"A CROSS SECTIONAL STUDY OF DERMOSCOPIC FINDINGS IN NON-CICATRICIAL ALOPECIA"

By

REG NO. : BT0113001

Dissertation

Submitted to the
KLE University Belagavi, Karnataka

In partial fulfillment
of the requirements for the degree of

DOCTOR OF MEDICINE (M.D.)

In

DEPARTMENT OF DERMATOLOGY,
VENEREOLOGY AND LEPROSY

DEPARTMENT OF DERMATOLOGY, VENEREOLOGY AND LEPROSY

J. N. MEDICAL COLLEGE, NEHRU NAGAR

BELAGAVI-590010

APRIL- 2016

KLE UNIVERSITY, BELAGAVI,

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LIST OF ABBREVIATIONS USED

AA	:	Alopecia Areata
AcTE	:	Acute Telogen Effluviun
AGA	:	Androgenetic Alopecia
AGA 1	:	Androgenetic Alopecia Grade 1(according to modified Hamilton- norwood scale
AGA 2	:	Androgenetic Alopecia Grade 2 (according to modified Hamilton- norwood scale
AGA 3	:	Androgenetic Alopecia Grade 3 (according to modified Hamilton- norwood scale
AGA 3 a	:	Androgenetic Alopecia Grade 3a (according to modified Hamilton- norwood scale
AGA 3 v	:	Androgenetic Alopecia Grade 3 v (according to modified Hamilton- norwood scale
AGA 4	:	Androgenetic Alopecia Grade 4 (according to modified Hamilton- norwood scale
AI	:	Alopecia areata Incognita
AT	:	Alopecia Totalis
AU	:	Alopecia Universalis
BASP	:	Basic And Specific Classification
ChTE	:	Chronic Telogen Effluviun
DLE	:	Discoid Lupus Erythematosus
FT	:	Fronto-temporal
IDA	:	Iron Deficiency Anemia
LPP	:	Lichen Plano Pilaris

L1	:	Ludwig Grade 1 of Female Androgenetic Alopecia
L2	:	Ludwig Grade 2 of Female Androgenetic Alopecia
Ophi	:	Ophiasis pattern of Alopecia Areata
PaAA	:	Patchy Alopecia Areata
PL	:	Polarized Light
TE	:	Telogen Effluvium
UV	:	Ultra Violet
WL	:	White Light

ABSTRACT

Background: Hair loss can be cicatricial or scarring and non-cicatricial or non-scarring based on the damage to the hair follicle. The primary conditions which constitute non-cicatricial alopecia are Androgenetic alopecia [AGA], Alopecia areata [AA], Telogen effluvium [TE], of which AGA is the commonest. The development of new hair follicles following birth, barring a few exceptions is not a possibility. Therefore, in spite of treating the underlying pathology, patches of scarring alopecia do not show re-growth of hair. Non-scarring alopecias, on the other hand are more amenable to treatment and will be the objects of this study, particularly, AGA, AA and TE.

Dermoscopy, also known as Epiluminescence microscopy, or Skin surface microscopy is a non-invasive, in-vivo technique, most commonly used for viewing pigmented skin lesions. The term "Trichoscopy" was coined for dermoscopy of hair and scalp. Trichoscopic evaluation of the scalp is done on the basis of follicular patterns, interfollicular patterns and hair signs. Any condition affecting the scalp will have characteristic patterns, based on which diagnosis of the particular condition can be made.

Aim: To study the dermoscopic findings in non-cicatricial alopecia. (Androgenetic Alopecia, Alopecia Areata and Telogen Effluvium)

Materials and method: This study was a cross sectional study consisting of 1000 patients clinically diagnosed as having Androgenetic alopecia, alopecia areata or Telogen effluvium, irrespective of age or sex. Patients having scarring alopecia or non-scarring alopecia due to other conditions were excluded from the study. Clinical

photographs were taken after informed consent and hair pull test was performed. Trichoscopic examination was done on six areas of the scalp with the addition of 2 areas in alopecia areata. The findings were tabulated and the prevalence of each trichoscopic feature in the three types of alopecia was calculated.

Results: This study showed that among 100 patients with non-cicatricial alopecia, the majority had AGA (47%), AA (21%) and TE (21%) were of equal prevalence and 11% had a combination of alopecias. The male: female ratio for AGA was 8:1, AA was 1.1:1 and TE was 1:20 showing that AGA is more common in males, TE is more common in females and AA has no significant difference in the sex distribution. Maximum number of patients (38%) were in the age group of 21 – 30 years. On examination, pallor was more prevalent in patients of TE (52%) and hair pull test was positive in all cases of TE and positive at periphery of lesions in 62% patients of AA. The characteristic follicular features on Trichoscopy observed in AGA were peripilar sign (29% < 4 fields; 49% > 4 fields), yellow dots (49% < 4 fields) and empty hair follicles (32% < 4 fields; 6% > 4 fields). The characteristic hair shaft pattern observed was vellus hair (19% < 4 fields; 53% > 4 fields). Variation in hair shaft diameter was more prevalent in fronto-temporal areas (80%) and was absent in occipital area. The prevalence of single hair pilosebaceous units was more prevalent in fronto-temporal areas (27% < 4 fields; 64% > 4 fields) than in occipital area (28%). The characteristic follicular features of AA on Trichoscopy were black dots (19% < 4 fields; 66% > 4 fields), yellow dots (62% < 4 fields; 19% > 4 fields) and empty hair follicles (14% < 4 fields; 19% > 4 fields). The characteristic hair patterns were broken hair (80% < 4 fields; 10% > 4 fields), exclamation mark hair (57% < 4 fields), vellus hair (43% < 4 fields),

pigtail regrowing hair (29% < 4 fields), upright regrowing hair (23% < 4 fields), zig-zag hair (19% < 4 fields) and monilethrix-like hair (10% < 4 fields). TE is said to be a disease of exclusion on Trichoscopy. The characteristic finding is that the variation in hair shaft diameter is prevalent in fronto-temporal (14%) and occipital areas (71%). It is important to differentiate this condition from AGA, where-in the variation in hair shaft thickness is present in fronto-temporal areas and absent in occipital area. The follicular features present in TE are peripilar sign (40% < 4 fields), yellow dots (29% < 4 fields), upright regrowing hair (14% < 4 fields) and vellus hair (10% < 4 fields). The majority of patients having combination of alopecias were those with the combination of AGA and TE (63.6%). The characteristic features in them is that vellus hair and variation in hair shaft diameter are more pronounced in fronto-temporal areas than occipital area.

Conclusion: According to this study, Trichoscopic features of alopecia areata are characteristic and may prove invaluable in the treatment of the condition. Androgenetic alopecia has characteristic trichoscopic features as well, but it can be confused with Telogen effluvium. To differentiate one from the other, it has to be kept in mind that the findings in Androgenetic alopecia spare the occipital area, whereas Telogen effluvium involves the occipital area. But, these conditions often co-exist. Trichoscope is a useful tool for diagnostic purposes and to monitor the response to treatment.

Keywords: Dermoscopy, Trichoscopy, Non-cicatricial alopecia

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INTRODUCTION

Hair style, a characteristic of human beings is a mark of health and represents identity and ethnic group of a person. One's quality of life can be seriously affected by hair loss.[1]

On the basis of permanent damage to the hair follicles, hair loss can be cicatricial or scarring and non-cicatricial or non-scarring. The primary conditions which constitute non-cicatricial alopecia are Androgenetic alopecia [AGA], Alopecia areata [AA], Telogen effluvium [TE], of which AGA is the commonest.[2] Trichotillomania, Anagen effluvium, Drug induced alopecia, Tractional alopecia, alopecia caused by systemic disorders, Viral, bacterial, Fungal infections of the scalp are other causes of non-scaring alopecia.[2] The development of new hair follicles following birth, barring a few exceptions is not a possibility. Therefore, in spite of treating the underlying pathology, patches of scarring alopecia do not show re-growth of hair. Non-scarring alopecias, on the other hand are more amenable to treatment and will be the objects of this study, particularly, AGA, AA and TE. A patient suffering from hair loss is evaluated by several methods. They are;

TABLE 1[3]: METHODS OF EVALUATION OF HAIR LOSS

NON-INVASIVE METHODS	SEMI-INVASIVE METHODS	INVASIVE METHODS
Dermatoscopy, Questionnaire, Daily hair count, Phototricogram,	Trichogram, Unit area Trichogram	Scalp biopsy

Trichoscan, standardized wash test, 60-s hair count, Hair weight, Global photographs		

Dermoscopy, also known as Epiluminescence microscopy, or Skin surface microscopy is a non-invasive, in-vivo technique, most commonly used for viewing pigmented skin lesions.[4] The term "Trichoscopy" was coined in 2006 by Lidia Rudnicka and Malgorzata Olszewska and it was coined for dermoscopy of hair and scalp.[5]

The dermoscope suitable for scalp examination is a manual dermoscope (x 10 magnification) or a videodermoscope[6] (x 20 to x1000 magnification). The manual dermoscopes which are available are contact dermoscopes. They require an interface solution, like alcohol or oil. Videodermoscopes, on the other hand do not require interface solution. They have three modes- Ultraviolet light (UV), Polarized light (PL) and White light (WL).[4] Trichoscopic evaluation of the scalp is done on the basis of follicular patterns, interfollicular patterns and hair signs.[4] Any condition affecting the scalp will have characteristic patterns, based on which diagnosis of the particular condition can be made.

A trichoscope is a reliable tool with reproducible results and comes in handy in cases where multiple conditions may coexist. It also offers the advantage of examining larger areas in a short duration of time.[4]

OBJECTIVES

- **Primary objective:** To study the Dermoscopic findings of scalp and hair in non-cicatricial alopecia (Androgenetic alopecia, Alopecia areata and Telogen effluvium)

REVIEW OF LITERATURE

Trichoscopy

Trichoscopy (hair and scalp dermoscopy) is a non-invasive, economical tool which helps the clinician to rapidly differentiate common hair disorders, but is unfortunately underutilized.[7] "Dry dermoscopy" is the term used when scalp dermoscopy is performed without interface solution.[8] The utility of dry dermoscopy is in observing tertiary structures of skin surface, like hairs.[9] Follicular hyperkeratosis and scaling of the scalp are evaluated by dry dermoscopy. Vascular patterns and follicular changes, on the other hand are evaluated by using interface solution.[10]

Figure 1a[11]-Handheld dermoscopes
This figure demonstrates handheld dermoscopes, that work in either the contact or noncontact mode.
They are of three types: contact dermoscopes, polarized light contact dermoscopes, and polarized light noncontact dermoscopes.
Choosing a device is a matter of individual preference; there is no preferred type of dermoscope for performing hair and scalp examinations. The standard magnification of handheld dermoscopes is (×10)

Figure 1b[11]-Basic digital dermoscopes and photographic equipment

The figure demonstrates simplified digital dermoscopes that can be connected to a computer(via USB) and kits which connect selected handheld dermoscopes to a regular photo camera or to an iPhone 4/4S.

The usual magnification is(×10 to ×80).

They have the advantage of higher magnification and picture capturing options. They do not usually have an adequate light source.

Figure 1c[11]-Advanced digital dermoscopes

This figure demonstrates digital dermoscopes (videodermoscopes), which take high-magnification, high-quality photographs. They are usually expensive with the prices depending on the softwares.

This type of digital dermoscope offers multiple magnifications in the range of (×20 to ×70 or ×100) and higher.

Technical considerations

The trichoscopic evaluation of the hair and scalp is done based on the study of patterns of the hair follicles, interfollicular patterns and the hair signs.

TABLE 2[4]: PATTERNS OF TRICHOSCOPY

FOLLICULAR PATTERNS[1,12,13,14]	HAIR SHAFT CHARACTERISTICS[15,16,17,18]	INTERFOLLICULAR PATTERNS[6]
White dots Yellow dots Black dots	Specific characteristics of hair shafts in various hereditary and acquired hair disorders.	Pigment patterns Vascular patterns

Follicular patterns

1. Yellow dots [6,19,12,13,20]

They are polycyclic or round, yellow colored dots which represent distended follicular infundibulum, containing sebum and degenerating keratinocytes, best visualized under PL.[6,19] They are seen most commonly in AA and in some cases of AGA and Alopecia incognita. They are however the most sensitive feature of AA[21,22] In AA they are keratinous, but represent sebaceous debris in AGA and are more common in areas with scanty terminal hair.[4]

Figure 2[4]: Yellow Dots

The arrows represent yellow dots, seen typically in alopecia areata. (x50)

2. White dots [6,19,14,23]

They are seen in scarring/cicatricial alopecias that spare the interfollicular epidermis [folliculitis decalvans, lichen planopilaris (LPP)], appearing as pale white dots. They basically signify scarring as they represent destroyed follicles which are subsequently replaced by fibrous tracts. They are better visualized against a dark background. They are usually confused with eccrine duct openings which appear pale as well - but the differentiating points are that eccrine ducts are rounded structures and are regularly placed, visualized in normal and diseased scalp.

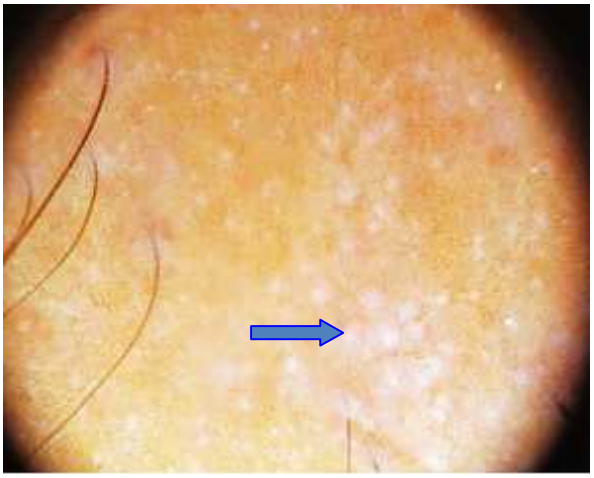


Figure 3[11]: White Dots

Two types of white dots are visible in this image. The *upper part* of the image shows pinpoint white dots corresponding to eccrine sweat gland and follicular openings on sun-exposed skin. The *lower part* of the picture shows larger white irregular dots with blunt borders and the tendency to become confluent. These white dots correspond to follicular fibrosis in the course of LPP. (×70)

3. Black dots [6,19,21,23]

They represent hair which are fractured before they can emerge from the scalp and hence remain as stubs of hair, seen most commonly in AA. They may be visualized within yellow dots.

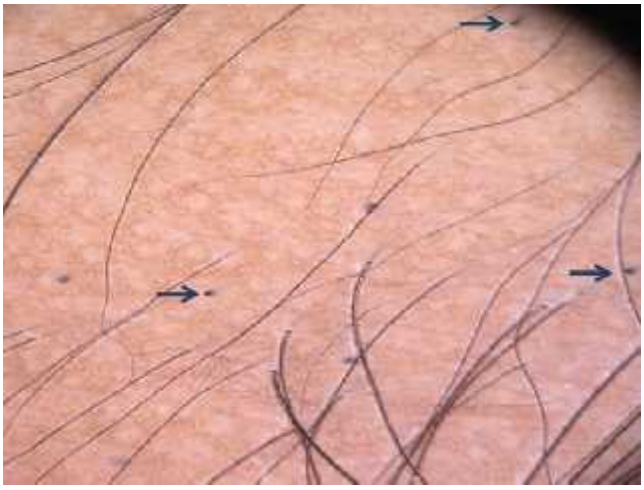


Figure 4[4]: Black Dots

Multiple black dots seen in alopecia areata, representative of fractured dystrophic and telogen hairs. Furthermore note the homogenous honey comb pigment pattern in the background. (x50)

Interfollicular patterns

Vascular patterns

1. Interfollicular simple red loops [6,19]

They are usually visualized in inflammatory conditions, but can appear in normal scalp as well. They are visualized as hairpin like structures, multiple in number and regularly spaced. Their absence signifies epidermal atrophy.

2. Interfollicular twisted loops [6,19]

This pattern is characteristic of acanthotic conditions, like folliculitis decalvans, psoriasis etc. They are best visualized by tangential placement of the probe to the scalp surface and appear as twisted coils.

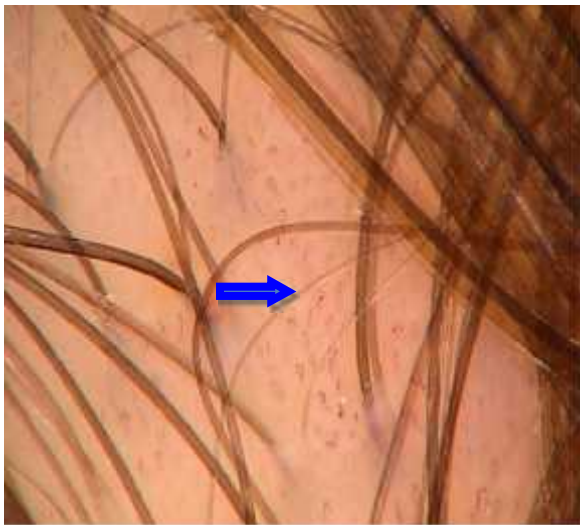


Figure 5[11]: Interfollicular twisted loops

In less severe cases of scalp psoriasis, vessels are arranged in clusters. These clusters contain several types of small vessels (lace-like, linear, looped, glomerular, small arborizing, linear, twisted, comma-like). A consistent feature is the distribution of these vessels between pilosebaceous units. (x10)

3. Arborizing red lines [6,19]

They represent sub-papillary plexus and are visualized as lines that underlie the loops in normal and diseased scalp. They are visualized under higher magnification.

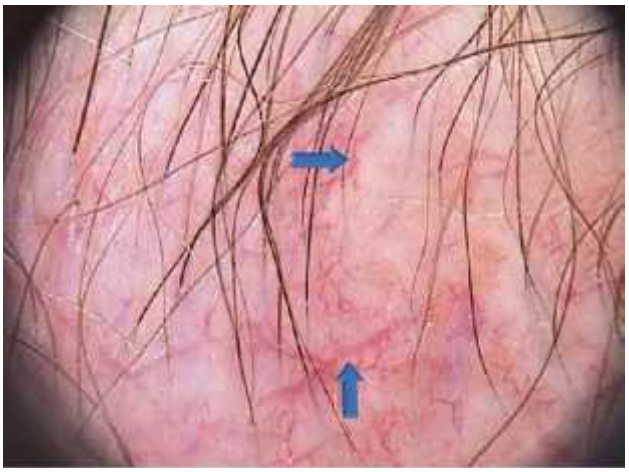


Figure 6[11]:

Thick arborizing vessels in discoid lupus erythematosus (DLE)

Thick arborizing vessels(*arrows*) are observed in two distinct clinical situations: DLE and basal cell carcinoma. (x10)

These vascular patterns are easily seen in white-skinned individuals, but are overlapped by pigment patterns in pigmented skin types.

Pigment patterns [6,19]

The normal scalp has a diffuse honeycomb pigment pattern, more pronounced in darker skin shades. It appears as hyperchromic grid

(irregular lines), representative of melanotic rete ridges and hypochromic holes, representative of suprapapillary epidermis. Bald areas have a darker pigment pattern secondary to tanning.

Normal scalp

Follicular pattern – contain 1-4 hairs in one hair follicle.[10]

Interfollicular pattern – simple red loop and arborizing red lines.[13,24]

Pigment pattern – honeycomb pigment, more pronounced in sun-exposed areas.

Hair pattern - Up to about 10 % of normal human scalp hairs are vellus hairs, defined as hypopigmented, nonmedullated hairs less than 30 mm thick and less than 2–3 mm long.[11]

ANDROGENETIC ALOPECIA

Definition

Androgenetic alopecia is the result of a progressive, patterned hair loss that occurs when genetically predisposed individuals are exposed to androgens.[25] The terms male pattern hair loss and female pattern hair loss are used for the respective sexes as the pattern of hair loss differs between them.[26]

Prevalence

Men

Balding occurs in differing frequencies in all races. Prevalence, being the highest in Caucasian population is around 30% for men in their 30s, 40% for men in their 40s and 50% for men in their 50s.[27] In the context of Indians, a population based study of 1005 subjects showed a prevalence of

58% in males in the range group of 30-50 years.[28] Oriental races show a lower prevalence. Wang et al[27] conducted a Chinese study which showed a 21.3% prevalence rate, whereas a Korean study[29] showed a prevalence rate of 14.1%. It is evident from the above studies, that incidence increases with increasing age.

Studies on the commonest type/grade of AGA, according to the Norwood classification have shown that type 2 and 3 are the commonest in Indian population.[30] Another Indian population based study showed similar results.[31] Wang et als'[27] Chinese study showed type 4 as the commonest, whereas Paik et als' Korean study showed type 3 as the commonest in their respective communities.[29]

Women

The number of epidemiological studies are fewer in women. A Caucasian population based study by Norwood[32] of 1006 patients showed a 19% prevalence rate. A Chinese population based study showed a 6% prevalence rate and a Korean population based study showed similar results with a prevalence rate of 5.6%.[27,29] There is also a similar increase in incidence with increasing age.[32,33]

Clinical features and Grading

There are various grading systems available for AGA, of which the Modified Norwood-Hamilton classification (Table 3) is the most widely accepted for males, consisting of seven broad groups and four specific variant types.[31,34,35] In women, three patterns are described.[36]

Table 3[31,34,35]: Modified Norwood-Hamilton Classification

TYPE	CLINICAL DEFINITION
1	Minimal recession of hair line along the anterior border in the Fronto-temporal (FT) region
2	The anterior border of the scalp in the FT region has triangular areas of recession that tend to be symmetrical. The areas extend no more posterior than approximately 2 cm anterior to a line drawn in a coronal plane between the external auditory meatus on both sides. Hair is either lost or sparse along the mid-frontal border.
3	Characterized by deep FT hair recession, usually symmetrical and either bald or sparsely covered with hair. These areas of recession extend further posterior than a point that lies approximately 2 cm anterior to a line drawn in a coronal plane between the external auditory meatus on both sides
3v	Hair is mainly lost in the vertex. There may be some frontal recession but it does not exceed that seen in type 3
4	The frontal and FT recession is more than type 3. There is also sparseness or loss of hair in the vertex. These bald areas are extensive, but separated from each other by a band of moderately dense hair that joins the fully haired fringe on either side of the scalp
5	The hair loss in vertex and FT region is more than type 4 and band of hair between them is narrower and sparser
6	The hair loss over FT and vertex regions is confluent and the bridge of hair that crosses the crown is absent
7	There is only a narrow horseshoe shaped band that begins laterally, anterior to the ear and extends posteriorly on the sides and fairly low on the occipital area.
Variants (type variants a)	Constitutes 3% of all cases of AGA (1): the anterior border progresses posteriorly without the normal island of hair in the mid-frontal region. (2):there is no simultaneous development of the bald area over the vertex. Instead the anterior recession advances posterior to the vertex.
2a	The entire anterior border of the hairline lies high on the forehead. The usual mid-frontal island of hair is sparse. The area of denudation extends no further than 2cm from the frontal hairline.
3a	The area of denudation reaches the mid-coronal line.
4a	The area of denudation extends beyond the mid-coronal line and there may be considerate thinning of hair posterior to the actual hairline.
5a	Most advanced degree of alopecia. However the bald area does not reach the vertex

Table 4[37]: Ludwig Scale For Female AGA

Stage 1	Thinning of hair is seen mainly over the anterior part of the crown with minimal widening of the parting width.
Stage 2	Thinning of the crown becomes more evident because of an increase in the number of thin and short hair.
Stage 3	The crown becomes almost totally bald. There is significant widening of the parting width, but the frontal hairline is still maintained.

