"COMPARISON OF CLINICAL AND AUTOPSY DIAGNOSIS OF CAUSE OF DEATH AT KLES'S DR. PRABHAKAR KORE HOSPITAL AND MEDICAL RESEARCH CENTRE, BELGAUM"– A ONE YEAR CROSS SECTIONAL STUDY

By

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Under the guidance of

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ABSTRACT

Background and objectives:

The approach of clinician to the investigation of death is different from that of the autopsy surgeon. Despite medical and technologic advances, clinicians may misdiagnose a patient's situation and the cause of death. Autopsy may be valuable in uncovering the most frequent diagnostic pitfalls. Hence this present study was conducted to study the autopsy diagnosis of cause of death, compare the clinical and autopsy diagnosis of cause of death, evaluate the accuracy of clinical diagnosis of cause of death, and study the age and sex wise distribution of medico legal cases autopsied.

Methodology:

The present cross sectional study was carried out on the victim's of medico legal cases, who died in the KLES's Dr Prabhakar Kore Hospital & medical research centre, Belgaum and subsequently autopsied, during the period from 01-01-2008 to 31-12-2008.

Observation and results:

Out of the total medico legal autopsies conducted during the study period 100, RTA related deaths were 58 accounted for 58%. Burns cases were 24 which constituted for 24% of the total cases followed by poisoning cases 8 which constituted for 8%. There were 4 cases of fall from height (4%), snake bite 3 (3%) cases and 3 (3%) hanging cases. Only in 7 (7%) of the cases there was total disagreement in the opinion for cause of death between the clinical diagnosis and the autopsy diagnosis. In RTA there was disagreement in 6(6%) of the cases and in poisoning 1(1%) case. In all other 93(93%) of the cases there was total agreement for the cause of death.

Conclusion and interpretation:

The overall disagreement for the diagnosis of cause of death between clinical and autopsy diagnosis was in 7(7%) cases, out of 100 cases studied. In these cases, knowledge of the correct diagnosis would have altered therapy. Although the autopsy is being undermined, they are still the most accurate method of determining the cause of death and auditing accuracy of clinical diagnosis, diagnostic tests and death certification.

Keywords: Autopsy diagnosis, Clinical diagnosis, Cause of death.

CONTENTS

SL. NO.	TOPIC	PAGE NO.
1.	INTRODUCTION	1
2.	OBJECTIVES	4
3.	REVIEW OF LITERATURE	5
4.	METHODOLOGY	24
5.	RESULTS	26
6.	DISCUSSION	58
7.	CONCLUSION	70
8.	SUMMARY	72
9	BIBLIOGRAPHY	74
10	ANNEXURES	82
	ANNEXURE I- PHOTOGRAPHS	
	ANNEXURE II – CONSENT FORM	
	ANNEXURE III – PROFORMA	
	ANNEXURE IV – MASTER CHART	

LIST OF TABLES

NUMBER.	DESCRIPTION	PAGE NO.
01	Profile of medico legal autopsies conducted during the study period	26
02	Profile of Age and sex wise distribution of cases of fatal RTA	28
03	Profile of autopsy diagnosis of Cause of death for RTA	29
04	Profile of clinical diagnosis of Cause of death for RTA	30
05	Profile of comparison between the autopsy diagnosis and the clinical diagnosis for RTA	31
06(A)	Profile of External injury	32
06(B)	Profile of External injury	33
07	Profile of Internal injury	33
08	Profile of Soft tissue involvement	34
09	Profile of Bone fracture	35
10	Profile of Internal Injury in head & neck	37
11	Profile of Intracranial hemorrhage	38
12	Profile of Internal Injury in thorax	39
13	Profile of Internal injury in abdomen	40
14	Profile of Internal injury in limbs	41

NUMBER.	DESCRIPTION	PAGE NO.
15	Profile of Age and sex wise distribution of cases of Burns	42
16	Profile of autopsy diagnosis of Cause of death for Burns	43
17	Profile of clinical diagnosis of Cause of death for Burns	44
18	Profile of Period of survival following Burns	45
19	Profile of percentage of burns	46
20	Profile of Age and sex wise distribution of cases of Poisoning	47
21	Profile of autopsy diagnosis of Cause of death for Poisoning	48
22	Profile of clinical diagnosis of Cause of death for Poisoning cases	49
23	Profile of Age and sex wise distribution of fall from height cases	50
24	Profile of autopsy diagnosis of Cause of death for fall from height cases	51
25	Profile of Age and sex wise distribution of snake bite cases	52
26	Profile of autopsy diagnosis of Cause of death for snake bite cases	53

27	Profile of Age and sex wise distribution of hanging cases	54
28	Profile of autopsy diagnosis of Cause of death for hanging cases	55

LIST OF GRAPHS

NUMBER.	DESCRIPTION	PAGE NO.
01	Profile of medico legal autopsies conducted during the study period	27
02	Profile of Age and sex wise distribution of cases of fatal RTA	28
03	Profile of autopsy diagnosis of Cause of death for RTA	29
04	Profile of clinical diagnosis of Cause of death for RTA	30
05	Profile of comparison between the autopsy diagnosis and the clinical diagnosis for RTA	32
06(A)	Profile of External injury	33
06(B)	Profile of External injury	33
07	Profile of Internal injury	34
08	Profile of Soft tissue involvement	35
09	Profile of Bone fracture	36
10	Profile of Internal Injury in head & neck	36
11	Profile of Intracranial hemorrhage	38
12	Profile of Internal Injury in thorax	39
13	Profile of Internal injury in abdomen	41

NUMBER.	DESCRIPTION	PAGE NO.
14	Profile of Internal injury in limbs	41
15	Profile of Age and sex wise distribution of cases of Burns	43
16	Profile of autopsy diagnosis of Cause of death for Burns	44
18	Profile of Period of survival following Burns	45
19	Profile of percentage of burns	46
20	Profile of Age and sex wise distribution of cases of Poisoning	47
21	Profile of autopsy diagnosis of Cause of death for Poisoning	48
22	Profile of clinical diagnosis of Cause of death for Poisoning cases	49
23	Profile of Age and sex wise distribution of fall from height cases	50
24	Profile of autopsy diagnosis of Cause of death for fall from height cases	51
25	Profile of Age and sex wise distribution of snake bite cases	52
26	Profile of autopsy diagnosis of Cause of death for snake bite cases	53

27	Profile of Age and sex wise distribution of hanging cases	55
28	Profile of autopsy diagnosis of Cause of death for hanging cases	55

INTRODUCTION

Law has not tried to define death. By death, Black's law dictionary means "cessation of life or ceasing to exist". Medicolegal definition of death is permanent and irreversible cessation of functions of the three interlinked vital systems of the body which are called the tripod of life, namely the nervous, circulatory and respiratory systems. This medicolegal definition is also known as somatic death or clinical death or systemic death. The death of the individual cells is known as cellular or molecular death. Doctor has to prevent death of a person, pronounce a person dead when his life terminates, ascertain the time and cause of death.[1]

Historically the concept of death was that of "heart and respiration death". Heart lung bypass machines, mechanical respirators, and other devices, have however changed this medically in favour of a new concept "brain death". Brain death is of three types, cortical or cerebral death, brain stem death and the whole brain death. Approach of clinician to the investigation of death is different from that of the autopsy surgeon.[2]

Despite medical and technologic advances, clinicians may misdiagnose a patient's situation and the cause of death. Autopsy may be valuable in uncovering the most frequent diagnostic pitfalls.[3]

Autopsy has long been regarded as an important tool for confirming the clinical cause of death, education and quality assurance. Concerns surrounding informed consent and the retention of organs have heightened clinicians' anxieties in requesting permission to perform an autopsy.[4]

Autopsy is a useful tool for the evaluation of accuracy of the clinical diagnoses of cause of death. Autopsy diagnoses were used as the "gold standard".[5]

The fast moving progress in medical technology causes someone to ask if the progress is not only in diagnostic abilities but also in diagnostic precision. Despite the improved quality of diagnostic technology, the frequency of misdiagnosis has not decreased appreciably. The goal of autopsy is not only to uncover clinician's mistakes or judge them but rather to instruct clinicians to learn by their own mistakes.[6]

Since the publication of a study that related deaths to alterations in normal anatomy, autopsy has been established as an effective method to identify new nosological entities and to improve the investigation of known pathological diseases. In addition to diagnostic and therapeutic errors, various diseases and their mechanisms have been established since then, and therapeutic methods have been developed based on autopsy data. Although autopsies are thought to be of crucial importance for medical teaching and insuring the quality of medical care, a decline in the number of autopsies has been reported in several hospitals. The diagnostic process is a complex interaction between knowledge, abilities, and technical procedures under conditions of uncertainty. The technology available for diagnostic procedures has made great advances during the past few decades, particularly in terms of resources for diagnostic imaging techniques such as computed tomography, ultra sonography, and nuclear magnetic resonance. However, these new technologies have also contributed to false positive and false negative diagnoses. Considering autopsy has the gold standard for diagnostic confirmation, studies carried out during the past 20 years have shown important disagreement and have failed to show a significant increase in diagnostic agreement in the assessment of pathologies, groups of pathologies, groups

of patients like neonatal, paediatric, elderly, and psychiatric patients, or even different locations such as intensive care units and hospitals affiliated or not with a university.[7]

In spite of advances in medical technology, there remains a high discrepancy rate between the ante mortem clinical diagnosis and autopsy diagnosis of cause of death for patients who die in hospitals. All studies conducted till to date were retrospective reviews. A prospective study comparing clinical and autopsy diagnoses of cause of death, using standardized forms completed at the time of death, might provide more accuracy in estimating discrepancies.[8]

This prospective study is to compare the clinical and autopsy diagnoses of cause of death of patients who died in the tertiary hospital, and to analyze any discrepancy between them. The need for establishing the exact cause of death which helps to make necessary interventions and proper management of cases makes this study necessary.

OBJECTIVES

The present cross sectional study is undertaken at KLES's Dr Prabhakar Kore Hospital & Medical Research Centre, Belgaum, on the medicolegal cases that were admitted, succumbed and subsequently autopsied with the following objectives.

1. To study the autopsy diagnosis of cause of death.

2. To compare the clinical and autopsy diagnosis of cause of death.

3. To evaluate the accuracy of clinical diagnosis of cause of death.

4. To study the age and sex wise distribution of medico legal cases autopsied.

REVIEW OF LITERATURE

Cause of death

The causes of death to be entered on the medical certificate of cause of death are all those diseases, morbid conditions or injuries which either resulted in or contributed to death and the circumstances of the accident or violence which produced any such injuries.[9]

Medical Certificate of Cause of Death

Medical Certificate of Cause of Death (MCCD) Scheme is an important tool to obtain reliable and scientific information in terms of causes of mortality. Because of this importance, a provision has been made in the Registration of Births and Deaths (RBD) Act, 1969 for certification by a medical practitioner who has attended the deceased during their last illness. Thus the scheme forms an integral part of Registration of Births and Deaths Act.[10]

The certificate of cause of death consists of Part-1 and Part-2.

Part-1 of the cause of death statement

The part -1 is divided into three lines, (a), (b), and (c). Only one cause is to be entered on each line of part-1. The underlying cause of death should be entered on the lowest line used in this part. The underlying cause of death is the condition that started the sequence of events between normal health and the (direct) immediate cause of death.

Line (a): Immediate cause

The direct or immediate cause of death is reported on line (a). This is the disease, injury or complication that directly preceded the death. It can be the sole entry in the statement if only one condition was present at death. There must be always being an entry on line (a). The mode of dying like heart failure, respiratory failure should not be stated at all since it is no more than a symptom of the fact that death occurred and provides no useful information.

Line (b): Due to (or as a consequence of)

If the condition on the line (a) was the consequence of another condition, record it in line (b). This condition must be antecedent to the immediate cause of death, both with respect to time and etiological or pathological violence or circumstances of accident is antecedent to an injury entered on line (a) and should be entered on line (b).

Line (c)

The condition, if any which gave rise to the antecedent condition on line (b) is to be reported here. The remarks given for line (b) apply here also. If the condition on line (b) is the underlying cause, nothing more be entered on this line. However, if the sequence of events comprises more than three stages, extra line and entries may be made in part-1. However many conditions are involved, write the full sequence, one condition per line, with the most recent condition (immediate cause) at the top, and the earliest (the condition that started the sequence of events between normal health and death) last. Normally the condition or circumstances on the lowest line used in part-1 will be taken as the basis for underlying cause statistics.

Part-2: Other significant conditions

Enter, in order of significance, all other diseases or conditions believed to have unfavorably influenced the course of the morbid process and thus contributed to the total outcome but which were not related to the disease or condition directly causing death. There will be cases where it will be difficult to decide whether a condition relevant to death should be recorded as part of the fatal sequence in part-1 or as a contributory condition in part-2. Conditions in part one should represent a distinct sequence so that each condition may be regarded as being the consequence of the condition entered immediately below it. Where a condition does not seem to fit into such a sequence, consider whether it belongs in part-2.[11]

Concept of death

Death has been defined in Registration of Births and Death Act 1969 Sec 29 (B) as the permanent disappearance of all the evidence of life at any time after live birth has taken place. The definitions are clearly inadequate and make the task of medical practitioner extremely precarious and prove to gave legal consequences.[11]

Autopsy

Havard in his "Detection of secret homicide" (1960) has enlarged on the danger of disposing of medicolegal cases with out autopsy, and these dangers have been confirmed by other surveys. The work of Heasman (1962) and of Johnson (1969) both confirm that clinical diagnosis is incorrect in approximately 50% of cases.[12]

Though 'necropsy' is the semantically the most accurate description of the investigative dissection of a dead body, the word 'autopsy' is used so extensively that there is now no ambiguity about its meaning. The term 'postmortem examination' is an alternative. The forensic investigation of deaths was introduced relatively early from the requirements of the judicial system. The earliest known forensic dissections took place in Italy, probably in the middle of the thirteen century, at the University of Bologna. The first one was recorded by William of Saliceto, a surgeon and a teacher on the medical faculty there. The principles of modern medico-legal investigations were developed based on the codes of the sixteenth century Europe: the Bamberg code in 1507, the Caroline code in 1532 and later the Theresian code in 1769. The hospital or clinical autopsy became meaningful first after the introduction of modern concepts of pathogenesis of diseases by Carl von Rokitansky (1804-1878) and cellular pathology by Rudolf Virchow (1821-1902). Further development of medico-legal autopsy has been greatly influenced by the judicial system adopted, the main emphasis in most countries being in the detection and investigation of criminal and other unnatural or unexpected deaths.[13]

