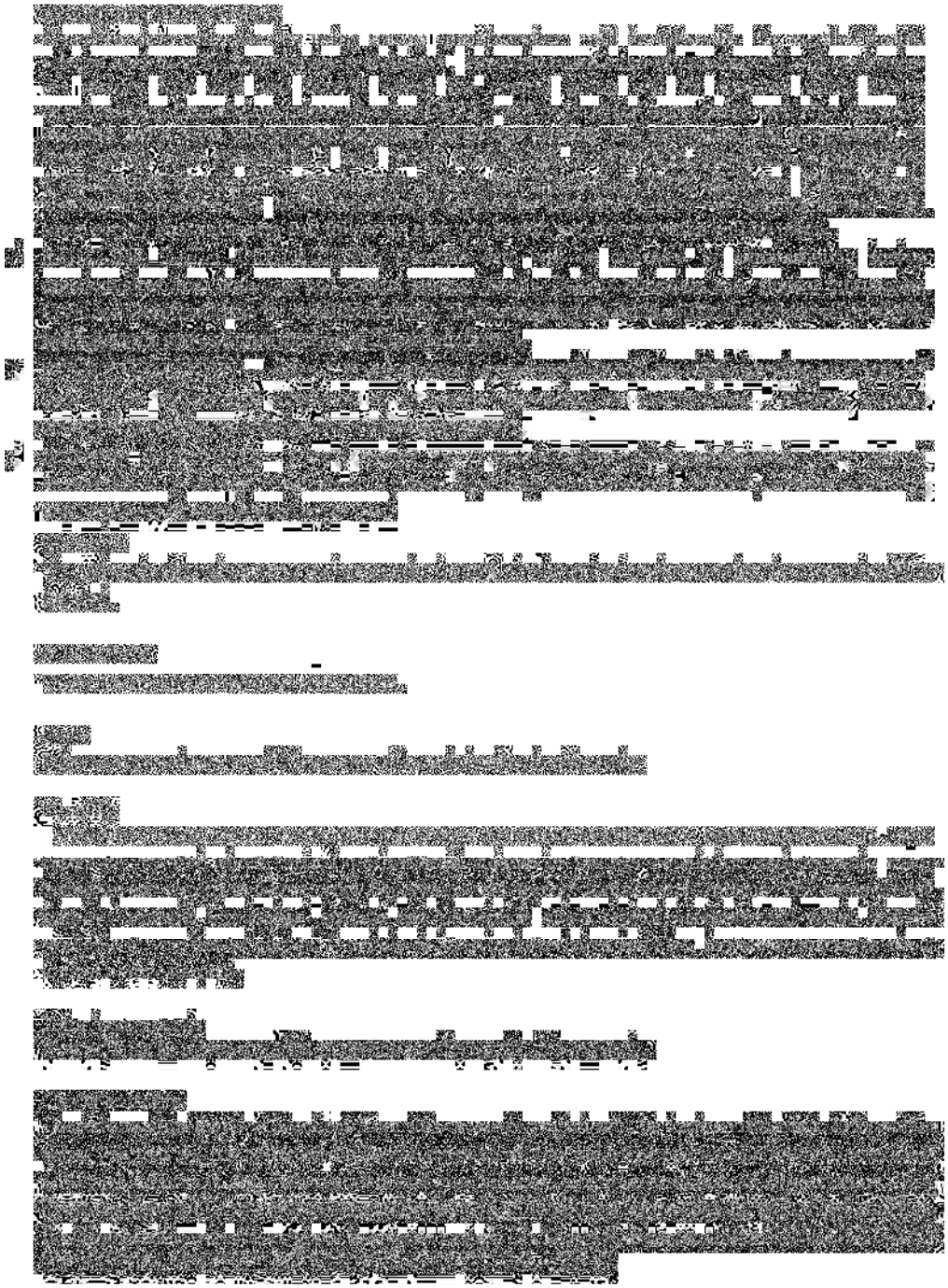

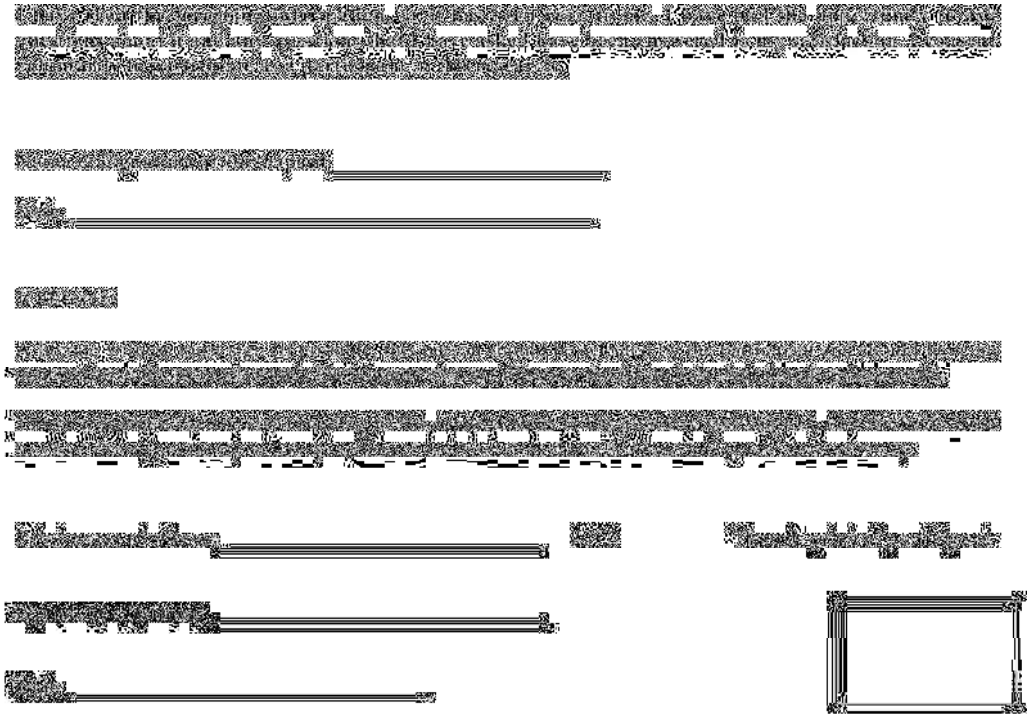

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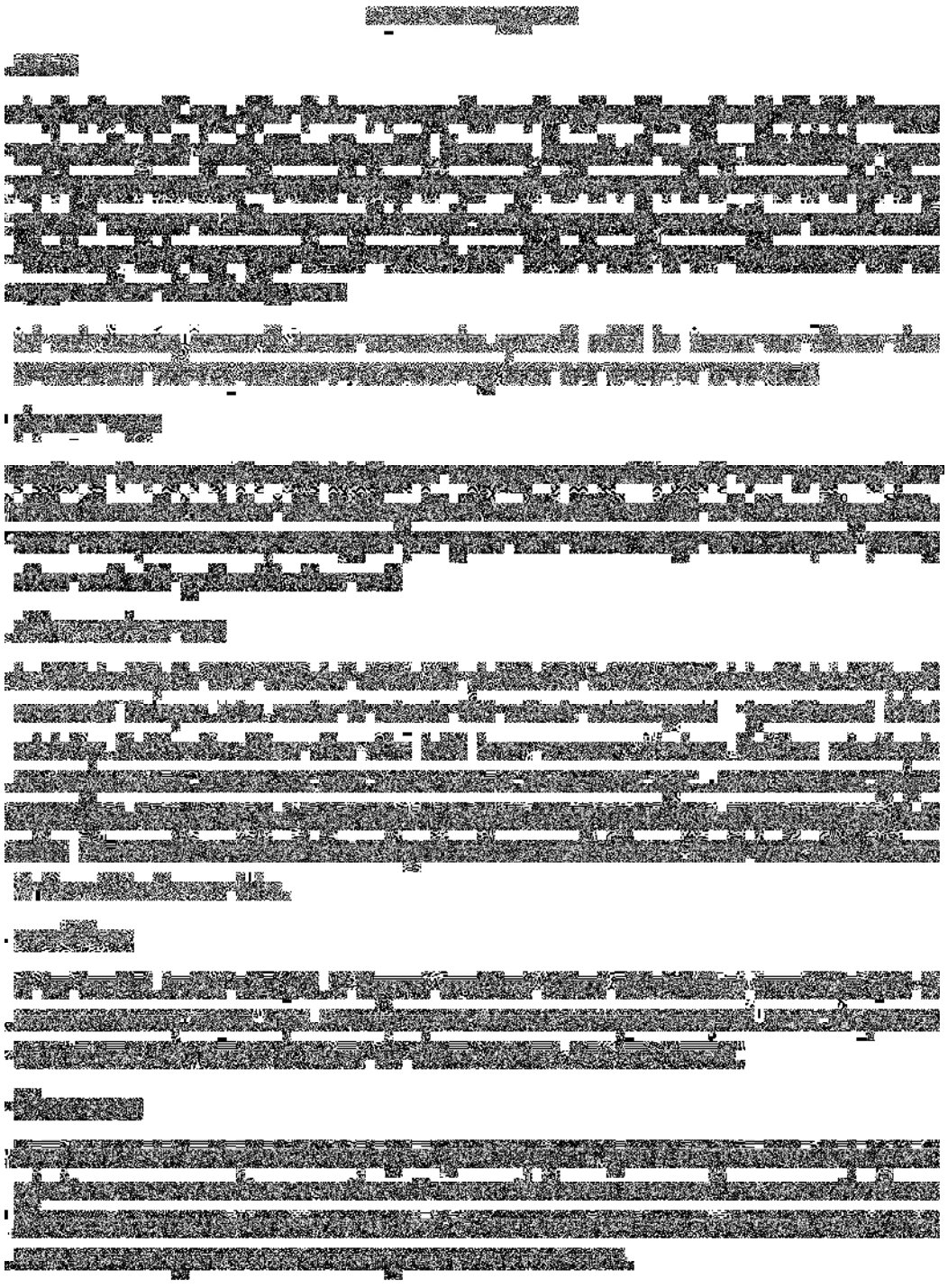

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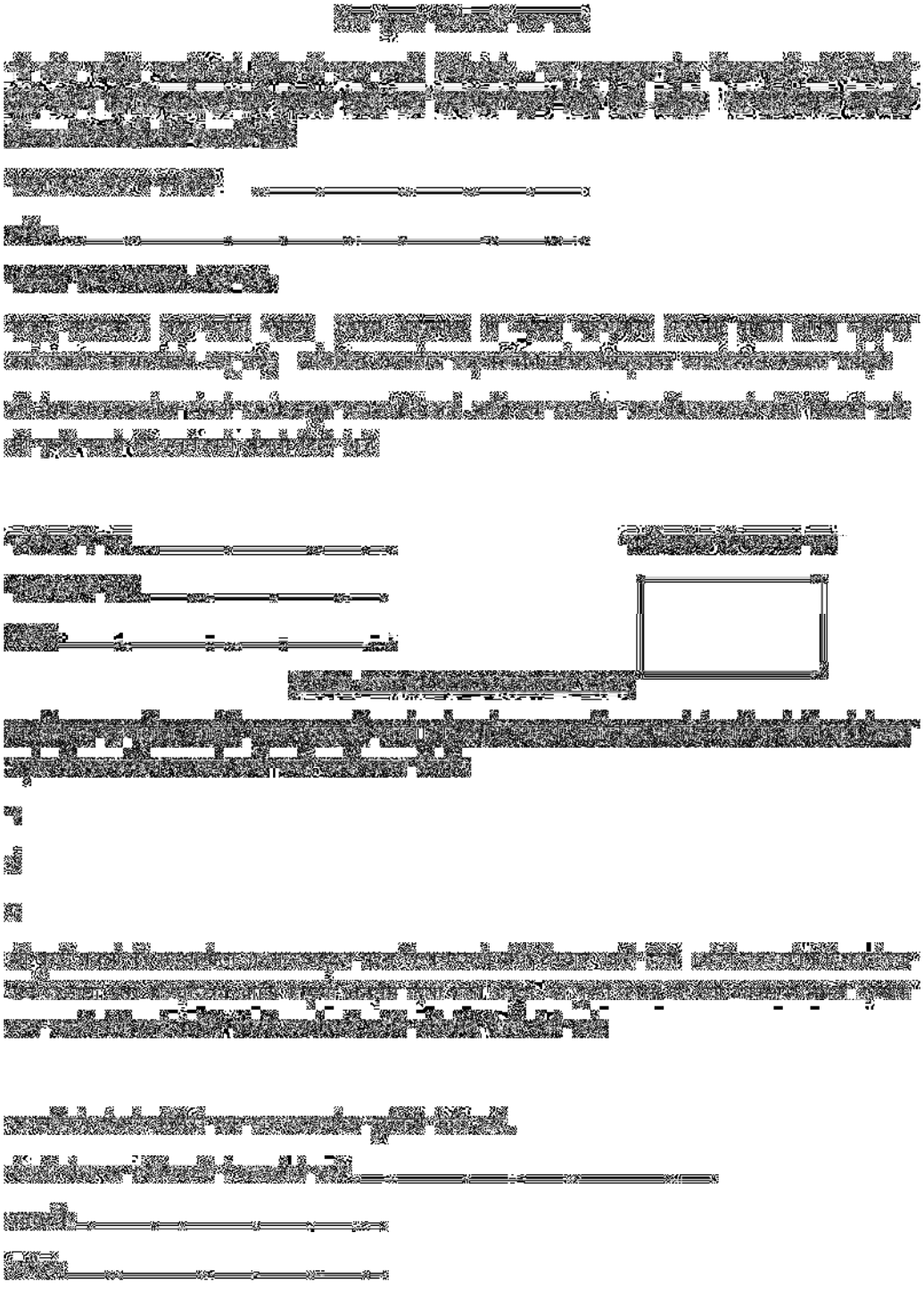
या प्रस्तावाचे पुनरावलोकन केले गेले आहे आणि एथिकल क्लीयरन्स कमिटी, काहेर, बेलागावी, ही एक समिती आहे