Table 5[38]: Sinclair Scale For Female AGA

Grade 1	Is normal. Found in all girls prior to puberty, but in only forty-five percent of women aged eighty or over
Grade 2	Shows a widening of the central part
Grade 3	Shows widening of the central part and thinning of hair on either side of the central part
Grade 4	Reveals the emergence of a diffuse hair loss over the top of the scalp
Grade 5	Indicates advanced hair loss

The commonly used grading scales for female AGA are as mentioned above. Lee et al suggested a new, universal and systematic classification known as the Basic And Specific Classification (BASP).[39] The shape of the anterior hairline is represented by (BA), which is of four types (L,M,C and U) and the density of hair on specific areas is represented by (SP), which is of two types

(F and V). The final type is determined by the combination of these two entities.

Type L – No recession is observed along the anterior border in the FT region.

Type M – Recession in the FT hairline is more prominent than the mid-anterior hairline. The hairline resembles the letter M

Type C – Recession in the mid-anterior hairline is more prominent than the FT hairline. The entire anterior hairline regresses posteriorly in the shape of a semi-circle, resembling the letter C

Type U – The anterior hairline recedes posteriorly beyond the vertex forming a horseshoe shape, resembling the letter U

Type F – General decrease in the density of hair over the entire scalp, regardless of the anterior hairline. It is more marked over the frontal area.

Type V – Hair loss is seen more distinctly over the vertex than the frontal area.[39]

Trichoscopy in AGA

Similar trichoscopic features are shared by both male and female AGA. They constitute hair shaft thickness heterogeneity, yellow dots, perifollicular discolouration (peripilar sign), an increased proportion of vellus hair, follicular units with only one emerging hair shaft.[12,13,40,41] Thin wavy hair can co-exist with honeycomb hyperpigmentation as non-specific features.[13,23]

Simultaneous presence of hair of varying thickness is characteristic of hair thickness heterogeneity i.e. vellus, thin, intermediate and thick. Rough estimation of hair thickness can be obtained with a handheld dermoscope. Precise assessment of hair shaft thickness can be obtained with some videodermoscope softwares. Accurate measurement of hair thickness is not essential for diagnosis, however it is invaluable for monitoring treatment efficacy and for research purposes. Hair diameter diversity signifies follicle miniaturization in AGA[40,42]

There is increased proportion of vellus hair in AGA. Vellus hairs are defined as non-medullated, hypopigmented hair less than 30µm thick and less than 2-3mm long and constitute up to 10% of normal human scalp.[43,44] In patients with female AGA, the proportion of vellus hair in the frontal scalp area is 20.9% plus or minus 12%, which is significantly greater than the 6.15% plus or minus 4.6% seen in healthy volunteers.[41]

A decreased number of hairs per follicular unit is a characteristic but nonspecific feature of AGA and in patients with female AGA, 65.2% plus or minus 19.9% is the percentage of follicular units with only one emerging hair shaft in the frontal area, the corresponding percentages being 39% plus or minus 13.4% in patients with TE and 27.3% plus or minus 13% in healthy individuals.[11]

Yellow dots seem to be a variable feature of AGA, which is indicated by various studies showing the presence of yellow dots in 66%[41], 30.5%[45,] 10-26%[40] and 7%[13] of patients with AGA.

Brown perifollicular discolouration (peripilar sign) is observed in 20-66% of patients and in 32.4% plus or minus 4.7% of hair follicles in patients with AGA, which is significantly higher than that seen in healthy individuals.[40,41]

Trichoscopic abnormalities are more obvious in the frontal area than in the occipital area.

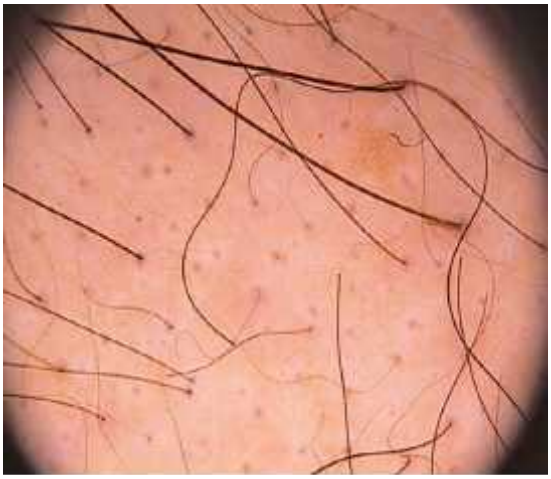


Figure 7[11]:

Trichoscopic features of Androgenetic alopecia .

This image shows the typical pattern of AGA, with vellus hairs, hair shaft thickness heterogeneity, wavy hairs, a predominance of pilosebaceous units with only one hair, the peripilar sign, and yellow dots. (×20)

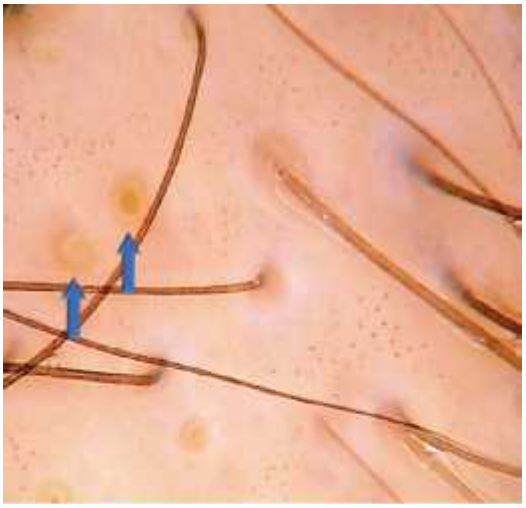


Figure 8[11]:

Yellow dots (*arrows*) contain keratinous material and show a double border, and their surface may appear uneven. There is large variation in size and shape and the irregular distribution. Yellow dots have been observed with variable frequency in different studies. The frequency is more if patient avoids hair washing for 2–3 days before trichoscopic examination. (×20)

Figure 9[11]:

The **peripilar sign** (arrows) indicates perifollicular presence of Lymphocytic infiltrates. Peripilar sign is said to be specific for AGA. However, it is indistinguishable from a similar phenomenon observed in telogen effluvium. (<5 %) of hair follicle openings with brown perifollicular discoloration can be observed in healthy individuals. (×20)

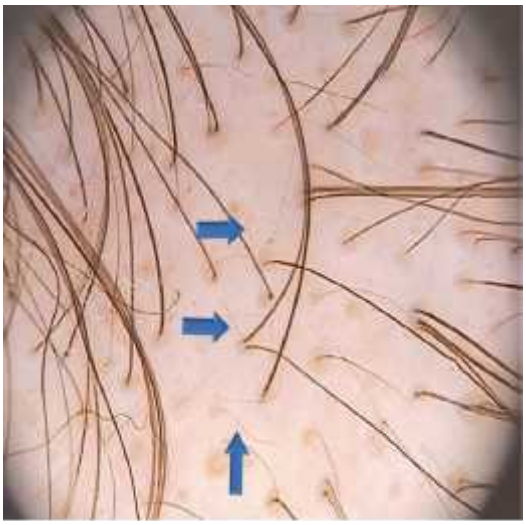


Figure 10[11]:

Vellus hairs (arrows) are less than 30 mm thick, less than 2–3 mm long, hypopigmented and nonmedullated. They are produced by miniaturized hair follicles; hence, their number is significantly increased in AGA. Shown here is a trichoscopic image of the frontal area of a male patient with AGA.(×20)

ALOPECIA AREATA

Definition

Alopecia areata is a common, chronic, non-scarring, autoimmune and inflammatory hair loss on the scalp and/or body.[46,47]

It, being the most common autoimmune cause of hair loss, has a disappointing response to available therapies, as its pathology is not fully understood.[48,49,50,51]

Epidemiology

AA affects both sexes equally, with a lifetime risk of 1.7% and a reported incidence of 0.1-0.2%.[52] This hair disorder can affect both adults and children and hairs of all color are affected equally.[53] In the United States and United Kingdom 2% of new dermatology outpatient attendance is accounted for by this disorder.[54] It usually does not affect children <3 years of age. Most patients, however are relatively young: 66% are younger than 30 years of age and around 20% are older than 40 year and even though there is no sex predilection, one study showed that 21 to 30 years of age group men were more affected.[55] The reported incidence in China is 3.8% and the percentage

of patients who had their first episode before the age of 40 was 85.5%.[56] In another study conducted in China, it was seen that median age of onset of AA was 10 years and the ratio of males: females was 1.4: 1, with the males being more severely affected and more extensive and recalcitrant lesions in patients with childhood onset of the disorder.[57]

AA may be associated with other autoimmune diseases and the association is seen in around 16% of cases of AA[58,59] e.g. autoimmune thyroid disease in 8% to 28%[60], vitiligo in 4%[61], and lupus erythematosus in 0.6% of patients.[62]

Clinical features

AA usually manifests with sudden onset, well demarcated loss of hair, most commonly on the scalp (90%), presenting as single or multiple round to oval patches of alopecia with a distinctive border along which normal hair demarcates the periphery of the lesion.[52,56,63] It can present with different clinical patterns such as:

(a) Alopecia Areata (AA), or recurrent hair loss with patches on arms, scalp, lashes, brows, legs, pubic region.[64]

(b) Alopecia Totalis (AT), or complete (or near complete) loss of scalp and facial hair.[65]

(c) Alopecia Universalis (AU), or complete loss of all body and scalp hair.[65]

(d) Ophiasis pattern – well demarcated loss of hair extending along the occipital and temporal scalp margins.

(e) Alopecia Areata Incognita – Diffuse hair loss over the scalp

(f) "Sudden graying" variant – pigmented hair follicles are targeted , therefore resulting in demasking of pre-existing gray hair.[66,67,68]

(g) Reticulate alopecia

(h) Ophiasis Inversa or Sisaphio pattern – hair is present only on the temporal and occipital areas[46,69,70]

"Exclamation mark hair" is a characteristic finding, which is usually seen in or around the patches of alopecia. They appear thick at the distal end and are tapered towards the scalp end. The other findings like nail pitting, cadaverized hair (comedo-like black dots), growth of depigmented hair in formerly alopecic lesion are also suggestive of AA.[66,67,68,71] There is abrupt conversion of affected hair from anagen to Telogen which leads to well demarcated hair loss and localized bald patches. Hair pull tests from the periphery of the bald patches may positively correlate (six hair or more) with activity of the disease.[71]

The affected skin appears normal with no epidermal alteration or scaling.[47] Nail changes are usually present in 3-30% of patients, with nail pitting being the most common and other changes including trachyonychia, onycorrhexis, Beau's lines, onychomadesis, red-spotted lunula, longitudinal ridging and punctuate or transverse leukonychia.[69,71]

Trichoscopy in AA

Trichoscopy of AA may show varying results, depending on disease activity, severity and duration of the disease, with the hallmark features being regularly distributed yellow dots, tapered hair, micro-exclamation mark hair, black dots (cadaverized hair), broken hair, regrowing upright and regrowing coiled hair.[11]

In a study conducted by Lacarruba et al in 2004 on 200 patients with AA with acute and chronic disease, he found that the features of acute AA

were black dots, vellus hair and micro-exclamation hair.[12] The findings of chronic AA with recent onset are smooth and thin scalp and prominent follicular openings and in longstanding chronic AA, the findings are keratotic plug impacted hair follicles.[11] The trichoscopic features of hair regrowth are homogeneous, darkly pigmented, sparse hair growing in upright position or regularly coiled pigtail hairs, which can be differentiated from delicate, hypopigmented vellus hair by their dark pigmentation and upright position.[11] Ross et al, in his study of 58 patients of AA in 2006, found black dots, yellow dots, exclamation hair and dystrophic hair as the most characteristic features, which were similarly expressed in all investigated subgroups of AA: patchy, AT, AU, diffuse and ophiasis pattern.[13]

Inui S et al, in his study on 300 patients of AA, identified trichoscopic markers of disease activity and severity, with the results showing that black dots, tapering hairs positively correlated with disease activity, whereas short vellus hair had negative correlation.[70] Yellow dots, on the other hand are more commonly seen in patients with inactive AA.[23] Mane et al, showed that 5.31 months was the mean duration of disease in patients showing broken hair and that 16.33 was the mean duration of disease in patients in whom broken hairs were absent, therefore indicating that broken hairs tend to correlate with short disease duration.[20] There was, however no statistically significant positive or negative correlation found between disease severity and any trichoscopic feature in this study.[20] An additional finding in this study was the monilethrix-like (Pohl-Pinkus) hair shaft constrictions which was observed in two of sixty-six patients of AA.[20] In patients with chronic longstanding diffuse AA of many years' duration, there may be no characteristic trichoscopic features, not even dots.[70]

The most difficult differential diagnosis is Trichotillomania, which is characterized by decreased hair density, irregularly coiled hairs, hairs broken at different lengths and sparse yellow dots, that may or may not contain black dots.[72]

Table 6[11]: Trichoscopic features of AA

Active hair loss	Longstanding inactive disease	Hair regrowth
Black dots Micro-exclamation mark hair Broken hairs Monilethrix-like hairs Trichorrhexis nodosa	Yellow dots Vellus hairs Follicular openings may not be visible	Upright regrowing hair Pigtail hairs Vellus hairs

Table 7[11]: Prevalence of Trichoscopic features of AA

Features	Patients, %
Black dots	44-70
Micro-exclamation mark hair	30-44
Tapered hairs	12-42
Broken hairs	45-58
Yellow dots	63-94
Vellus hairs	33-72
Trichorrhexis nodosa	3-16
Monilethrix-like hairs	2-3

Pohl-Pinkus constrictions	-
Upright regrowing hairs	-
Pigtail regrowing hairs	-
Zigzag hairs	-

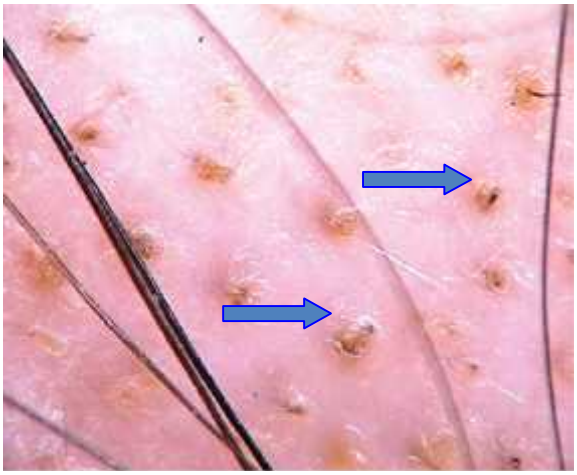


Figure 11[11]:

Yellow dots (arrows) in a case of AA. This dry trichoscopic image shows the hyperkeratotic nature of these structures in a patient with long standing alopecia areata. This "three-dimensional" structure may not be visible in patients who use topical therapies and when immersion fluid is Used. (×70)

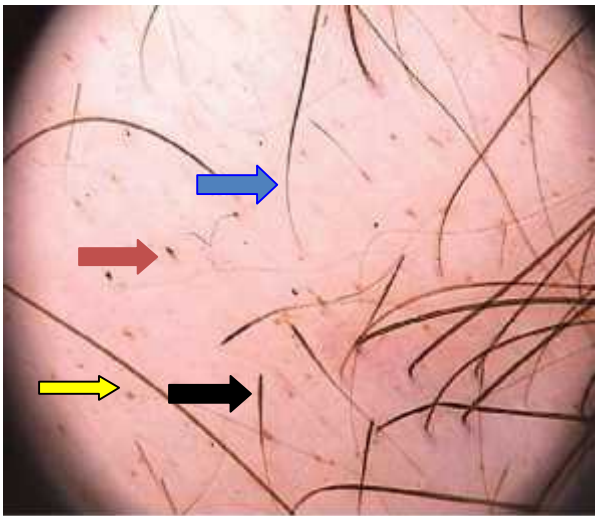


Figure 12[11]: Trichoscopic features of AA

Case of active alopecia areata showing

Tapered hairs (blue arrow)

Micro-exclamation mark hairs (black arrow)

Black dots (brown arrow)

Yellow dots (yellow arrow) (x20)

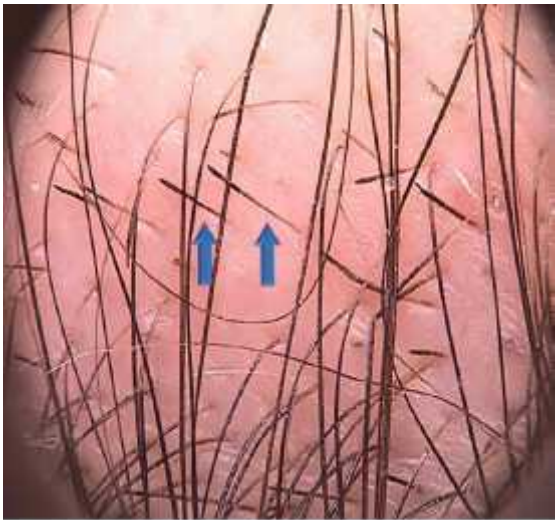


Figure 13[11]:

Exclamation mark hairs thin at the proximal end and thicker at the distal end. Those observed on Trichoscopy (*arrows*) are also called micro–exclamation mark hairs. Normal exclamation mark hairs, which are visible to the naked eye, are approximately 1cm (~ 0.5 in) long, whereas trichoscopy allows visualization of exclamation mark hairs that are 1 to 2 mm long.(x20)

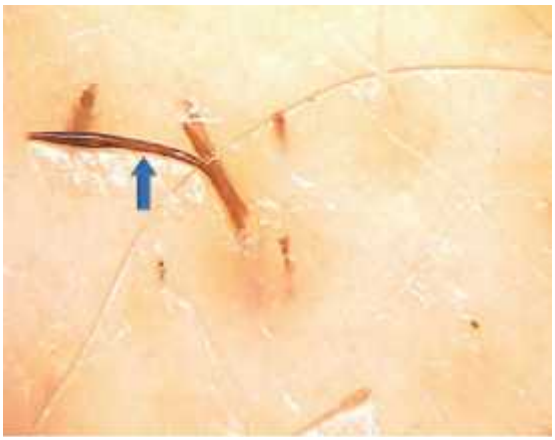


Figure 14[11]:

Monilethrix – like hairs in alopecia areata . The hair shaft has two nodosities (parts of the hair that are thicker than the constricted sites); one is thicker and longer than the other. This irregularity differentiates monilethrix-like hairs from true monilethrix (×70)

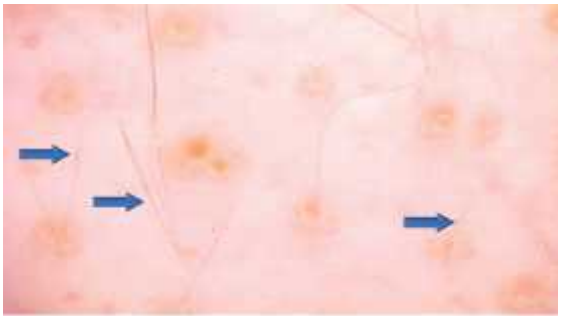


Figure 15[11]:

Vellus hairs in alopecia areata . The presence of multiple regrowing short white vellus hairs (*arrows*) may be a first, weak sign of disease remission.(x70)

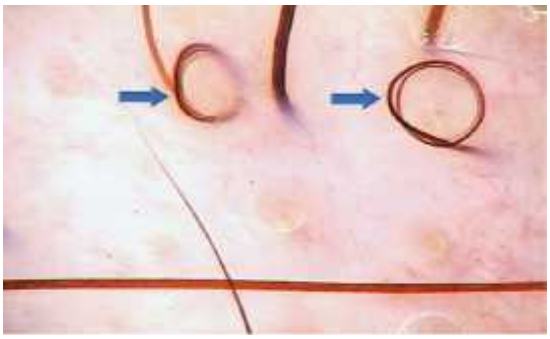


Figure 16[11]:

Pigtail regrowing hairs in alopecia areata (x70)

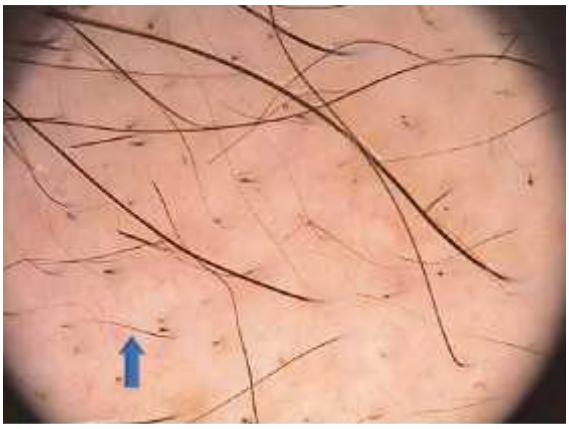


Figure 17[11]:

Upright regrowing hairs. These anagen hairs are pigmented and sharply pointed. (×20)