In a study done in Veterans administration hospital, Wadsworth and ULCA School of medicine, Los Angeles, California over a period from January 1, 1967, to December 31, 1969, a total of 2,258 brain scans were performed using 99m Tc-sodium pertechnetate. The results were correlated with autopsy findings. Only those scans with scan-to-autopsy intervals of less than 6 weeks were chosen. Of the 2,258 scans, 84 cases met this criterion. Of 84 cases, 22 (26%) of the brain scans were normal, with no lesions at autopsy. In 33 cases (39.8%), the brain scans were abnormal and there were lesions at autopsy (positive correlation). Thus in 65.8% of

the cases, the scan-autopsy correlation were correct. In 28 cases (33%), the scan was normal but the brain showed lesions at autopsy (false negative). In only one case (1.2%) was the scan abnormal and no lesion found at autopsy (false positive). In 34.2% of the cases, therefore, the scan autopsy correlation was incorrect.[14]

In a study done at Department of Neurology, Ninewells Hospital and Medical School, Dundee, UK, Department of Neurology, Craigavon Area Hospital, Port down County Armagh, UK, the records of 44 patients undergoing autopsy were reviewed to determine the cause of death, clinical assessment during life and Neuropathological autopsy findings. In a cohort of 44 cases undergoing autopsy between 1989 and 1998, the cause of death could be directly or indirectly (bronchopneumonia, aspiration/pneumonia and respiratory failure) attributed to Motor neuron disease in 32/44 (73%) cases. The clinical diagnosis of Motor neuron disease was confirmed at autopsy in 44/44 (100%) cases, 3/44 (7%) cases showed coexistent neurodegenerative disease and 5/44 (11%) were familial Motor neuron disease cases. Within this cohort, Motor neuron disease contributes to death in the majority of cases and there is excellent clinicopathological correlation, irrespective of the clinical grading criteria used. However, the autopsy rate is low (4%) and further larger studies are required to identify heterogeneity within the disease.[15]

In a study on 500 of 2,211 autopsies performed in the department of pathology of a tertiary care hospital during a 10-year period from 1989 to 1998 at Jalisco, Mexico the sensitivity, specificity, predictive values, and concordance scores between premortem and postmortem diagnoses were computed. The autopsy diagnoses were used as the “gold standard.” Four-hundred twenty-two (84.4%) of the autopsies met

inclusion criteria. Diseases of the respiratory tract were diagnosed in 44.1% (186) of all autopsy reports reviewed. The higher sensitivity for diagnosis was observed in congenital anomalies (87.5%), while the higher specificity was observed in diagnosis of complications of pregnancy, childbirth, and the puerperium (98.98%). The higher concordance between premortem and postmortem diagnosis was observed with the diagnoses of neoplasm's, and for the group of complications of pregnancy, childbirth, and the puerperium. A clinical diagnosis successfully addressed the cause of death in 40% of the cases. Low values for concordance between autopsy reports and clinical diagnosis were present in most of the autopsies reports reviewed.[5]

In a study on 186 reports specifying the findings of autopsies of victims with complex burns performed at National Centre of Thermal Injuries of the Republic of Moldova in the period 1989-2003 with the intention of comparing the pathomorphological and organic-systemic deteriorations with their clinical manifestations on the basis of a retrospective analysis of the relevant records.

On the basis of observations, the results were retrospective analysis of necropsy records denoted a variable incidence of destructive processes in the visceral organs: 30.1% in the neurological system, 36.0% in the uropoiesis system, 34.4% in the gastrointestinal system, 52.0% in the hepatobiliary system, and 39.7% in the cardiovascular system, with a prevalence in the pulmonary system of 64.2%. A comparative analysis of the incidence of affections detected in various visceral organs (according to the necropsy data in the 186 burn patients) and the incidence of their clinical manifestations proved that in 35% of patients with extensive and deep burns all of these developed asymptomatically and were diagnosed only through autopsy.[16]

In a study on total of 4828 necropsies, performed between 1990 and 1995 in the University Hospital of the Faculty of Medicine of Ribeirao Preto, University of Sao Paulo, Brazil, to determine the agreement between clinical and necropsy diagnoses of the basic cause of death, and to compare the results with those obtained in a previous study carried out at the same university hospital. The result was compared with the 1978–80 period; a significant increase in diagnostic agreement was seen for the group submitted to complete necropsy, whereas no similar increase was detected when only the macroscopic step was analyzed. There was a discrete tendency to an improved correlation between clinical and postmortem data stated by full necropsy analysis. The findings show that microscopic analysis remains important to confirm the cause of death in many cases. Diagnostic discrepancies remained high, and therefore complete necropsy continues to be an essential instrument for the assessment of clinical diagnosis.[7]

In a study conducted in the departments of pediatrics and pathology, North Shore University Hospital-Cornell University Medical College, Manhasset, Newyork, to examine the correlation between clinical diagnoses and autopsy findings in children who die in the pediatric intensive care unit (PICU), the results were of 193 patients who died during the 7½year study period, 50 (6%) had autopsies performed. The mean age was 34.7 months (range 15 hours to 17 years), and the mean length of stay in the PICU was 12.2 days (range 2 hours to 60 days). Major admitting diagnoses included postoperative cardiac surgery (19), nonoperative cardiac disease (7), hematologic/malignant disorder (5), and acquired immunodeficiency syndrome (5). There were 5 cases (10%) where autopsy revealed a major finding that, if known prior to death, would have altered clinical management and might have resulted in cure or

prolonged survival. In another 9 patients (18%) the autopsy revealed major findings that, if known prior to death, would not have altered management. Eight of these findings related to the cause of death and 2 of them involved the basic disease. There was no correlation between new findings and either patient age or length of stay in the PICU. Despite modern diagnostic techniques, the autopsy continues to reveal valuable and unsuspected information.[17]

In a study done on hospital based autopsies performed at 248 institutions participating in the 1993 College of American Pathologists Q-Probes Quality Improvement Program, Using the College of American Pathologists Q-Probes format, institutions prospectively assessed a maximum of 15 consecutive autopsies each, excluding forensic cases and stillborn infants, conducted over a 6-month period. They documented answers to clinical questions provided at autopsy and classified unexpected disease diagnoses according to a standardized system. Percentages of clinical questions resolved by the autopsy and percentage of autopsies with unexpected findings of graded clinical impact the results were in the aggregate database of 6427 questions from 2479 autopsies, overall 93.0% were answered by the autopsy. The 3 most common question categories were (1) identify pathology to account for clinical signs or symptoms (28.0%); (2) establish the cause of death (21.0%); and (3) confirm a clinical diagnosis (19.0%). At least one major unexpected disease finding that contributed to the patient's death was discovered in 39.7% of the total number of autopsies. There were no differences in the percentages of autopsies with these major unexpected findings when the data were stratified by institutional demographics or decedent characteristics.[18]

In a study done to determine the degree of concordance between clinical cause of death and autopsy diagnosis in a medical intensive care unit setting in a tertiary referral hospital over a 2-year period from January 1, 1994, to December 31, 1995 in department of general medicine, Tan Tock Seng hospital, Singapore, one thousand eight hundred patients were admitted to the medical intensive care unit during the study period. There were 401 medical intensive care unit deaths (22.3%). The autopsy rate was 22.7% (91 of 401). The mean age of the autopsied patients (55.1 ± 13.5 years) was lower than those without autopsy (62.4 ± 15.2 years). The two groups were otherwise similar with regard to sex, race, APACHE (acute physiology and chronic health evaluation) III scores, and lengths of stay in the medical intensive care unit and hospital. The discordance between clinical and postmortem diagnoses was 19.8% (95% confidence interval, 12 to 29%). There were no differences in age, sex, APACHE III scores, predicted mortality, and lengths of stay in medical intensive care unit hospital between patients with concordant and discordant diagnoses. In 44.4% (8 of 18) of the discordant cases, management would have been modified had the autopsied diagnosis been made premortem. Seven of the autopsied patients had organ transplantation. Three of the patients who had organ transplantation had discordant diagnoses, including two patients with disseminated fungal infection that was not diagnosed clinically. Although the observed discordance in transplant patients (43%) was higher than in those without transplant (19%), the difference was not statistically significant. Younger patients tended to have a higher autopsy rate than older patients. The discordance between the clinical cause of death and postmortem diagnosis was 19.8%. In 44.4% of the discordant cases, knowledge of the correct diagnosis would have altered therapy.[19]

In a 3 year prospective study of all consecutive autopsies performed on patients who died in a university hospital medical-surgical intensive care unit to determine how many might have benefited from a different level of care, had the autopsy diagnosis been made before death. All clinical diagnoses were compared with autopsy findings at monthly clinical-pathological meetings. Major and minor diagnostic discrepancies were categorized according to the criteria of Goldman et al. The result was out of 1492 patients admitted to the medical intensive care unit, 315 died, of whom 167 (53.0%) were autopsied. The most common reason (79.7%) for not obtaining an autopsy was family refusal. Autopsies revealed 171 missed diagnoses, including 21 cancers, 12 strokes, 11 myocardial infarctions, 10 pulmonary emboli, and 9 endocarditic among others. Major diagnostic errors were made in 53 (31.7%) of 167 patients, with a high percentage of immune compromised patients also observed among these. Even in the era of modern diagnostic technology, regular comparisons of clinical and autopsy diagnoses provide pertinent information that might improve future management of medical intensive care unit patients.[20]

In a prospective evaluation performed between September 1996 and December 1998 in an eight-bed pediatric intensive care unit of a university hospital in Brazil, to verify the frequency of discrepancies between clinical diagnoses and autopsy findings, one hundred and two autopsies were evaluated. The autopsy revealed unexpected findings in 73 study patients (72%), 33 of which were related to "major diagnoses", either causes of death or main underlying disease. In 12 patients (12%), the correct diagnosis, if known before death, might have led to a change in the patient's therapy or outcome. Unexpected findings in this group included viral or fungal infection and pulmonary embolism. None of the possible predictive factors that

were studied showed significant statistical association between clinical and autopsy discrepant diagnoses in the analysis. Although diagnoses of both cause of death and underlying disease were accurate in most cases before death, some autopsies revealed findings that would have changed intensive care unit therapy. Nonbacterial infections and pulmonary embolism should always be considered when managing critically ill patients with underlying disease. Autopsy examinations continue to provide important information, especially in the pediatric intensive care unit setting, despite the advances in diagnostic technology.[21]

In a study done in Institute for Forensic Medicine, Ljubljana, analyzed 444 out of the total of 921 autopsy reports, for each of which a comparison between the postmortem diagnosis and the clinical diagnosis was made contained in the medical report on the death and the causes of death. A complete agreement between the diagnoses was established in 48.87% of cases; partial disagreement in 22.74%; and total disagreement in 13.5%, 9.68% of cases were classified as falling into group 5.

For the three diseases that are among the most common causes of death, percentage of agreement was established, the percentage of over diagnosis and the percentage of under diagnosis. The most frequently under diagnosed disease (in 61% of cases) was pulmonary thromboembolia; in 15% a thromboembolia was confirmed in autopsy. In 24%, a myocardial infarction was not diagnosed clinically and in 60% the clinical diagnosis of a myocardial infarction was confirmed in autopsy. In 33% a heart failure was not diagnosed during the clinical stages but only in autopsy, in 66% the clinical diagnosis of a heart failure was confirmed in autopsy.[22]

In another study in Institute for Forensic Medicine, Medical Faculty Ljubljana, Korytkova 2, 1000 Ljubljana, Slovenia, the autopsy records of 1792 deceased persons

in 1997 and 1998 were reviewed and compared the clinical and post mortem diagnoses. All autopsies performed on deceased persons not admitted to the Clinical Medical Centre were eliminated. From the remaining 911 autopsy reports the post mortem diagnoses with the clinical diagnoses were compared. The findings were classified into five groups according to the level of agreement between the clinical and the post mortem diagnoses. Group 1 included cases of complete agreement between clinical and post mortem diagnoses. Group 2 cases of disagreement about the basic illness, group 3 cases of partial disagreement about the direct causes of death, group 4 cases of total disagreement between the clinical diagnosis and the post mortem, named, also misdiagnosis and group 5 clinical diagnosis which could not be classified. The diagnoses were in total agreement in 49.30% of cases, in partial agreement (disagreement about direct causes of death) in 20.68% and in disagreement about the basic illness in 6.87%. The diagnoses were in total disagreement in 9.87%. 13.30% of cases were not possible to classify owing to incomplete death certificates or reports of the causes of death.[6]

In a study done in Birmingham Heartlands Hospital, Birmingham, UK, between January 1998 and June 2001 retrospective investigation was done on trends in postmortem examination rates and discrepancies between premortem clinical and postmortem diagnoses in a population of critically ill patients admitted to a 13 bed, general medical/surgical intensive care unit. Agreement between diagnoses before death and postmortem findings were compared using the Goldman system. The result was out of total 636 deaths, only 49 (7.7%) underwent postmortem examinations. Of these, 38 (78%) cases were available for review. It was found that postmortem findings were in complete agreement with pre death diagnoses in fewer than half of the cases, (45%). Major missed diagnoses were present in 15 cases (39%). Myocardial

infarction, carcinoma and pulmonary embolism represented the most frequently missed diagnoses.[4]

In a study done in Department of Emergency Medicine, The Canberra Hospital, ACT, Australia during the period from January 1st, 1999 to June 30th, 2001, was to compare the clinical and postmortem examination diagnoses of patients of a tertiary hospital, and to analyze any discrepancy between them. A total of 59 patients were studied. There was complete agreement between the ante mortem diagnosis and the autopsy result in 51% of cases. The incidence of major missed diagnoses where if the diagnosis had been known before the patient died, treatment may have been altered or survival may have been prolonged was 7%. There is a significant discrepancy rate between the ante mortem diagnosis and the autopsy diagnosis. However, in this study, serious missed diagnoses in which outcome may have been significantly altered are unusual among those who die in the emergency department of a tertiary referral hospital.[8]

In a retrospective analysis of the protocols of 252 consecutive cases of adult patients autopsied in the Department of Forensic Medicine and Toxicology of Athens Medical School, Greece during the period 1999-2003, the result was in 73 cases (29%), the autopsy findings confirmed the clinical diagnosis and the cause of death suggested by the clinicians. In 45 cases (19%), the clinical diagnosis and the cause of death suggested by the clinicians were discordant with the autopsy findings. In 105 cases (42%), the autopsy requests did not include any suggestion about the cause of the patient's death. In 7 cases (3%), several diagnoses were suggested by the clinicians, and in 16 cases (6%), the comparison between clinical and postmortem diagnosis was not possible. The most frequently misdiagnosed diseases were coronary

disease and pulmonary embolism. It was concluded from this study that autopsies may reveal unexpected findings that are of critical importance and that a continued emphasis on autopsy evaluation is necessary to improve the quality of patient care.[3]