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[redacted]

ತಿಳುವಳಿಕೆಯುಳ್ಳ ಒಪ್ಪಿಗೆ ರೂಪವಾಗಿದೆ. ನಮ್ಮ ಸಂಶೋಧನಾ ಯೋಜನೆಯ ಶೀರ್ಷಿಕೆ "ಸಮುದಾಯ ಫಾರ್ಮಾ ಔಷಧಿಕಾರರಿಂದ ಸಾಮಯಿಕ ಕಾರ್ಟಿಕೊಸ್ಟೆರಾಯ್ಡ್‌ಗಳ ತರ್ಕಬದ್ಧ ವಿತರಣೆಯ ಮೌಲ್ಯಮಾಪನ ಮತ್ತು ಆರೋಗ್ಯ ವಿಜ್ಞಾನ ಜನಸಂಖ್ಯೆಯ ಮೇಲೆ ಅದರ ಪರಿಣಾಮ"

ಪ್ರಧಾನ ತನಿಖಾಧಿಕಾರಿ ಹೆಸರು : : ಡಾ.ಸೌಮ್ಯಾ ಸ್ಫೂರ್ತಿ.ಎಂ,

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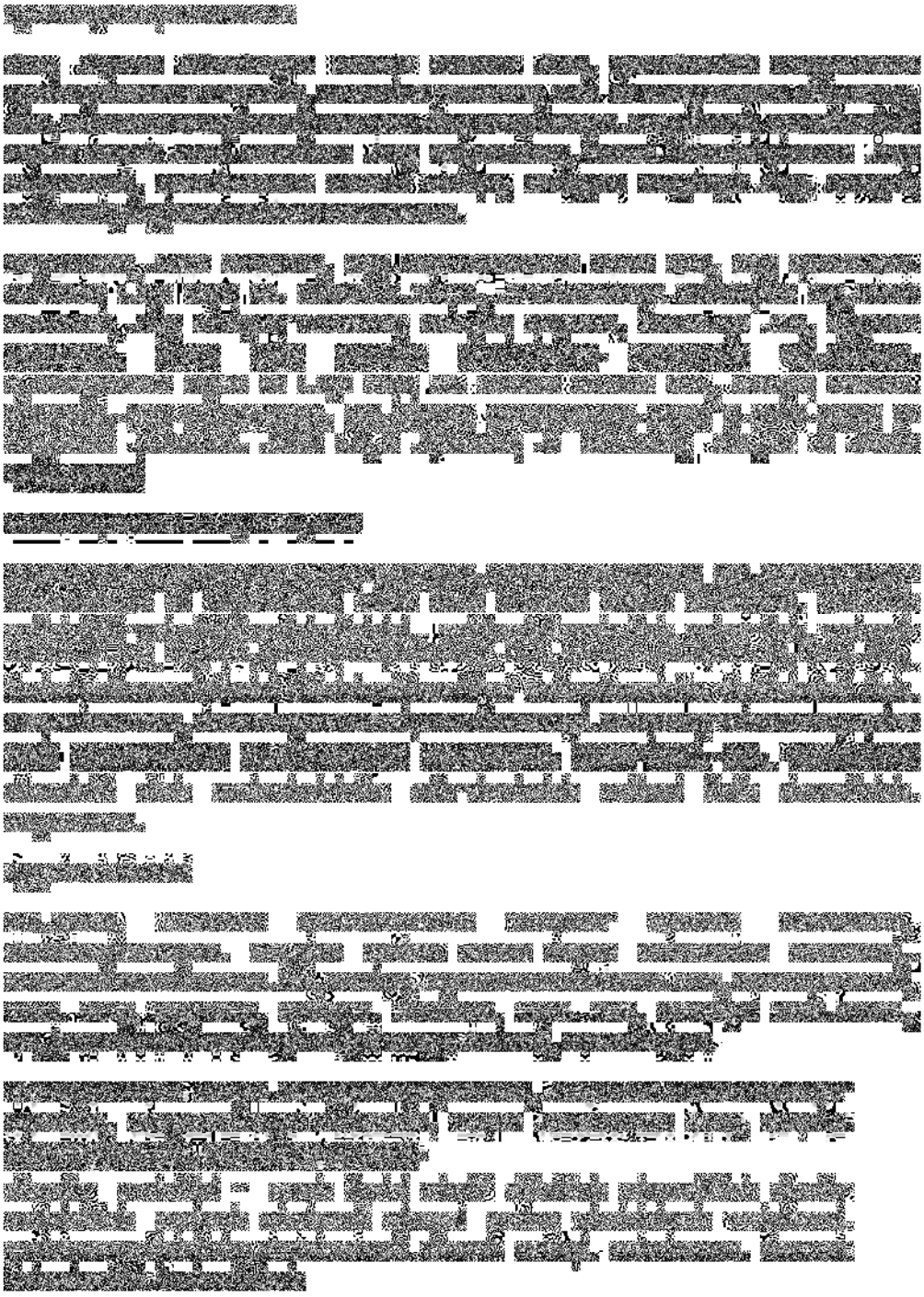