Figure 18[11]:

Kinky, zigzag hairs (*arrows*) are commonly observed in active alopecia areata of recent onset and can be confused with tinea capitis. (×20)

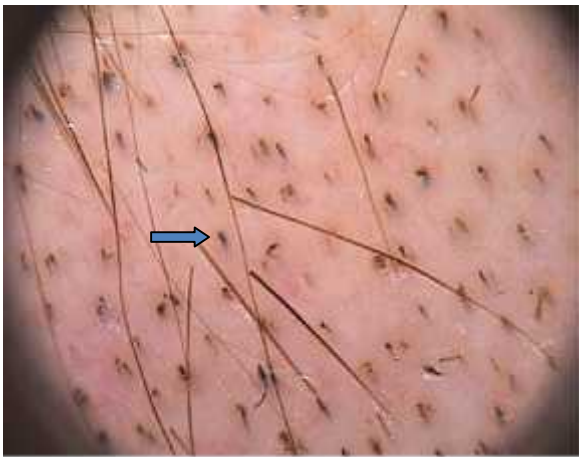


Figure 19[11]:
In alopecia areata, **broken hairs** may develop in two ways. One is transverse fracture of terminal hair shafts weakened by the inflammatory process. In such cases, hair fracturing may be preceded by monilethrix-like hairs (Pohl-Pinkus constriction) or by trichorrhexis nodosa in the course of the disease. The other possibility is rapid regrowth of incompletely destroyed hair shafts that previously formed the black dots. (×20)

TELOGEN EFFLUVIUM

Definition

The term Telogen Effluvium was first coined by Kligman to describe increased shedding of normal club hairs, with the hypothesis that irrespective of the cause, the follicle tends to behave in a similar fashion by undergoing a premature termination of anagen, precipitating telogen.[73,74]

It is a hair cycling abnormality[75] occurring as a reaction pattern to various physical or mental stressors.[76] The severity and duration of exposure to the offending agent determines the degree of effluvium, rather than the type of offending agent.[77] There is increased, synchronized shedding of telogen hair.[78] Headington described five functional types of TE.[79] TE can be acute or chronic. Acute telogen effluvium (AcTE) presents as a diffuse, non-patterned hair loss from scalp that occurs around 3 months after the inciting event and is usually self-limiting within 6 months.[80] Chronic telogen effluvium (ChTE) is diffuse shedding of telogen hair that persists >6 months, either represents a primary a primary disorder and is then a diagnosis of exclusion or is

secondary to a variety of systemic diseases.[80] Whiting described chronic telogen effluvium as a primary idiopathic entity.[81]

Epidemiology

The true incidence/prevalence is largely unknown since most of the cases are subclinical.[75,82] An appropriate inciting event can cause AcTE in either sex, however, females most often present with AcTE because of hormonal changes, which is a major cause of AcTE. The effect of age is also unclear, with elderly women being reported to be more susceptible to AcTE following high fever, surgical trauma, severe hemorrhage or psychological stress.[83]

Causes of TE

Acute telogen effluvium

1. High fever
2. Surgery[74]
3. Hemorrhage[84]
4. Emotional stress[85]
5. Crash-diets[86]
6. Postpartum[80]
7. Heavy metals : Arsenic,[87] Thallium,[88] Selenium[89]
8. Actinic effluvium: sunlight and UV light induced[90,91]
9. Contact allergic dermatitis to hair dye[92]
10. Idiopathic (33%)[80]

Chronic telogen effluvium

1. Shortened anagen[78]
2. Following ATE/Postpartum[80,81]

Chronic diffuse telogen hair loss

1. Hyperthyroidism (50%)[93]
2. Hypothyroidism (33%)[94]
3. Iron deficiency anaemia (IDA)[80]
4. Iron deficiency without anaemia[95,96]
5. Acrodermatitis enteropathica[84]
6. Acquired Zinc deficiency[84]
7. Multiple carboxylase deficiency leading to biotin deficiency[97]
8. Chronic starvation[98,99]
9. Pancreatic disease and malabsorption[100]
10. Hodgkin's disease[101]
11. Autoimmune connective tissue disorders[102]
12. Infections like syphilis[103], Human Immunodeficiency Virus[104]

Drugs causing TE

1. Retinoids[105]
2. Minoxidil: short-lived TE due to immediate telogen release[80,106]
3. Minoxidil withdrawal[78]
4. Cytotoxic drugs[107]
5. Antithyroid agents[108]
6. Lithium[109]

7. Human Papilloma Virus Vaccine[110]
8. Magnesium valproate,[111] Lamotrigine[111]

Clinical features

Acute telogen effluvium

Patients present with complaints of increased hair loss while washing/brushing.[78] Few may have bitemporal thinning.[78] Resolving effluvium presents with shorter, regrowing frontal hair. Questions about onset and triggering events will give the clinician clues to the diagnosis.

On examination, the scalp appears normal, with no signs of inflammation or follicular miniaturization and hair pull test will be positive.[112,113,114] Trichogram shows an increase in telogen hair (>25%)[115] AcTE usually remits by 6 months in 95% of cases, but in a few cases of postpartum TE, there may be persistent, episodic shedding because some hair follicles may revert to an asynchronous growth pattern.[116,78,79]

Chronic telogen effluvium

Patients, usually middle aged females present with history of chronic hair loss with insidious onset and fluctuating course and an overall decrease in their hair length and volume.[117,118] On examination, however, thickness of hair appears normal, with shorter growing hairs in bitemporal and frontal areas and few patients having marked bitemporal recession, with hair pull test being positive.[83] It can be distinguished from classic AcTE by its long fluctuating course.[80]

Trichoscopy in TE

Trichoscopy has limited value in diagnosis of TE.[11] Frequent, but non-specific findings are empty hair follicles, predominance of follicular units with only one hair, peripilar sign, and upright regrowing hairs.[11] There is no significant difference between frontal and occipital areas, which differentiates TE from AGA and the both diseases however frequently coexist.[11]

Table 8[11]: Trichoscopic features of TE

- Predominance of follicular units with only one hair
- Upright regrowing hair
- Peripilar sign
- Empty hair follicles/yellow dots
- Lack of features typical of other diseases

Table 9[11]: Trichoscopic features of AGA and TE

Feature	TE	AGA	TE+AGA
Empty hair follicles	+	+	+
Follicular units with only one hair in frontal area	+	++	++
Upright regrowing hair	++	+/-	+
Thin terminal hairs	+	+	+
Peripilar sign	+	++	++
Vellus hairs	-	+	+
Hair shaft thickness heterogeneity	-	+	+
Predominant abnormalities in frontal region	-	+	+

+ present,++ common,- absent

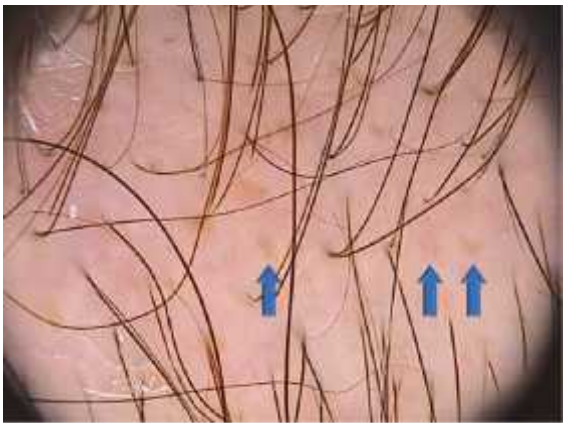


Figure 20:[11]

Empty hair follicles in telogen effluvium

This image was taken from the temporal area of a patient with severe telogen effluvium. Most of the empty follicular openings appear as yellow dots (*arrows*), easily confused with AGA (x20)

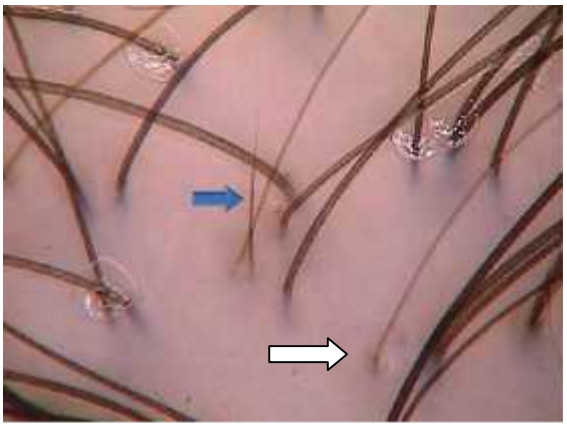


Figure 21:[11]

Upright regrowing hair (blue arrow) and hair follicles with only one hair (white arrow). The upright regrowing hairs are anagen hairs.(x20)

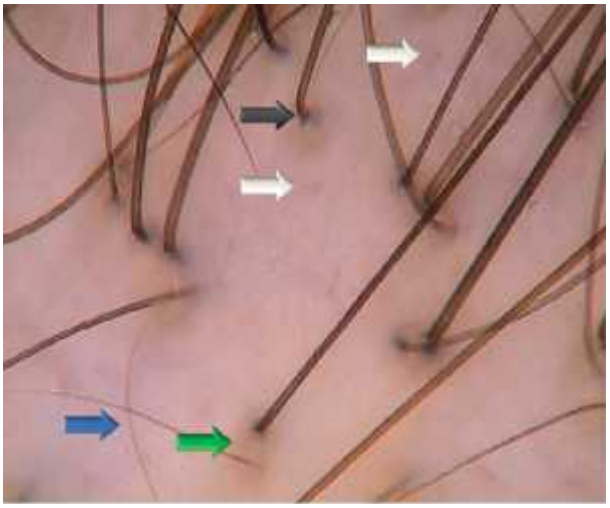
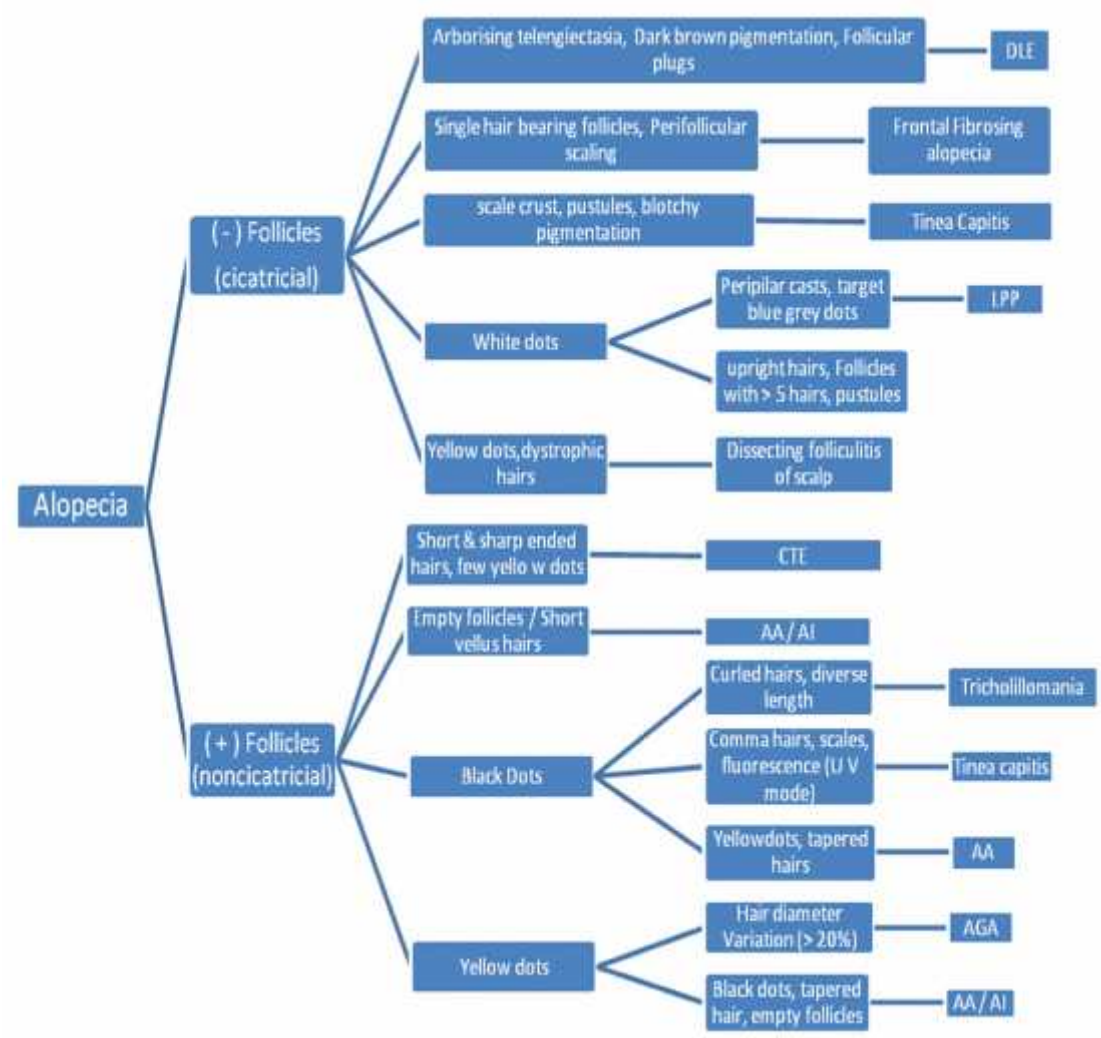


Figure 22:[11]

Trichoscopic features of Telogen effluvium

This image presents various trichoscopic features of telogen effluvium: short upright regrowing hairs (*blue arrow*), empty hair follicles (*white arrows*), perifollicular discoloration (*gray arrow*), and follicular units with one hair (*green arrow*) (×70)

Figure 23:[4] Approach to Alopecia based on Trichoscopy



METHODOLOGY

A cross-sectional study design is suited for estimating prevalence of diseases and their features. We adopted a ***cross-sectional design*** for this study. The details of the study methodology are described below:

- ***Study source:*** The study was conducted in the Department of Dermatology, Venereology and Leprosy, KLE's Dr. Prabhaka Kore Hospital and Medical Research Centre, Belgaum as a part of the MD academic curriculum.
- ***Study duration*** – The study was conducted between January 2014 to December 2014
- ***Ethical clearance:*** It was granted by the J.N.M.C. Institutional Ethics Committee of Human Subjects Research.
- ***Study design:*** Cross-sectional study
- ***Sample size:*** The study was a nonrandomized single-arm observational study. Hence, based on previous records of patients having non-cicatricial alopecia who had attented the outpatient department of Dermatology, Venereology and Leprosy in the previous year, a sample size of **100** was selected.
- ***Sample selection criteria:*** All patients having Androgenetic alopecia, Alopecia areata and Telogen effluvium attending KLE's Dr. Prabhakar Kore Hospital and MRC, Belgaum, were recruited as per the Inclusion and Exclusion criteria.

- ***Inclusion criteria:*** All consenting male and female patients, with Androgenetic alopecia, Alopecia areata and Telogen effluvium attending the Department of Dermatology, Venereology and Leprosy between January to December 2014.

- ***Exclusion criteria:*** Patients having scarring alopecia or alopecia secondary to drugs and external injury were excluded from the study. Patients having non-cicatricial alopecia other than Androgenetic alopecia, Alopecia areata or Telogen effluvium were also excluded from the study.

- ***Data collection –*** A detailed history regarding the age, sex, occupation, family history, personal habits, duration of the disease and history of previous treatment was taken. Clinical photographs of the lesions were taken. Dermatological and systemic examination was carried out. Diagnosis of Androgenetic alopecia/ Alopecia areata/ Telogen effluvium was made on clinical examination and by performing Hair pull test. The alopecias were graded/ classified corresponding to the type of alopecia. Modified Hamilton-Norwood scale was used for male AGA and Ludwig's scale was used for female pattern hair loss. Alopecia areata was classified as Patchy AA, Ophiasis AA, Alopecia Universalis and Alopecia Totalis based on the distribution of alopecia. Telogen effluvium was classified as Acute or chronic based on the duration of alopecia. Dermoscopic/ Trichoscopic examination of the scalp and hair was performed using a videodermatoscope (Dermaindia) which is a non-contact dermatoscope providing 50X and 200X magnification. Six areas of the scalp; bilateral

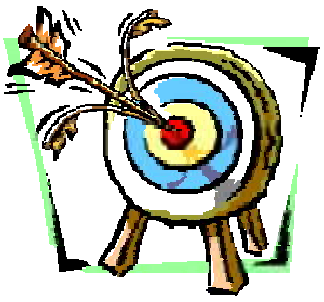
fronto-temporal, bilateral parieto-temporal, occipital and vertex areas were examined using 50X magnification in androgenic alopecia and telogen effluvium. Two additional areas were examined in cases of alopecia areata; the center and periphery of the bald patch. The data was noted in a pre-tested and pre-designed proforma after taking informed and written consent.

- ***Limitations of the instrument :*** The interfollicular patterns could not be appreciated because of the excessive reflection of the white light from the light source. Dermoscopic examination could not be carried out with a laptop/ desktop.

- ***Advantages of the instrument :*** The dermoscopic findings could be stored in the laptop and reproduced whenever necessary.

- ***Statistical Method for Data Analysis :*** Percentages were used to determine the prevalence of each trichoscopic feature in the three conditions. Chi square test was used wherever applicable.

Introduction



Objectives

Review of Literature

Methodology

Results

Discussion

Conclusion

Summary

Bibliography

Annexure-I

Annexure-II

Annexure-III

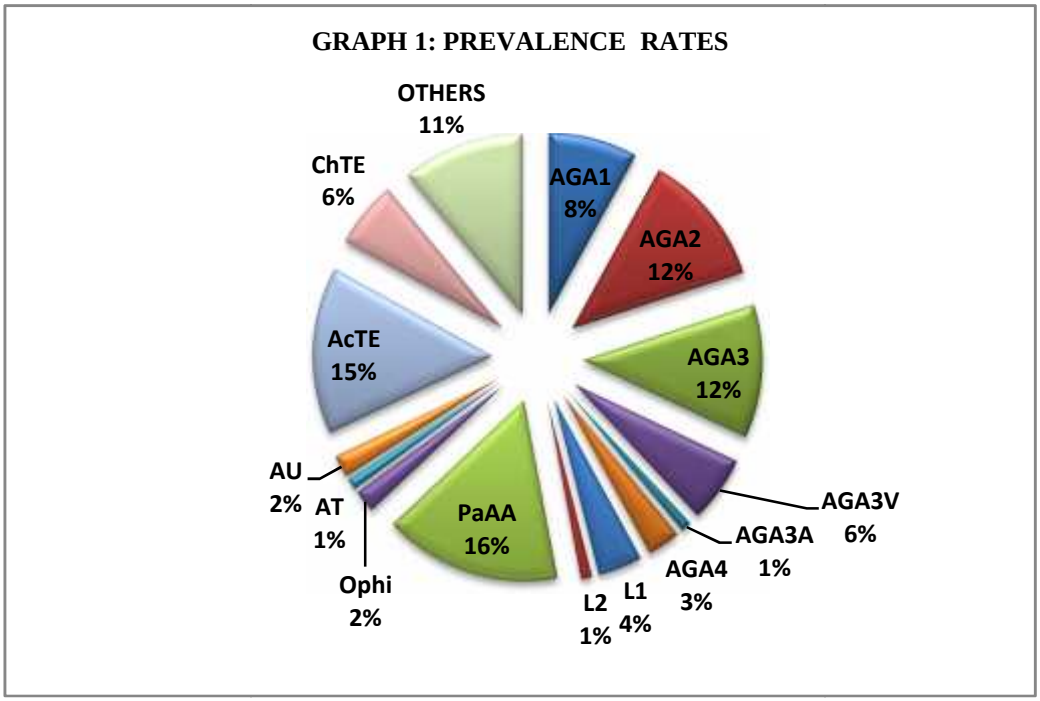
Annexure-IV

Annexure-V

RESULTS

All the 100 patients in the present study were cases of non-cicatricial/non-scarring alopecia. Of the 100 cases of non-scarring alopecia, AGA constituted 47%, in which 8% was contributed by AGA 1; 12% by AGA 2; 12% by AGA 3; 6% by AGA 3V; 1% by AGA 3A; 3% by AGA 4; 4% by L1 and 1% by L2. AA was present in 21% of all the patients; 16% having PaAA; 2% having Ophi pattern; 1% having AT and 2% having AU. TE was found in 21% of the patients, out of which 15% of them had AcTE and 6% had ChTE. 11% (Others) was contributed by the patients who had a combination of conditions i.e. 1% by PaAA+AcTE; 1% by AGA1+PaAA; 2% by AGA2+PaAA; 1% by AGA2+ChTE; 4% by L2+ChTE; 1% by AGA1+AcTE and 1% by L1+ChTE.

Graph 1: Prevalence of different types of Non-Cicatricial Alopecias

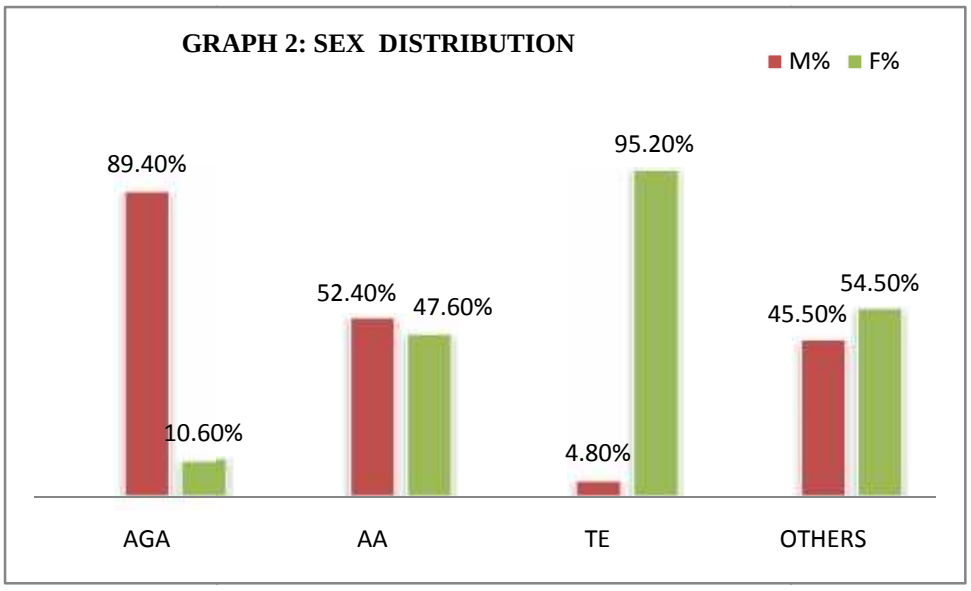


Sex distribution:

Out of the 100 patients that were included in the study, the percentage of male patients having AGA was 89.4% and the percentage of female patients having AGA was 10.6%. The percentage of male patients having AA was 52.4% and the percentage of female patients having the same was 47.6%. The percentage of male patients having TE was 4.8% and the percentage of female patients having the same was 95.2%. Sex distribution was statistically correlated with non-cicatricial alopecias. Statistical value (p) of <0.05 was considered significant.