In a study done in Department of Anesthesiology and Critical Care Medicine, Memorial Sloan-Kettering Cancer Center, 1275 York Avenue, New York, NY 10021, USA, a retrospective review of medical records and autopsy reports of all cancer patients who died in a medical surgical intrinsic care unit and had an autopsy performed between 1 January 1999 and 30 September 2005 at a tertiary care cancer center was done. Pre mortem clinical diagnoses were compared with the postmortem findings. Major missed diagnoses were identified and classified, according to the Goldman criteria, into class I and class II discrepancies. The result was of the 658 deaths in the ICU during the study period, 86 (13%) autopsies were performed. Of the 86 patients, 22 (26%) had 25 major missed diagnoses, 12 (54%) patients had class I discrepancies, 7 (32%) had class II discrepancies, and 3 (14%) had both class I and class II discrepancies. Class I discrepancies were due to opportunistic infections (67%) and cardiac complications (33%), whereas class II discrepancies were due to cardiopulmonary complications (70%) and opportunistic infections (30%). There was a discrepancy rate of 26% between pre mortem clinical diagnoses and postmortem findings in cancer patients who died in a medical-surgical intrinsic care unit at a tertiary care cancer center. The study underscores the need for enhanced surveillance, monitoring, and treatment of infections and cardiopulmonary disorders in critically ill cancer patients.[23]

In a study done by the Forensic Medicine Department, Medical University, Poland, from the year 2000 to 2004, to determine the most frequent errors in medical treatment of craniocerebral injuries, based on materials reviewed, the result was, seven hundred ninety three opinions related to medical practice were given between 2000 and 2004; 30 cases referred to craniocerebral injuries. There were 19 opinions analyzed in which incorrectness of diagnostic and therapeutic process was found. Eight cases were related to disqualification from hospitalization, 4 cases referred to delay in diagnosis because of transportation to another place, and 4 cases were related to abandoned or misinterpreted imaging studies. Analyzed material comprised 17 errors during the decision-making process, including 4 diagnostic errors, as well as 1 therapeutic, 1 executive, and 1 organizational error. The most common error was disqualification from hospitalization of patients who should be observed in hospital. It was followed (in order of frequency) by errors related to transportation to the sobering chamber or to another hospital, and failure to perform or misinterpretation of imaging studies. The fewest errors referred to treatment. The main cause of craniocerebral injury was fall of a drunken person, and the alcohol intoxication made diagnosis difficult and delayed.[24]

In a study that was conducted in the Dept of Forensic Medicine & Toxicology, SMS Medical College, Jaipur, in the period from 15 December 2001 to 4 April 2002 with the aim to find out the correlation of X-ray (Skull), CT scan (Head), surgical intervention findings with the autopsy findings in the cases of acute Head trauma. Total of 140 cases of acute head trauma were selected irrespective of age, sex, religion caste etc. who had been admitted in Neurosurgery dept. and X-ray, CT scan head and /or surgical intervention had been done, subsequently died & autopsy was

performed. X- Ray skull gave better information on fracture of skull than CT scan, particularly when the fracture is located on the vault or base of skull and is of linear variety. 27 cases of fracture of the temporal bone were specially studied, out of these 140 cases. All these cases had the features of triad, indicating of fracture of petrous part of temporal bone i.e. cerebrospinal fluid otorrhoea 14(51.1%), 7th nerve palsy 9(33.3%), severe middle ear bleeding 18(66.6%) & conducting hearing loss 5(85%). The plain X-ray demonstrated the fracture of temporal bone in 21 cases (79%) and the CT scan demonstrated their in 24 cases (88%). Longitudinal fractures are common in 18 cases (66%) and procedure of choice for their demonstration is lateral tomography, Transverse fracture alone was uncommon (2 cases) and can only be demonstrated in anterior posterior tomography projections and is usually associated with occipital fractures. CT Scan Examination give better information in detection of fracture of temporal bone as well as the type of fracture which is essential for planning the surgical intervention or treating the patient conservatively in order to avoid the complications like, persistent cerebrospinal fluid otorrhoea, posterior meningitis or even death.[25]

In a retrospective analysis of autopsy reports, death certificates, and medical records for consecutive autopsy cases in 3 institutional settings: a major urban university hospital, a community hospital in which autopsies were provided as a service to physicians in cases of inpatient deaths, and a third community hospital that provided private autopsies to families willing to pay several thousand dollars for the service in the year 2002 in America for discrepancies between clinical and autopsy findings. The overall rate of major discrepancy that involved the cause of death was 17.2%. Factors that increased the likelihood of missed diagnoses were private setting

(P = 0.0005), community setting (P = 0.02), and short hospital stay before death (P = 0.02). Additional major findings were present in 28.5% of autopsies. Length of hospital stay before death, institution, and selection bias all affect the rate of major unexpected findings in hospital-based autopsies.[26]

In an observational study in Departments of Pathology and Medicine, Combined Military Hospital (CMH) Kharian, a tertiary care hospital, from January 2001 to December 2003, to determine the usefulness of autopsy findings in the quality improvement of patients care, the clinical and necropsy findings of all the cases, who died in hospital and had undergone autopsy were retrieved from record of clinical case sheet data and autopsy record of the hospital. The two were analyzed and compared according to the discrepancy classification. The exclusion and inclusion criteria, the international classification of disease (ICD) to code deaths, the global burden of disease (GBD) system to classify and group diseases, and the Goldman discrepancy classification to compare clinical and autopsy diagnosis and classify the discrepancies, were used as described. Results: The death rate varied from 0.94% to 1.29% and autopsy rate from 4.69% to 10.10% annually between January 2001 and December 2003. The number of cases classified according to GBD system was 3 (5%) in Group 1, 26 (43.33 %) in Group 2 and 31 (51.66 %) in Group 3. The discrepancy classes included 9 (15 %) class I major discrepancies and 3 (5 %) class II major discrepancies. Non-discrepant diagnosis was seen in 37 cases (61.66 %) and 11 cases (18.32 %) were non classifiable. This study showed the usefulness of autopsy findings in the quality improvement of the diagnosis and management of the disease by showing only a minority of cases with discrepant diagnosis of the cause of death.[27]

A meta analysis of discrepancies between clinical and autopsy diagnoses and the contribution of autopsy histology was carried out in Department of Histopathology, South Manchester University Hospitals Trust, Manchester, UK in the year 2005. The results were over 20% of clinically unexpected autopsy findings, including 5% of major findings, can be correctly diagnosed only by histological examination. Although the autopsy and particularly autopsy histology are being undermined, they are still the most accurate method of determining the cause of death and auditing accuracy of clinical diagnosis, diagnostic tests and death certification.[28]

In a study at Postgraduate Institute of Medical Education and Research, Chandigarh, India in the year 2006 on head injury cases where comparison was made on CT scan and autopsy findings, it was observed that traumatic subarachnoid hemorrhage which was detected in CT scans of only 10 patients was found in 33 cases at autopsy. Whereas CT revealed thin subdural hematoma (SDH) in 5 cases, autopsy however showed the same in 15. Four cases were found to have extradural hematoma at autopsy, though it was detected on CT scan in 3 cases. Autopsy revealed contusions in temporal region in 26, frontal region in 16, occipital region in 5 and in the cerebellum in 2 patients. However CT scan was able to diagnose the same in 16 cases in temporal and 10 cases in the frontal region. Autopsy of the brain stem revealed contusion in 30 patients; however only 6 patients could show the same on CT scan. Contusions involving the thalamus and hypothalamic region were detected in 9 patients at autopsy but the same was revealed on CT in 2 patients. Although petechial hemorrhages in corpus callosum were observed in 11 patients, CT showed this finding in only one patient. None of the 4 patients who had evidence of uncal herniation on autopsy could be diagnosed to have the same on CT scan. The above findings show

that routine CT scan, which is the commonest tool for diagnosis in acute severe head injury cases, does have various short comings. Subdural hemorrhage and subarachnoid hemorrhage were detected in only 33% of patients on CT scan though extradural hemorrhage was better delineated on the CT. Small contusions or petechial hemorrhages on the brain stem, cerebral peduncles, corpus callosum or thalamic/hypothalamic areas were also missed in great numbers in CT.[29]

METHODOLOGY

The present study was a cross-sectional study. The study material comprised of all medico legal cases who were admitted and who succumbed and subsequently autopsied at the KLES's Dr Prabhakar Kore Hospital & Medical Research Centre, Belgaum during the 1 year period from 1st January 2008 to 31st December 2008.

The sample size was estimated to be 100 (by taking 80% of the average of similar cases, in KLES's Dr Prabhakar Kore Hospital & MRC, Belgaum, over a period of previous 3 years – (January 2005 to December 2007) and this was covered during the above said period.

Ethical clearance for the present study was obtained from the Institutional Ethical Committee, J. N. Medical College, Belgaum.

In the present study information regarding the bio-data of the deceased and various characters regarding the circumstances of the accident and time of accident were gathered from all possible sources like police records, hospital records and also by direct interrogation with investigating officer, eye witnesses (if available), relatives and friends of the deceased accompanying dead bodies. In addition to these the clinical case sheets were thoroughly reviewed and where ever necessary the treating doctor was consulted for the necessary information regarding the investigations done. In each case, a thorough external and internal examination was done for the injuries and opinion as to the cause of death was made after the examination. The data thus obtained was recorded in the predesigned and pretested proforma, which comprised relevant data that is concerned with the objectives of the study and analyzed.

All the victims of medico legal cases who died in KLES's Dr Prabhakar Kore Hospital & Medical Research Centre, Belgaum and subsequently autopsied at the same centre, were included in the present study. Cases which were brought dead and infant deaths were excluded from the study.

Written informed consent, for collection of data gathered during the study and for taking photograph of findings observed during autopsy, was obtained from the legally authorized person in every case.

RESULTS

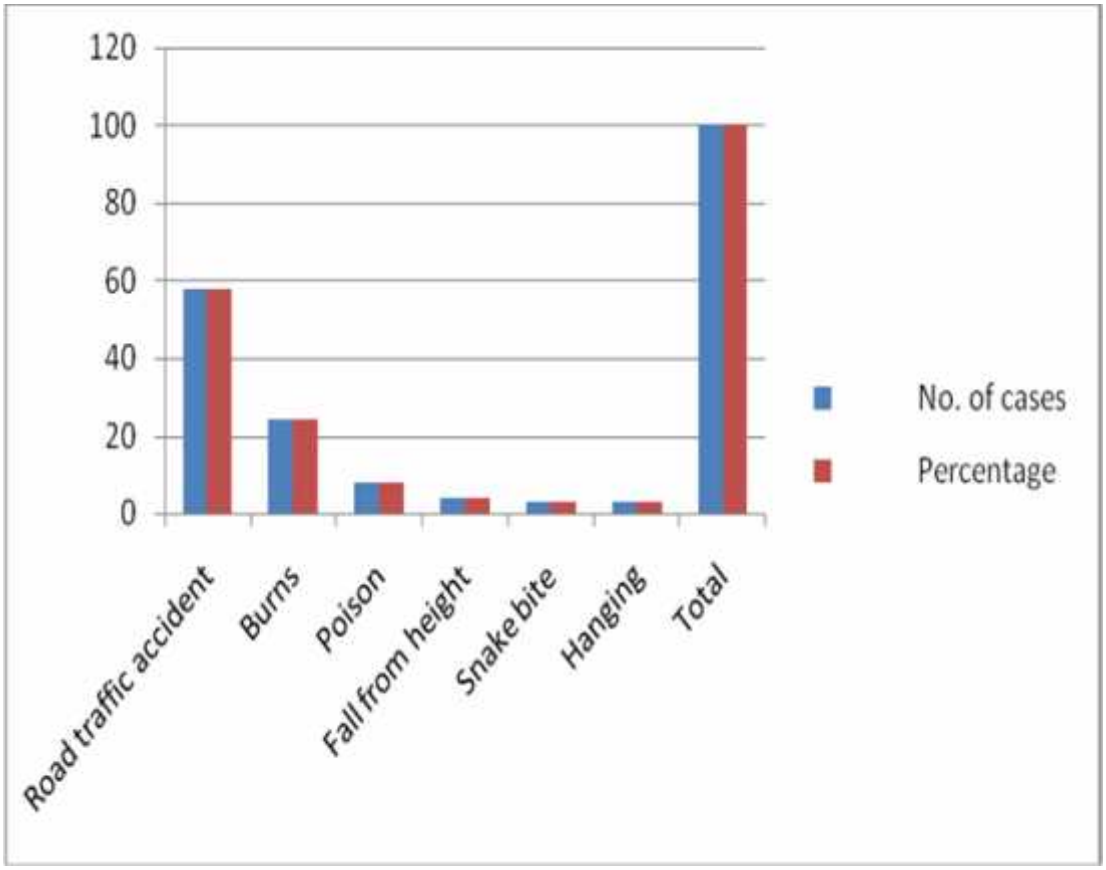
Profile of medico legal autopsies conducted during the study period:

During the present study period from 1st January 2008 to 31st December 2008, a total of 100 medicolegal autopsies were conducted out of which 58 cases were of fatal Road Traffic Accident (RTA) with lesions. All the victims of fatal RTA had lesions of one or the other systems of the body. Deaths due to fatal RTAs accounted for more than half (58%) of the total medicolegal autopsies conducted i.e. more than half of unnatural deaths were due to RTAs. Burns cases were 24 which constituted for 24% of the total cases followed by poisoning cases 8 which constituted for 8%. There were 4 cases of fall from height (4%), snake bite 3 (3%) cases and 3 (3%) hanging cases.