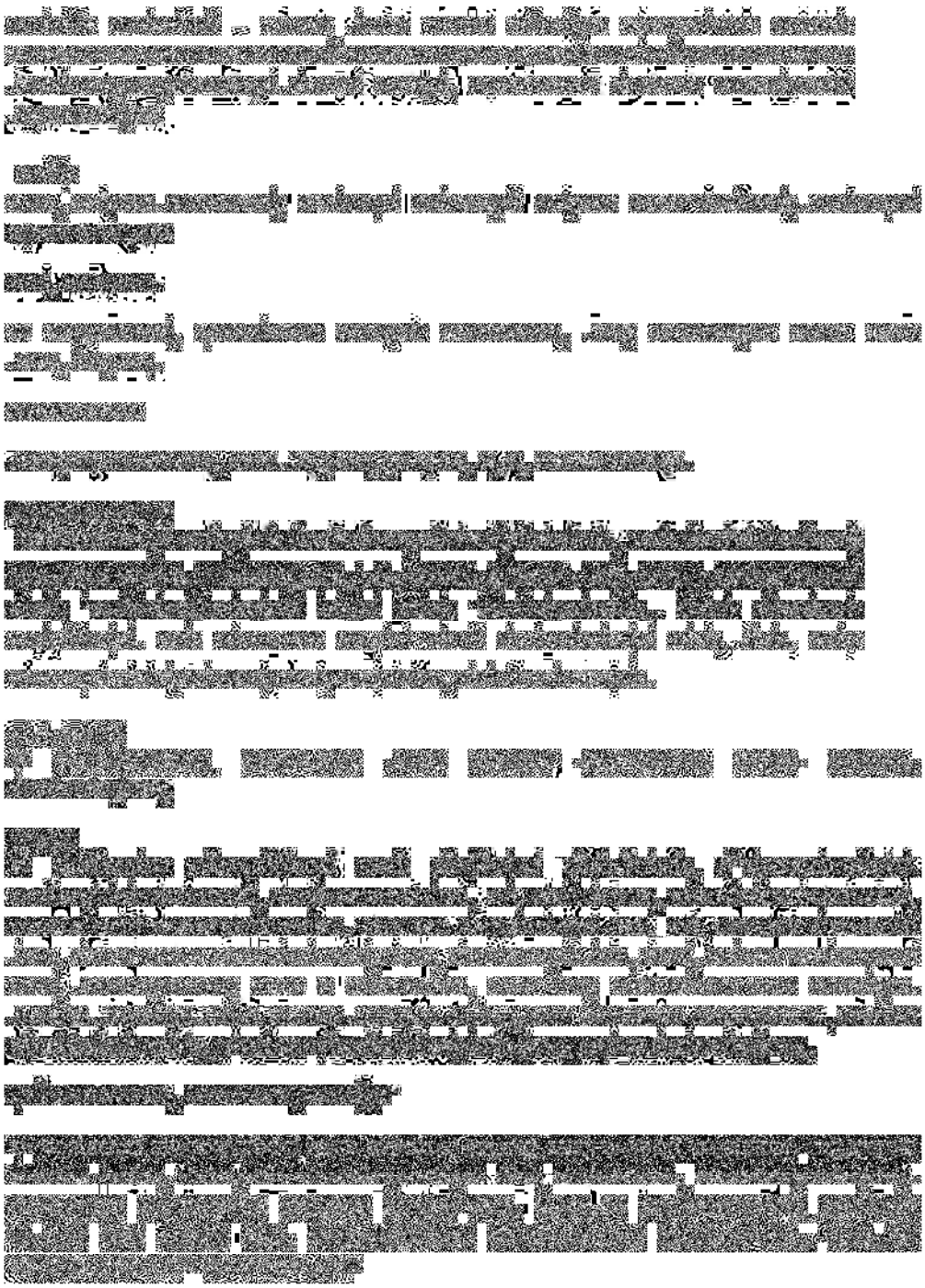

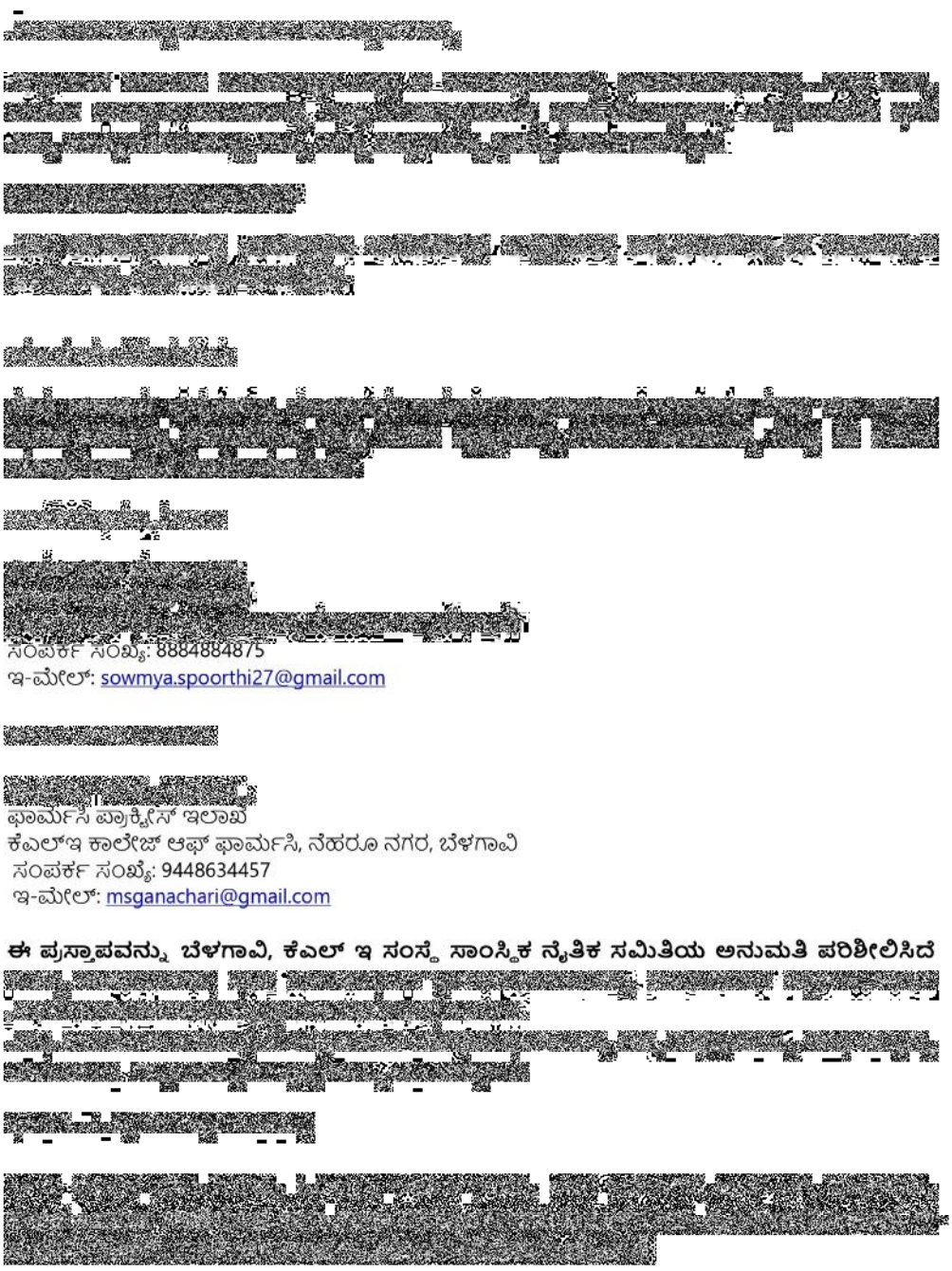

ಸಂಪರ್ಕ ಸಂಖ್ಯೆ: 8884884875
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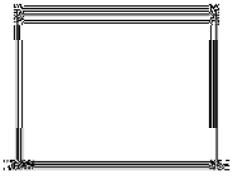
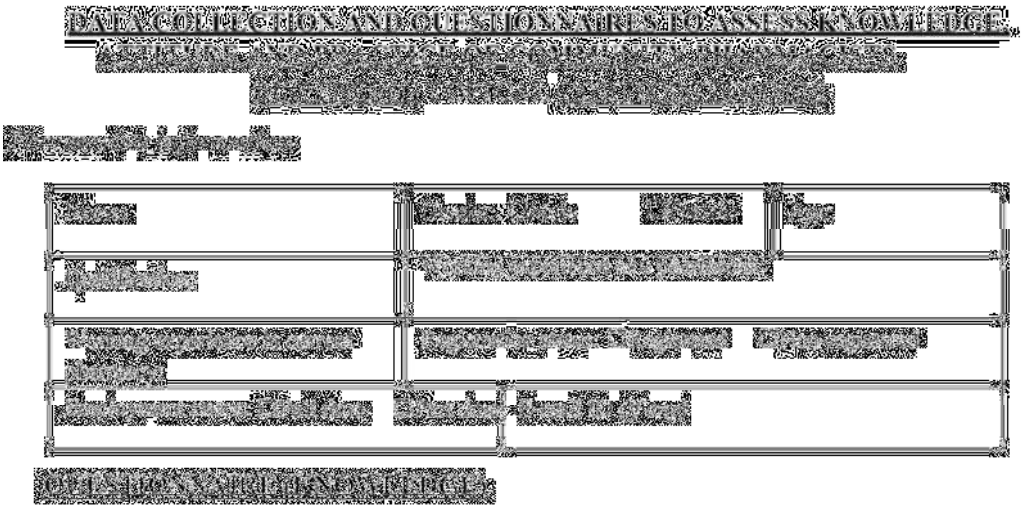
ಫಾರ್ಮಸಿ ಪ್ರಾಕ್ಟೀಸ್ ಇಲಾಖೆ
ಕೆಎಲ್ಇ ಕಾಲೇಜ್ ಆಫ್ ಫಾರ್ಮಸಿ, ನೆಹರೂ ನಗರ, ಬೆಳಗಾವಿ
ಸಂಪರ್ಕ ಸಂಖ್ಯೆ: 9448634457
ಇ-ಮೇಲ್: msganachari@gmail.com

ಈ ಪ್ರಸ್ತಾಪವನ್ನು ಬೆಳಗಾವಿ, ಕೆಎಲ್ ಇ ಸಂಸ್ಥೆ ಸಾಂಸ್ಥಿಕ ನೈತಿಕ ಸಮಿತಿಯ ಅನುಮತಿ ಪರಿಶೀಲಿಸಿದೆ



ANNEXURE – V - KAP QUESTIONNAIRES



	QUESTIONS	Yes/No/	Yes/No/
1.	Do you know what are Topical Corticosteroids		
2.	Do you know the use of Topical Corticosteroids		
3.	Are you aware Topical Corticosteroid comes under Schedule H		
4.	Do you know Schedule H drugs should be sold by retail on the prescription of a Registered Medical Practitioner only.		
5.	Are you aware of the side effects caused by Topical Corticosteroids?		
6.	Can Topical corticosteroids be stopped suddenly?		
7.	Can Topical corticosteroid flare up the infection?		
8.	Are you aware of the various potencies of Topical Corticosteroids		
9.	Do you know Topical Corticosteroids are Anti- inflammatory drugs.		
10.	Do you know thinning of skin caused by Topical corticosteroid		

ATTITUDE QUESTIONNAIRES

Sl.No	QUESTIONS	Pre Test Agree/ Disagree	Post Test Agree/ Disagree
1.	Pharmacists have role in preventing Topical corticosteroid abuse		
2.	Topical corticosteroids should not be used for long term without drug-free period.		
3.	Topical Corticosteroids can not be Used on Certain Skin Areas such as Eyelids		
4.	Is that fine, Dispensing Topical Corticosteroids without Registered Medical Practitioners Prescription.		
5.	One should instruct patient what to do when side effects appear after using Topical Corticosteroids		
6.	One should instruct patient about Fingertip unit Topical Corticosteroid application.		
7.	Topical corticosteroids potency is selected based on the severity and site of the patient's condition.		
8.	Instruct the patient about potential adverse drug reactions of Topical corticosteroids before dispensing.		
9.	Replace corticosteroids with any other substitute of corticosteroids without doctors advise.		
10.	Can Patient Stop applying Topical Corticosteroids immediately, if the symptoms reduce		

PRACTICE QUESTIONNAIRES

Sl.No	QUESTIONS	Pre Test Yes/No/	Post Test Yes/No
1.	Do you dispense Topical corticosteroids?		
2.	Do you dispense Topical corticosteroids without prescription?		
3.	Do you dispense Topical corticosteroids for expired Prescription?		
4.	Do you think topical corticosteroids application is safe only when prescribed by dermatologist		
5.	Do you counsel the patient before dispensing the Topical corticosteroids?		
6.	Have you ever prescribed Topical corticosteroids for any condition of consumer		
7.	Has any consumer reported side effects after using corticosteroids?		
8.	Is steroid addiction a problem		
9.	Have you ever been sensitized regarding topical steroid misuse		
10.	Do you find this seminar informative		

[redacted]

Date: [redacted]

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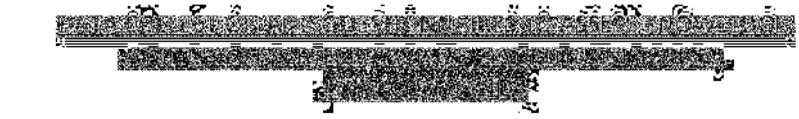
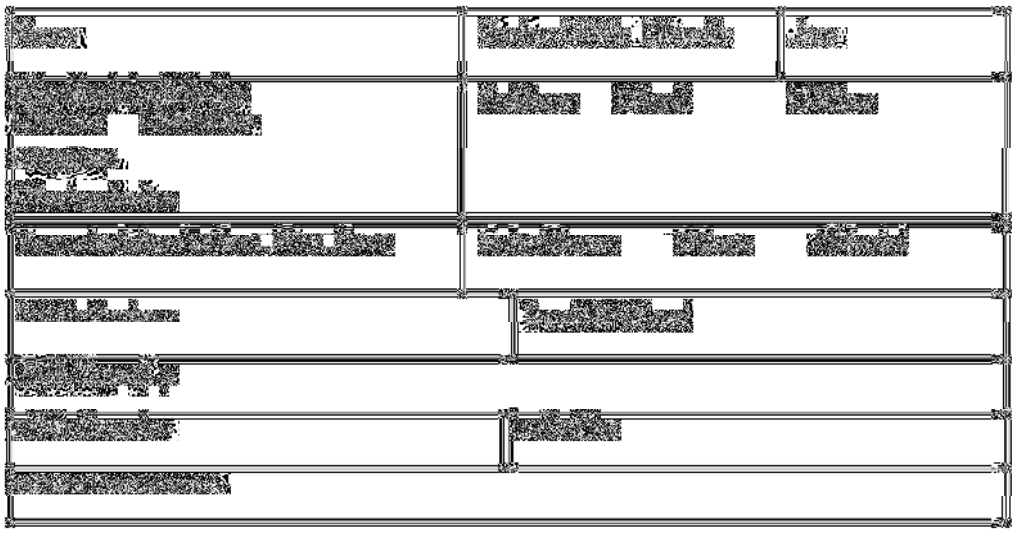
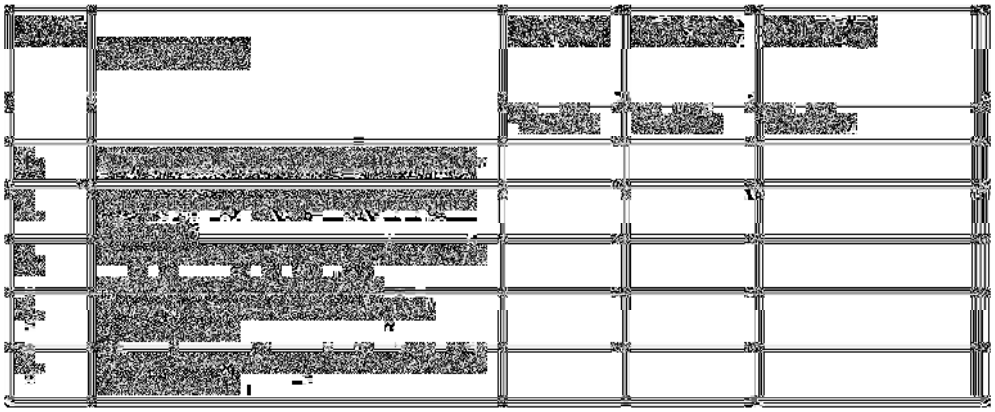
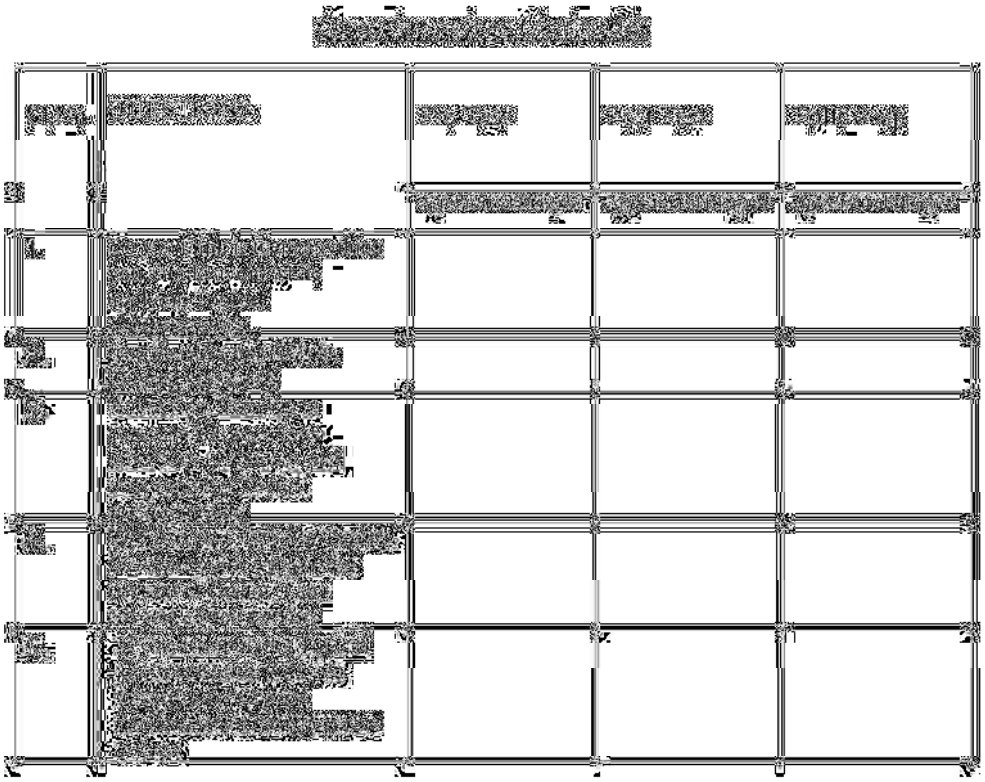
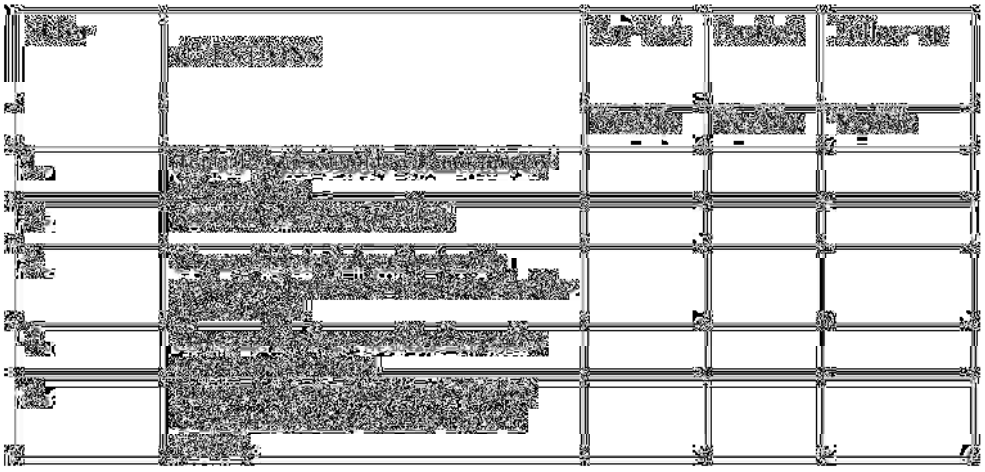
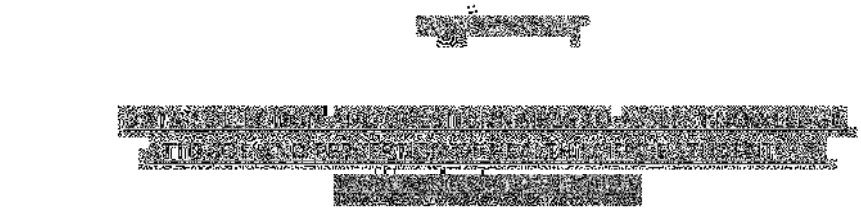