Table 10: Sex Distribution of patients with AGA, AA and TE

CLINICAL DIAGNOSIS	MALE	%	FEMALE	%	
AGA	42	89.40%	5	10.60%	x^2 = **44.66**
AA	11	52.40%	10	47.60%	**P < 0.001**
TE	1	4.80%	20	95.20%	
OTHERS	5	45.50%	6	54.50%	



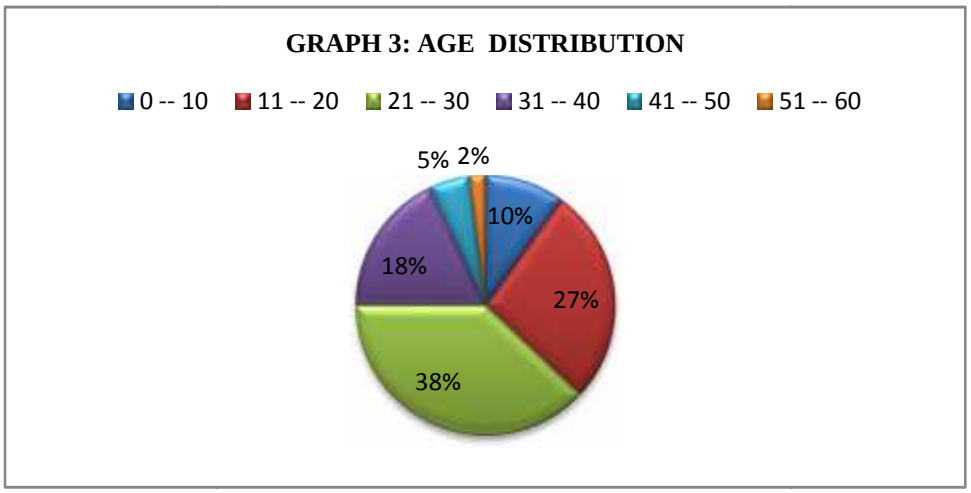
The above data suggests that, out of 47 patients of AGA, the maximum number of patients, 42 (89.4%) were male and that male to female ratio is 8:1. The male: female ratio of patients with AA is almost equal, 1.1:1 (11 male and 10 female) . The maximum number of patients with TE were female, 20 (95.20%); the male: female ratio being 1 : 20. The male : female ratio of patients suffering from a combination of non-scarring alopecias is almost equal, 1 : 1.2 (5 male and 6 female).

Age distribution:

The youngest person in the study was 6 years old, whereas the oldest was 57 years old. The average age of all the patients enrolled in the study was 31.5 years.

Table 11: Age Distribution

AGE(YEARS)	NUMBER OF PATIENTS	%
0 -- 10	10	10%
11 -- 20	27	27%
21 -- 30	38	38%
31 -- 40	18	18%
41 -- 50	5	5%
51 -- 60	2	2%



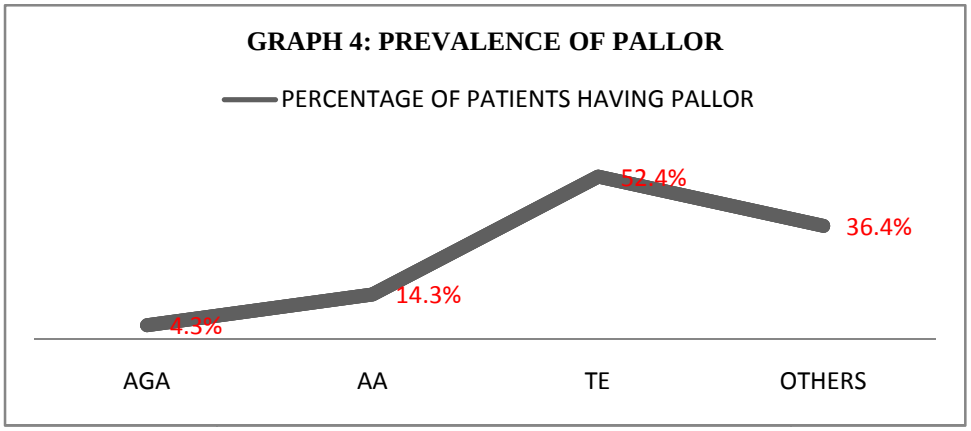
The above data suggests that out of 100 patients of non-cicatricial alopecia, 38 (38%) of patients were between the age group of 21-30 years, 27 (27%) in 11-20, 18 (18%) in 31-40, 10 (10%) in 0-10, 5 (5%) in 41-50 and 2 (2%) in 51-60 years. So the maximum number of patients were in between the age group of 21 to 30 years. Mean age ± standard deviation was found to be 31.5 ± 4.362

Prevalence of Pallor:

Amongst the 47 patients of AGA in the study, 2 (4.3%) had clinical pallor; 3 (14.3%) of 21 patients of AA; 11 (52.4%) of 21 patients of TE and 4 (36.4%) of patients with combination of alopecias had clinical pallor. Pallor was statistically correlate with non-cicatricial alopecia. Statistical value (p) of <0.05 was considered significant

Table 12: Prevalence of pallor

CLINICAL DIAGNOSIS	TOTAL NUMBER OF PATIENTS	NUMBER OF PATIENTS HAVING PALLOR	%	
AGA	47	2	4.3	x^2 = 23.31
AA	21	3	14.3	
TE	21	11	52.4	P = 0.0003
OTHERS	11	4	36.4	



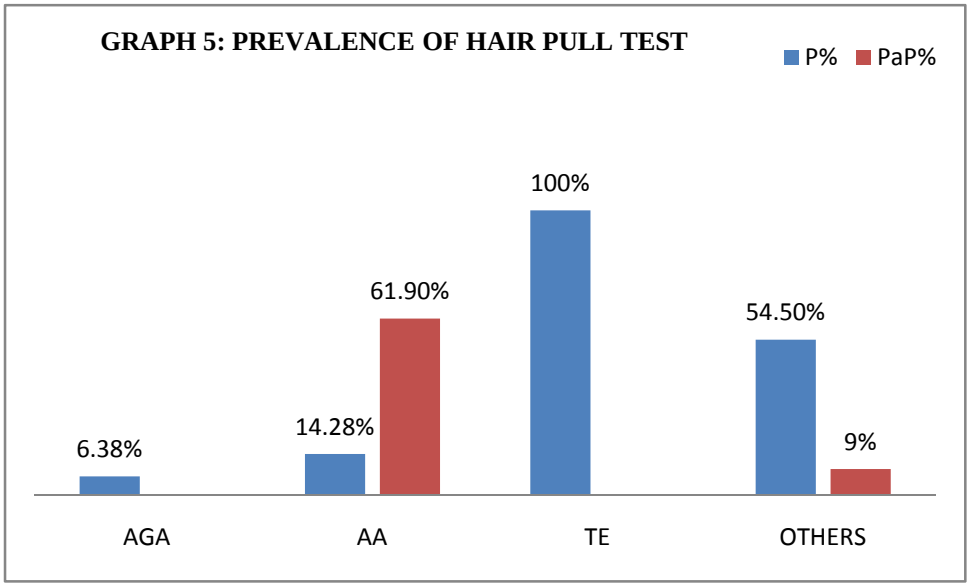
The above data suggests that clinical pallor is of high prevalence 11 (52.4%) in patients with TE.

Hair Pull Test:

Hair pull test was performed on all the patients involved in the study and 3 (6.38%) patients with AGA, 3 (14.28%) patients with AA, all 21(100%) patients with TE and 6 (54.50%) patients with combination of alopecias showed positive results. Hair pull test was positive at the periphery of the lesion in 13(61.9%) of patients with AA and 1 (9%) patient with combination of alopecias.

Table 13: Prevalence of Hair Pull Test

CLINICAL DIAGNOSIS	PRESENT	P%	PRESENT AT PERIPHERY	PaP%
AGA	3	6.38%	0	0%
AA	3	14.28%	13	61.9%
TE	21	100%	0	0%
OTHERS	6	54.50%	1	9%



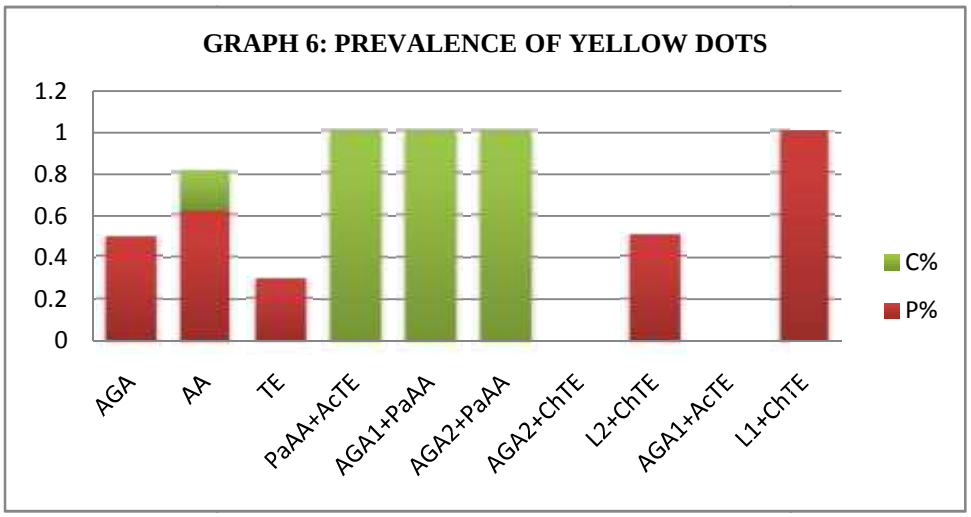
The above data suggests that hair pull test positive in all patients, 21 (100%) with TE and positive at the periphery of 13 (61.9%) patients with AA.

Yellow Dots:

On Trichoscopic Examination of six areas of the scalp, (bilateral fronto-temporal, bilateral parieto-temporal, vertical and occipital) yellow dots were present (≥ 1 field or ; < 4 fields or) in 23 (49%) patients of AGA, 13 (62%) patients of AA, 6 (29%) of TE, 2 (50%) patients of L2+ChTE and 1 (100%) patient of L1+ChTE. It was a common (≥ 4 fields) finding in 4 (19%) patients of AA, 1 (100%) patient of PaAA+AcTE, 1 (100%) patient of AGA1+PaAA, 2 (100%) patients of AGA2+PaAA.

Table 14: Prevalence of Yellow Dots

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	23	49%	0	0%
AA	13	62%	4	19%
TE	6	29%	0	0%
PaAA+AcTE	0	0%	1	100%
AGA1+PaAA	0	0%	1	100%
AGA2+PaAA	0	0%	2	100%
AGA2+ChTE	0	0%	0	0%
L2+ChTE	2	50%	0	0%
AGA1+AcTE	0	0%	0	0%
L1+ChTE	1	100%	0	0%



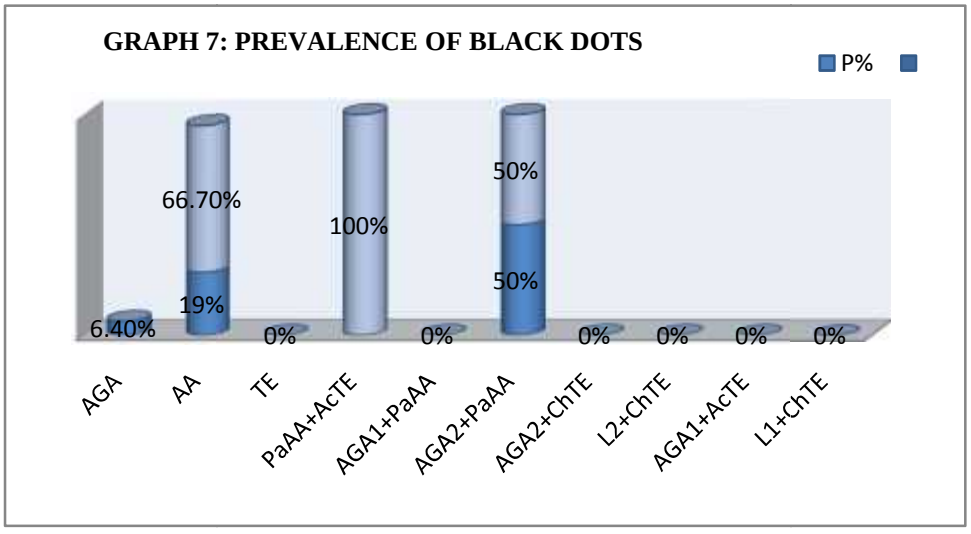
The above data suggests that yellow dots are present in increasing frequency in TE (29%), AGA (49%) and AA (62%) repectively, but are most common in AA and in combination of alopecias containing AA.

Black Dots:

Black dots were present in 3 (6.4%) patients of AGA and 6 (19%) patients of AA. They were a common finding in 14 (66.7%) patients of AA, 1 (100%) patient of PaAA+AcTE and 1 (50%) patient of AGA2+PaAA.

Table 15: Prevalence of Black Dots

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	3	6.40%	0	0%
AA	6	19%	14	66.70%
TE	0	0%	0	0%
PaAA+AcTE	0	0%	1	100%
AGA1+PaAA	0	0%	0	0%
AGA2+PaAA	1	50%	1	50%
AGA2+ChTE	0	0%	0	0%
L2+ChTE	0	0%	0	0%
AGA1+AcTE	0	0%	0	0%
L1+ChTE	0	0%	0	0%



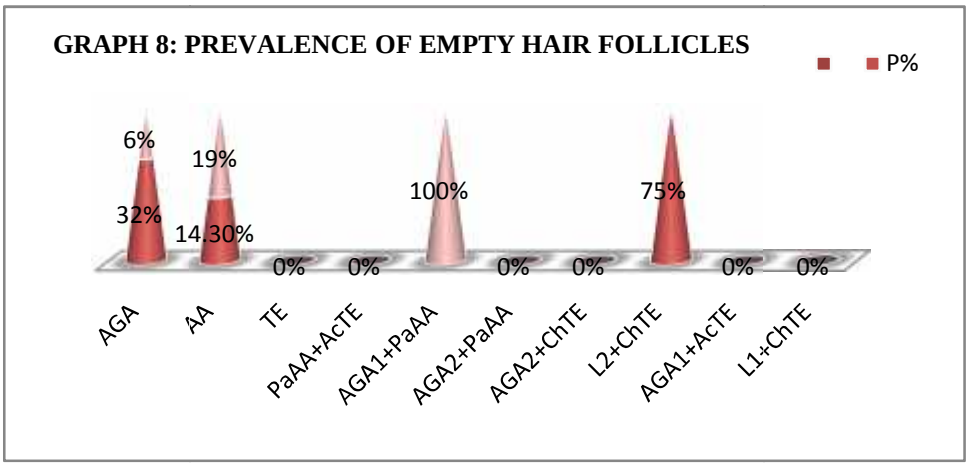
The above data suggest that black dots can be present in AGA (6.4%), it is however most commonly present in AA (66.7%) and in combination of alopecias containing AA.

Empty Hair Follicles:

Empty hair follicles were a common finding in 3 (6%) patients of AGA and 4 (19%) patients of AA. They were present in 15 (32%) of AGA, 3 (14.3%) of AA, 1 (100%) of AGA1+PaAA, 1 (100%) of AGA2+PaAA, 2 (50%) patients of AGA2+ChTE and 3 (75%) patients of L2+ChTE.

Table 16: Prevalence of Empty Hair Follicles

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	15	32%	3	6%
AA	3	14.30%	4	19%
TE	0	0%	0	0%
PaAA+AcTE	0	0%	0	0%
AGA1+PaAA	1	100%	0	0%
AGA2+PaAA	1	100%	0	0%
AGA2+ChTE	2	50%	0	0%
L2+ChTE	3	75%	0	0%
AGA1+AcTE	0	0%	0	0%
L1+ChTE	0	0%	0	0%



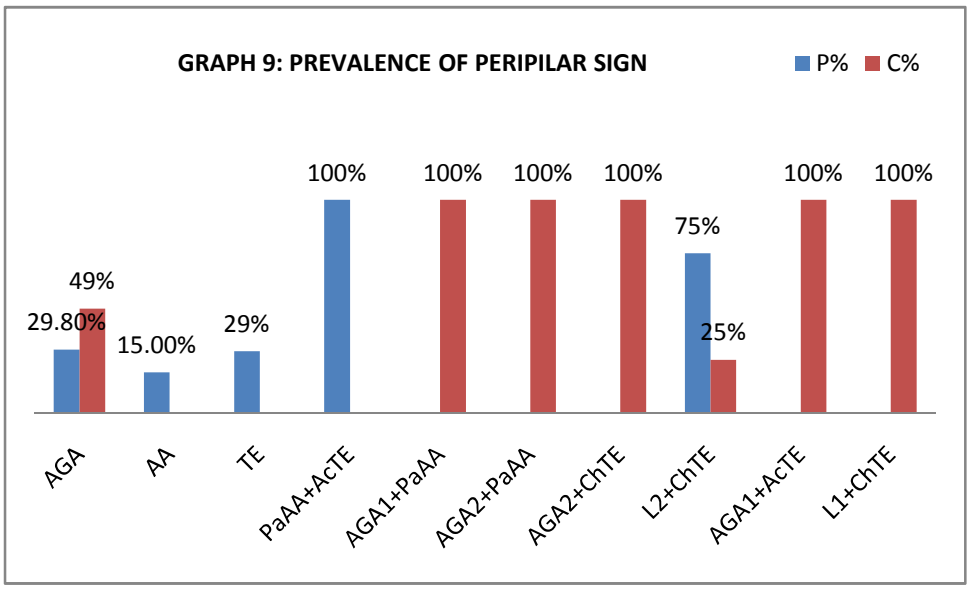
The above data suggests that empty hair follicles are present in increasing frequencies in AA (14.3%) and AGA (32%) respectively and are most commonly found in AA (19%) and AGA (6%) and in combinations containing AGA.

Peripilar Sign:

Peripilar sign was present in 14 (29.8%) patients of AGA, 4 (15%) patients of AA, 6 (29%) patients of TE, 1 (100%) patient of PaAA+AcTE and 3 (75%) patients of L2+ChTE. It was commonly found in 23 (49%) patients of AGA, 1 (100%) patient of AGA1+PaAA, 2 (100%) patient of AGA2+PaAA, 1 (100%) patient of AGA2+ChTE, 1 (25%) patient of L2+ChTE, 1 (100%) patient of AGA1+AcTE and 1 (100%) patient of L1+ChTE

Table 17: Prevalence of Peripilar Sign

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	14	29.80%	23	49%
AA	4	15.00%	0	0%
TE	6	29%	0	0%
PaAA+AcTE	1	100%	0	0%
AGA1+PaAA	0	0%	1	100%
AGA2+PaAA	0	0%	2	100%
AGA2+ChTE	0	0%	1	100%
L2+ChTE	3	75%	1	25%
AGA1+AcTE	0	0%	1	100%
L1+ChTE	0	0%	1	100%



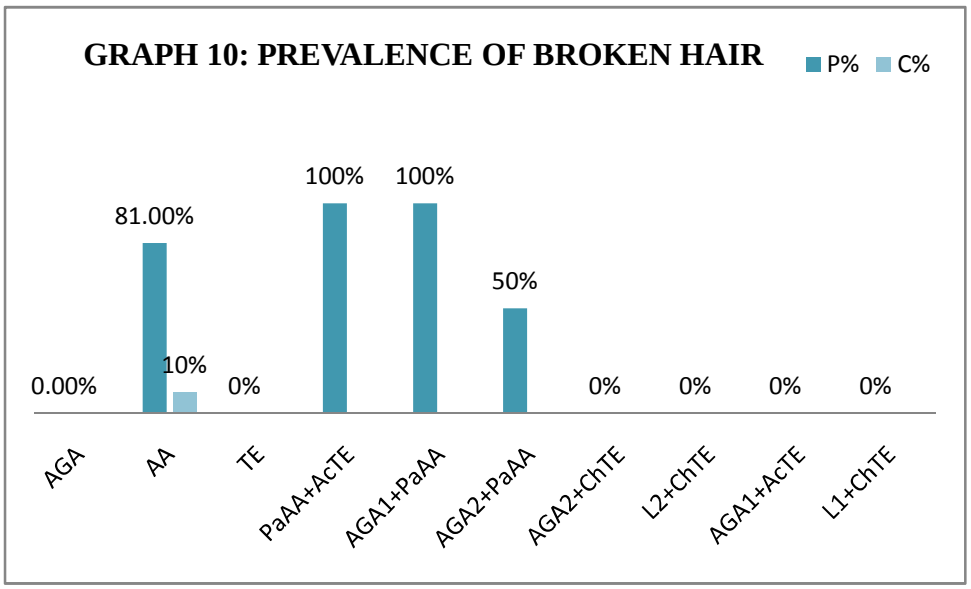
The above data suggests that peripilar sign is present in increasing frequencies in AA (15%) and TE (29%). It is however most commonly found in AGA (49%) and in combinations containing AGA.

Broken Hair:

Broken hair was present in 17 (81%) patients of AA, 1 (100%) patient of PaAA+AcTE, 1 (100%) patient of AGA1+PaAA and 1 (50%) patient of AGA2+PaAA. It was common in 2 (10%) patients of AA.