Table 1: Profile of medico legal autopsies conducted during the study period

Type of case	No. of cases	Percentage
Road traffic accident	58	58
Burns	24	24
Poison	08	08
Fall from height	04	04
Snake bite	03	03
Hanging	03	03
Total	**100**	**100**

Graph No.1: Profile of medico legal autopsies conducted during the study period



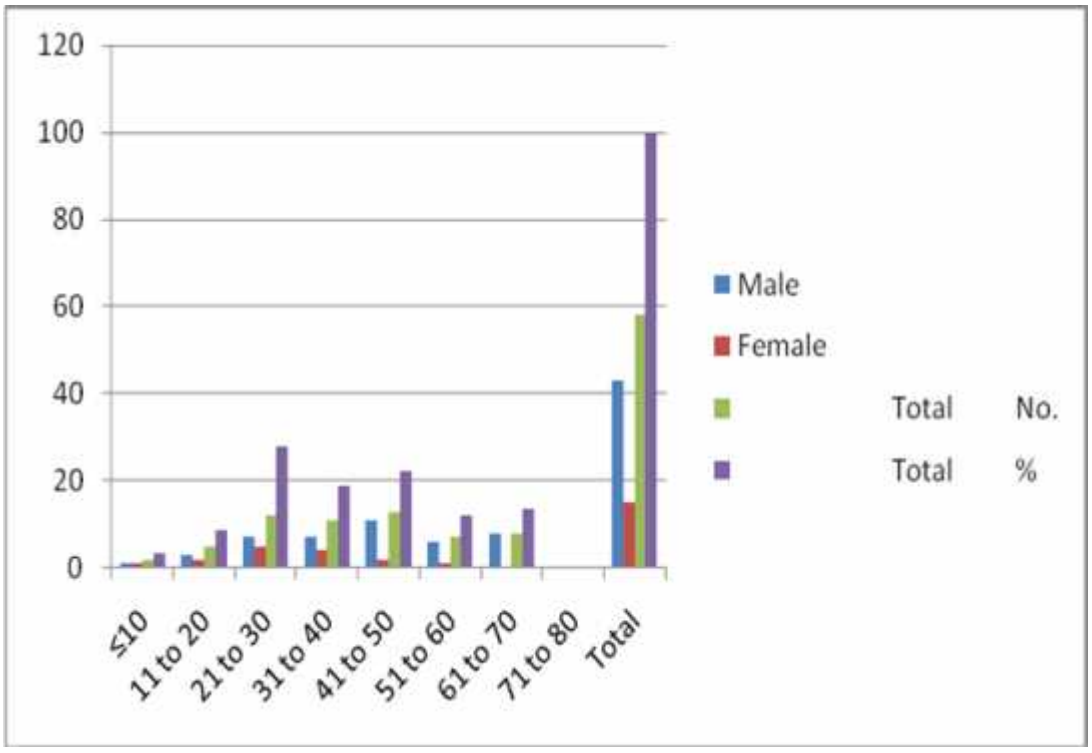
Profile of Age and sex wise distribution of cases of fatal RTA:

Out of 58 cases, 45 (77.5%) were males and 13 (22.5%) were females indicating that a large majority of victims were male and male female ratio was 3.4:1. Maximum numbers of victims (13 cases, 22.4%) were in the age group 41 - 50 years, followed by 21- 30 yrs (12 cases, 20.6%). Minimum victims were found in the age group of 01-10 yrs (2cases, 3.4%). and more than 70 years no cases were there. Youngest victim was 2 years old female child and eldest was 69 years old male. 62% of victims were between 21 to 50 years.

Table 2: Age and sex wise distribution of cases of fatal RTA:

Age group (in years)	Male	Female	Total	
			No.	%
≤10	1	1	2	3.4
11 to 20	3	2	5	8.6
21 to 30	7	5	12	28
31 to 40	7	4	11	18.9
41 to 50	11	2	13	22.4
51 to 60	6	1	7	12
61 to 70	8	0	8	13.7
71 to 80	0	0	0	0
Total	**43**	**15**	**58**	**100**

Graph No.2: Age and sex wise distribution of cases of fatal RTA



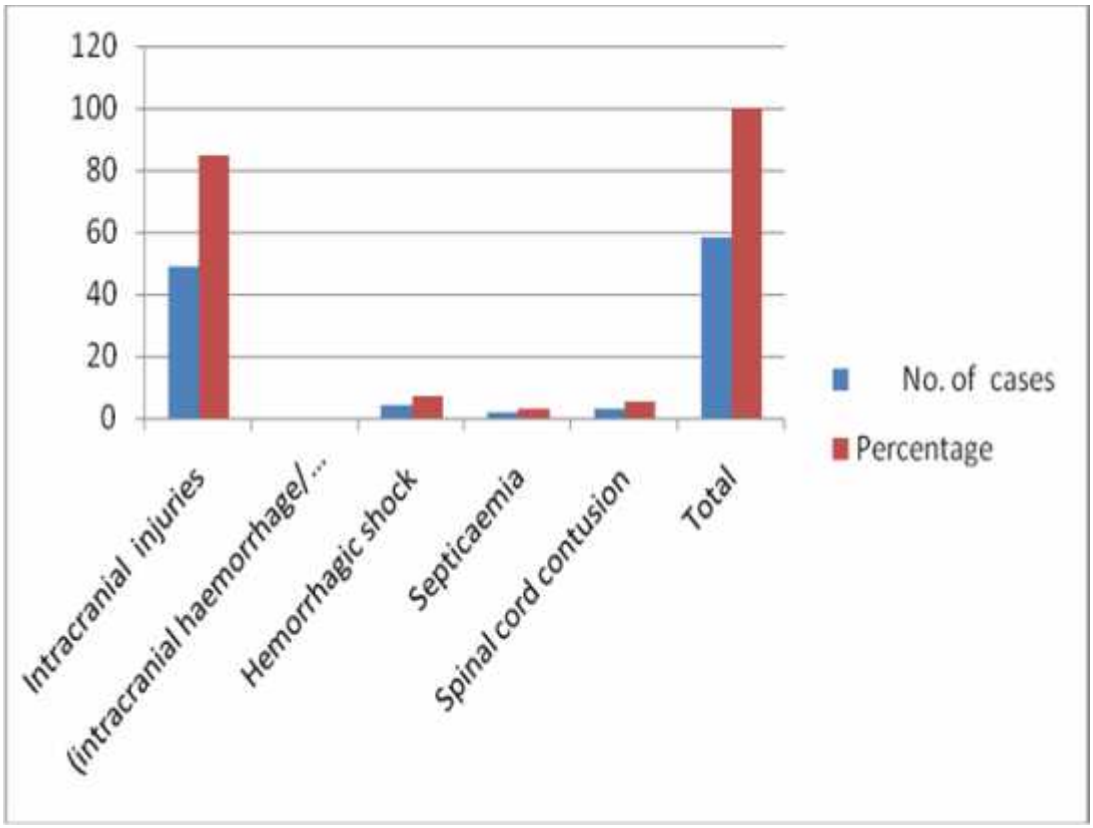
Profile of autopsy diagnosis of Cause of death for fatal RTA cases:

In present study, maximum cause of death was intracranial injuries (85%) followed by hemorrhagic shock (7%), spinal cord contusion (5%) and septicemia (3%).

Table 3: Profile of autopsy diagnosis of Cause of death for fatal RTA cases:

Cause of death	No. of cases	Percentage
Intracranial injuries (intracranial hemorrhage/ brain injury	49	85
Hemorrhagic shock	04	07
Septicemia	02	03
Spinal cord contusion	03	05
Total	**58**	**100**

Graph No3: Profile of autopsy diagnosis of Cause of death for fatal RTA cases:



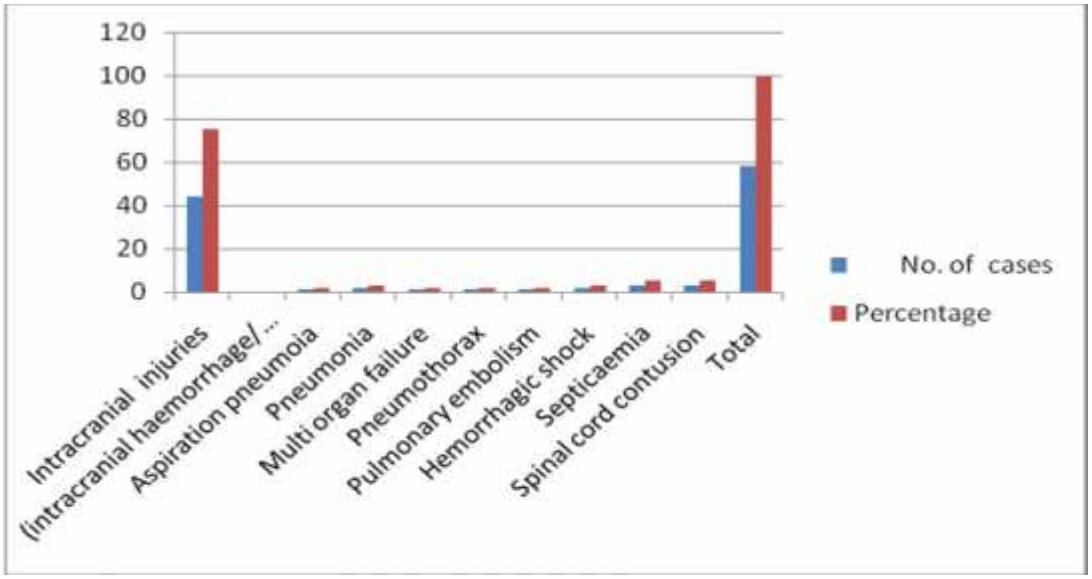
Profile of clinical diagnosis of Cause of death for fatal RTA cases:

In this study, the clinical diagnosis of cause of death was intracranial injuries 75% followed by septicemia and spinal cord contusion 5% cases. Hemorrhagic shock and pneumonia was given as cause of death for 3% cases. Aspiration pneumonia, multi organ failure, pulmonary embolism, pneumothorax were given as cause of death for each case.

Table 4: Profile of clinical diagnosis of Cause of death for fatal RTA cases:

Cause of death	No. of cases	Percentage
Intracranial injuries (intracranial hemorrhage/ brain injury	44	75
Aspiration pneumonia	01	02
Pneumonia	02	03
Multi organ failure	01	02
Pneumothorax	01	02
Pulmonary embolism	01	02
Hemorrhagic shock	02	03
Septicemia	03	05
Spinal cord contusion	03	05
Total	**58**	**100**

Graph 4: Profile of clinical diagnosis of Cause of death for fatal RTA cases:



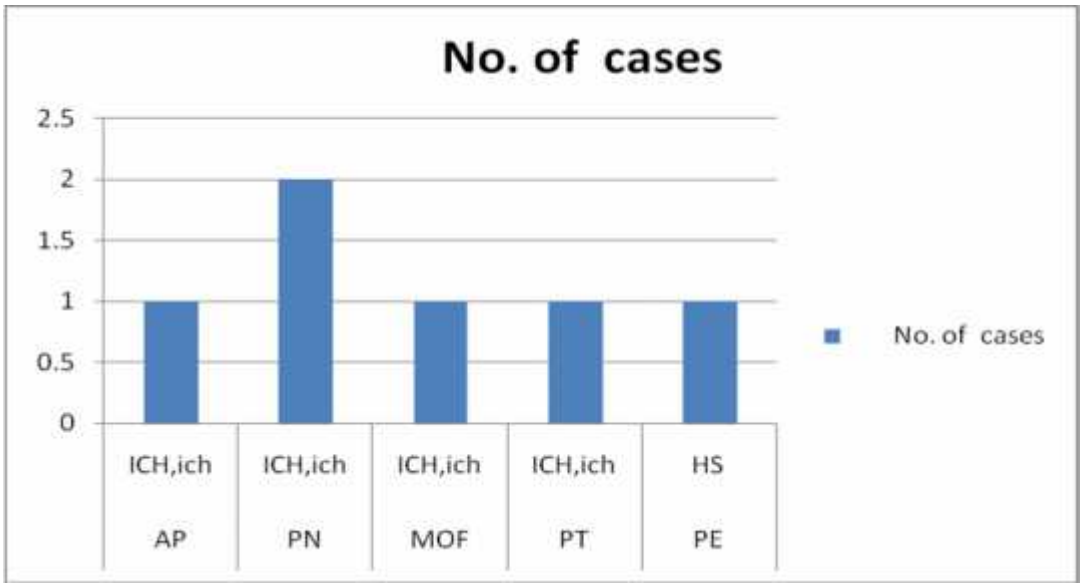
Profile of comparison between the autopsy diagnosis and the clinical diagnosis for fatal RTA cases:

It was observed that in 6 cases out of 58 cases amounting to 10% of the total RTA cases there was total disagreement regarding the opinion of cause of death. In the rest of the cases 52(90%) there was total agreement.

Table 5: Profile of comparison between the autopsy diagnosis and the clinical diagnosis for fatal RTA cases:

Clinical cause of death	Autopsy cause of death	No. of cases
Aspiration pneumonia	Intracranial injuries (intracranial hemorrhage/ brain injury	01
Pneumonia	Intracranial injuries (intracranial hemorrhage/ brain injury	02
Multi organ failure	Intracranial injuries (intracranial hemorrhage/ brain injury	01
Pneumothorax	Intracranial injuries (intracranial hemorrhage/ brain injury	01
Pulmonary embolism	Hemorrhagic shock	01

Graph 5: Profile of comparison between the autopsy diagnosis and the clinical diagnosis for fatal RTA cases:



Profile of External injury:

In present study external injuries were seen in 56 cases and the remaining 2 cases did not show any of the external injuries. External injuries were like abrasions, lacerations and contusions were seen. Injuries like incised or penetrating wounds were never encountered in our study. Maximum was abrasions (97%) followed by lacerations (93%) and contusions (93%).

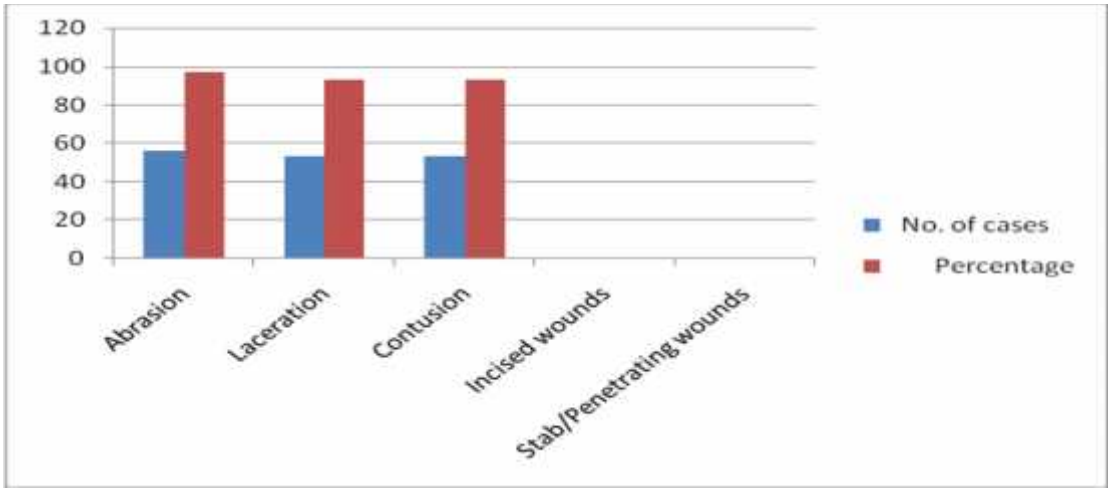
Table 6(A): Profile of External injury

Injury	No. of cases	Percentage
External injury	56	97
No external injury	02	03
Total	**58**	**100**

Table 6(B): Profile of External injury:

Type of injury	No. of cases	Percentage
Abrasion	56	97
Laceration	53	93
Contusion	53	93
Incised wounds	00	00
Stab/Penetrating wounds	00	00

Graph 6: Profile of External injury (Table A & B)



Profile of Internal injury:

In present study internal injuries were classified like bone fracture and soft tissue injuries. Bone fracture was seen among 94 cases and soft tissue injuries were seen in almost all i.e. 100 cases.