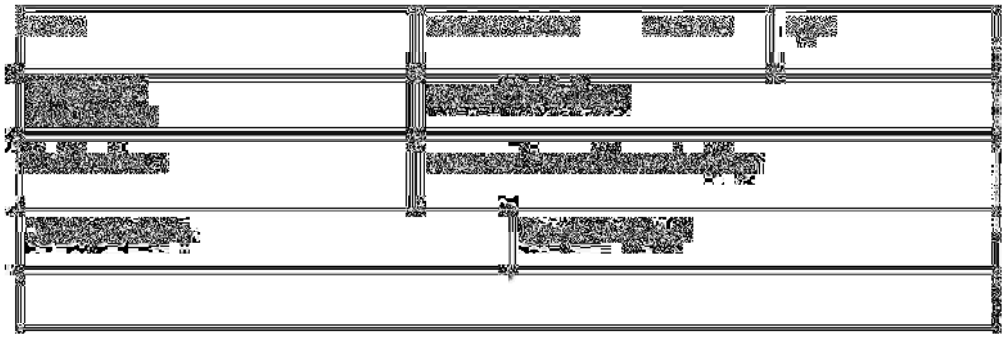


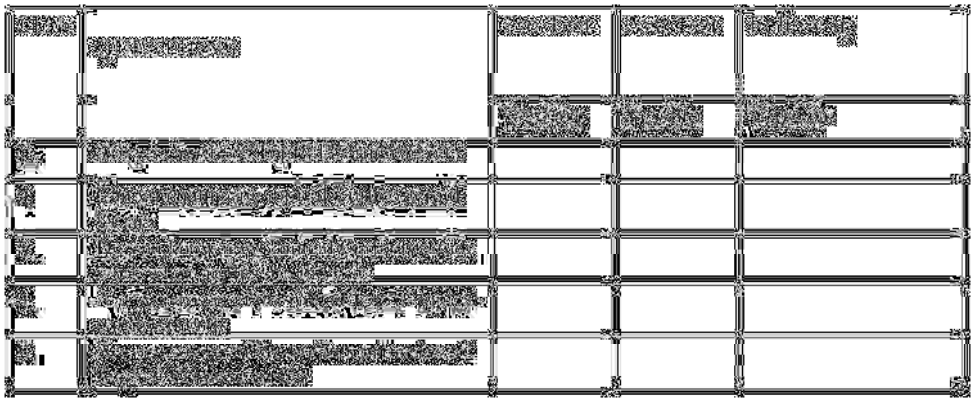


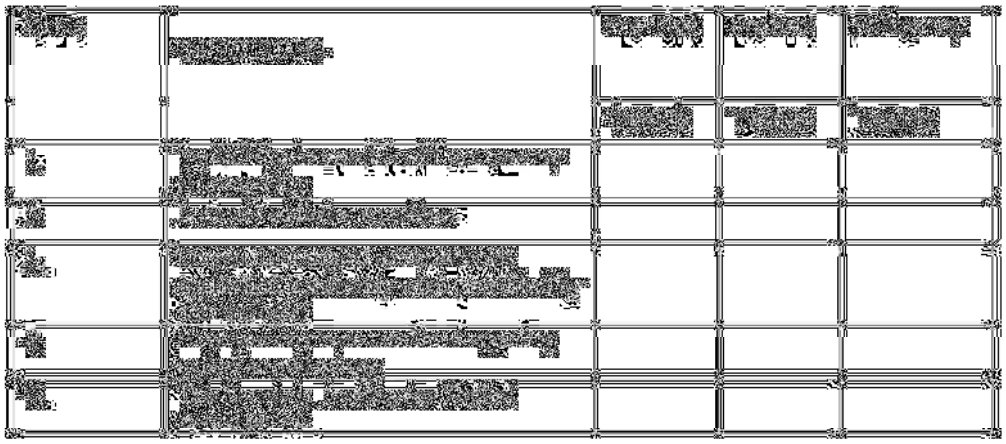






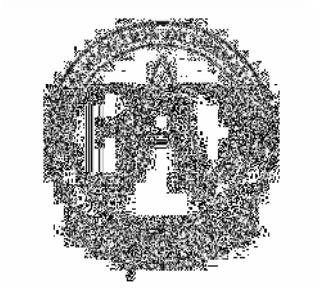






ANNEXURE – VI - NARANJO SCALE

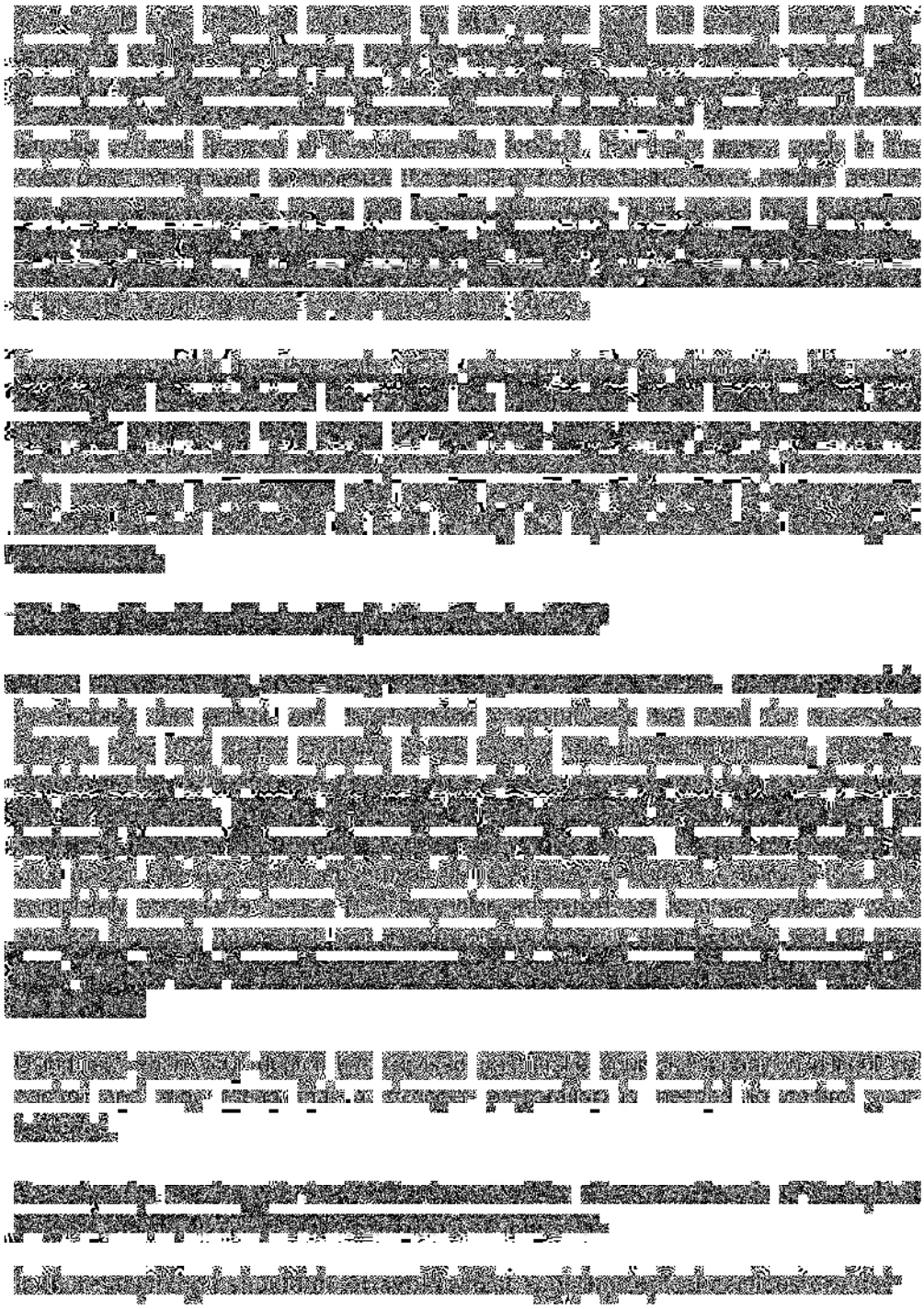
ANNEXURE – VII - SUBJECT INFORMATION LEAFLET

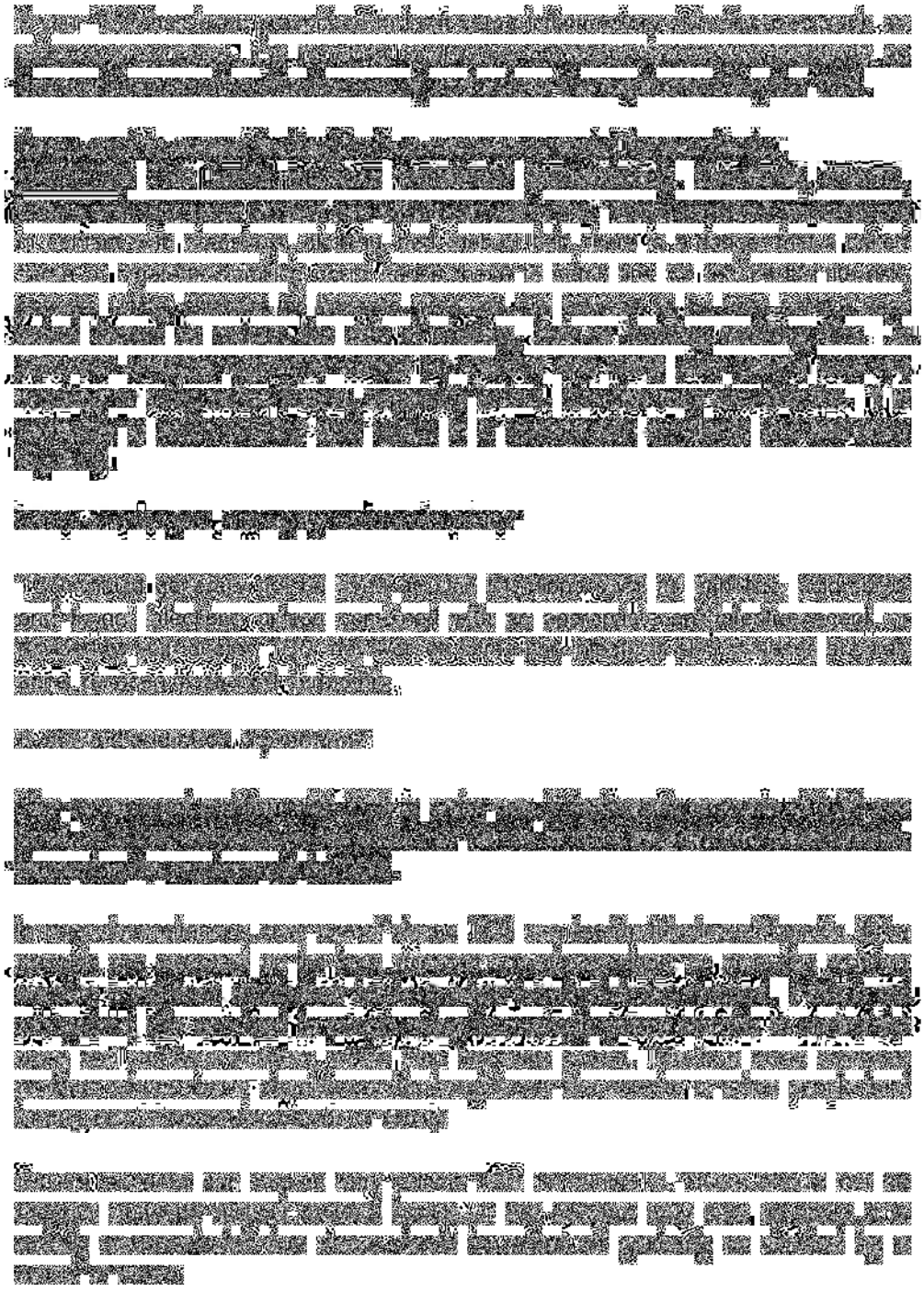


[redacted]

TCS suppress skin inflammation (which causes redness and itching) rather than treating the cause of the inflammation and so they do not usually cure the condition [redacted]

How should I apply topical corticosteroids?





Fingertip Unit Application

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

http://www.eczema.org/corticosteroids

http://www.patient.co.uk/health/topical-steroids

http://dermnetnz.org/treatments/topical-steroids.html

For details of source materials please contact the Clinical Standards Unit (clinicalstandards@bad.org.uk).