Table 18: Prevalence of Broken Hair

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	0	0.00%	0	0.00%
AA	17	81.00%	2	10%
TE	0	0%	0	0%
PaAA+AcTE	1	100%	0	0%
AGA1+PaAA	1	100%	0	0%
AGA2+PaAA	1	50%	0	0%
AGA2+ChTE	0	0%	0	0%
L2+ChTE	0	0%	0	0%
AGA1+AcTE	0	0%	0	0%
L1+ChTE	0	0%	0	0%



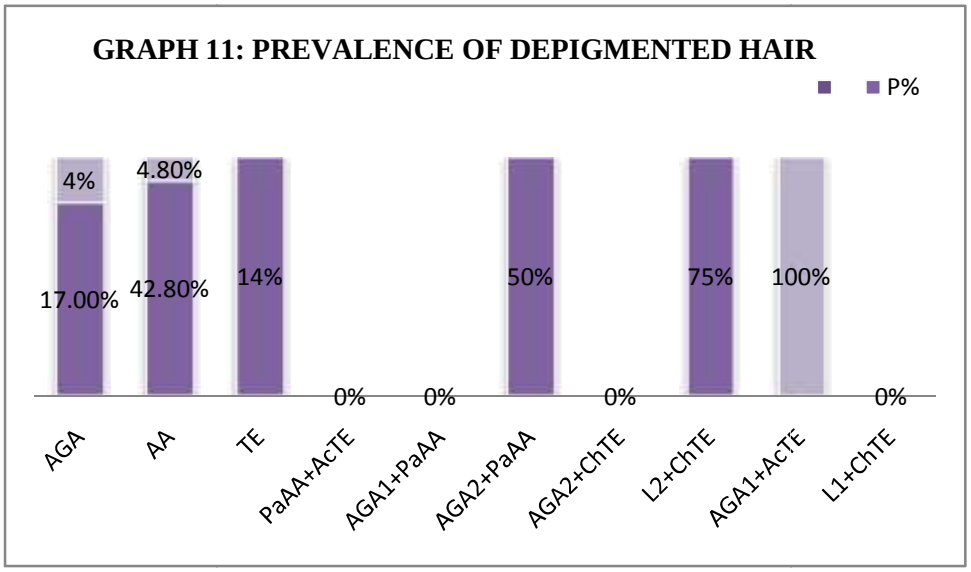
The above data suggests that broken hair is present in 81% of patients with AA and in combination of alopecias containing AA, but is commonly found in 10% of AA.

Depigmented Hair:

Depigmented hair was present in 8 (17%) patients of AGA, 9 (42.8%) patients of AA, 3 (14%) patients of TE, 1 (50%) patient of AGA2+PaAA, 3 (75%) patients of L2+ChTE. It was common in 2 (4%) patients of AGA, 1 (4.8%) patient of AA and 1 (100%) patient of AGA1+AcTE.

Table 19: Prevalence of Depigmented Hair

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	8	17.00%	2	4%
AA	9	42.80%	1	4.80%
TE	3	14%	0	0%
PaAA+AcTE	0	0%	0	0%
AGA1+PaAA	0	0%	0	0%
AGA2+PaAA	1	50%	0	0%
AGA2+ChTE	0	0%	0	0%
L2+ChTE	3	75%	0	0%
AGA1+AcTE	0	0%	1	100%
L1+ChTE	0	0%	0	0%



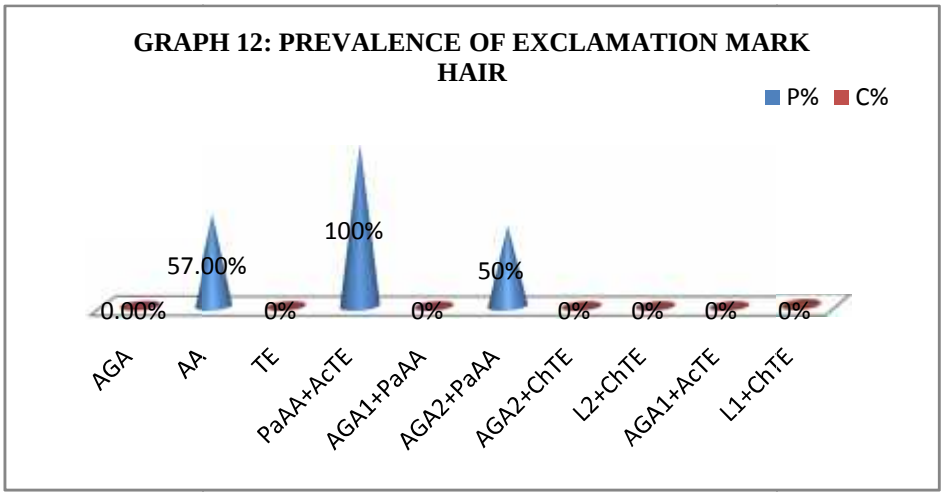
The above data suggest that depigmented hair is present in increasing frequency in TE (14%), AGA (17%) and AA (42.8%) respectively. It is commonly found in almost equal frequencies in AGA (4%) and AA (4.8%).

Exclamation Mark Hair:

Exclamation mark hair was present in 12 (57%) patients of AA, 1 (100%) patient of PaAA+AcTE and 1 (50%) patient of AGA2+PaAA.

Table 20: Prevalence of Exclamation Mark Hair

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	0	0.00%	0	0%
AA	12	57%	0	0.00%
TE	0	0%	0	0%
PaAA+AcTE	1	100%	0	0%
AGA1+PaAA	0	0%	0	0%
AGA2+PaAA	1	50%	0	0%
AGA2+ChTE	0	0%	0	0%
L2+ChTE	0	0%	0	0%
AGA1+AcTE	0	0%	0	0%
L1+ChTE	0	0%	0	0%



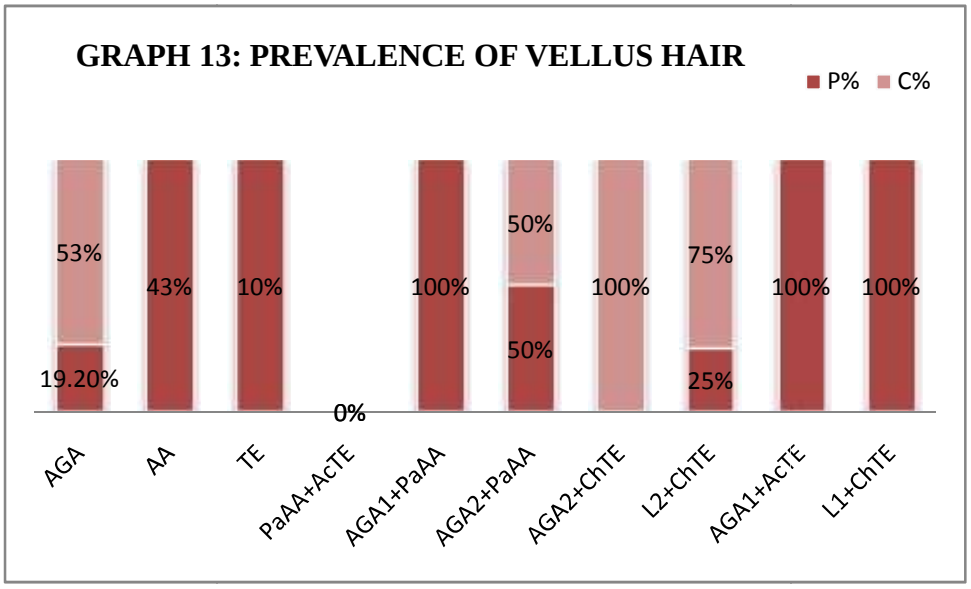
The above data suggest that Exclamation mark hair is present exclusively in AA (57%) and in combinations of alopecias containing AA in this study.

Vellus Hair:

Vellus hair was present in 9 (19.2%) patients of AGA, 9 (43%) patients of AA, 2 (10%) patients of TE, 1 (100%) patient of AGA1+PaAA, 1 (50%) patient of AGA2+PaAA, 1 (25%) patient of L2+ChTE, 1 (100%) patient of AGA1+AcTE and 1 (100%) patient of L1+ChTE. It was most commonly found in 25 (53%) patients of AGA.

Table 21: Prevalence of Vellus Hair

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	9	19.20%	25	53%
AA	9	43%	0	0%
TE	2	10%	0	0%
PaAA+AcTE	0	0%	0	0%
AGA1+PaAA	1	100%	0	0%
AGA2+PaAA	1	50%	1	50%
AGA2+ChTE	0	0%	1	100%
L2+ChTE	1	25%	3	75%
AGA1+AcTE	1	100%	0	0%
L1+ChTE	1	100%	0	0%



The above data suggest that vellus hair is present in increasing frequency in TE (10%) and AA (43%) respectively. However, it is common in AGA (53%) and in combinations containing AGA.

Variation in Hair Diameter (Fronto-Temporal Area):

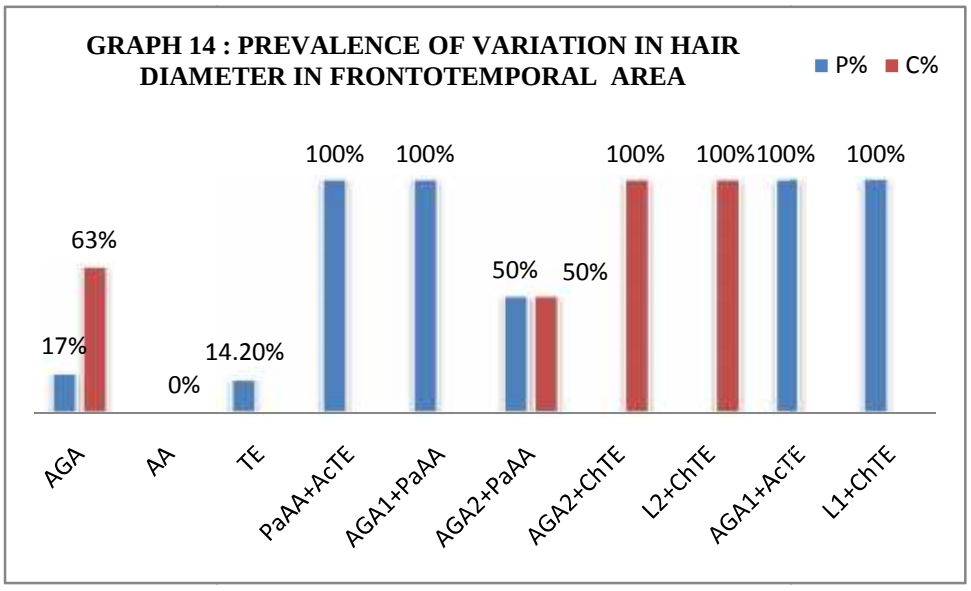
Variation in hair shaft diameter in the fronto-temporal areas was present in 8 (17%) patients of AGA, 3 (14.2%) patients of TE, 1 (100%) patient of PaAA+AcTE, 1 (100%) of AGA1+PaAA, 1 (50%) patient of

AGA2+PaAA. It was common in 30 (63%) patients of AGA, 3(14%) patients of TE, 1 (50%) patient of AGA2+PaAA, 1 (100%) patient of AGA2+ChTE and 4 (100%) patients of L2+ChTE.

Table 22: Prevalence of Variation in Hair Diameter

(Fronto-Temporal Area)

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	8	17%	30	63%
AA	0	0.00%	0	0%
TE	3	14.2%	0	0%
PaAA+AcTE	1	100%	0	0%
AGA1+PaAA	1	100%	0	0%
AGA2+PaAA	1	50%	1	50%
AGA2+ChTE	0	0%	1	100%
L2+ChTE	0	0%	4	100%
AGA1+AcTE	1	100%	0	0%
L1+ChTE	1	100%	0	0%



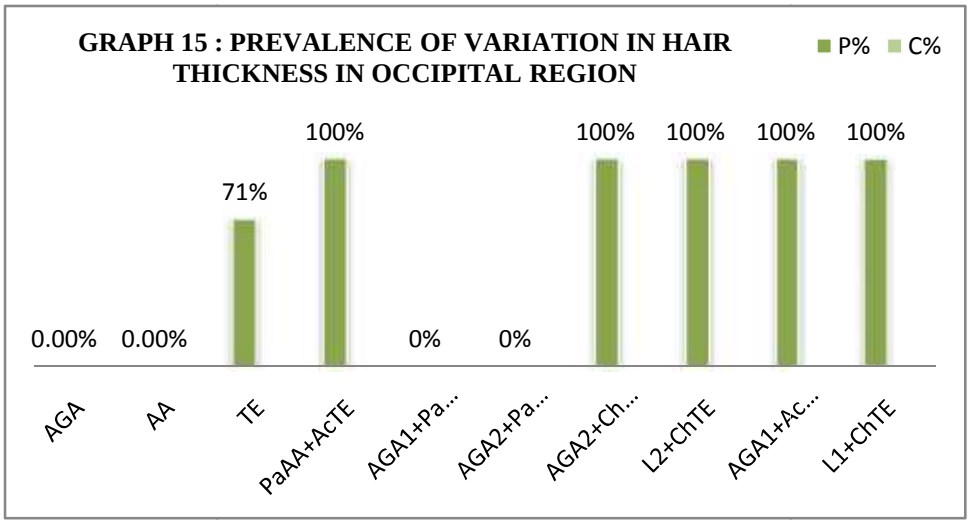
The above data suggest that variation in hair shaft diameters in fronto-temporal area is present in AGA and TE, but it is more common in AGA (63%) than TE (14.2%).

Variation in Hair Diameter (Occipital Area)

Variation of hair shaft diameter in occipital area was present in 15(71%) patients of TE, 1 (100%) patient of PaAA+AcTE, 1 (100%) patient of AGA2+ChTE, 4 (100%) patients of L2+ChTE, 1 (100%) patient of AGA1+AcTE and 1 (100%) patient of L1+ChTE.

Table 23: Prevalence of Variation in Hair Shaft Diameter (Occipital)

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	0	0.00%	0	0.00%
AA	0	0.00%	0	0%
TE	15	71%	0	0%
PaAA+AcTE	1	100%	0	0%
AGA1+PaAA	0	0%	0	0%
AGA2+PaAA	0	0%	0	0%
AGA2+ChTE	1	100%	0	0%
L2+ChTE	4	100%	0	0%
AGA1+AcTE	1	100%	0	0%
L1+ChTE	1	100%	0	0%



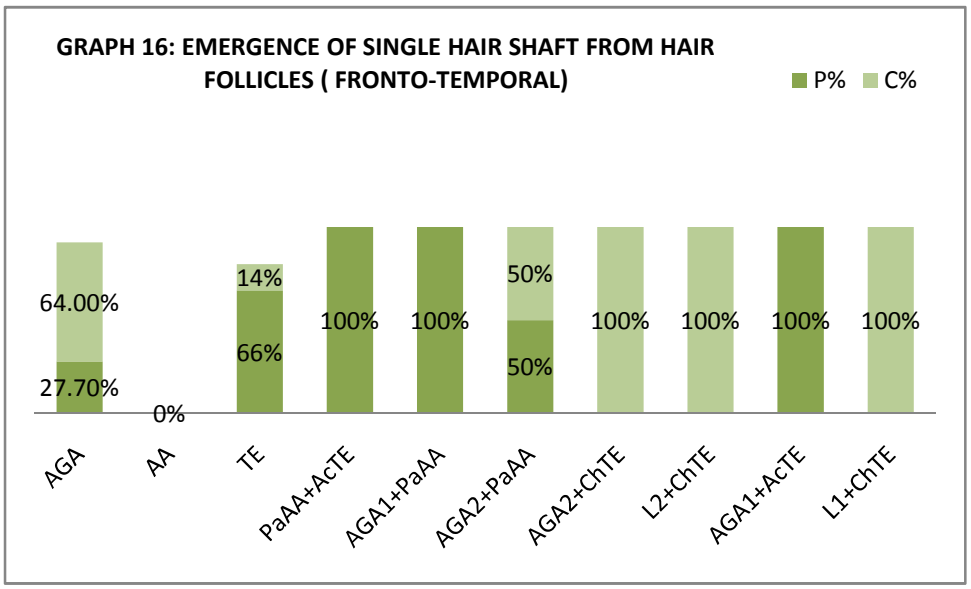
The above data suggest that variation in hair shaft diameter in occipital area is predominantly found in TE and in combinations of alopecias containing TE.

Emergence of Single Hair Shaft from Hair Follicle (Fronto-temporal areas)

Emergence of single hair shaft from hair follicles in the fronto-temporal areas was present in 13 (27.7%) patients of AGA, 14 (66%) patients of TE, 1 (100%) patient of PaAA+AcTE, 1 (100%) patient of AGA1+PaAA, 1 (50%) patient of AGA2+PaAA and 1 (100%) patient of AGA1+AcTE. It was common in 30 (64%) patients of AGA, 3 (14%) patients of TE, 1 (50%) patient of AGA2+PaAA, 1 (100%) patient of AGA2+ChTE, 4 (100%) patients of L2+ChTE.

Table 24: Prevalence of Emergence of single hair shaft from hair follicles (Fronto-temporal area)

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	13	27.70%	30	64.0%
AA	0	0.00%	0	0%
TE	14	66%	3	14%
PaAA+AcTE	1	100%	0	0%
AGA1+PaAA	1	100%	0	0%
AGA2+PaAA	1	50%	1	50%
AGA2+ChTE	0	0%	1	100%
L2+ChTE	0	0%	4	100%
AGA1+AcTE	1	100%	0	0%
L1+ChTE	0	0%	1	100%



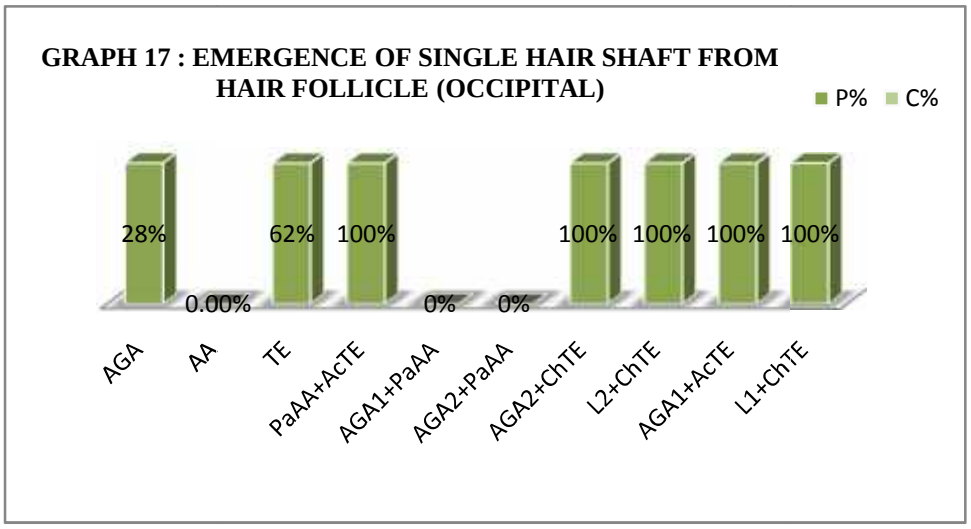
The above data suggests that emergence of single hair shaft from hair follicle in fronto-temporal area is present in TE and AGA; it is however more common in AGA than TE.

Emergence of Single Hair Shaft from Hair Follicles (Occipital)

Emergence of single hair shaft from hair follicles was present in 13 patients of AGA (28%) and 13 (62%) patients of TE, 1 (100%) patient of PaAA+AcTE, 1 (100%) patient of AGA2+ChTE, 4 (100%) patients of L2+ChTE, 1 (100%) patient of AGA1+AcTE and 1 (100%) patient of L2+ChTE. It was common in 2 (10%) patients of TE.

Table 25: Prevalence of Emergence of Single Hair Shaft from Hair Follicles (Occipital)

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	13	28%	0	0.00%
AA	0	0.00%	0	0%
TE	13	62%	0	0%
PaAA+AcTE	1	100%	0	0%
AGA1+PaAA	0	0%	0	0%
AGA2+PaAA	0	0%	0	0%
AGA2+ChTE	1	100%	0	0%
L2+ChTE	4	100%	0	0%
AGA1+AcTE	1	100%	0	0%
L1+ChTE	1	100%	0	0%



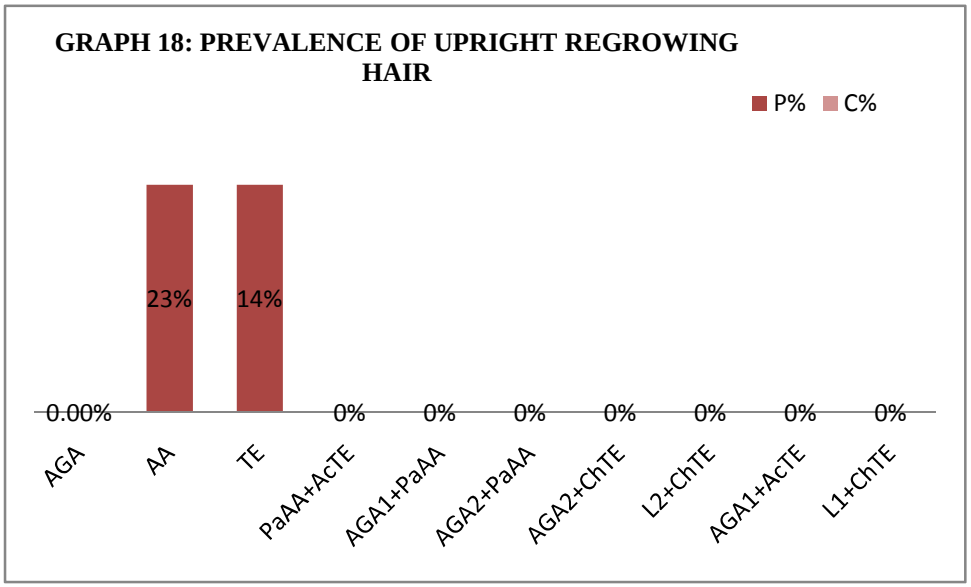
The above data suggest that emergence of single hair shaft from hair follicle in occipital area is present in AGA (28%) and in TE (62%).

Upright Regrowing Hair:

Upright regrowing hair was present in 5 (23%) patients of AA and 3 (14%) patients of TE. It was more common in AA than TE.