Table 7: Profile of Internal injury

Type	No. of cases
Bone fracture	54
Soft tissue	58

Graph 7: Profile of Internal injury

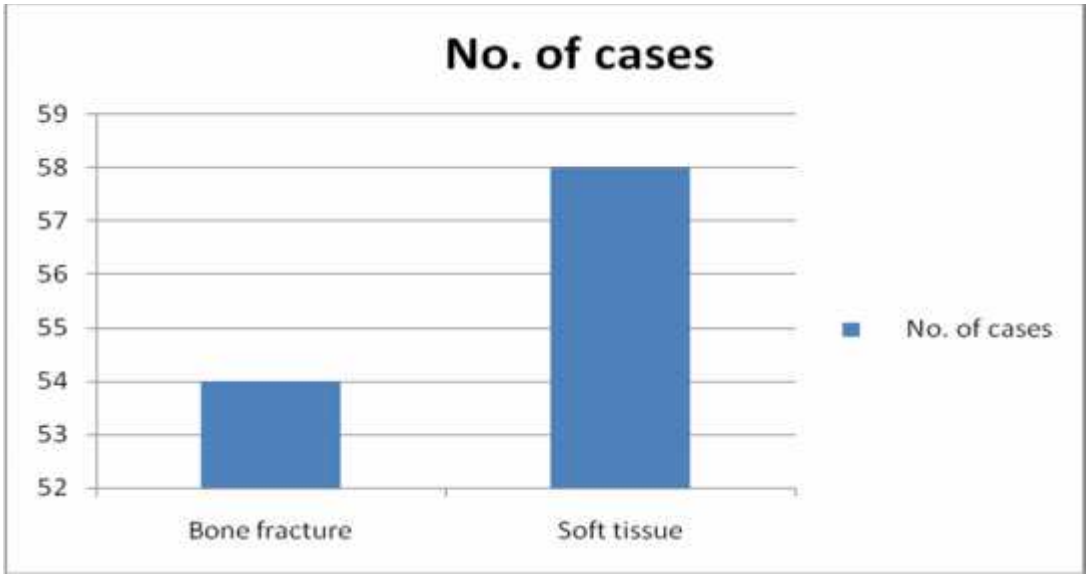


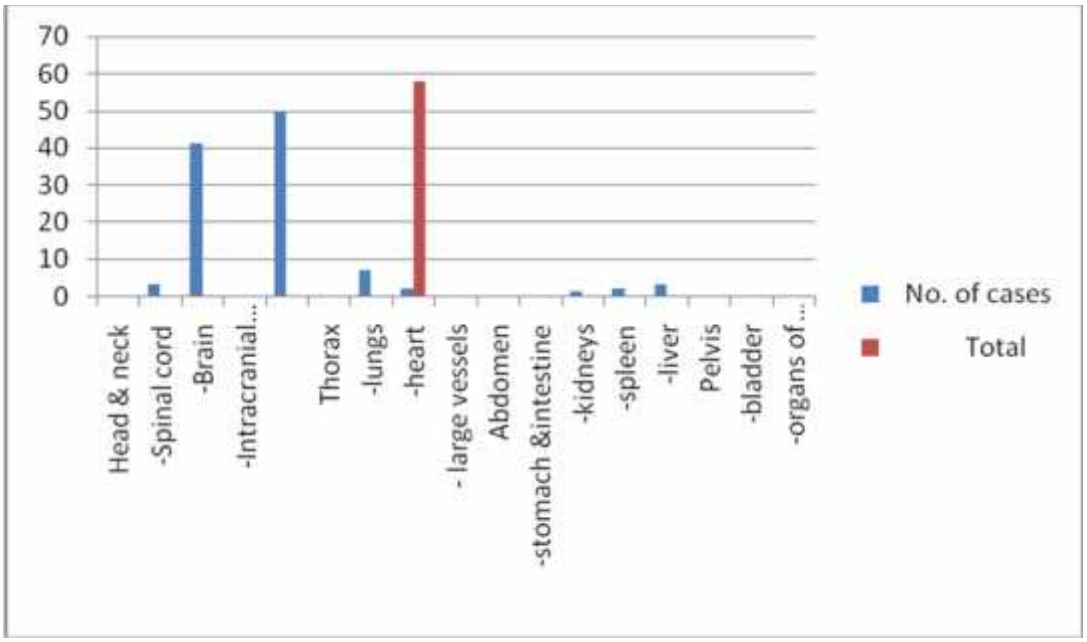
Table 8: Profile of Soft tissue involvement:

Type	No. of cases	Total
Head & neck -Spinal cord -Brain -Intracranial hemorrhage	 03 41 50	**58**
Thorax -lungs -heart	 07 02	
Abdomen -stomach &intestine -kidneys -spleen -liver	 00 01 02 03	
Pelvis -bladder -organs of generation	 00 00	

In this study, soft tissue injuries were classified as head & neck, thorax, abdomen & pelvis. In head & neck, brain injuries were seen in 41 cases, spinal cord injury was seen in 3 cases and brain hemorrhages was seen in 50 cases. In thorax, lung injuries were seen in 17 cases and heart injuries in 2 cases. In abdomen, kidney

injury was seen in 1 case, spleen injuries were seen in 2 cases and liver injuries 3 cases. In pelvis, no soft tissue involvement was seen.

Graph 8: Profile of Soft tissue involvement



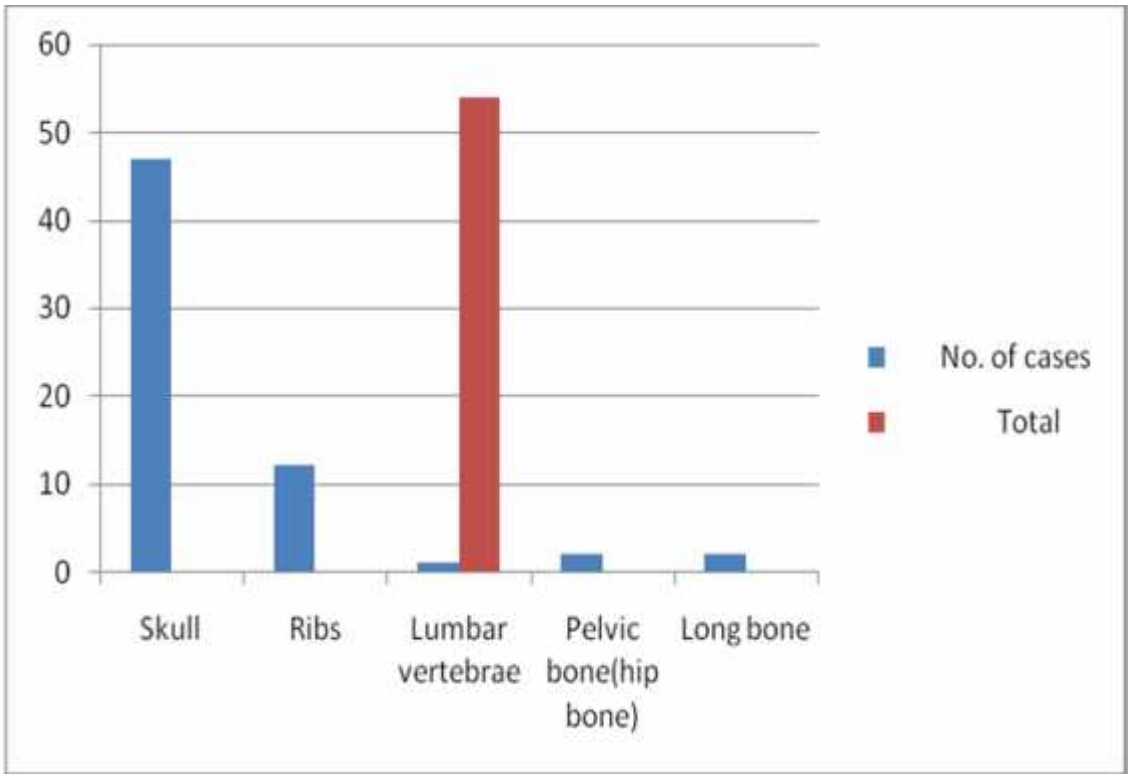
Profile of Bone fracture:

In present study, bone fracture was seen in 54 cases. The bone fracture involved fracture of skull, ribs, lumbar vertebrae, pelvic bone & long bones. Skull fracture was seen in 47 cases. Ribs fracture was seen in 12 cases. Lumbar vertebrae fracture was seen in 1 case. Pelvic bone fracture was seen in 2 cases. Long bone fracture was seen in 2 cases.

Table 9: Profile of Bone fracture

Type	No. of cases	Total
Skull	47	**54**
Ribs	12	
Lumbar vertebrae	01	
Pelvic bone(hip bone)	02	
Long bone	02	

Graph 9: Profile of Bone fracture



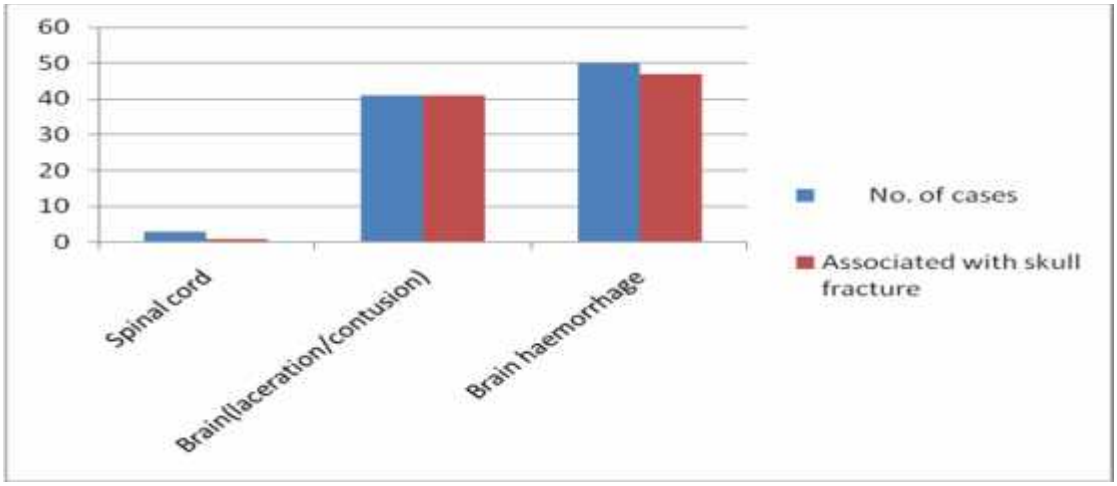
Profile of Internal Injury in head & neck:

In present study, brain injury (laceration/contusion) was seen in 41 cases and all associated with fracture of the skull. The spinal cord injury was seen in 3, of which 01 case had fracture of skull, that too base of the skull. The intracranial hemorrhage was seen in 50 cases, of which 47 cases showed fracture of skull.

Table 10: Profile of Internal Injury in head & neck

Type of injury	No. of cases	Associated with skull fracture
Spinal cord	03	01
Brain(laceration/contusion)	41	41
Brain hemorrhage	50	47

Graph 10: Profile of Internal Injury in head & neck



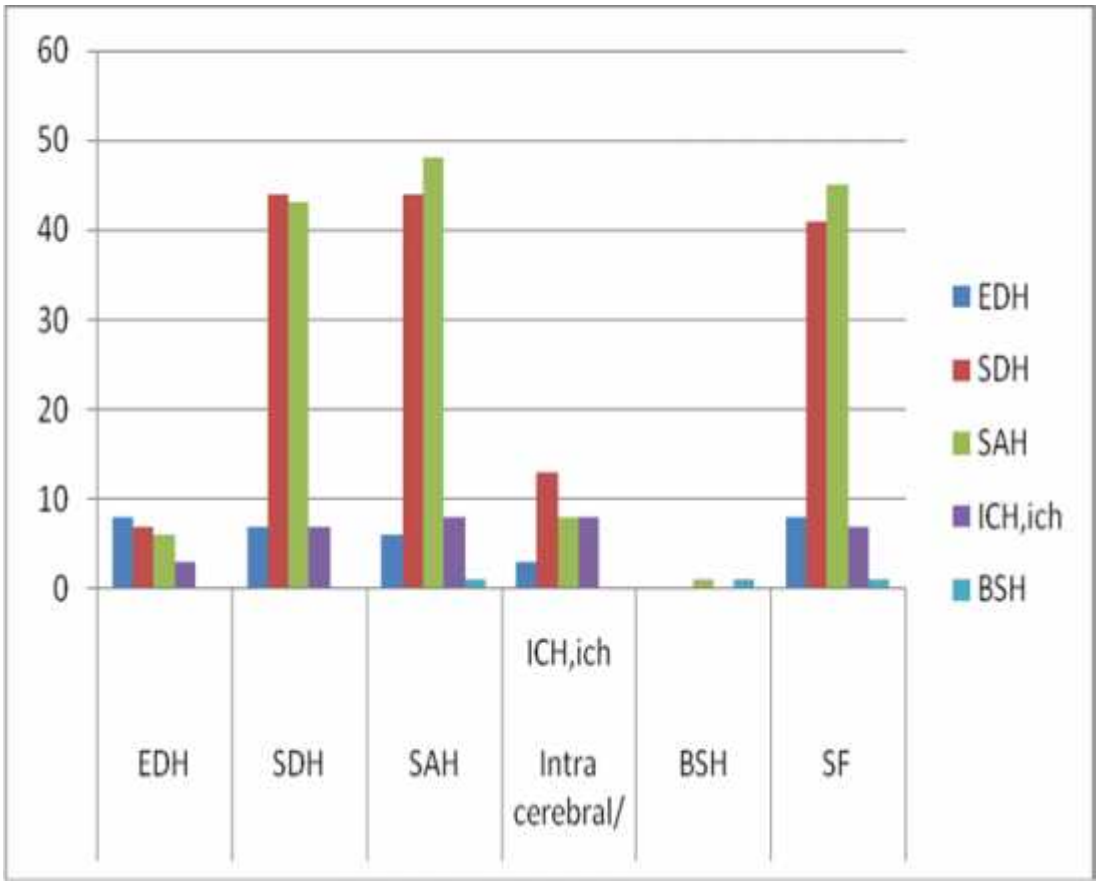
Profile of Intracranial hemorrhage:

In present study, brain hemorrhages were classified as extra dural hemorrhage, subdural hemorrhage, subarachnoid hemorrhage, intra cerebral/cerebellar hemorrhage and brain stem hemorrhage. Subarachnoid hemorrhage was most commonly seen (48 cases), followed by sub dural hemorrhage (44), extra dural hemorrhage and intra cerebral/cerebellar hemorrhage (each in 8 cases). Least seen was brain stem hemorrhage (1 case). Subarachnoid hemorrhage was associated with subdural hemorrhage in 43 cases. Subarachnoid hemorrhage was associated with intra cerebral hemorrhage in 8 cases. Subarachnoid hemorrhage was associated with extradural hemorrhage in 7 cases. Extradural hemorrhage was seen in only 8 cases as it was sweaped out due to fracture of skull and hence it was not appreciated at autopsy. All the 8 cases of extradural hemorrhage had fracture of the skull. Among the 44 cases of subdural hemorrhage, 41 had fracture of skull. Among the 48 cases of subarachnoid hemorrhage, 45 had fracture of the skull. Among the 8 cases intra cerebral/cerebellar hemorrhage, 7 had fracture of the skull. In the single case of brain stem hemorrhage, there was fracture of skull. Significant association was seen between subarachnoid and subdural hemorrhage in our study.