[redacted]

[redacted]

Dermatologists' Patient Information Lay Review Panel

BRITISH ASSOCIATION OF DERMATOLOGISTS
PATIENT INFORMATION LEAFLET
PRODUCED MARCH 2012
UPDATED MARCH 2015, MAY 2019
REVIEW DATE MAY 2022

Health & care information you can trust
The Information Standard Certified Member

ANNEXURE – VIII – Links for Audio-Video-Visual Tools

IADVL Awareness Drive on Topical Steroid Misuse Videos

https://youtu.be/SZCP9w7bZt8?si=3ZwmZDORtjiUyp4w

https://youtu.be/KARZW1uE1Rw?si=J79cXiw6iFir4Zb0

https://youtu.be/IHIv2zDowjI?si=iszwgJukwRJMRz8L

https://youtu.be/SizUWxDypyo?si=UdknNJ8oOnzEF435

ANNEXURE – IX - PUBLICATIONS

Journal of Young Pharmacists, 2023; 15(3):563-568.
https://www.jyoungpharm.org

Original Article

Assessment and Evaluation of Knowledge, Attitude and Perception on Topical Corticosteroids among Health Science Student Population

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ABSTRACT

Background: Abuse of topical corticosteroids is a growing concern for dermatologists in India. It manifests itself in a variety of ways, most frequently on the face. Important underlying issues include a lack of public knowledge and the simplicity of acquiring topical corticosteroids without a prescription. There is a need to take urgent remedial steps and increase awareness about this problem in Health Science Student Population. Therefore, our study aims to assess and evaluate the Knowledge, Attitude and Perception (KAP) among health science student population regarding usage of topical corticosteroids. **Materials and Methods:** A Randomized case control study carried out among health science student population. A Self-prepared and validated KAP questionnaires were distributed to the health science student population through online forms and face-to-face interview were done after seminar was conducted in case group using audio-video visuals and only subject information leaflet is given in control group then post study was done after 1 month and follow-up after 3 months with the same set of questionnaires. **Results:** Out of 520 students women made up 69.23% more participants than men. The percentage of people aged 20 to 30 was 71.15%. Most of the participants were undergraduates with 81.15%. Pharmacy (22.69%) is the field with the highest enrolment, followed by Ayurveda, Nursing, Physiotherapy, Medical, dental and allied degrees. Case group showed significant improvement in KAP score respectively compared to control group ($p<0.05$). **Conclusion:** Educating with audio video visuals and seminar shows significant improvement in KAP scores compared to giving subject information leaflet.

Keywords: Topical corticosteroids, Health science, Knowledge, Attitude, Perception.

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Revised: 20-05-2023;
Accepted: 26-06-2023.

INTRODUCTION

Steroids are naturally occurring substance, produced by the body.[1] By decreasing the amount of collagen in the skin and controlling inflammation, corticosteroids treat diseases of the skin.[2] Topical corticosteroids are corticosteroids that are administered on the skin as creams, ointments, lotions, shampoos, and gels. Topical corticosteroids are available in various potencies. However, long-term adverse effects seen with topical corticosteroids are topical steroid dependent face, also called red face syndrome, steroid addiction, dermatitis rosaceaformis steroidica, topical corticosteroid induced rosacea like dermatitis. etc. might be dangerous.[3] Topical corticosteroids because of their activity, they can momentarily cover skin inflammation and result in temporary fairness.[4,5] Topical corticosteroids abuse is more among females compared to males for fairness purposes.[6]

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Topical corticosteroids provide a quick symptomatic relief in most of the inflammatory dermatoses.[7] Because of this, it is one of the most frequently recommended topical medications, which have been used around for roughly 60 years at this point.[8] Sulzberger and Witten initially presented it as compound F in 1952 (hydrocortisone).[9] Strong corticosteroids, including clobetasone, fluticasone, and mometasone are only permitted to be marketed in India with a qualified medical practitioner's prescription under Indian rules and regulations. There are at least 18 corticosteroid molecules available in Indian market for topical use, out of which a few are easily available at almost all medical stores without prescription.[10] All steroids are listed in Schedule H of the Drugs and Cosmetics Rules of 1945, but topical preparations and eye ointments are mysteriously left off the list in a footnote even though there are no oral formulations of these medications.[11] This suggests that these pharmaceuticals are for all intents and purposes deemed to be available Over the Counter (OTC). This requires immediate revision.[12,13]

In the recent years, it has been noticed that there is an increase in topical corticosteroids misuse in the community.[14] Topical

corticosteroids abuse is quite common with varied presentations most commonly on face.[15] There is need to take urgent remedial steps and increase awareness about this problem in health science student population using topical corticosteroids.[16] Keeping this in view our study aims to create awareness among health science student population through seminar using audio video visuals for one group and comparing KAP of case with control, assess the Knowledge, Attitude and Perception (KAP) regarding topical corticosteroids among the sample of health science student population.

MATERIALS AND METHODS

A prospective interventional study was conducted among health science student population in different constitutional units of the university. The study was conducted for the duration of six months. Health science student population were enrolled in this study in prior to Institutional Ethical Committee (IEC) with Ethical clearance number (Ref no: KAHER/EC/21-22/023) and written informed consent form was obtained from each participant before the enrolment. The study was conducted using self-framed and validated KAP questionnaire among health science student population. Health science student population includes diploma, undergraduates, post graduates from different courses (Pharmacy, Nursing, Physiotherapy, Ayurveda, Bachelor of Medicine and Bachelor of Surgery (MBBS), Bachelor of Dental Surgery (BDS), Allied health science courses) were approached individually in small groups for the survey and was conducted with help of questionnaires.

As there was no validated questionnaire available, we used a set of 10 questions in each section of KAP accordingly (Table 1). For subject information leaflet we took the permission for using standardized subject information leaflet provided by British Association of dermatology on awareness of topical corticosteroids. We randomized the sample population using computer randomization method into two groups as case and control. Same validated questionnaire was used in both case and control group for Pre, Post and follow-up.

The case group was given intervention after taking pre KAP scores, both subject information leaflet and educated them using audio, video visuals followed by seminar showing pictorial representation of the side effects of the topical corticosteroid's abuse/misuse and post KAP scores was taken and compared both pre and post KAP scores. After one month follow up was conducted in case group. Whereas the control group was not given any intervention after the pre KAP scores obtained, post KAP scores were obtained as such without intervention, one month follow up scores were obtained and compared accordingly.

The data results were analysed for descriptive statistics by *t* test, *p* values and with 95% confidence interval using SPSS (Statistical Package for Social Sciences) software version 22.0. The schematic representation of the study has been depicted in the Figure 1.

RESULTS

A total of 520 health science students were enrolled into the study. They were randomized into case (260) and control (260) groups by using computer randomization method. The age group of health science student population in case group were 26.54% (69) in between 18-20 years and 73.46% (191) in between 21-30 years. Whereas in control the age group of health science student population were 31.15% (81) in between 18-20 years and 68.85% (179) in between 21-30 years. Out of 260 health science student population, in case 68.08% (177) were females and 31.92% (83) were males. Whereas in control 70.38% (183) were females and 29.62% (77) were males. The majority of the participants were the undergraduate students in case 81.92% (213) and in control 80.38% (209) followed by diploma students in case 12.69% (33) and in control 11.15% (29). The minor participants were the post graduate student in case 5.38% (14) and in control 8.46% (22). The majority course students enrolled in the case are Pharmacy 29.23% (76) followed by Ayurveda 20.77% (54), Physiotherapy 13.08% (34), Nursing 11.92% (31), medical allied course 9.62% (25), BDS 8.08% (21) and MBBS 7.31% (19). In control group are Nursing 21.54% (56), 8.46% (22) and medical allied course 8.46% (22). The demographics profile of the health science student population is characterised in Table 1.

On assessment of Knowledge parameter, the time points in the case group, the pre-test of the mean 1.54 and SD 1.41, the post-test of the mean 5.45 and SD 0.62, the follow-up of the mean 4.82 and SD 0.58, the pre-test to post test of the mean 3.91 and SD 1.52, the pre-test to follow-up of the mean 3.28 and SD 1.47. The

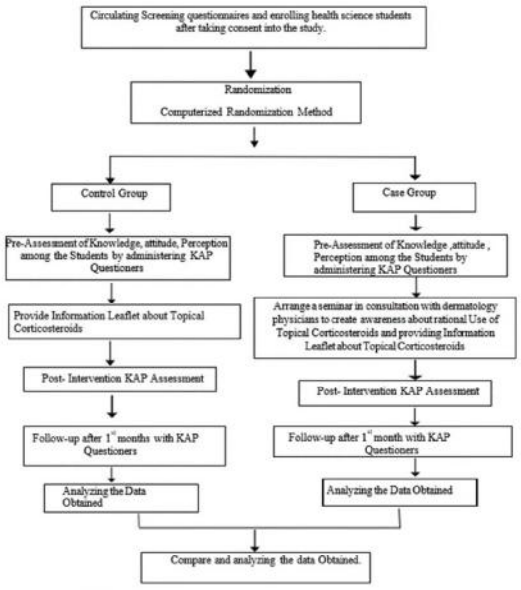

Figure 1: Schematic representation of methodology.

Table 1: Comparison of cases and controls with demographic profile.

Profile	Cases	%	Controls	%	Total	%	χ^2	*p*-value
Age groups								
18 – 20	69	26.54	81	31.15	150	28.85	1.3490	0.2450
21 – 30	191	73.46	179	68.85	370	71.15		
Gender								
Male	83	31.92	77	29.62	160	30.77	0.3250	0.5690
Female	177	68.08	183	70.38	360	69.23		
Education Qualification								
Diploma	33	12.69	29	11.15	62	11.92	2.0740	0.3550
Undergraduate	213	81.92	209	80.38	422	81.15		
Postgraduate	14	5.38	22	8.46	36	6.92		
Courses								
Pharmacy	76	29.23	42	16.15	118	22.69	18.1770	0.0060*
Nursing	31	11.92	56	21.54	87	16.73		
Physiotherapy	34	13.08	37	14.23	71	13.65		
Ayurveda	54	20.77	56	21.54	110	21.15		
MBBS	19	7.31	25	9.62	44	8.46		
BDS	21	8.08	22	8.46	43	8.27		
Allied Course	25	9.62	22	8.46	47	9.04		
Total	260	100.00	260	100.00	520	100.00		

time points in the control group, the pre-test of the mean 1.62 and SD 1.48, the post-test of the mean 2.76 and SD 0.62, the follow-up of the mean 4.82 and SD 0.58, the pre-test to post test of the mean 3.91 and SD 1.52, the pre-test to follow-up of the mean 3.28 and SD 1.47. In attitude parameter, the time points in the case group, the pre-test of the mean 10.18 and SD 1.49, the post-test of the mean 22.42 and SD 1.60, the follow-up of the mean 22.35 and SD 1.43, the pre-test to post test of the mean 12.23 and SD 2.08, the pre-test to follow-up of the mean 12.17 and SD 1.98. The time points in the control group, the pre-test of the mean 10.49 and SD 1.98, the post-test of the mean 11.90 and SD 3.05, the follow-up of the mean 11.75 and SD 2.77, the pre-test to post test of the mean 1.41 and SD 2.72, the pre-test to follow-up of the mean 1.26 and SD 2.69. Where as in Perception parameter, the time points in the case group, the pre-test of the mean 1.56 and SD 1.03, the post-test of the mean 5.60 and SD 0.56, the follow-up of the mean 5.60 and SD 0.56, the pre-test to post test of the mean 4.03 and SD 1.14, the pre-test to follow-up of the mean 4.03 and SD 1.14. The time points in the control group, the pre-test of the mean 1.67 and SD 1.05, the post-test of the mean 4.20 and SD 0.88, the follow-up of the mean 4.20 and SD 0.88, the pre-test to post test of the mean 2.53 and SD 1.23, the pre-test to follow-up of the mean 2.53 and SD 1.23. The *p*-value (<0.005) among the parameters of knowledge, attitude and perception was found a significant improvement between the case and control groups by using dependent test as shown in the Table 2.

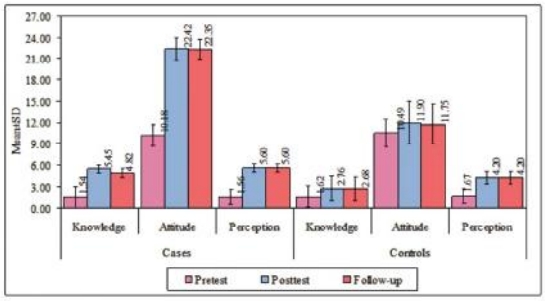

Figure 2: Comparison of pre-test, post-test and follow up scores of knowledge, attitude and perception in cases and controls.

The comparison of pre-test, post-test and follow up scores of KAP in cases and controls using dependent T test summarized in Figure 2.

DISCUSSION

Awareness on topical corticosteroids among the health science students is one of the better implementing education choices which improves the practice in treating common people who abuse the topical corticosteroids.[17] Among all the literature that is currently available, studies on topical steroid usage only include demographic information, are cross-sectional studies, and do not include follow-up studies. Although topical corticosteroids are

Table 2: Comparison of cases and controls with mean pretest, posttest and follow up scores of knowledges, attitude and perception by independent *t* test.