Table 26: Prevalence of upright regrowing hair

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	0	0.00%	0	0.00%
AA	5	23%	0	00%
TE	3	14%	0	0%
PaAA+AcTE	0	0%	0	0%
AGA1+PaAA	0	0%	0	0%
AGA2+PaAA	0	0%	0	0%
AGA2+ChTE	0	0%	0	0%
L2+ChTE	0	0%	0	0%
AGA1+AcTE	0	0%	0	0%
L1+ChTE	0	0%	0	0%



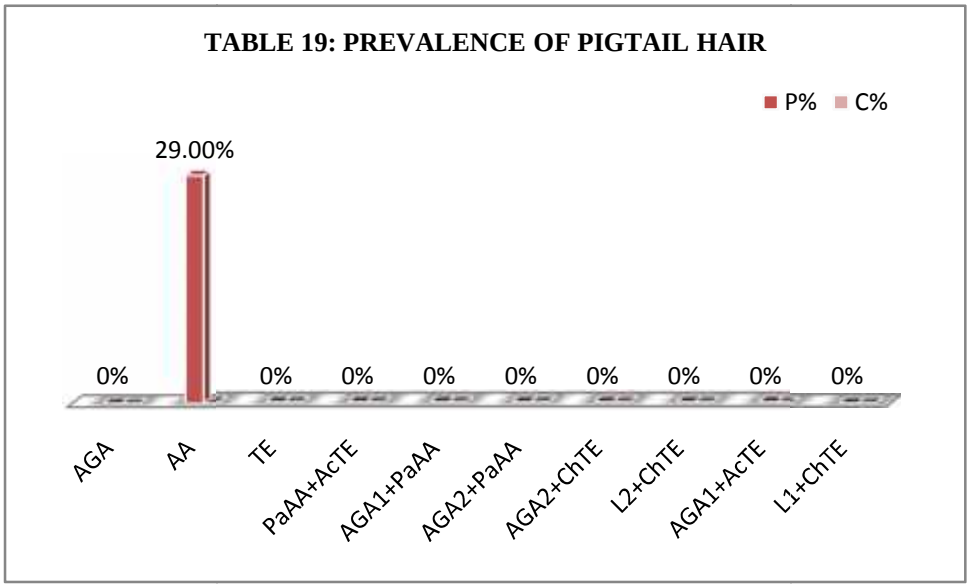
The above data suggest that upright regrowing hair can be present in TE (14%) and AA (23%).

Pigtail Hair:

Pigtail hair was present in 6 (29%) patients of AA.

Table 27: Prevalence of Pigtail Hair

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	0	0.00%	0	0.00%
AA	6	29.00%	0	0%
TE	0	0%	0	0%
PaAA+AcTE	0	0%	0	0%
AGA1+PaAA	0	0%	0	0%
AGA2+PaAA	0	0%	0	0%
AGA2+ChTE	0	0%	0	0%
L2+ChTE	0	0%	0	0%
AGA1+AcTE	0	0%	0	0%
L1+ChTE	0	0%	0	0%



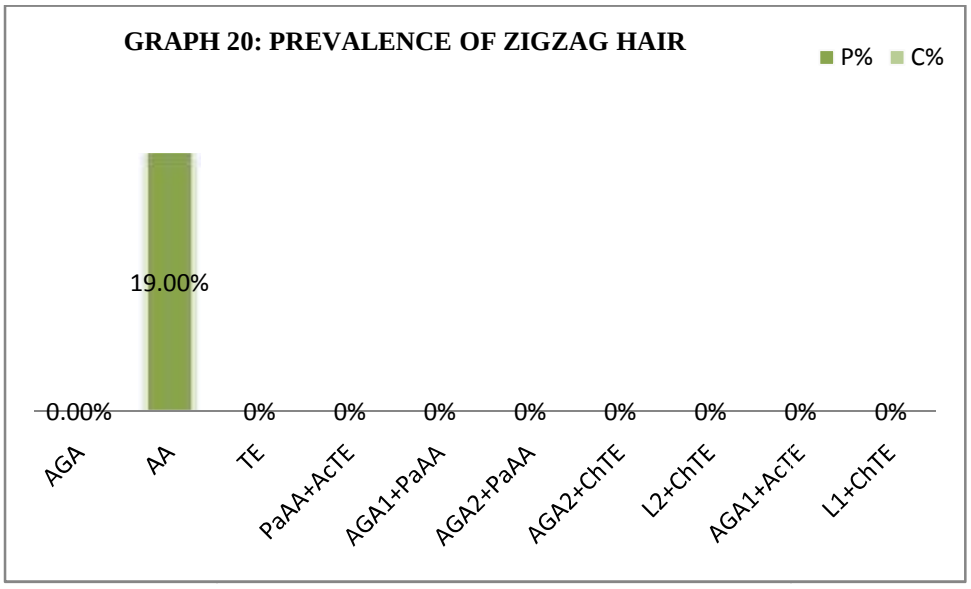
The above data suggests that pigtail hair is specifically found in AA (29%) in this study.

Zigzag Hair:

Zigzag hair was present in 4 (19%) patients of AA.

Table 28: Prevalence of Zigzag Hair

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	0	0.00%	0	0.00%
AA	4	19.00%	0	0%
TE	0	0%	0	0%
PaAA+AcTE	0	0%	0	0%
AGA1+PaAA	0	0%	0	0%
AGA2+PaAA	0	0%	0	0%
AGA2+ChTE	0	0%	0	0%
L2+ChTE	0	0%	0	0%
AGA1+AcTE	0	0%	0	0%
L1+ChTE	0	0%	0	0%



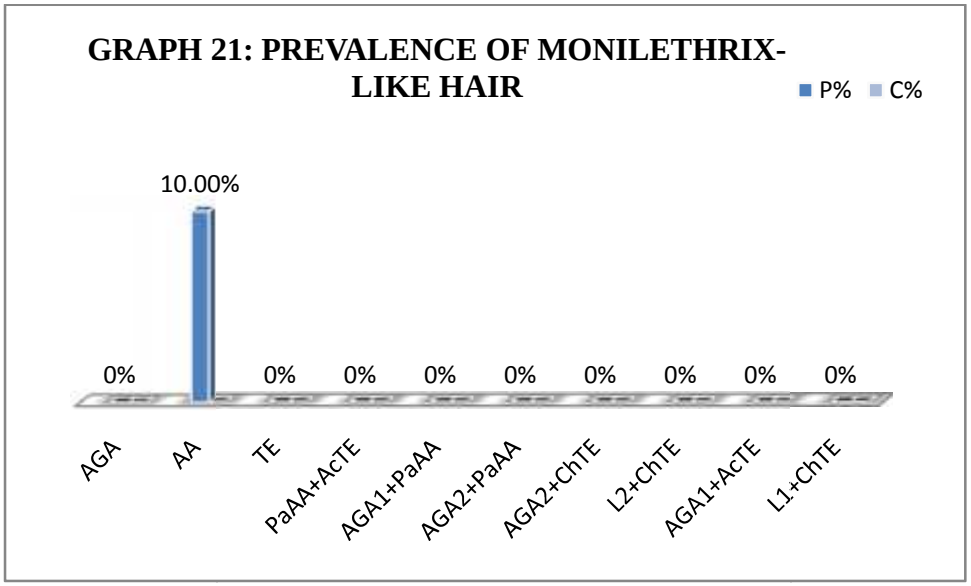
The above data suggest that zigzag hair is specifically found in AA (19%) in this study.

Monilethrix-like Hair:

Monilethrix-like hair was present in 2 (10%) patients of AA.

Table 29: Prevalence of Monilethrix-like Hair

CLINICAL DIAGNOSIS	PRESENT	P%	COMMON	C%
AGA	0	0.00%	0	0.00%
AA	2	10.00%	0	0%
TE	0	0%	0	0%
PaAA+AcTE	0	0%	0	0%
AGA1+PaAA	0	0%	0	0%
AGA2+PaAA	0	0%	0	0%
AGA2+ChTE	0	0%	0	0%
L2+ChTE	0	0%	0	0%
AGA1+AcTE	0	0%	0	0%
L1+ChTE	0	0%	0	0%



The above data suggest that monilethrix-like hair is present specifically in AA (10%) in this study.

DISCUSSION

Dermoscopy has received considerable interest in the recent years, with special consideration to Trichoscopy. Various instruments are being used for Trichoscopy i.e. non-contact and contact. The trichoscopic findings in alopecias has not yet been standardized. Hence, this study has been done to detect the most common trichoscopic features in the most common non-scarring alopecias. Here we have compared the present study with a few related studies.

The sample size in the present study, using a non-contact polarized light dermatoscope was 100. In a south Indian study conducted by Balachandra Ankad, et al, a contact dermatoscope was used to study 50 patients of alopecia areata. In another Indian study done in Gujarat by Vivek V Nikam and Hita H Mehta, both contact and non-contact dermatoscopes were used to study 112 cases of cicatricial and non-cicatricial alopecia. In an Egyptian study done by Abd-Elaziz El-Taweel, et al 40 patients of alopecia areata and tinea capitis were studied using non-contact dermatoscope.

Table 30: Comparison of Sample Size of Various Studies

Studies	Sample size
Present study	**100**
Balachandra Ankad, et al[119]	**50**
Abd-Elaziz El-Taweel, et al[120]	**40**
Vivek V Nikam and Hita H Mehta[121]	**112**

Larger the sample size, more is the significance of the study. However, due to time constraint only 100 patients were examined.

Types of Alopecia :

In the present study, 47 patients had AGA, 21 had AA, 21 had TE, 11 had a combination of alopecias. Whereas, in the study done by Vivek V Nikam and Hita H Mehta, 25 of the patients had AGA, 32 of the patients had AA and the rest were those of cicatricial alopecia. TE was not included in their study, probably because it is a disease of exclusion on Trichoscopy. The number of patients having AGA were comparatively higher in the present study, making the present study more reliable for that particular alopecia. In the study by Balachandra Ankad, et al, all the 50 patients studied were those of AA, hence giving the trichoscopic observations in this study more weightage for this particular alopecia. In the study by Abd-Elaziz El-Taweel, et al, 20 patients of AA were studied. A comparison of the types of alopecias in different studies has been presented in the table below

Table 31: Comparison of types of Alopecias in various studies

Studies	AGA	AA	TE	Combination of alopecias
Present study	**47**	**21**	**21**	**11**
Balachandra Ankad, et al	**-**	**50**	**-**	**-**
Vivek V Nikam and Hita H Mehta	**25**	**32**	**-**	**-**
Abd-Elaziz El-Taweel, et al	**-**	**20**	**-**	**-**

In this study, combination of alopecias and TE has been included, which were not included in the above studies.

Sex Distribution:

In the present study, out of 47 patients of AGA, 42 (89.4%) were male and 5 (10.6%) were female and 21 patients having AA were constituted by 11 male patients (52.4%) and by 10 female patients (47.6%). Out of the 21 patients of TE in the present study, 20 patients (95.2%) were female and 1 patient (4.8%) was male and in the 11 patients having combination of alopecias, 5 patients (45.5%) were male and 6 patients (54.5%) female. A comparison of the sex distribution in various studies is presented in the table below

Table 32: Comparison of Sex distribution in different alopecias in various studies

STUDY	AGA		AA		TE	
	M	F	M	F	M	F
Present study	**42 (89%)**	**5 (11%)**	**11 (52%)**	**10(48%)**	**1(4%)**	**20(96%)**
Balachandra Ankad, et al	**21 (84%)**	**4 (16%)**	**22 (68%)**	**10(32%)**	**-**	**-**
Vivek V Nikam and Hita H Mehta	**-**	**-**	**7 (35%)**	**13(65%)**	**-**	**-**
Abd-Elaziz El-Taweel, et al	**-**	**-**	**30 (60%)**	**20(40%)**	**-**	**-**

The sex distribution in AGA in the present study is consistent with the study done by Vivek V Nikam and Hita H Mehta. AGA is known to affect males more commonly than females. The sex distribution in AA showed varying results possibly due to the differences in sample size in the various studies. The sex distribution of TE has not been studied in the above studies. Females are said to be affected more commonly than males.

Age Distribution:

The comparison of age distribution in present study with other studies is presented in the table below

Table 33: Comparison of Age distribution in various studies

STUDY	AGE RANGE (IN YEARS)	MEAN AGE (IN YEARS)
Present study	**6 - 57**	**31.5 ± 4.362**
Balachandra Ankad, et al	**3 – 55**	**5.25 ± 2.75**
Abd-Elaziz El-Taweel, et al	**1.5 - 11**	**29**

The range of age in years, in the present study and that in the study by Balachandra Ankad, et al are similar though their study was only on AA. This is because in the present study the youngest and oldest patient were those having AA. Hence, the data is comparable. The range of age in the present study does not correspond with that of the study by Abd-Elaziz El-Taweel, et al because of the variation in sample size.

TRICHOSCOPIC FEATURES

It will be discussed under follicular features, interfollicular features and hair patterns.

Follicular features

Yellow Dots: A comparison of prevalence yellow dots in the present study with other studies is presented in the table below.

Table 34: Comparison of prevalence of Yellow Dots in various studies

STUDY	AGA		AA		TE	
	P	C	P	C	P	C
Present study	23(49%)	-	13(62%)	4(19%)	6(29%)	-
Balachandra Ankad, et al	-		25 (50%)		-	
Vivek V Nikam and Hita H Mehta	10 (40%)		2 (6.25%)		-	
Abd-Elaziz El-Taweel, et al	-		11 (55%)		-	
Lidia Rudnicka, et al[11]	7 – 66%		25 (50%)			

The prevalence of yellow dots in AGA in the present study is comparable to that of Vivek V Nikam and Hita H Mehtas' study and the study done by Lidia Rudnicka, et al. In AA however, the prevalence of yellow dots is comparable

to three studies by Balachandra Ankad, et al, Abd-Elaziz El-Taweel, et al and Lidia Rudnicka, et al respectively. But it varies greately from the values in Vivek V Nikam and Hita H Mehtas' study. This variation may be due to the variation in the trichoscope used for the study and in the sample size. Similar studies on the prevalence of yellow dots in TE is not available.

Black Dots: A comparison of prevalence of black dots in the present study with other studies is presented in the table below.

Table 35: Comparison of prevalence of Black Dots in various studies

STUDY	AGA		AA		TE	
	P	C	P	C	P	C
Present study	3(6.4%)	-	6(19%)	14(66%)	-	-
Balachandra Ankad, et al	-		10 (20%)		-	
Vivek V Nikam and Hita H Mehta	0		23 (71%)		-	
Abd-Elaziz El-Taweel, et al	-		13 (65%)		-	
Lidia Rudnicka, et al	0		44 – 70%		-	

The prevalence of black dots in AA in the present study is comparable to that of the three studies by Vivek V Nikam and Hita H Mehta, Abd-Elaziz El-Taweel,

et al and Lidia Rudnicka, et al respectively. The present study has listed the findings under the headings of " P " (Present) and " C " (Common) based on the number of fields they are present in, which has not been done in the above studies. In Vivek V Nikam and Hita H Mehtas' study no black dots found in AGA; whereas in the present study it was found in 3 patients. These variations may be due to the variation in sample size or due to the different instruments used for the study.

Empty Hair Follicles: A comparison of prevalence of empty hair follicles in the present study with other studies is presented in the table below.

Table 36: Comparison of prevalence of Empty hair follicles in various studies

STUDY	AGA		AA		TE	
	P	C	P	C	P	C
Present study	15 (32%)	3 (6%)	3 (14%)	4(19%)	-	-
Vivek V Nikam and Hita H Mehta	4 (16%)		5 (16%)		-	

The prevalence of empty hair follicles in AGA in the present study is much higher than the study by Vivek V Nikam and Hita H Mehtas' study. In AA also, the prevalence values differ in both the studies. This difference is perhaps due to the difference in sample size and the dermoscope used.

Peripilar Sign: A comparison of prevalence of peripilar sign in the present study with other studies is presented in the table below.

Table 37: Comparison of prevalence of Peripilar Sign in various studies

STUDY	AGA		AA		TE	
	P	C	P	C	P	C
Present study	14 (29%)	23(49%)	4(15%)	-	6(29%)	-
Vivek V Nikam and Hita H Mehta	15 (60%)		3 (9.3%)		-	
Lidia Rudnicka, et al	20 – 66%		-		-	

The prevalence of peripilar sign in AGA in the present study is comparable to the studies done by Vivek V Nikam and Hita H Mehta and Lidia Rudnicka, et al. The prevalence in AA is comparable. Similar studies on TE have not been done so far.

Interfollicular Features :

The dermoscope used in the present study was not suitable to study interfollicular features like pigment and vascular patterns due to the excessive glare from the white light. Hence no comments can be made about the interfollicular features.

Hair Patterns:

Broken Hair: A comparison of prevalence of broken hair in the present study with other studies is presented in the table below.

Table 38: Comparison of prevalence of Broken Hair in various studies

STUDY	AGA		AA		TE	
	P	C	P	C	P	C
Present study	0	0	17 (80%)	2 (10%)	-	-
Vivek V Nikam and Hita H Mehta	4 (16%)		19 (60%)		-	
Abd-Elaziz El-Taweel, et al	-		18 (90%)		-	
Lidia Rudnicka, et al	-		45 - 58%		-	

The prevalence of broken hair in AA in the present study is comparable to that of the study done by Abd-Elaziz El-Taweel, et al. It is, however higher than the prevalence seen in the studies done by Vivek V Nikam and Hita H Mehta and Lidia Rudnicka, et al. In the present study broken hair was not observed in any case of AGA, whereas in the study done by Vivek V Nikam and Hita H Mehta it was present in 4 patients. This difference may be due to the variation in sample size or due to different dermoscope used. Broken hair was absent in patients having TE according to the present study and could not be compared to any other studies due to the lack of similar studies in the literature.

Exclamation Mark Hair: A comparison of prevalence of exclamation mark hair in the present study with other studies is presented in the table below.

Table 39: Comparison of prevalence of Exclamation Mark Hair in various studies

STUDY	AGA		AA		TE	
	P	C	P	C	P	C
Present study	0	0	12 (57%)	0	-	-
Balachandra Ankad, et al	-		30 (60%)		-	
Abd-Elaziz El-Taweel, et al	-		11 (50%)		-	
Lidia Rudnicka, et al	-		30 - 44%		-	

The prevalence of EMH in AA in the present study is similar to that found in the studies be Balachandra Ankad, et al, Abd-Elaziz El-Taweel, et al and Lidia Rudnicka, et al. EMH is absent in AGA as observed in the above studies.

Vellus Hair: A comparison of prevalence of Vellus hair in the present study with other studies is presented in the table below.

Table 40: Comparison of prevalence of Vellus Hair in various studies

STUDY	AGA		AA		TE	
	P	C	P	C	P	C
Present study	9 (19%)	25(53%)	9 (43%)	0	2(10%)	0
Balachandra Ankad, et al	-		5 (10%)		-	
Vivek V Nikam and Hita H Mehta	14 (56%)		11 (34%)		-	
Abd-Elaziz El-Taweel, et al	-		8 (40%)		-	
Lidia Rudnicka, et al	20.9 ± 12%		33 – 72%		-	

The prevalence of vellus hair in the present study in AGA is comparable to that found in the study done by Vivek V Nikam and Hita H Mehta, but higher than that found in the study by Lidia Rudnicka, et al. The prevalence of vellus hair in AA in the present study is similar to the findings in the studies done by Vivek V Nikam and Hita H Mehta, Lidia Rudnicka, et al and Abd-Elaziz El-Taweel, et al. It is, however greater than the findings in the study by Balachandra Ankad, et al. This variation can be explained by the diversity in types of AA present in both the studies and the time duration of the disease in the patients enrolled in both the studies. No similar studies were found about TE in the literature.

Variation in hair shaft thickness: A comparison of prevalence of variation in hair shaft diameter in the present study with other studies is presented in the table below.

Table 41: Comparison of prevalence of Variation in Hair Shaft Diameter in various studies

STUDY	Variation in Hair Shaft Diameter							
	Fronto – Temporal Areas				Occipital Area			
	AGA		TE		AGA		TE	
	P	C	P	C	P	C	P	C
Present study	8(17%)	30(63%)	3 (14%)	0	0	0	15(71%)	0
Adriana Rakowska, et al[41]	20.9 ± 12%		10.4 ± 3.9%		0		18 (54.5%)	

The prevalence of variation in hair shaft diameter in AGA in the present study is higher than that seen in the study by Adriana Rakowska, et al. This may be because the patients having AGA enrolled in the present study were both male and female, whereas only 32 patients having FAGA were enrolled in the study by Adriana Rakowska, et al. It is however evident that the variation in hair shaft thickness in Fronto-temporal area is more in AGA than TE and the variation in the occipital area is present in TE and absent in AGA.

Emergence of Single Hair Shaft from Hair Follicles: A comparison of prevalence of single hair pilosebaceous units in the present study with other studies is presented in the table below.

Table 42: Comparison of prevalence of Single Hair Pilosebaceous units in various studies

STUDY	Single Hair Pilosebaceous units							
	Fronto – Temporal Areas				Occipital Area			
	AGA		TE		AGA		TE	
	P	C	P	C	P	C	P	C
Present study	13(27%)	30(64%)	14(66%)	3(14%)	13(28%)	0	13(62%)	0
Adriana Rakowska, et al	65.2 ± 19.9%		39 ± 13.4%		36.8 ± 18.6%		31 ± 23%	

The prevalence of single hair pilosebaceous units in the present study in the Fronto-temporal areas in AGA and TE is higher than that found in the study by Adriana Rakowska, et al. This may be because the patients having AGA enrolled in the present study were both male and female, whereas only 32 patients having FAGA were enrolled in the study by Adriana Rakowska, et al. It is however evident that single hair pilosebaceous units in AGA and TE are more common in fronto-temporal area than in the occipital area.

Pigtail Hair: A comparison of prevalence of pigtail hair in the present study with other studies is presented in the table below.

Table 43: Comparison of prevalence of Pigtail Hair in various studies

STUDY	AGA		AA		TE	
	P	C	P	C	P	C
Present study	0	0	6 (29%)	0	0	0
Abd-Elaziz El-Taweel, et al	-		3 (15%)		-	

The prevalence of pigtail regrowing hair in AA in the present study is comparable to that found in the study by Abd-Elaziz El-Taweel, et al. It was absent in AGA and TE, in the present study.