Table 11: Profile of Intracranial hemorrhage

	Extra Dural Hemorrhage	Sub Dural Hemorrhage	Sub Arachnoid hemorrhage	Intra cerebral/ cerebellar hemorrhage	Brainstem Hemorrhage	Skull fracture
Extra Dural Hemorrhage	8	7	6	03	-	08
Sub Dural Hemorrhage	7	44	44	13	-	41
Sub Arachnoid Hemorrhage	06	43	48	08	01	45
Intra Cerebral / Cerebellar hemorrhage.	03	07	8	08	-	07
Brain Stem Hemorrhage	-	-	01	-	01	01

Graph 11: Profile of Intracranial hemorrhage



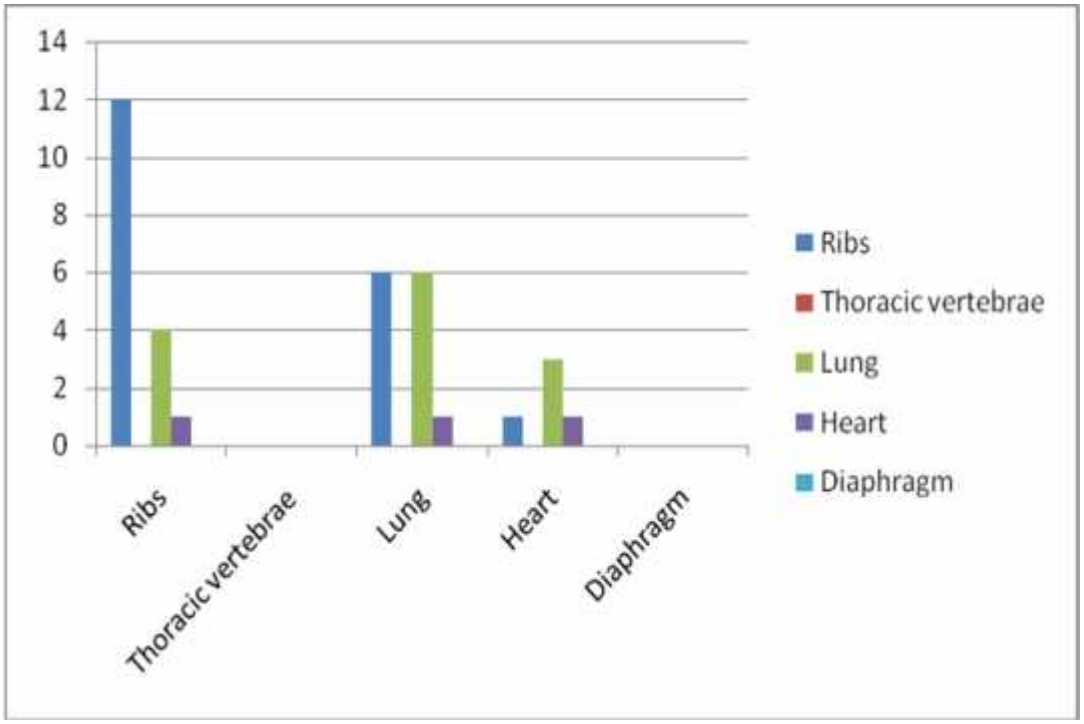
Profile of Internal Injury in thorax:

In present study, injuries in thorax were classified as ribs fracture, thoracic vertebrae fracture, lung injury, heart injury and diaphragm injury. Ribs fracture was most commonly seen in 12 cases followed by lung injury, seen in 6 cases and least was heart injuries 1 case.

Table 12: Profile of Internal Injury in thorax

	Ribs	Thoracic vertebrae	Lung	Heart	Diaphragm
Ribs	12	--	04	01	--
Thoracic vertebrae	--	--	--	--	--
Lung	06	--	06	01	--
Heart	01	--	03	01	--
Diaphragm	--	--	--	--	--

Graph 12: Profile of Internal Injury in thorax



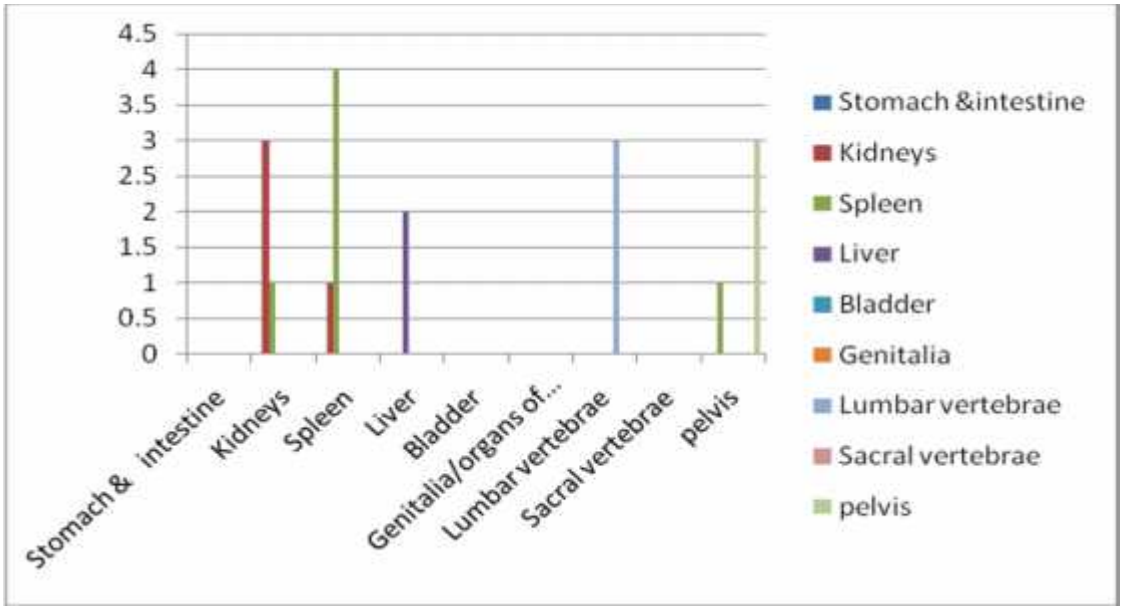
Profile of Internal injury in abdomen:

In present study, among the abdominal injuries, spleen injury was maximum (3 cases), followed by kidney, lumbar vertebra & pelvis involvement in 2 cases, and liver in 2 cases.

Table 13: Profile of Internal injury in abdomen

	Stomach & intestine	Kidneys	Spleen	Liver	Bladder	Genitalia/organs of generation	Lumbar vertebrae	Sacral vertebrae	pelvis
Stomach &intestine	--	--	--	--	--	--	--	--	--
Kidneys	--	03	01	--	--	--	--	--	--
Spleen	--	01	04	--	--	--	--	--	01
Liver	--	--	--	02	--	--	--	--	--
Bladder	--	--	--	--	--	--	--	--	--
Genitalia	--	--	--	--	--	--	--	--	--
Lumbar vertebrae	--	--	--	--	--	--	03	--	--
Sacral vertebrae	--	--	--	--	--	--	--	--	--
pelvis	--	--	--	--	--	--	--	--	03

Graph 13: Profile of Internal injury in abdomen



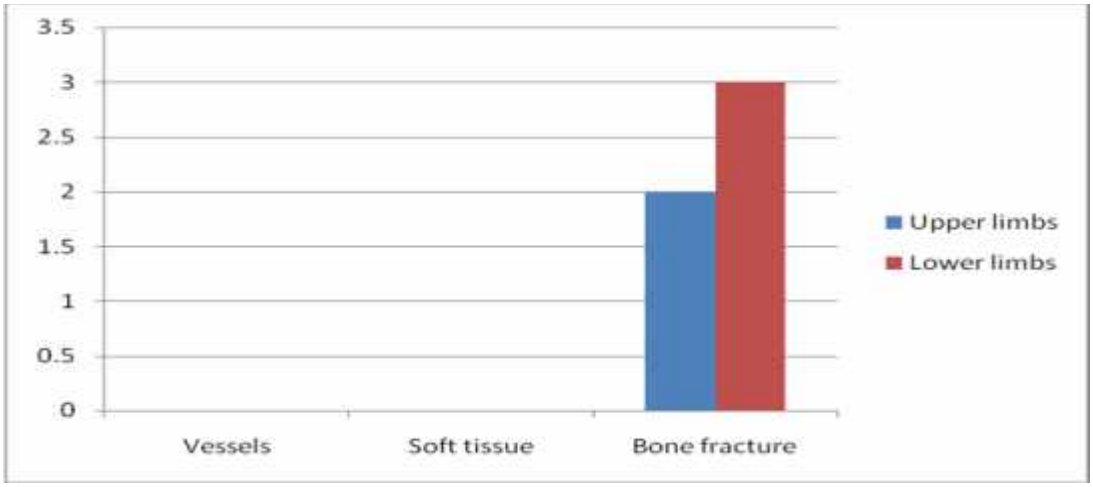
Profile of Internal injury in limbs:

In present study, lower limbs fracture was seen in 3 cases and upper limbs in 2 cases.

Table 14: Profile of Internal injury in limbs

	Vessels	Soft tissue	Bone fracture
Upper limbs	--	--	02
Lower limbs	--	--	03

Graph 14: Profile of Internal injury in limbs



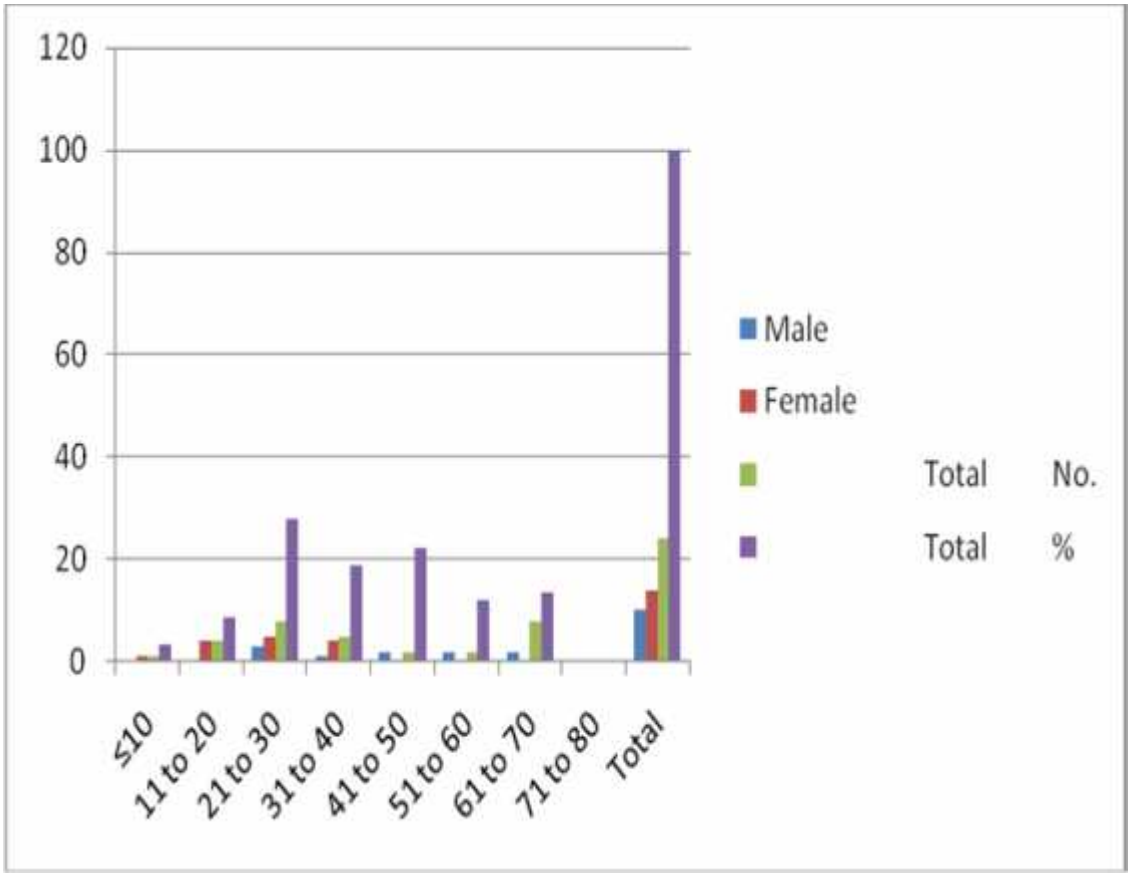
Profile of Age and sex wise distribution of cases of Burns:

Out of 24 cases, 10 (41.6%) were males and 14 (49.4%) were females indicating that a large majority of victims were female. Male to female ratio was 1:1.4. Maximum numbers of victims (8 cases, 33.3%) were in the age group 21 - 30 years, followed by 31- 40 yrs (5 cases, 20.8%). Minimum victims were found in the age group pf 01-10 yrs (1cases, 4.1%). and more than 70 years no cases were there. Youngest victim was 2 years old female child and eldest was 65 years old female. 70% of victims were between 11 to 40 years.