Parameters	Time points	Cases		Controls		*t*-value	*p*-value
		Mean	SD	Mean	SD		
Knowledge	Pre-test	1.54	1.41	1.62	1.48	-0.6361	0.5250
	Pos-ttest	5.45	0.62	2.76	1.71	23.8563	0.0001*
	Follow-up	4.82	0.58	2.68	1.64	19.8004	0.0001*
	Pre-test to post-test	3.91	1.52	1.14	2.29	16.3045	0.0001*
	Pre-test to follow-up	3.28	1.47	1.06	2.26	13.2340	0.0001*
Attitude	Pre-test	10.18	1.49	10.49	1.98	-2.0316	0.0427
	Post-test	22.42	1.60	11.90	3.05	49.1801	0.0001*
	Follow-up	22.35	1.43	11.75	2.77	54.8524	0.0001*
	Pre-test to posttest	12.23	2.08	1.41	2.72	50.9951	0.0001*
	Pre-test to follow-up	12.17	1.98	1.26	2.69	52.6696	0.0001*
Perception	Pre-test	1.56	1.03	1.67	1.05	-1.1835	0.2372
	Post-test	5.60	0.56	4.20	0.88	21.5615	0.0001*
	Follow-up	5.60	0.56	4.20	0.88	21.5615	0.0001*
	Pre-test to post-test	4.03	1.14	2.53	1.23	14.4327	0.0001*
	Pre-test to follow-up	4.03	1.14	2.53	1.23	14.4327	0.0001*

*$p<0.05$

ideal advised for particular illnesses and for particular lengths of time, this regimen is rarely followed. Its overuse and misuse have reached epidemic proportions, as is the situation in India. It will be extremely concerning if the population of health science students, who are an important part of the medical community and who should be strongly opposed to the idea of drug abuse, use topical corticosteroids on themselves for cosmetic reasons.[18] Since not all health science students will become dermatologists and there aren't enough dermatologists to treat everyone, learning about topical steroids should be part of the curriculum.

In a study conducted by Muthukumar and Ganapathy, among the majority of dentistry students concluded that they were knowledgeable with topical corticosteroid formulation, its use, and adverse effects. similarly in our study the health science students of both case and control groups were having pre-test knowledge low awareness in parameters such as application, usage, side effects about the topical corticosteroids but in the post test the knowledge about topical corticosteroids had been improved in case and remains same in control group.[19] In another study conducted by Alsukait *et al.* among the physicians had shown low knowledge as similar to our study in pre-test.[20] In our study the knowledge of the health science students was improved after educating, lack of adequate dermatology instruction in undergraduate curriculum may be to responsible for knowledge gaps regarding topical corticosteroids.

Topical corticosteroids are classified as schedule-H pharmaceuticals under the 1945 drugs and Cosmetics Rules, which prohibits the purchase of these medications without a valid prescription from a licensed physician.[21] In our study the health science students of both case and control groups were having pre-test attitude on schedule-H drugs awareness was less but after educating in the post test attitude case group was improved regarding schedule-H awareness on topical corticosteroids.[22] In a survey conducted by Berce *et al.*, on Family medicine providers, pharmacists interns and dermatology residents perception towards topical corticosteroids appears low which was modifiable characterized by significant improvements in overall knowledge and beliefs following participation in an evidence-based instructional session on the proper use of topical corticosteroids.[23] Similarly in our study regarding perception towards topical corticosteroids both case and control groups were having pre-test perception on topical corticosteroids was low but in post test case group got improved and control group remains same.[24]

According to one of the surveys conducted by Parul Verma, Pathania S *et al.*, there is a significant gap in the knowledge, attitude, and practice of topical corticosteroids among medical graduates. This gap can be filled with appropriate undergraduate training, as our study demonstrates a significant improvement in KAP following instruction using educational tools such as student information leaflets, audio visuals, and seminars.[25] In this study, we focused on the students with the objective to find out

about their knowledge, attitudes, and perceptions about topical steroids topical corticosteroids and to make them educated about steroid abuse and misuse.[26] In a study conducted by Saxon D Smith *et al.*, concludes there is a significant knowledge gaps about the use and safety of TCS among pharmacists similarly in our study pharmacy students also lacking knowledge gaps about the use and safety of TCS. So, it is our responsibility to educate medical fraternity on safety use of Topical Corticosteroids. Pharmacy students should be educated as they will be future community pharmacists who can educate the patients about TCS safety usage.[27-29] In a study conducted by Ashley N Millard *et al.*, concludes an interprofessional practice gap found between dermatologists and pharmacists.[30] Similarly, in our study the pre-test and post-test shows improvement in knowledge, attitude and perception on topical corticosteroids. The collaborative education and communication between the health science student groups is necessary required about application and adverse effects of topical corticosteroids.[30]

CONCLUSION

From this study we conclude that pre-test results revealed a significant knowledge, attitude, and perception gap among the population of students studying health sciences. Significant improvement in knowledge, attitude, and perception absorbed in intervention group in compared to control group after seminar and educating them through student information leaflet and audio video visuals. Hence educating students with educational tools, workshops, seminars and role plays conducted will be beneficial.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

KAP: Knowledge, Attitude and Perception; **TCS:** Topical Corticosteroids; **OTC:** Over the Counter; **IEC:** Institutional Ethical Committee; **MBBS:** Bachelor of Medicine and Bachelor of Surgery; **BDS:** Bachelor of Dental Surgery; **SPSS:** Statistical Package for Social Sciences; **SD:** Standard Deviation.

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RESEARCH ARTICLE

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Abstract

Numerous studies indicate that patients often misuse topical corticosteroids due to insufficient information and self-administration. In India, these medications are often available over the counter without proper prescriptions, leading to irrational use. This study aims to assess the knowledge, attitude, and practice (KAP) regarding topical corticosteroids among dermatology outpatients. A prospective pre-post study was conducted among 100 dermatology outpatients using validated KAP questionnaires administered through face-to-face interviews. Following patient counselling with an information leaflet, the same questionnaires were completed again after one month. Results showed 53% of participants were women, 71% were aged 22 to 40, and 56% were graduates. Additionally, 49% had fair economic status, 80% were married, and 65% resided in rural areas. The most common adverse drug reaction was acne (31%), with 61% rated as "possible" on the Naranjo scale. Clobetasol propionate 0.05% was misused by 29% of participants, primarily for skin lightening (31%). Pharmacists were the primary information source (51%). Pre-test scores for knowledge, attitude, and perception were low (mean 1.46±1.61, 4.00±3.18, 1.46±1.61), but significantly improved post-test (mean 3.10±2.03, 6.00±2.96, 3.14±2.03) with p-values <0.05 Patient counselling significantly increased knowledge about topical corticosteroids.

Keywords: Topical corticosteroids, Dermatology outpatients , Knowledge, Attitude, Practice.

[redacted]

(2024). A Questionnaire Study on Patient Knowledge, Attitude, and Perception of Topical Corticosteroid Abuse in a Dermatology Outpatient Department. The Scientific Temper, **15**(2):2375-2379.
Doi: 10.58414/SCIENTIFICTEMPER.2024.15.2.53
Source of support: Nil
Conflict of interest: None.

[redacted]

sometimes even in the absence of proper prescriptions. Studies have shown that patients lack education regarding topical corticosteroids, which in turn leads to its irrational use(Coondoo A.,2014) In the recent years, it has been noticed that there is an increase in Topical corticosteroid misuse in the community (Mehta AB.,2016). Topical corticosteroids

[redacted]

[redacted]

we used a set of 10 questions in each section of KAP . For subject information leaflet we took the permission for using standardized subject information leaflet provided by British Association of Dermatology on awareness of topical corticosteroids.

Questionnaire design

A questionnaire was designed to understand the knowledge, attitude, and perception of topical corticosteroids in dermatology outpatients. A pilot study was conducted prior to conduct of the main study where the questionnaire was validated and reliability was found to be good (Cronbach's alpha i.e., $\alpha \geq 0.9$). The questionnaires was divided into four sections each section contain 10 questions which includes demographic details, knowledge, attitude and perception. The questionnaire was framed with the questions of yes or no type and using five-point Likert scale. Section one is the patients demographics, which consists of the gender, duration of the TCs abuse, literacy , economic status , marital status and residence of the patients. Sections two, three, and four contain the KAP questions respectively. Questions are close-ended type. Sections two contains 10 basic questions to assess the knowledge of patients regarding topical corticosteroids. Section three contains 10 questions and three-point Likert response scale ranging from agree to disagree was used. Section four containing 10

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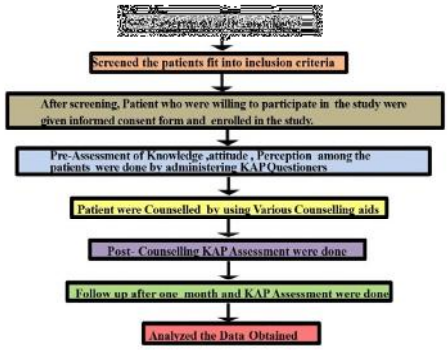
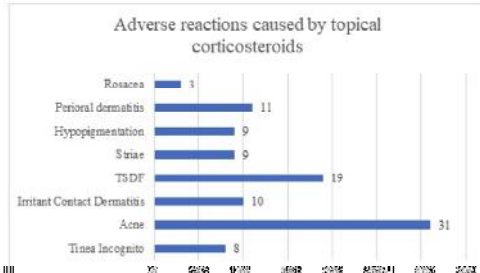


Figure 1: Study procedure



Demographic profile	*No of respondents*	*% of respondents*
Age groups		
Age	*Frequency*	*Percent*
18- 21yrs	25	25.0
22-40yrs	71	71.0
41-50yrs	4	4.0
Gender		
Male	47	47.0
Female	53	53.0
Educational status		
Primary	11	11.0
Secondary	30	30.0
Graduate	56	56.0
Post-graduation	3	3.0
Economic status		
Poor	16	16.0
Fair	49	49.0
Good	35	35.0
Poor	16	16.0
Residence		
Rural	65	65.0
Urban	35	35.0
Total	100	100.00

The Naranjo scale assessment results among the respondents show that 3% of cases were classified as definite,36% as probable, and 61% as possible, based on a total of 100 respondents as shown in Figure 3.

The data on the misuse of topical corticosteroids [illegible] 0.1%, and 3% used Hydrocortisone acetate 1% is shown in Figure 4.

The indications for the misuse of topical corticosteroids among respondents are 20% for fungal infections, 10% for acne, 31% for skin lightening, 3% for eczema, 11% for dermatitis, 14% for dermatophytosis, 9% for melasma, and 2% for psoriasis as shown in Figure 5.

The sources of information for the misuse of topical corticosteroids are 10% from general practitioners, 17% from non-allopathic doctors, 51% from pharmacists, 6% from friends, 4% from relatives, and 12% from social media

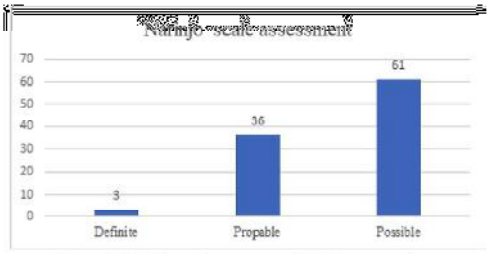
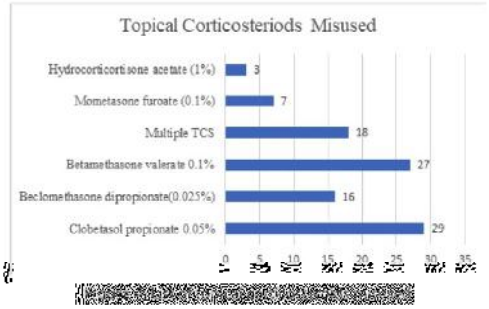
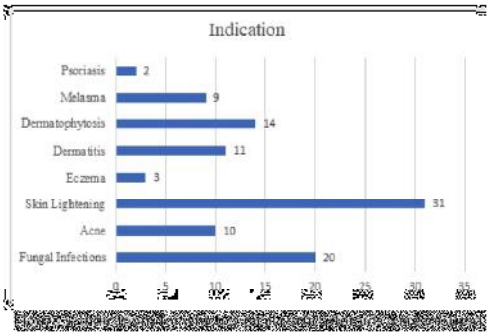
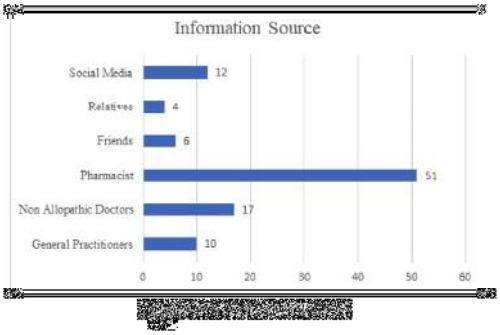
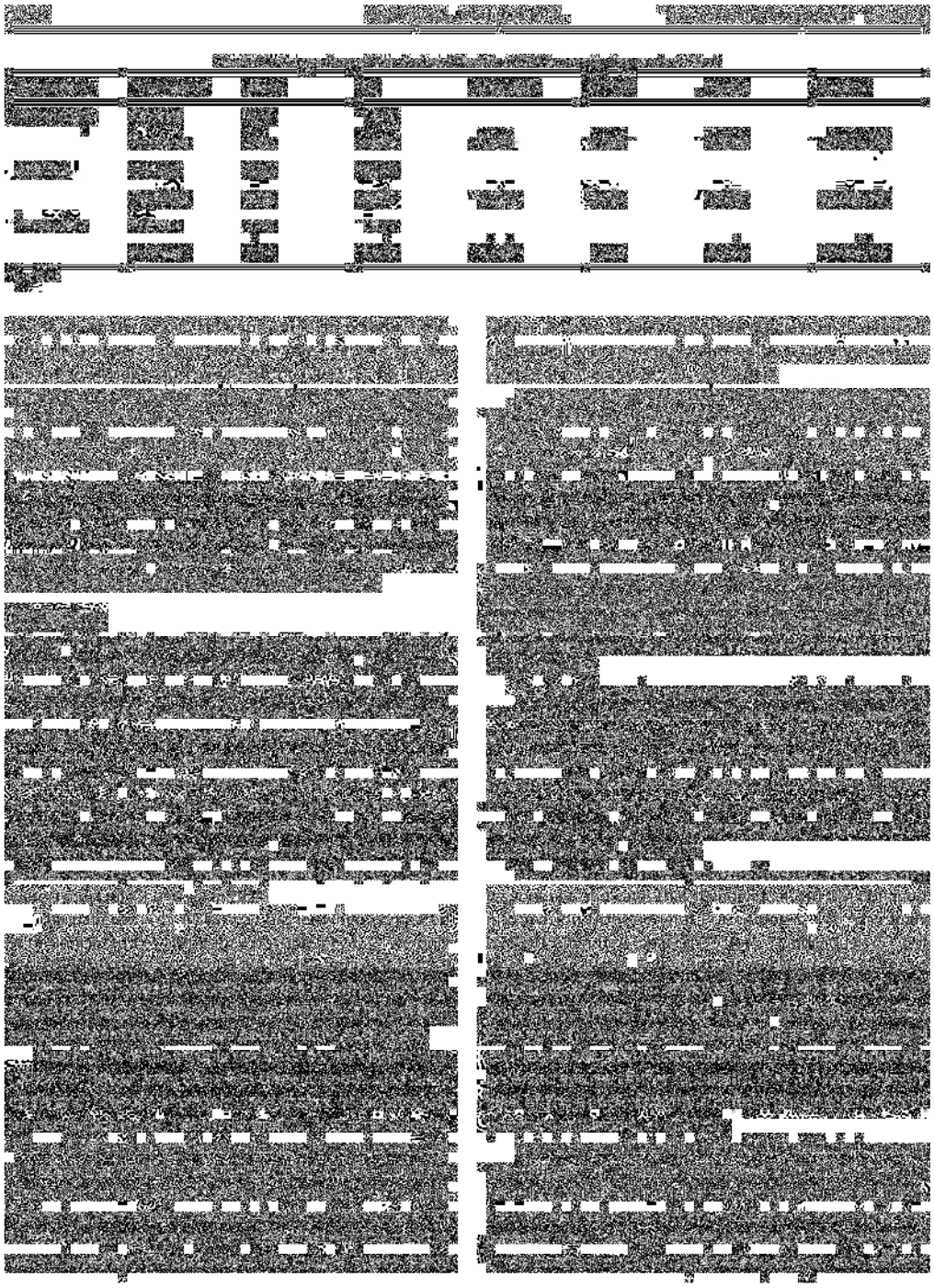