Monilethrix – like Hair: A comparison of prevalence of monilethrix - like hair in the present study with other studies is presented in the table below.

Table 44: Comparison of prevalence of Monilethrix - like Hair in various studies

STUDY	AGA		AA		TE	
	P	C	P	C	P	C
Present study	**0**	**0**	**2 (10%)**	**0**	**0**	**0**
Lidia Rudnicka, et al	**-**		**66 (3%)**		**-**	

The prevalence of monilethrix- like hair in AA in the present study is comparable to that found in the study by Lidia Rudnicka, et al. It was absent in AGA and TE, in the present study.

Upright regrowing hair in the present study was present in AA (23%) and TE (14%). Zigzag hair was observed in AA (19%) in the present study. These features have been mentioned in a study by Lidia Rudnicka, et al. The prevalence, however has not been mentioned.

CONCLUSION

This study showed that among 100 patients with non-cicatricial alopecia, the majority had AGA (47%), AA (21%) and TE (21%) were of equal prevalence and 11% had a combination of alopecias. The male: female ratio for AGA was 8:1, AA was 1.1:1 and TE was 1:20 showing that AGA is more common in males, TE is more common in females and AA has no significant difference in the sex distribution.

Maximum number of patients (38%) were in the age group of 21 – 30 years. On examination, pallor was more prevalent in patients of TE (52%) and hair pull test was positive in all cases of TE and positive at periphery of lesions in 62% patients of AA.

The characteristic follicular features on Trichoscopy observed in AGA were peripilar sign (29% < 4 fields; 49% > 4 fields), yellow dots (49% < 4 fields) and empty hair follicles (32% < 4 fields; 6% > 4 fields). The characteristic hair shaft pattern observed was vellus hair (19% < 4 fields; 53% > 4 fields). Variation in hair shaft diameter was more prevalent in fronto-temporal areas (80%) and was absent in occipital area. The prevalence of single hair pilosebaceous units was more prevalent in fronto-temporal areas (27% < 4 fields; 64% > 4 fields) than in occipital area (28%).

The characteristic follicular features of AA on Trichoscopy were black dots (19% < 4 fields; 66% > 4 fields), yellow dots (62% < 4 fields; 19% > 4 fields) and empty hair follicles (14% < 4 fields; 19% > 4 fields). The characteristic hair patterns were broken hair (80% < 4 fields; 10% > 4 fields), exclamation mark hair (57% < 4 fields), vellus hair (43% < 4 fields), pigtail regrowing hair (29%

< 4 fields), upright regrowing hair (23% < 4 fields), zig-zag hair (19% < 4 fields) and monilethrix-like hair (10% < 4 fields).

TE is said to be a disease of exclusion on Trichoscopy. The characteristic finding is that the variation in hair – shaft diameter is prevalent in fronto-temporal (14%) and occipital areas (71%). It is important to differentiate this condition from AGA, where-in the variation in hair shaft thickness is present in fronto-temporal areas and absent in occipital area. The follicular features present in TE are peripilar sign (40% < 4 fields), yellow dots (29% < 4 fields), upright regrowing hair (14% < 4 fields) and vellus hair (10% < 4 fields).

The majority of patients having combination of alopecias were those with the combination of AGA and TE (63.6%). The characteristic features in them is that vellus hair and variation in hair shaft diameter are more pronounced in fronto-temporal areas than occipital area.

The dermoscope used in the present study was not suitable to study interfollicular features like pigment and vascular patterns due to the excessive glare from the white light. Hence no comments can be made about the interfollicular features.

Perhaps, more studies with larger sample size and better dermoscopes will help to standardize the trichoscopic findings in different types of alopecias.

SUMMARY

This was a cross-sectional study carried out from January 2014 to December 2014. The source of data were patients with Androgenetic alopecia, Alopecia areata and Telogen effluvium attending the Dermatology OPD, at KLES Dr. Prabhakar Kore Hospital and MRC, Belgaum. The inclusion criteria was all consenting male and female patients, with Androgenetic alopecia, Alopecia areata and Telogen effluvium. The exclusion criteria were patients having scarring alopecia or alopecia secondary to drugs and external injury and patients having non-cicatricial alopecia other than Androgenetic alopecia, Alopecia areata or Telogen effluvium.

The objective of the study was to study the Dermoscopic findings of scalp and hair in non-cicatricial alopecia (Androgenetic alopecia, Alopecia areata and Telogen effluvium).

The sample size was 100 patients. A detailed history was taken with clinical photographs of the lesions. Dermatological and systemic examination was carried out. Diagnosis of Androgenetic alopecia/ Alopecia areata/ Telogen effluvium was made on clinical examination and by performing Hair pull test and they were graded using the appropriate grading scales. Dermoscopic/ Trichoscopic examination of the scalp and hair was performed using a videodermatoscope on six areas of the scalp; bilateral fronto-temporal, bilateral parieto-temporal, occipital and vertex areas. They were examined using 50X magnification in androgenic alopecia and telogen effluvium. Two additional areas were examined in cases of alopecia areata; the center and periphery of

the bald patch. The data was noted in a pre-tested and pre-designed proforma after taking informed and written consent.

All the results were tabulated. Percentages were used to determine the prevalence of each trichoscopic feature in the three conditions. Chi square test was used wherever applicable.

AGA was the most prevalent condition in the study. AGA was more prevalent in male, TE was more prevalent in females and AA had equal sex distribution. The maximum number of patients were in the age group of 21 – 30 years. On examination, pallor was more prevalent in patients of TE and hair pull test was positive in all cases of TE and positive at the periphery of lesions in 62% patients of AA.

The characteristic follicular features on Trichoscopy observed in AGA were peripilar sign, yellow dots and empty hair follicles. The characteristic hair shaft patterns observed was vellus hair, variation in hair shaft diameter And single hair pilosebaceous units which were more prevalent in fronto-temporal areas than in occipital area.

The characteristic follicular features of AA on Trichoscopy were black dots, yellow dots and empty hair follicles. The characteristic hair patterns were broken hair, exclamation mark hair and less commonly, pigtail regrowing hair, upright regrowing hair, zig-zag hair and monilethrix-like hair.

TE is said to be a disease of exclusion on Trichoscopy. The characteristic finding is that the variation in hair – shaft diameter is prevalent in fronto-temporal and occipital areas which differentiates it from AGA in which

the above feature is present in fronto-temporal areas and absent in occipital area.

The majority of patients having combination of alopecias were those with the combination of AGA and TE. The characteristic features in them is that vellus hair and variation in hair shaft diameter are more pronounced in fronto-temporal areas than occipital area.

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ANNEXURE I

INFORMED CONSENT FORM

I.D.NO.

Name of the participant (in block letters)	
Address	
Email	
Contact number	

"A Cross sectional study of Dermascopic findings in Non-cicatricial Alopecia attending the Out-patient department of Dermatology, Venereology and Leprosy of KLE hospital in Belgaum, an Observational Study"

Respected Sir/Madam, we invite you to participate in our study as, you are eligible for the same. During the study you will be asked some questions in detail regarding your present complaints.

Need for the study:

Non-cicatricial alopecia represents a number of clinical conditions which comprise of Alopecia Areata, Androgenetic Alopecia, Telogen Effluvium, Anagen Effluvium etc. Occasionally, the clinician may encounter difficulties in diagnosing such cases, as these conditions can mimic other diseases. To overcome such issues, various methods are available for evaluation of a patient presenting with hair loss. Most of them do not fit the ideal requirement to suit the need of the clinician or the patients. However, most methods, when interpreted with caution, provide valuable insights into patient diagnosis and monitoring. One such intervention is Dermoscopy, which has shown to be an important tool in the evaluation and diagnosis of patients with alopecia as a first step before performing a biopsy. It can even help dermatologists in finding the right site for the biopsy, or furthermore avoiding unnecessary biopsies. Through photograph assessment, follow up of patients is also best appreciated at each visit.

Purpose of the study:

The purpose of this study is to know the various dermascopic findings in patients with non-cicatricial alopecia (Androgenetic alopecia, alopecia areata and telogen effluvium) All patients attending the out patient department, who are diagnosed to have non-cicatricial alopecias (Androgenetic alopecia, alopecia areata and telogen effluvium) will be requested to participate in this study during the period of one year.

Procedure and treatment:

Should you choose to participate, you will be asked to give a detailed history of your disease, undergo a physical examination, and consent to a dermoscopic examination through which the findings will be recorded in the form of photographs.

Risks and benefits:

You may undergo some amount of discomfort during the process of investigations. The result of you taking part in this research would help health care providers towards a better understanding of this disease, and thus we will be able to provide improved patient care.

Alternatives:

If you decide not to participate in this study, you will still be receiving the usual standard care for your disease.

Privacy and confidentiality:

Your privacy will be respected and all information collected about you during the course of this study will be kept confidential. Your identity will remain undisclosed.

Institutional policy / Sponserer's policy:

The J N Medical College will provide, within the limitations of the laws of the State of Karnataka, facilities and medical attention to patients who suffer injuries as a result of participating in this project. However there will be no reimbursement of the expenses curtailed by you to undergo the treatment.

Queries:

If you have any questions regarding the study, you may contact KLE'S Dr. Prabhakar Kore Hospital and MRC on Telephone No. +919448133475.

Financial incentives:

You shall not be receiving any payment or any financial incentives for participating in this study.

Authorization to publish results:

The results of this study may be published for scientific purpose or presented to a scientific group. Your identity, however, will be maintained confidential at all times.

Voluntary participation:

Your participation in this study is voluntary. Your decision whether or not to participate will neither affect the care of your current disease, nor your future relations with the doctor or the hospital. In case you need further information regarding your rights as a study participant, you may please contact Dr. Ganga Pilli, Chairman of the ethical committee, J N Medical College, Belgaum on telephone No. 08312473777

Statement of Consent:

I.D.NO:

I Mr/Ms/Mrs

_____

Volunteer and consent to participate in this study. I have read the consent document or it has been read to me in my vernacular language. I accept to participate in the study. All the information regarding this study is provided to me and I have understood the same. I have been given the opportunity to ask questions and obtain appropriate answers.

Signature or left thumb print of participant:

Date:

Witness name:

Signature of witness:

Date:

Signature of the investigator:

Date:

If the participants are Minors (under 18), the parents sign the form, rather than the participants.

ANNEXURE II

PROFORMA

Study: A One year hospital based cross sectional study of Dermoscopic findings in Non-Cicatricial Alopecia

Case No:____ **OP No._____**

Name:

Age:

Sex:

Occupation:

Address with phone no. :

Chief complaints:

History of present illness:

Duration of onset:- _____

Mode of onset:

1. Sudden ☐
2. Gradual ☐

Precipitating factors if any:

Site of onset:

Any associated factors:

1.Itching ☐
2.Pain ☐
3.Burning ☐
4.Asymptomatic ☐

Systemic complaints:

Past history:

1.History suggestive of Diabetes Mellitus
Present ☐
Absent ☐
If present duration _____

2.) History suggestive of Hypertension:
Present ☐
Absent ☐
If present duration _____

3.) History suggestive of Thyroid Disorders:
Present ☐
Absent ☐
If present duration _____

4.) History suggestive of Cushing's Disease
Present ☐
Absent ☐
If present duration _____

5.) History suggestive of PCOS
Present ☐
Absent ☐
If present duration _____

6.) History of any other Medical Disorders:
Present ☐
Absent ☐
If present _____

Family History:

History of Similar complaints:

Present	☐
Absent	☐

Personal History:

Diet:	Vegetarian	☐
	Mixed	☐
Appetite:	Normal	☐
	Poor	☐
	Increased	☐
Sleep :	Normal	☐
	Reduced	☐
	Increased	☐

Addictions/Habits (if any)_____

General Physical Examination:

Vitals: Pulse:_____/min
BP :_____mmHg
Temp:_____ºF

Signs :

Pallor	☐
Icterus	☐
Cyanosis	☐
Clubbing	☐
Lymphadenopathy	☐
Oedema	☐

Dermoscopic findings

CLINICAL DIAGNOSIS	HAIR SHAFTS	HAIR FOLLICLE OPENINGS	PERI FOLLICULAR EPIDERMIS	CUTANEOUS MICRO VESSELS

Associated Features:

Mucosal Examination:

Genital Mucosa

Oral Mucosa

Hair Changes :

Nail Changes:

Systemic Examination:

CVS:_____

RS:_____

Per Abdomen:_____

CNS:_____

Investigations:

CLINICAL DIAGNOSIS

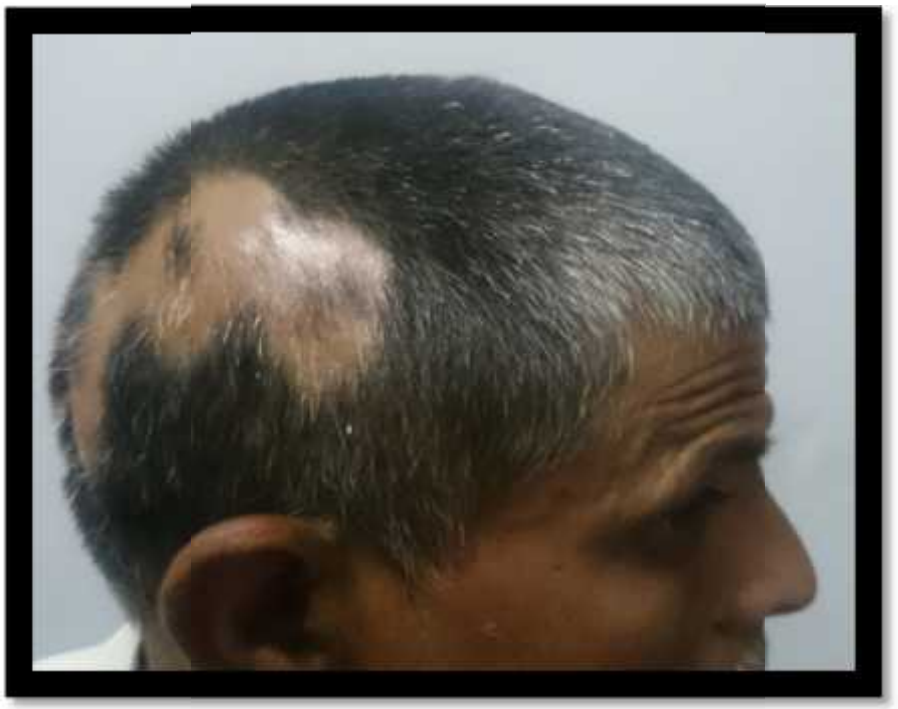
ALOPECIA AREATA	**ANDROGENIC ALOPECIA**	**TELOGEN EFFLUVIUM**

Signature: _____ Guide's Signature:_____

ANNEXURE III

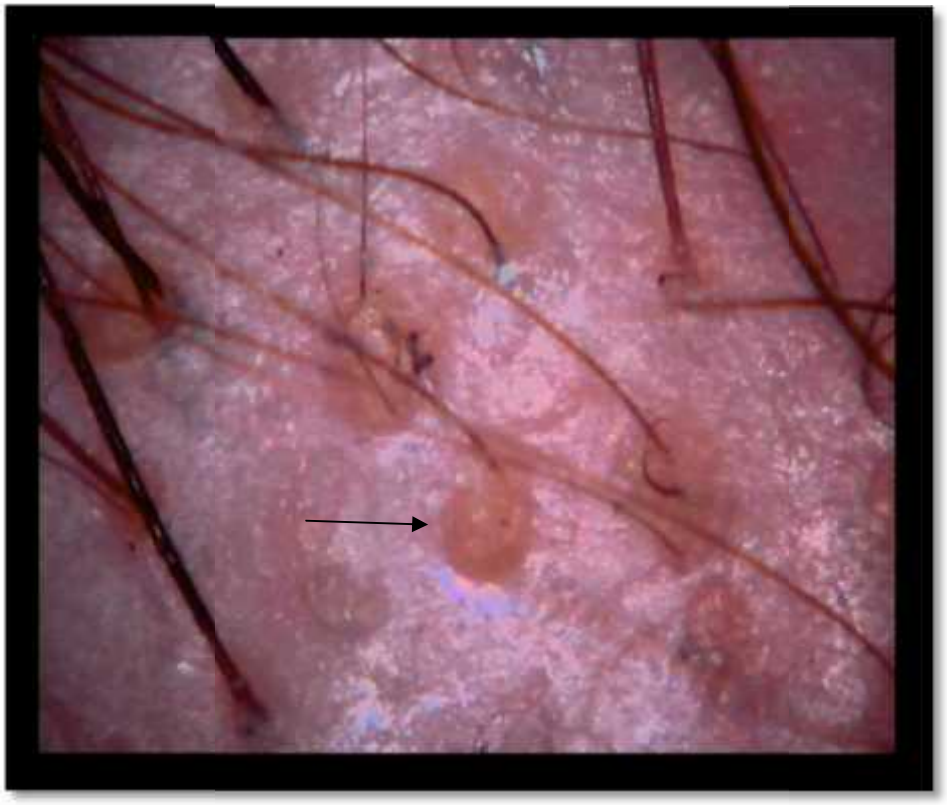
PHOTOGRAPHS

Photograph 1: Androgenetic Alopecia Grade 2

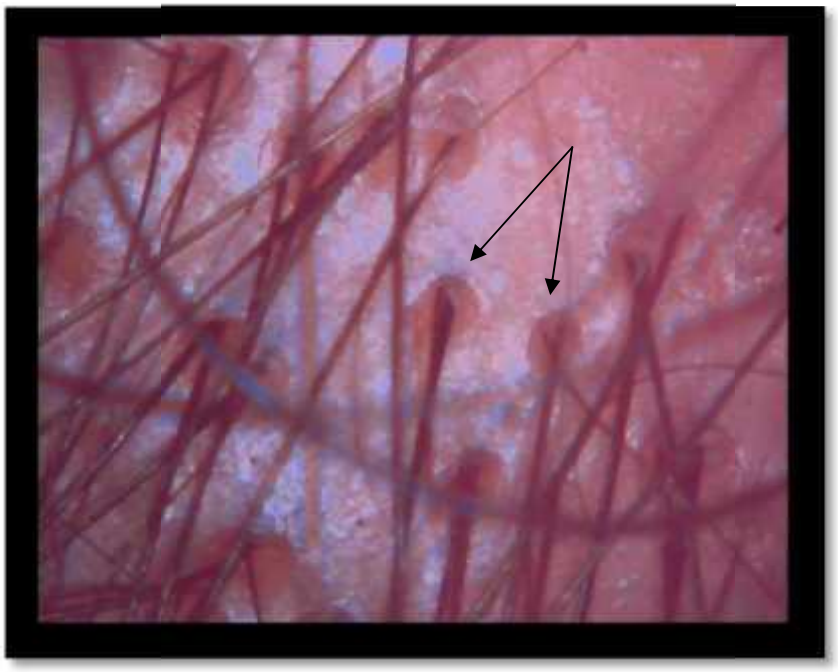


Photograph 2: Patchy Alopecia Areata

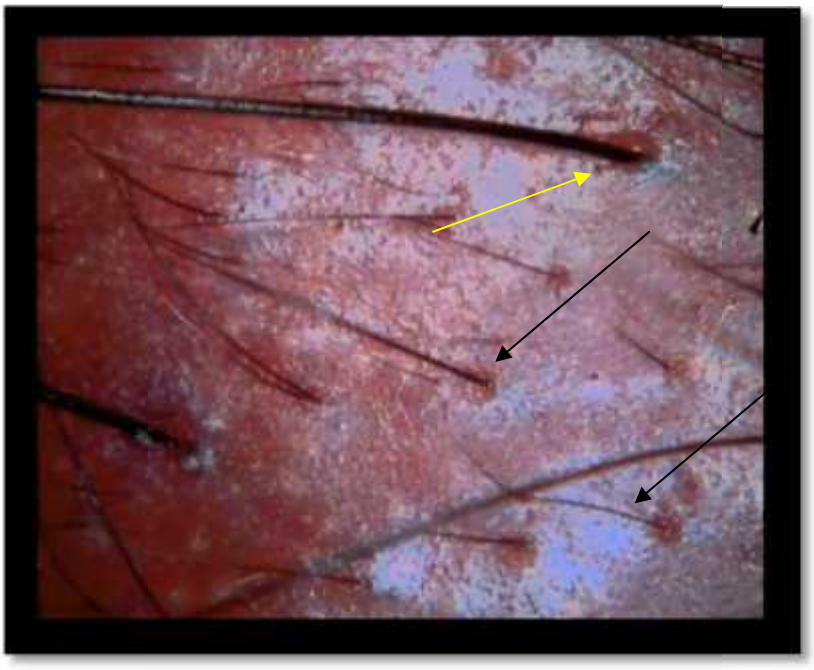
Photograph 3: Acute Telogen Effluvium



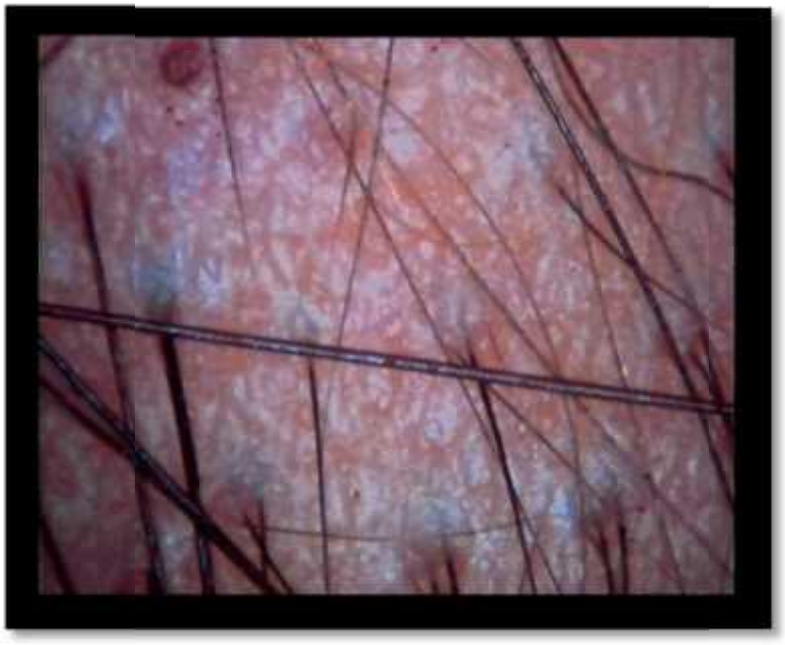
Photograph 4: Yellow dots in Androgenetic Alopecia