Table 15: Profile of Age and sex wise distribution of cases of Burns:

Age group (in years)	Male	Female	Total	
			No.	%
≤10	0	1	1	3.4
11-20	0	4	4	8.6
21-30	3	5	8	28
31-40	1	4	5	18.9
41-50	2	0	2	22.4
51-60	2	0	2	12
61-70	2	0	8	13.7
71-80	0	0	0	0
Total	**10**	**14**	**24**	**100**

Graph 15: Profile of Age and sex wise distribution of cases of Burns:



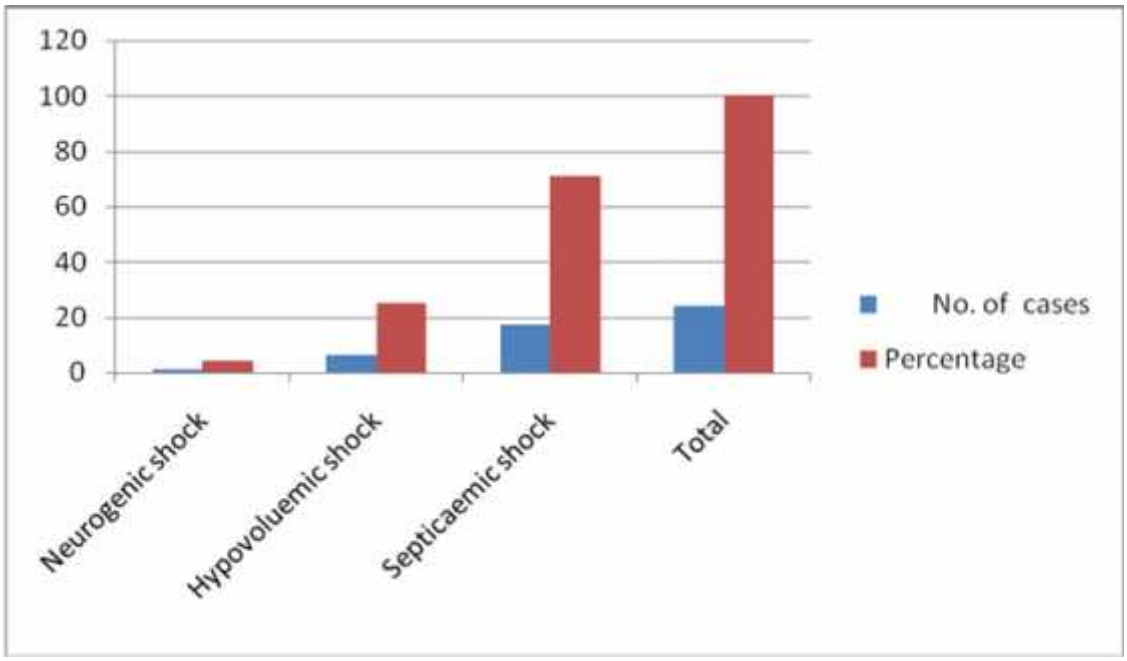
Profile of autopsy diagnosis of Cause of death for Burns:

In present study, maximum cause of death was septicemic shock 17 cases (70.9%) followed by hypovoluemic shock 6 cases (25%), neurogenic shock 1 case (4.1%).

Table 16: Profile of autopsy diagnosis of Cause of death for Burns:

Cause of death	No. of cases	Percentage
Neurogenic shock	01	4.1
Hypovoluemic shock	06	25
Septicemic shock	17	70.9
Total	**24**	**100**

Graph 16: Profile of autopsy diagnosis of Cause of death for Burns:



Profile of clinical diagnosis of Cause of death:

In this study, the clinical diagnosis of cause of death was septicemic shock 17 cases (70.9%) followed by hypovoluemic shock 6 cases (25%), neurogenic shock 1 case (4.1%).

Table 17: Profile of clinical diagnosis of Cause of death in Burns cases:

Cause of death	No. of cases	Percentage
Neurogenic shock	01	4.1
Hypovoluemic shock	06	25
Septicemic shock	17	70.9
Total	**24**	**100**

Profile of comparison between the autopsy diagnosis and the clinical diagnosis for burns cases.

It was observed that there was total agreement in the opinion for the cause of death between the autopsy diagnosis and the clinical diagnosis.

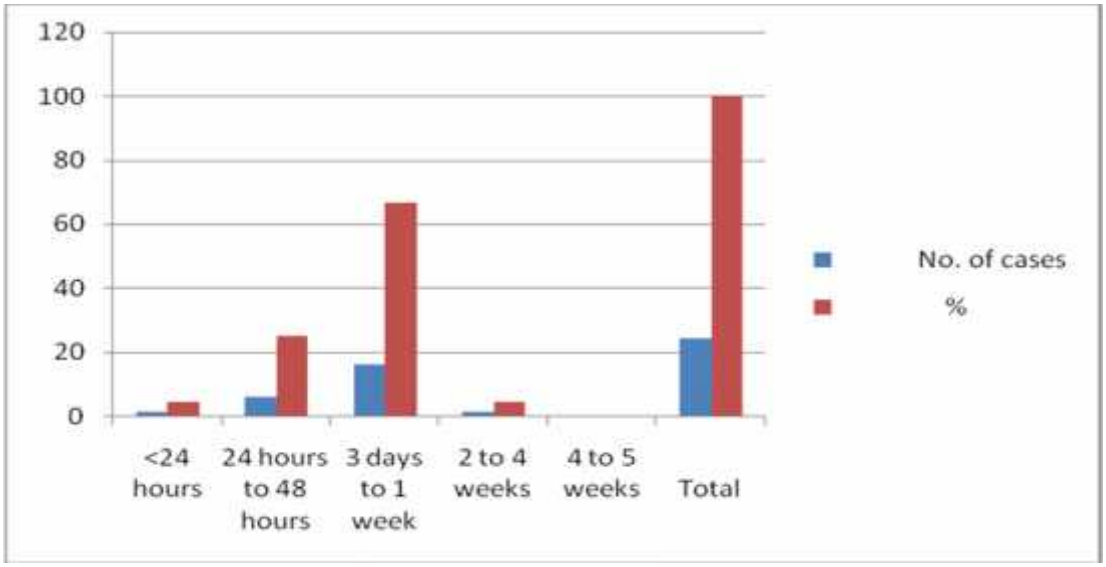
Profile of Period of survival following Burns:

In this study, 1 victim (4.1%) died within 24 hours after the accident, after 24 hours but within 48 hours 6 victims (25%) died. The cases which succumbed between 3 days to week were 16 (66.6%) and 1 case between 2 to 4 weeks.

Table 18: Period of survival following Burns:

Survival period	No. of cases	%
<24 hours	1	4.1
24 hours to 48 hours	6	25
3 days to 1 week	16	66.6
2 to 4 weeks	1	4.1
4 to 5 weeks	0	0
Total	**24**	**100**

Graph 18: Period of survival following Burns:



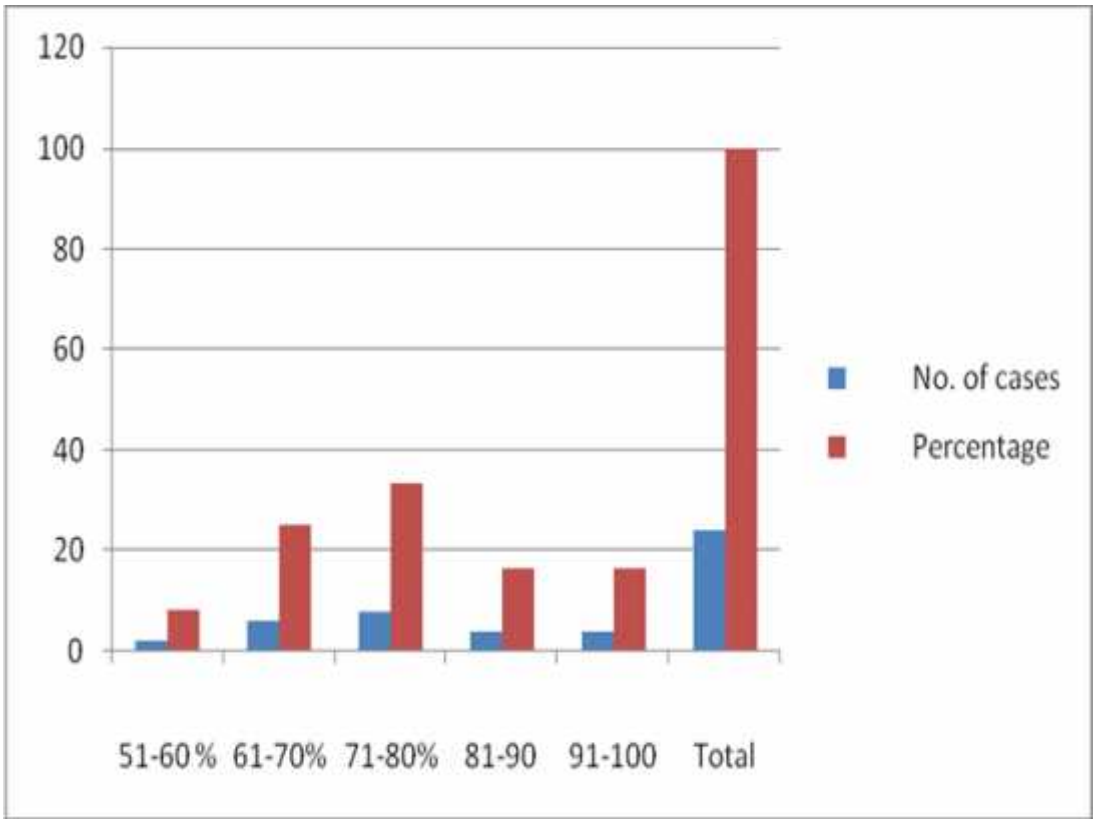
Profile of percentage of burns:

In this study 8 (33.5%) of the cases were with 71-80% of burns followed by 6 (25%) cases with 61-70% of burns. 4 (16.6%) cases each were found with 81-90% and 91-100%.

Table 19: Profile of percentage of burns:

Percentage of burns	No. of cases	Percentage
51-60 %	02	8.3
61-70%	06	25
71-80%	08	33.5
81-90	04	16.6
91-100	04	16.6
Total	**24**	**100**

Graph 19: Profile of percentage of burns:



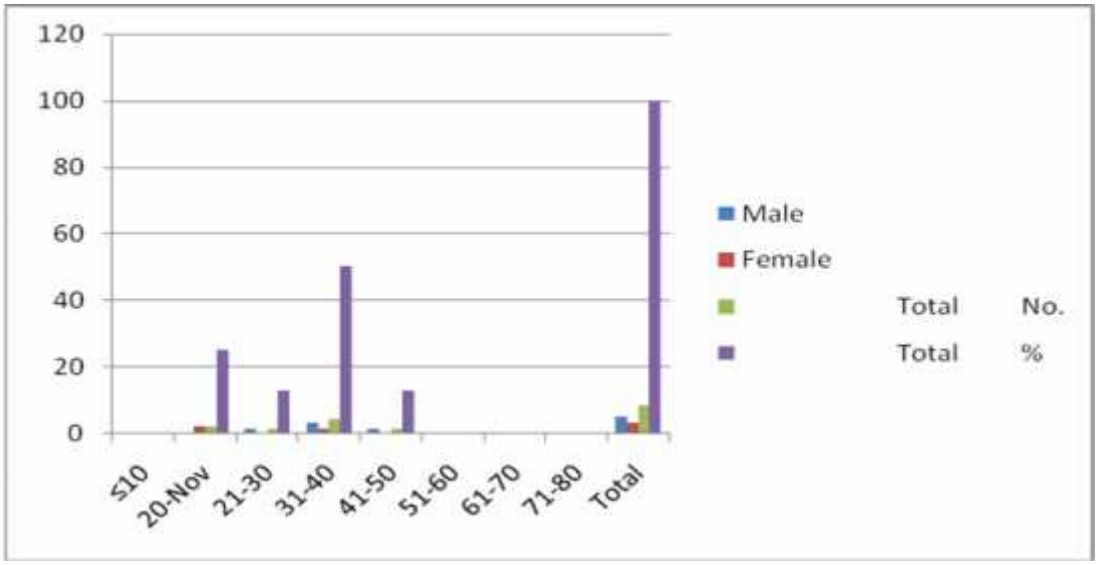
Profile of Age and sex wise distribution of cases of Poisoning:

Out of 8 cases, 5 (62.5%) were males and 3 (37.54%) were females. Male female ratio was 1.6:1. Maximum numbers of victims (3 cases, 50%) were in the age group 31-40 years, followed by 11- 20 yrs (2 cases, 25%), 31-40 (1case,12.5%), 41-50 (1 case,12.5%), 21-30 (1 case).

Table 20: Profile of Age and sex wise distribution of cases of Poisoning:

Age group (in years)	Male	Female	Total	
			No.	%
≤10	0	0	0	0
11-20	0	2	2	25
21-30	1	0	1	12.5
31-40	3	1	4	50
41-50	1	0	1	12.5
51-60	0	0	0	0
61-70	0	0	0	0
71-80	0	0	0	0
Total	**05**	**03**	**08**	**100**

Graph 20: Profile of Age and sex wise distribution of cases of Poisoning:



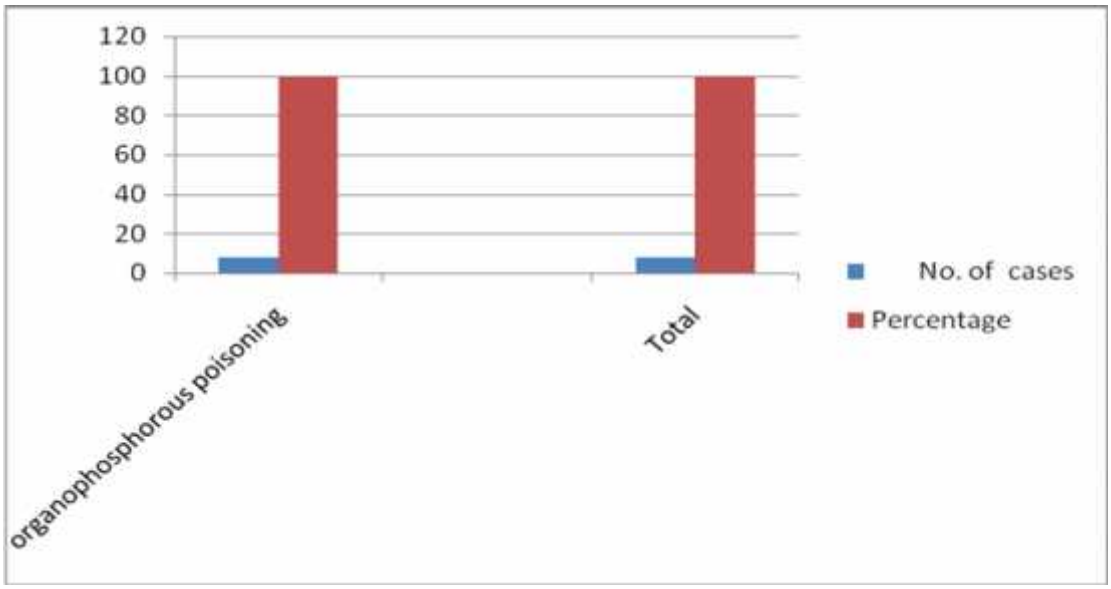
Profile of autopsy diagnosis of Cause of death for Poisoning:

In present study, maximum cause of death was organophosphorous poisoning 8 cases (100%).