Figure 3: Narinjo scale assessment of adverse reactions



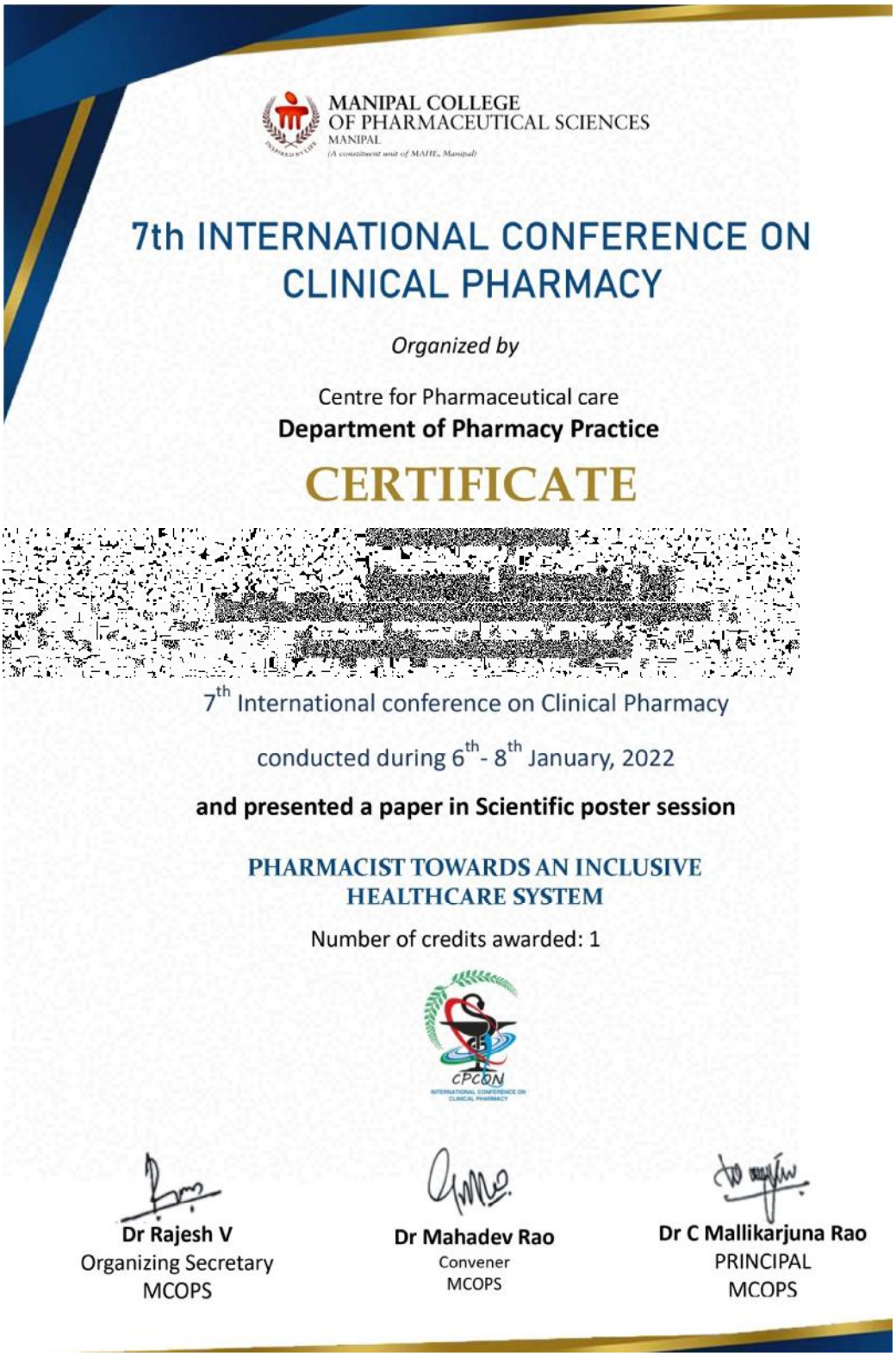






ANNEXURE – X - CERTIFICATES OF ORAL &

POSTER PRESENTATION



MANIPAL COLLEGE
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MANIPAL
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Organized by

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Department of Pharmacy Practice

CERTIFICATE

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7th International conference on Clinical Pharmacy

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and presented a paper in Scientific poster session

PHARMACIST TOWARDS AN INCLUSIVE HEALTHCARE SYSTEM

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Certificate of Presentation

This is to certify that
Dr.Sowmya Spoorthi.M has presented oral paper entitled Level of Awareness on Topical Corticosteroids among Health Science Population co-authored by M.S.Ganachari during PharmaNEST'3.E International Conference held at JSS College of Pharmacy, Ooty, The Nilgiris, Tamil Nadu on 14 - 15 October, 2022.

Presentation Code: PPE/O/624

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PharmaNEST 3.E

Dr. R. Kalirajan
Organizing Secretary,
PharmaNEST 3.E

Vikram Choudhary
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Dr/~~Mr/Miss/Mrs.~~/ Sowmya Spoorthi. has participated

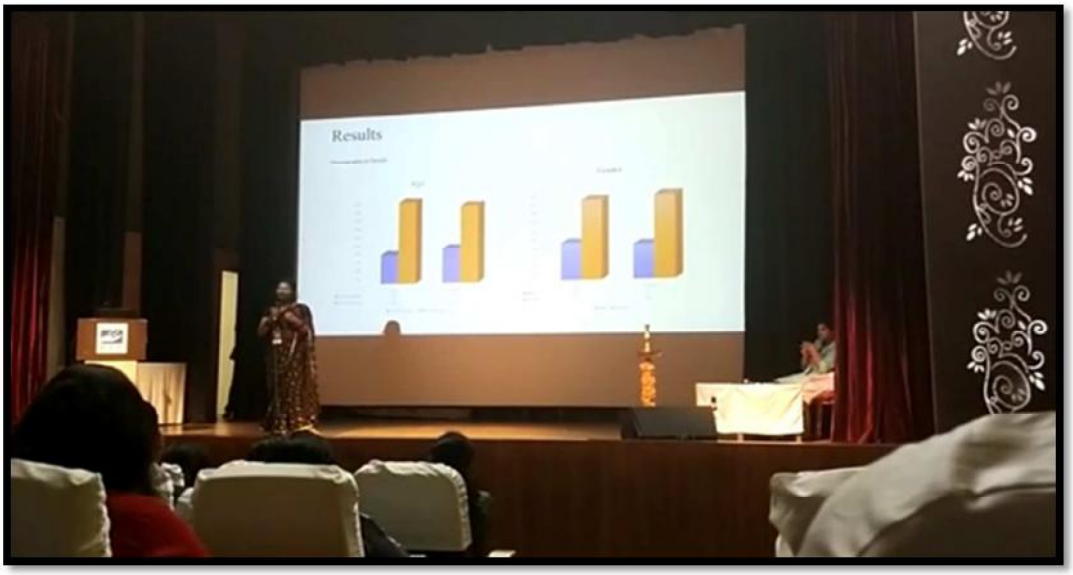
in Short Movie Making/ Street Play/ Story Telling/ Oral Presentation/ Pecha Kucha/ Poster Presentation in

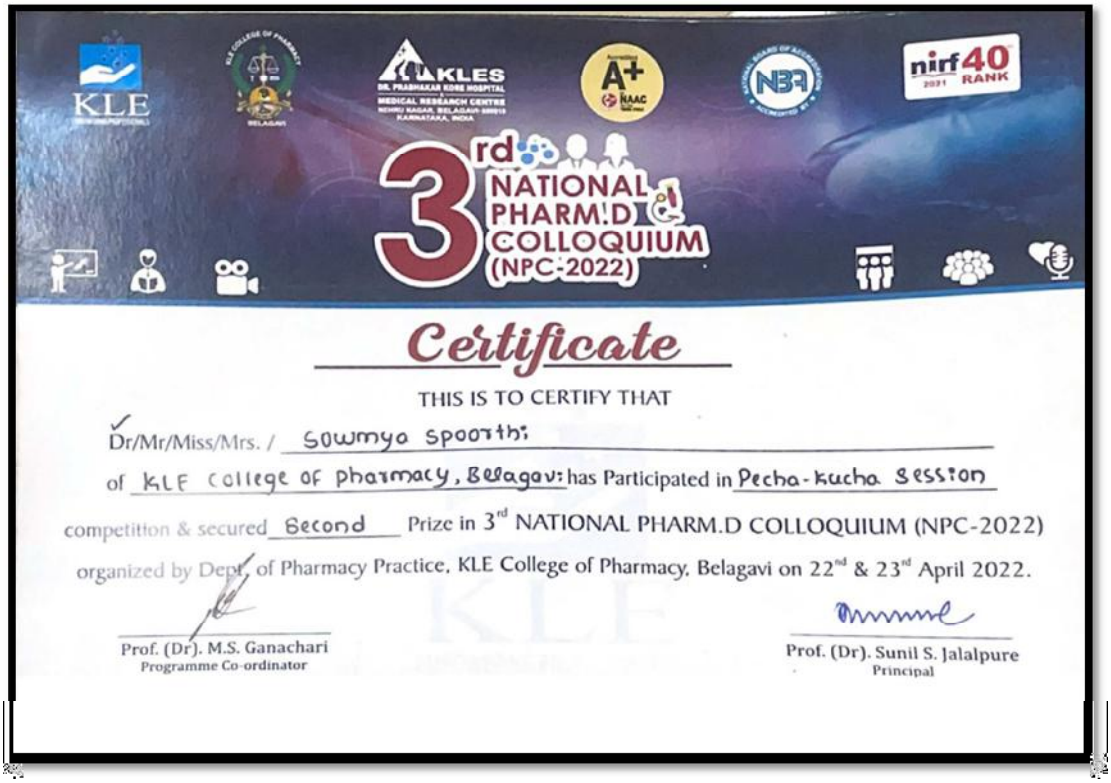
3rd NATIONAL PHARM.D COLLOQUIUM (NPC-2022) organized by Dept. of Pharmacy Practice,

KLE College of Pharmacy, Belagavi on 22nd & 23rd April 2022.

Prof. (Dr). M.S. Ganachari
Programme Co-ordinator

Prof. (Dr). Sunil S. Jalalpure
Principal





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Dr/Mr/Miss/Mrs. / Sowmya Spoorthi

of KLE College of Pharmacy, Belagavi has Participated in Pecha-kucha Session competition & secured Second Prize in 3rd NATIONAL PHARM.D COLLOQUIUM (NPC-2022) organized by Dept. of Pharmacy Practice, KLE College of Pharmacy, Belagavi on 22nd & 23rd April 2022.