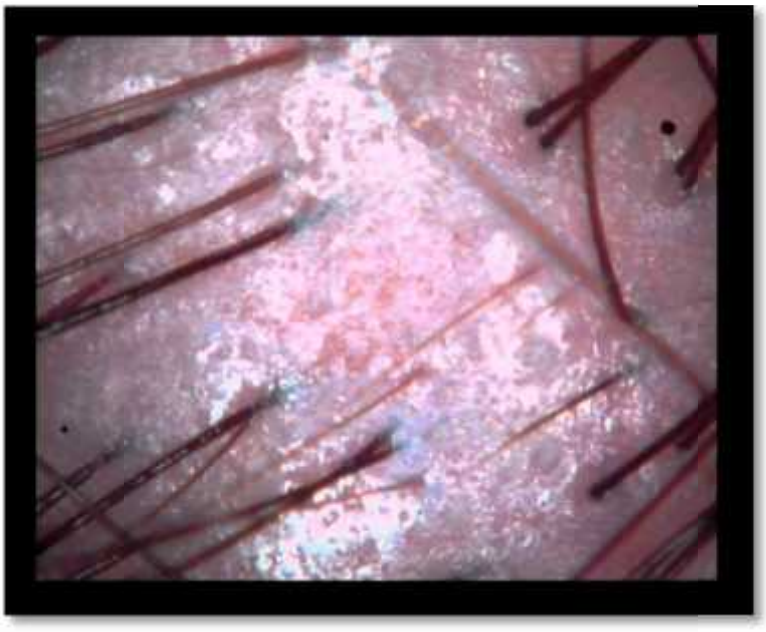
Photograph 5: Peripilar sign in Androgenetic alopecia



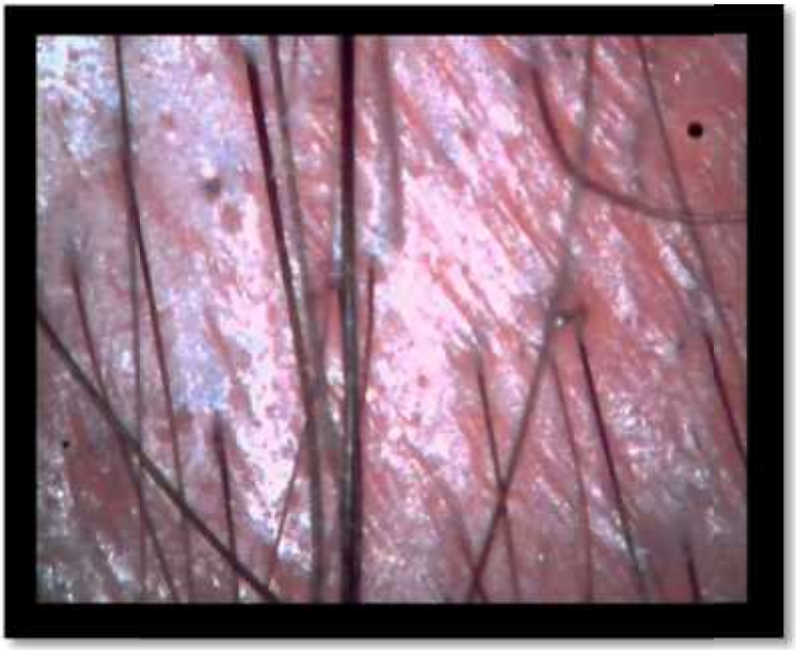
Photograph 6: Vellus hair (black arrow) in Fronto-temporal region in Androgenetic alopecia and single hair pilosebaceous unit (yellow arrow)



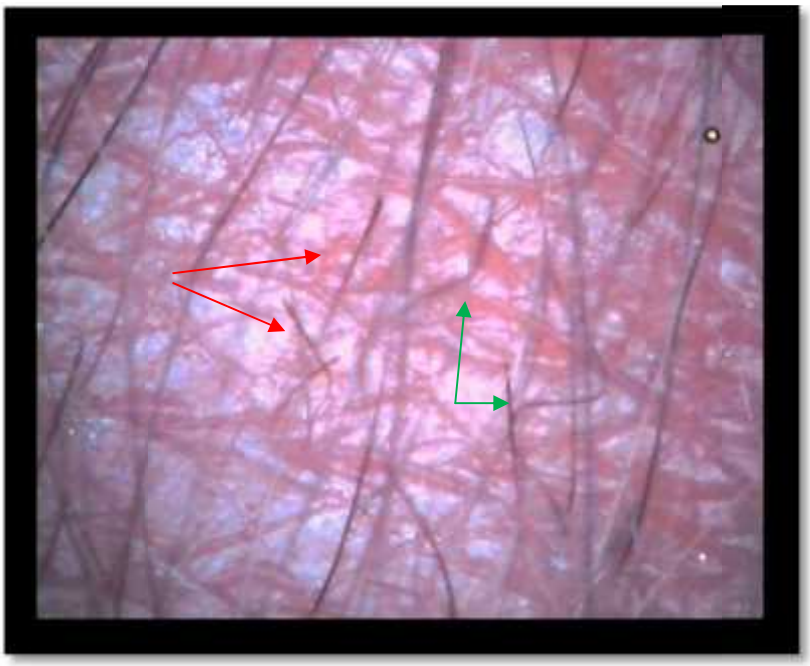
Photograph 7: Variation in hair shaft thickness in fronto-temporal area in Androgenetic alopecia



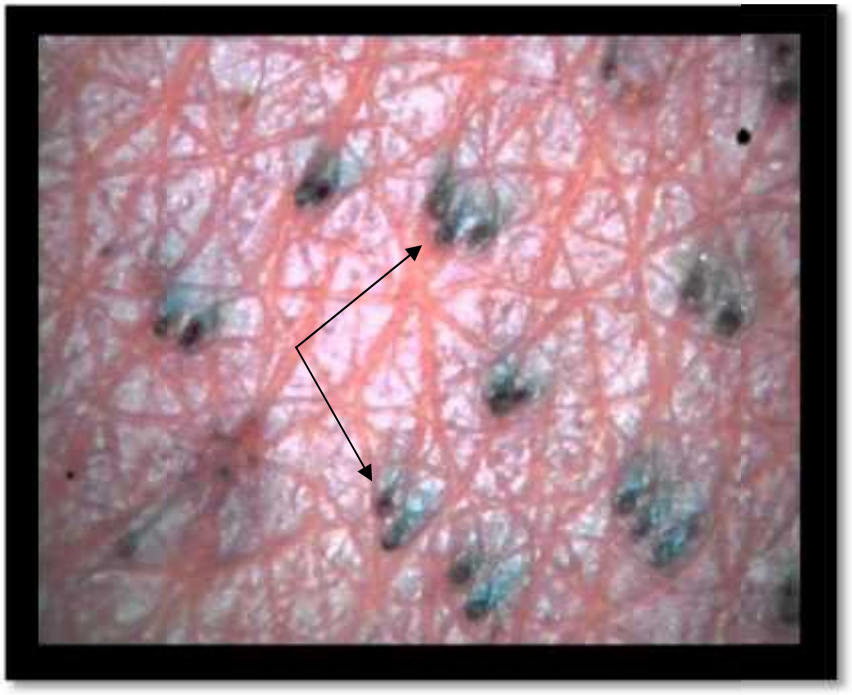
Photograph 8: Variation in hair shaft diameter with single hair pilosebaceous units and upright regrowing hair in frontotemporal region in Telogen effluvium



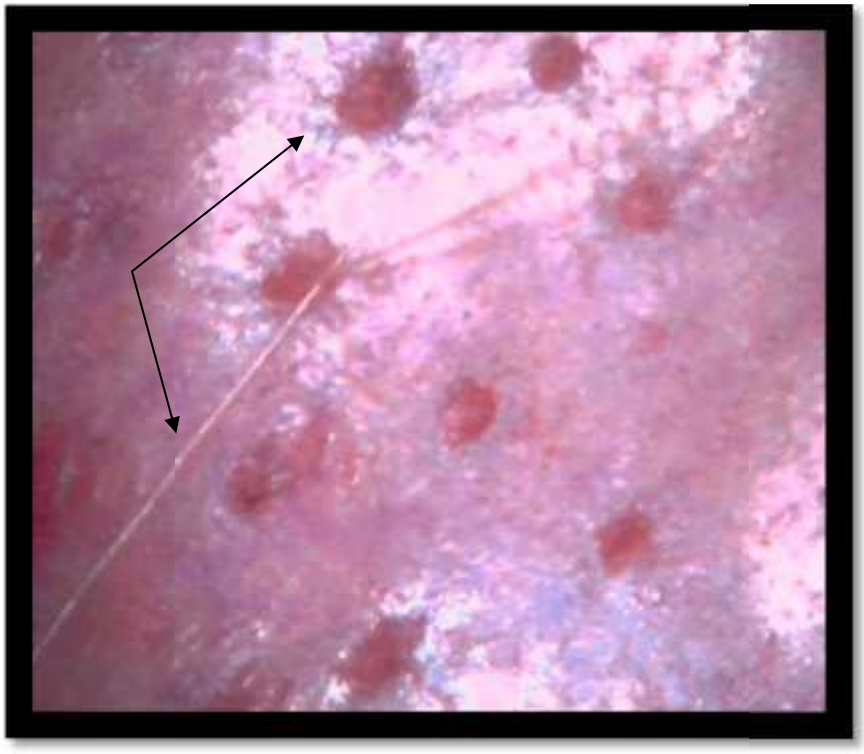
Photograph 9: Variation in hair shaft diameter with single hair pilosebceous unit in occipital area in Telogen effluvium



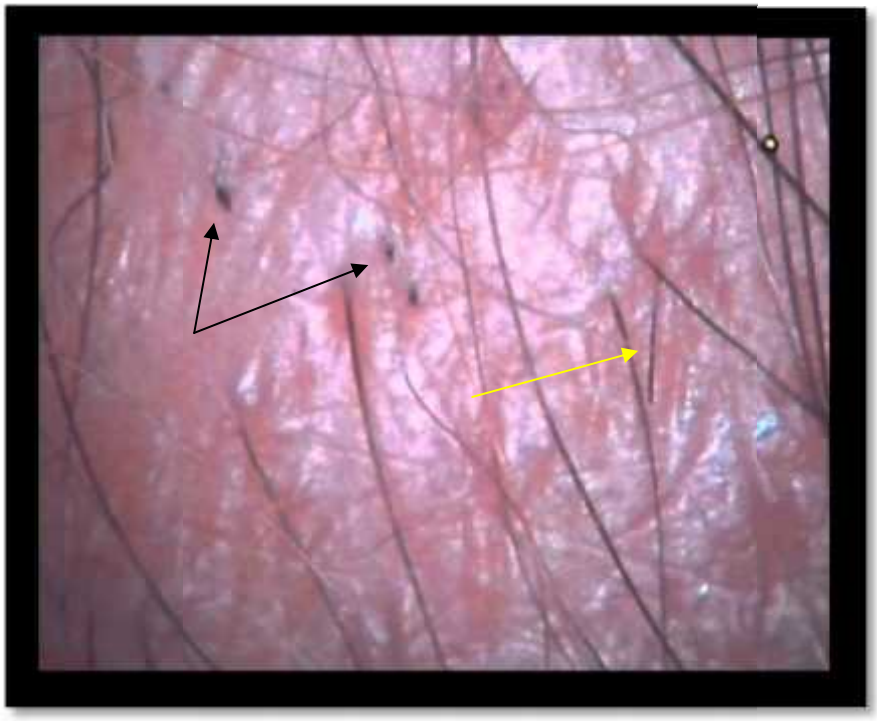
Photograph 10: Exclamation mark hair (red arrow) and zigzag hair (green arrows) in alopecia areata



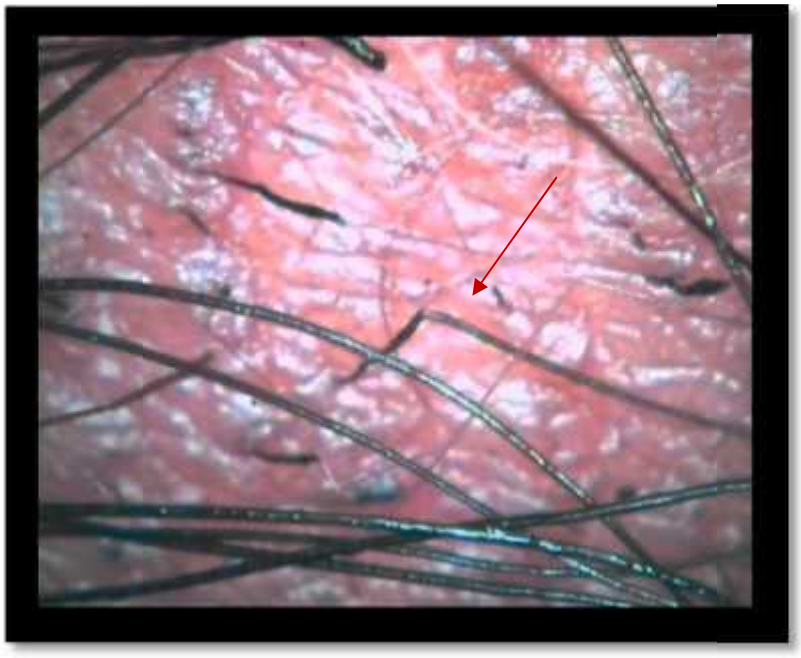
Photograph 11: Black dots in Alopecia Areata



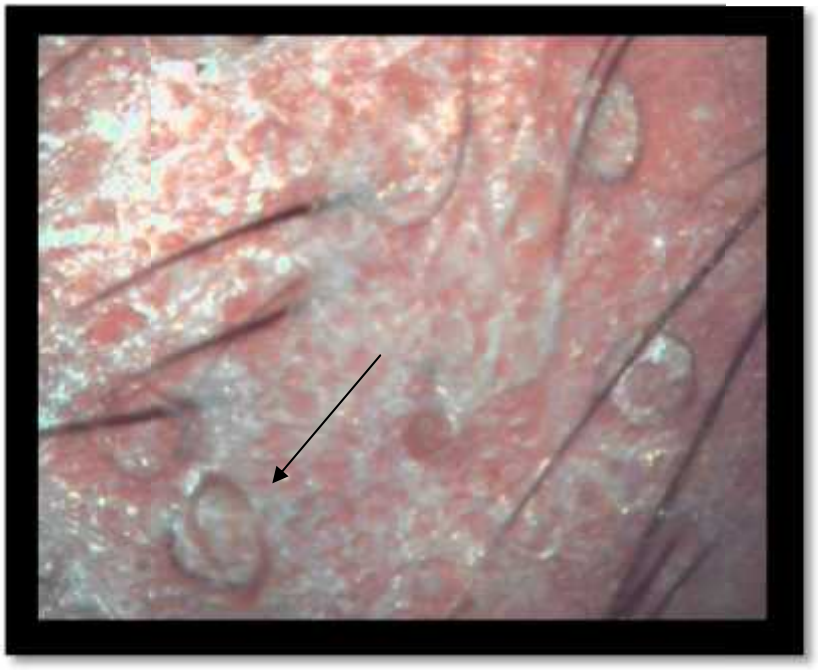
Photograph 12: Empty hair follicles with depigmented hair in Alopecia Universalis



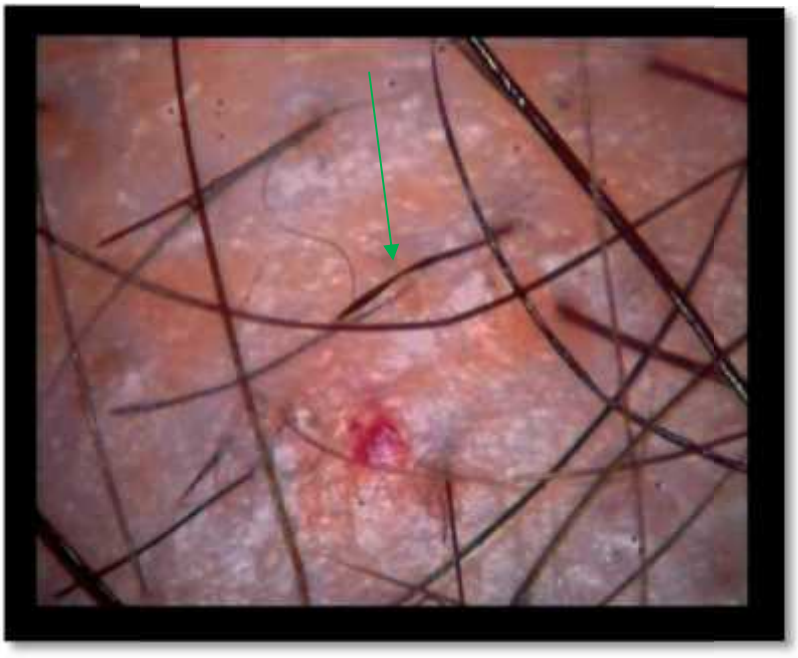
Photograph 13: Broken hair (black arrow) and exclamation mark hair (yellow arrow)



Photograph 14: Zigzag hair in alopecia areata



Photograph 15: Pigtail regrowing hair in Alopecia areata



Photograph 16: Monilethrix-like hair in alopecia areata

ANNEXURE – IV - KEY TO MASTER CHART

SL No. - Serial number

Sex –M – Male

F – Female

Occupation –

H – House wife

S – Student

I – Industrial Worker

A – Agriculturist

B – Business

PC – Police Constable

G – Government Employee

T – Teacher

L – Laborer

M – Mason

E – Engineer

D – Doctor

R – Retired

S Ed – Senior Editor

Duration of onset

Y – Years

M – Months

W – Weeks

D – Days

Family History -

A – Absent

P – Present

Diet –

M – Mixed

V – Vegetarian

Addiction/habits-

Alc – Alcohol

Smo – Smoking

Tob – Tobacco

A+S – Alcohol + Smoking

N - None

History of associated factors –

1 – Itching

2 – Pain

3 – Burning

4 – Asymptomatic

History of medical disorder

HypoT – Hypothyroidism

HyperT – Hyperthyroidism

Atopy – Atopy

Epi – Epilepsy

DM – Diabetes mellitus

HTN – Hypertension

IDA – Iron deficiency anemia

Anae – Anemia

Typo – Typhoid

ASD – Atrial Septal Defect

A - Absent

Hair Pull Test

P – Positive

N – Negative

PaP – Present at periphery

Androgenic Alopecia

Modified Hamilton – Norwood scale

TYPE	**CLINICAL DEFINITION**
1	Minimal recession of hair line along the anterior border in the Fronto-temporal (FT) region
2	The anterior border of the scalp in the FT region has triangular areas of recession that tend to be symmetrical. The areas extend no more posterior than approximately 2 cm anterior to a line drawn in a coronal plane between the external auditory meatus on both sides. Hair is either lost or sparse along the mid-frontal border.
3	Characterized by deep FT hair recession, usually symmetrical and either bald or sparsely covered with hair. These areas of recession extend further posterior than a point that lies approximately 2 cm anterior to a line drawn in a coronal plane between the external auditory meatus on both sides.
3v	Hair is mainly lost in the vertex. There may be some frontal recession but it does not exceed that seen in type 3
4	The frontal and FT recession is more than type 3. There is also sparseness or loss of hair in the vertex. These bald areas are extensive, but separated from each other by a band of moderately dense hair that joins the fully haired fringe on either side of the scalp
5	The hair loss in vertex and FT region is more than type 4 and band of hair between them is narrower and sparser
6	The hair loss over FT and vertex regions is confluent and the bridge of hair that crosses the crown is absent
7	There is only a narrow horseshoe shaped band that begins laterally, anterior to the ear and extends posteriorly on the sides and fairly low on the occipital area.

Variants (type variantsa)	Constitutes 3% of all cases of AGA (1): the anterior border progresses posteriorly without the normal island of hair in the mid-frontal region. (2):there is no simultaneous development of the bald area over the vertex. Instead the anterior recession advances posterior to the vertex.
2a	The entire anterior border of the hairline lies high on the forehead. The usual mid-frontal island of hair is sparse. The area of denudation extends no further than 2cm from the frontal hairline.
3a	The area of denudation reaches the mid-coronal line.
4a	The area of denudation extends beyond the mid-coronal line and there may be considerate thinning of hair posterior to the actual hairline.
5a	Most advanced degree of alopecia. However the bald area does not reach the vertex

L – Ludwig scale for female pattern hair loss

Stage 1	Thinning of hair is seen mainly over the anteriorpart of the crown with minimal widening of the parting width.
Stage 2	Thinning of the crown becomes more evident because of an increase in the number of thin and short hair.
Stage 3	The crown becomes almost totally bald. There is significant widening of the parting width, but the frontal hairline is still maintained.

A - Absent

Alopecia Areata –

PaAA – Patchy Alopecia Areata

AU – Alopecia Universalis

AT – Alopecia Totalis

A - Absent

Telogen Effluvium –

Ac – Acute Telogen Effluvium

Ch – Chronic Telogen Effluvium

A - Absent

Dermoscopic/Trichoscopic Findings

A – Absent

P – Present (< 4 Fields, ≥1 Field)

C – Common (≥ 4 Fields)

Nail Changes –

Pi1 – uncharacteristic

Pi2 – Psoriatic pitting

S Pi – Scotch Plaid pitting

O – Onychomycosis

Pla – Platynychia

LR –Longitudinal ridges

Dys – Dystrophy

Mel - Melanonychia

Others –

Vit – Vitiligo

LL – Lepromatous Leprosy

AV2 – Acne Vulgaris Grade 2

Urt – Urticaria

Pso – Psoriasis

MaM – Malar Melasma

Ch U – Cholinergic Urticaria

Ecz – Eczema

P.Ve – Pityriasis Versicolor

PMLE – Polymorphous Light Eruption

Kel – Keloid

LSA – Lichen sclerosis et atrophicus

A - Absent