Prof. (Dr). M.S. Ganachari
Programme Co-ordinator

Prof. (Dr). Sunil S. Jalalpure
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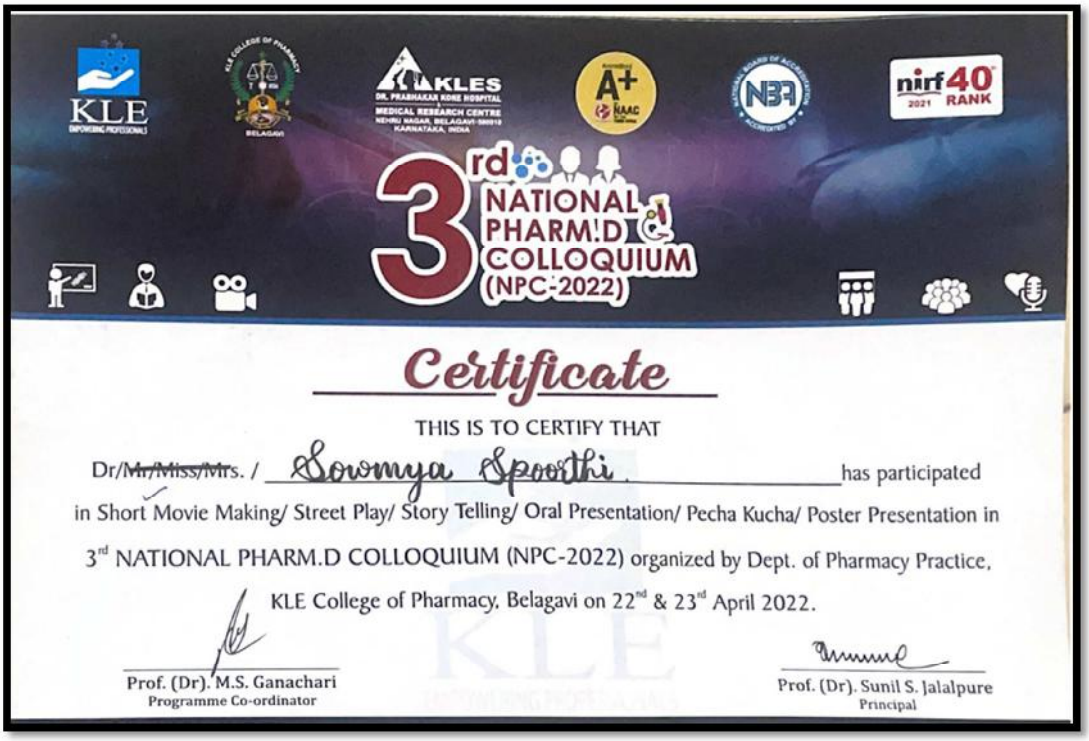

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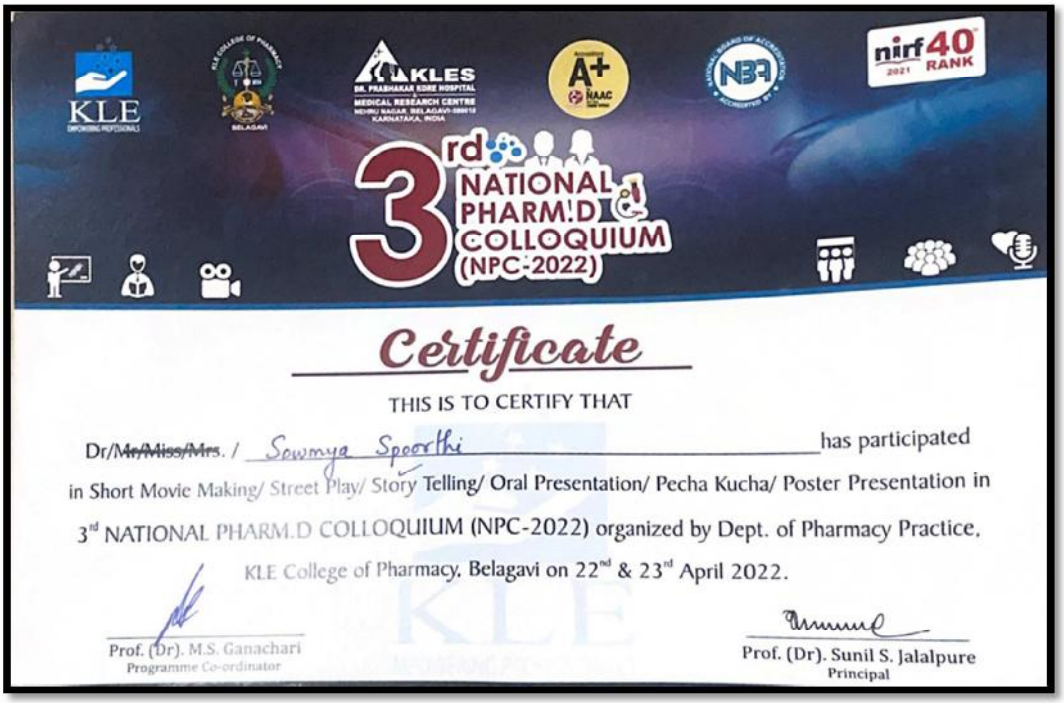

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Prof. (Dr). M.S. Ganachari
Programme Co-ordinator

Prof. (Dr). Sunil S. Jalalpure
Principal

Commacad

CERTIFICATE OF COMPLETION

is hereby presented to

Dr. Sowmya Spoorthi. M

in appreciation for completing the

SPSS - Master Workshop

held from March 26 '21 to March 28 '21.

DIRECTOR
COMMACAD

WORKSHOP CONVENER
COMMACAD

Certificate # - 1bJ6IUXWuq

COMMCAD

Certificate ID : JZ4YNUHGQ6WY2H

Certificate

OF COMPLETION

Presented to

Dr. Sowmya Spoorthi M

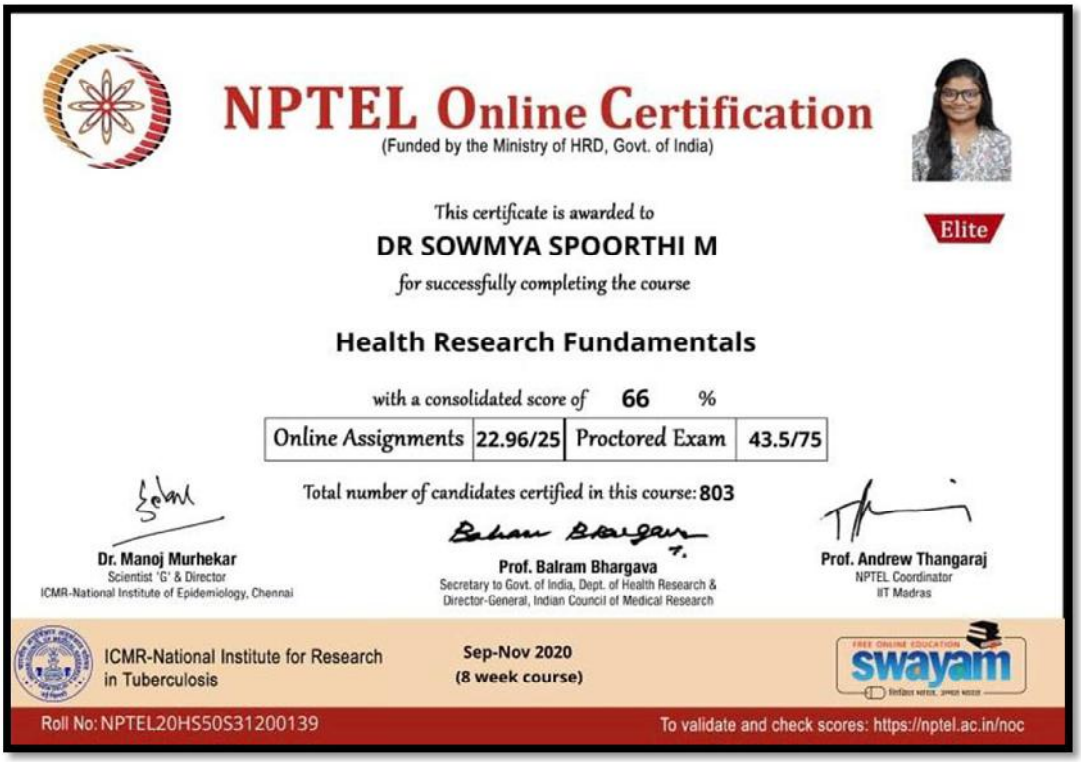
for successfully completing the e-workshop on

'Questionnaire Designing'.

Held from 30th to 31st July, 2022.

MR. PREM PAL
Director

MS. KARTIKA B.
Convener



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(Funded by the Ministry of HRD, Govt. of India)

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This certificate is awarded to

DR SOWMYA SPOORTHI M

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Health Research Fundamentals

with a consolidated score of **66** %

Online Assignments	22.96/25	Proctored Exam	43.5/75

Total number of candidates certified in this course: **803**

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Scientist 'G' & Director
ICMR-National Institute of Epidemiology, Chennai

Prof. Balram Bhargava
Secretary to Govt. of India, Dept. of Health Research &
Director-General, Indian Council of Medical Research

Prof. Andrew Thangaraj
NPTEL Coordinator
IIT Madras

ICMR-National Institute for Research in Tuberculosis

Sep-Nov 2020
(8 week course)

swayam

Roll No: NPTEL20HS50S31200139

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Department of Epidemiology and Biostatistics

KAHER/EBD/IN2021/D-008

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This is to certify that **Dr. Sowmya Spoorthi M.**

has attended the 'Intensive Course in Research Methodology and Biostatistics'

held from 11th January to 22nd February, 2021 at KAHER, Belagavi

and passed with **81.3 Percent (Grade A)**

Dr. N. K. Tyagi
Prof. & Head,
Department of Epidemiology & Biostatistics,
KAHER, Belagavi

Dr. V. A. Kothiwale
Registrar,
KAHER, Belagavi

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Department of Epidemiology and Biostatistics

CERTIFICATE

Workshop on
Sample Size Estimation, Systematic Review and Meta-Analysis using EXCEL/SPSS
held from 4th to 6th January 2021

This is to certify that **Dr. Sowmya Spoorthi M**
has participated as a Delegate in the workshop

Dr. N. K. Tyagi
Professor & Head,
Department of Epidemiology & Biostatistics, KAHER, Belagavi

Dr. V. A. Kothiwale
Registrar,
KAHER, Belagavi

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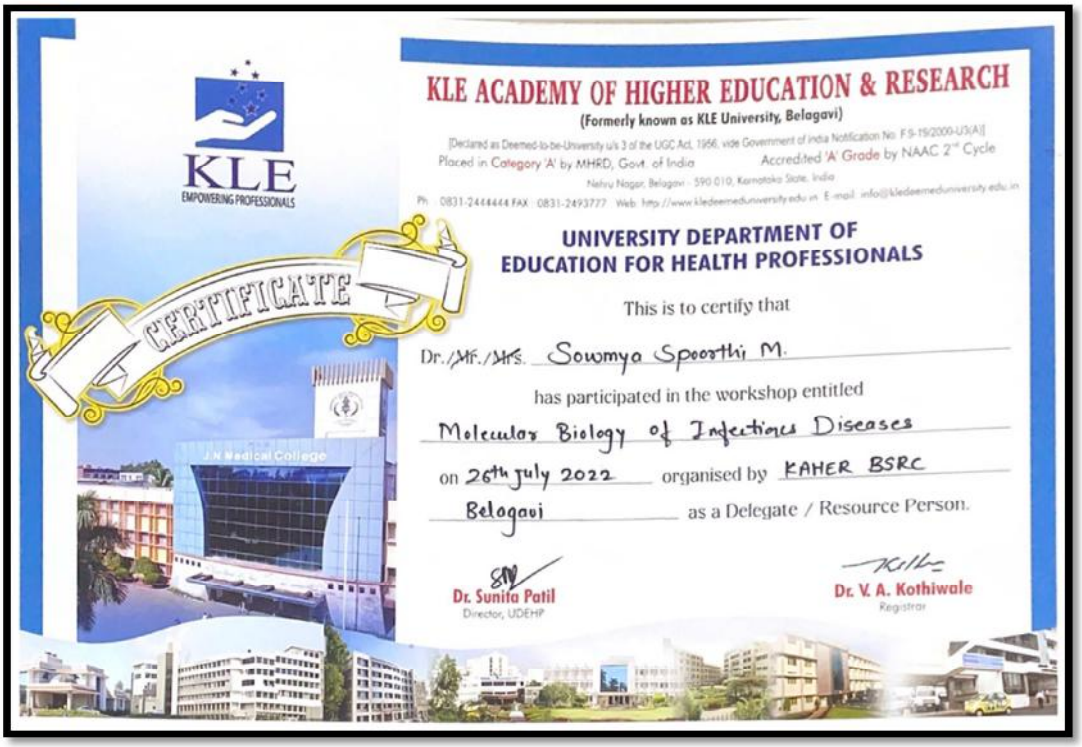

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has participated in the workshop entitled

Molecular Biology of Infectious Diseases

on 26th July 2022 organised by KAHER BSRC

Belagavi as a Delegate / Resource Person.

Dr. Sunita Patil
Director, UDEHP

Dr. V. A. Kothiwale
Registrar

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Has participated as Delegate/ Resource Person in

"WORKSHOP ON COMMUNITY PHARMACY MANAGEMENT SKILLS"

Conducted on 10th December 2022

Head of the Department
Prof. (Dr.) M. S. Ganachari
Department of Pharmacy Practice,
KLE College of Pharmacy, Belagavi

Principal
Prof. (Dr.) Sunil S. Jalalpure
KLE College of Pharmacy, Belagavi