Table 21: Profile of autopsy diagnosis of Cause of death for Poisoning:

Cause of death	No. of cases	Percentage
Organophosphorous poisoning	08	100
Aluminium phosphide poisoning	00	00
Total	**08**	**100**

Graph 21: Profile of autopsy diagnosis of Cause of death for Poisoning cases



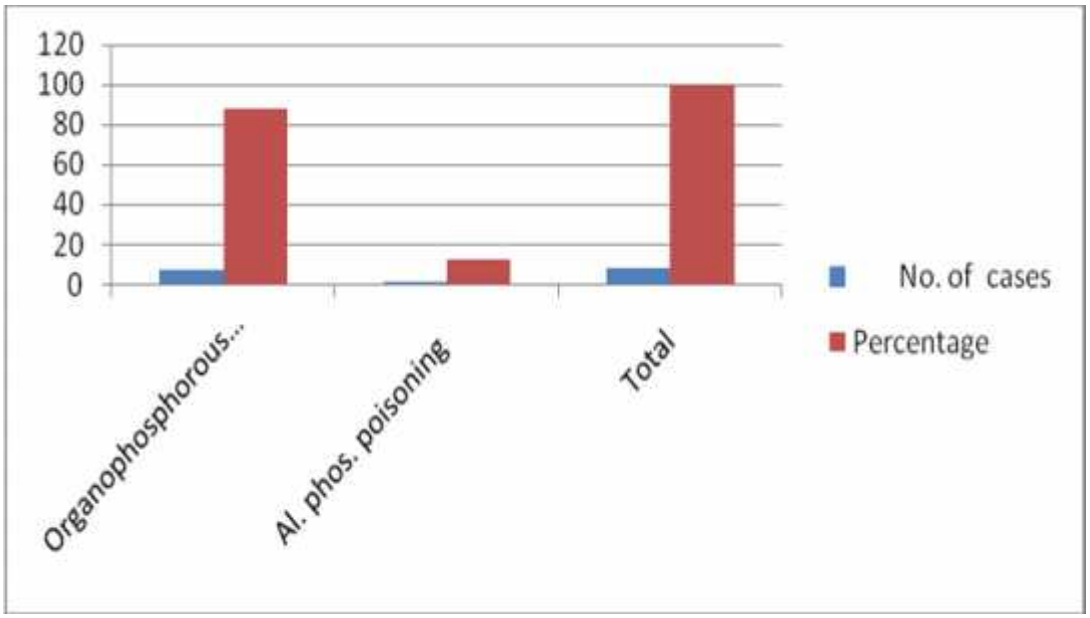
Profile of clinical diagnosis of Cause of death for Poisoning cases:

In present study, maximum cause of death was organo phosphorous poisoning 7 cases (87.5%) followed by aluminium phosphide poisoning 1 case (12.5%).

Table 22: Profile of clinical diagnosis of Cause of death in poisoning cases:

Cause of death	No. of cases	Percentage
Organophosphorous poisoning	07	87.5
Aluminium phosphide poisoning	01	12.5
Total	**08**	**100**

Graph 22: Profile of clinical diagnosis of Cause of death in Poisoning cases:



Profile of comparison between the autopsy diagnosis and the clinical diagnosis for poisoning cases:

It was observed that in 7 cases there was total agreement in the opinion for the cause of death between the autopsy diagnosis and the clinical diagnosis. In only one case clinical cause of death was given as aluminium phosphide poisoning whereas the autopsy diagnosis was organophosphorous poisoning.

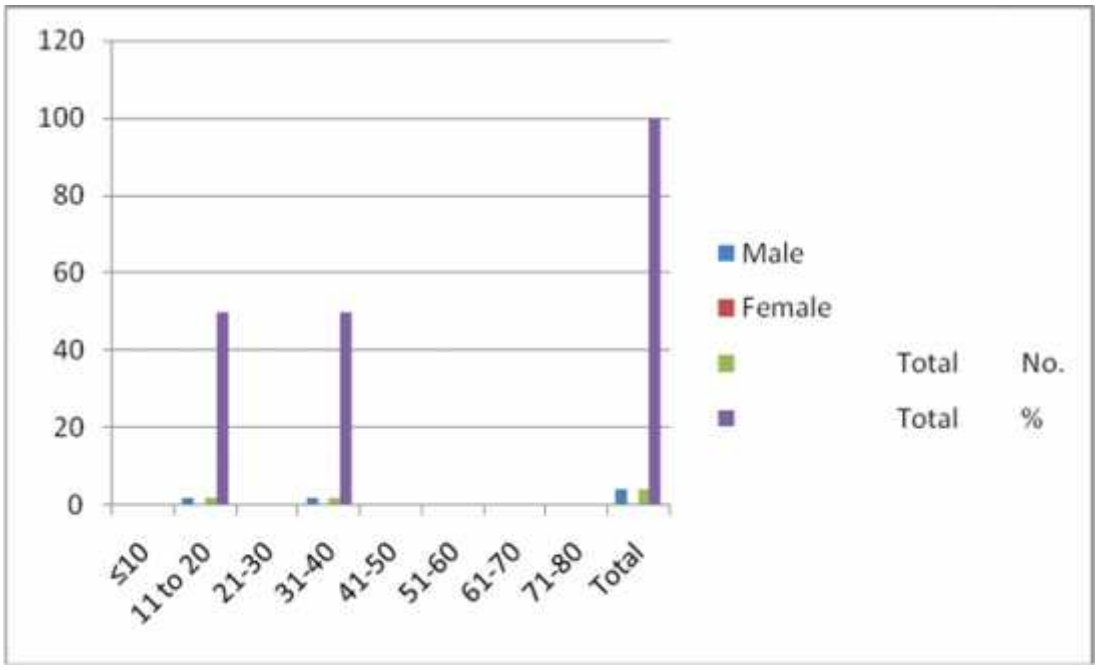
Profile of Age and sex wise distribution of fall from height cases:

There were total numbers of 4 fall from height cases. All cases were males, (100%). There were no female cases. Maximum numbers of victims (2 cases, 50%) were in the age group 31-40 years, followed by 11- 20 yrs (2 cases, 50%).

Table 23: Profile of Age and sex wise distribution of fall from height cases:

Age group (in years)	Male	Female	Total	
			No.	%
≤10	0	0	0	0
11-20	2	0	2	50
21-30	0	0	0	0
31-40	2	0	2	50
41-50	0	0	0	0
51-60	0	0	0	0
61-70	0	0	0	0
71-80	0	0	0	0
Total	**04**	**00**	**04**	**100**

Graph 23: Profile of Age and sex wise distribution of fall from height:



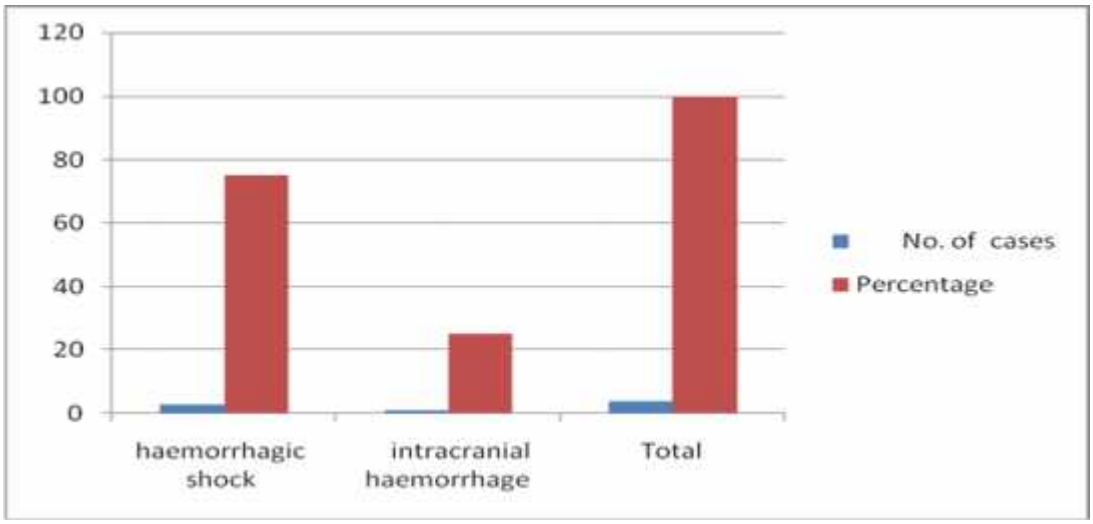
Profile of autopsy diagnosis of Cause of death for fall from height cases:

In our present study, maximum cause of death was hemorrhagic shock 3 cases (75%) and 1 case (25%) the cause of death was intracranial hemorrhage.

Table 24: Profile of autopsy diagnosis of Cause of death

Cause of death	No. of cases	Percentage
Hemorrhagic shock	03	75
Intracranial hemorrhage	01	25
Total	**04**	**100**

Graph 24: Profile of autopsy diagnosis of Cause of death for fall from height cases:



Profile of clinical diagnosis of Cause of death for fall from height cases:

In our present study, maximum cause of death was hemorrhagic shock 3 cases (75%) and 1 case (25%) the cause of death was intracranial hemorrhage.

Profile of comparison between the autopsy diagnosis and the clinical diagnosis for fall from height cases:

It was observed that in all cases there was total agreement in the opinion for the cause of death between the autopsy diagnosis and the clinical diagnosis.

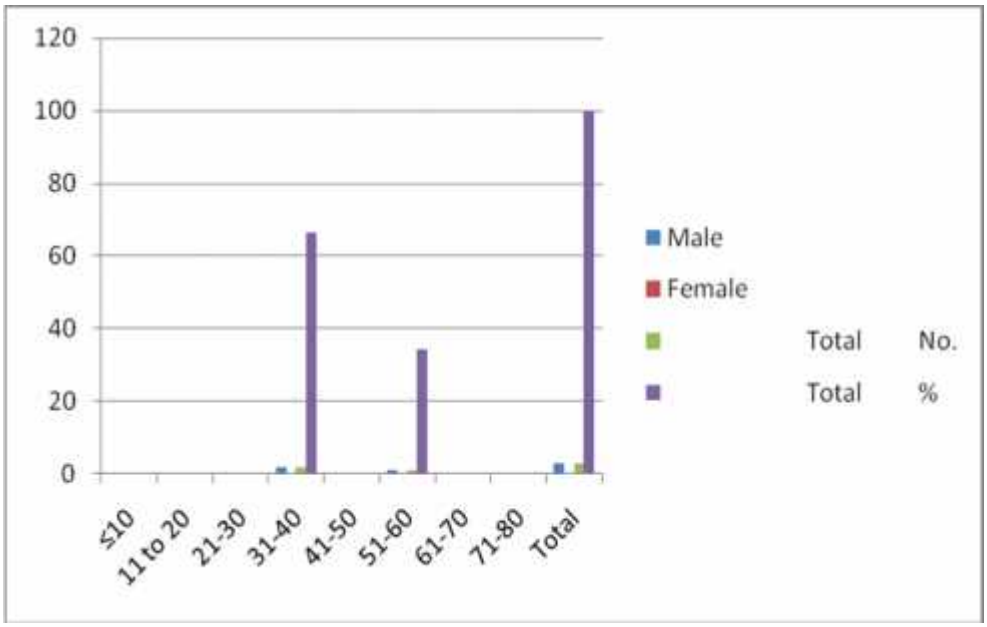
Profile of Age and sex wise distribution of snake bite cases:

There were total no of 3 snake bite cases. All cases were males. There were no female cases. Maximum numbers of victims (2 cases, 66.6%) were in the age group 31-40 years, followed by 51-60 yrs (1 case, 34.4%).

Table 25: Profile of Age and sex wise distribution of snake bite cases:

Age group (in years)	Male	Female	Total	
			No.	%
≤10	0	0	0	0
11-20	0	0	0	0
21-30	0	0	0	0
31-40	2	0	2	66.6
41-50	0	0	0	0
51-60	1	0	1	34.4
61-70	0	0	0	0
71-80	0	0	0	0
Total	**03**	**00**	**03**	**100**

Graph 25: Profile of Age and sex wise distribution of snake bite cases:



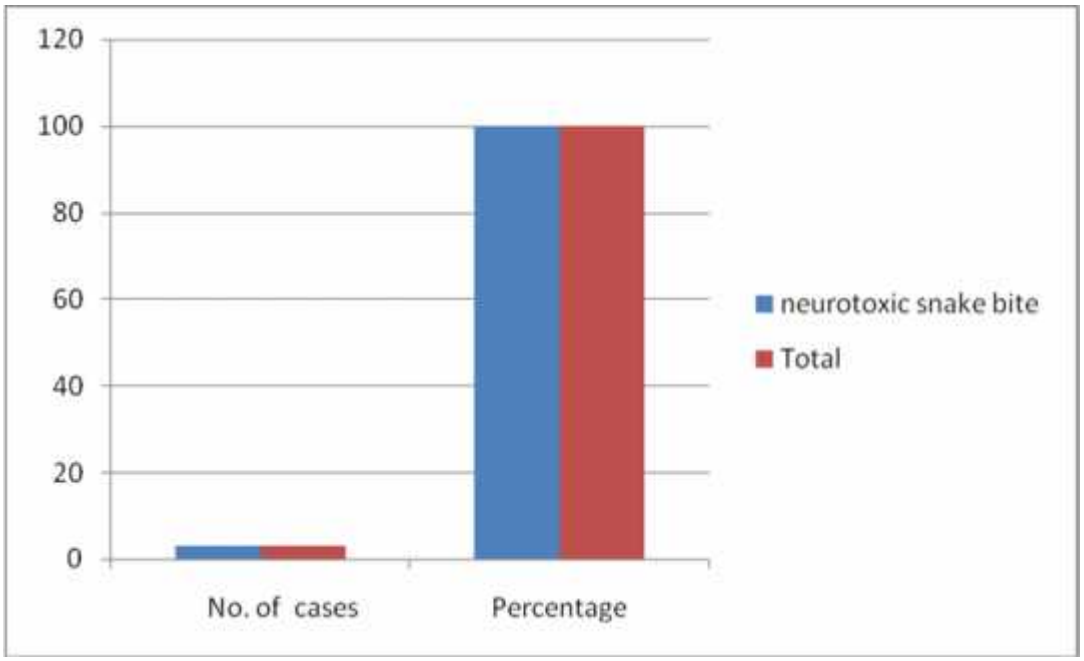
Profile of autopsy diagnosis of Cause of death for snake bite cases:

In present study, maximum cause of death was neurotoxic snake bite 3 cases (100%).

Table 26: Profile of autopsy diagnosis of Cause of death for snake bite cases

Cause of death	No. of cases	Percentage
Neurotoxic snake bite	03	100
Total	**03**	**100**

Graph 26: Profile of autopsy diagnosis of Cause of death for snake bite cases:



Profile of clinical diagnosis of Cause of death for snake bite cases:

In present study, maximum cause of death was neurotoxic snake bite 3 cases (100%).

Profile of comparison between the autopsy diagnosis and the clinical diagnosis for snake bite cases:

It was observed that in all cases there was total agreement in the opinion for the cause of death between the autopsy diagnosis and the clinical diagnosis.

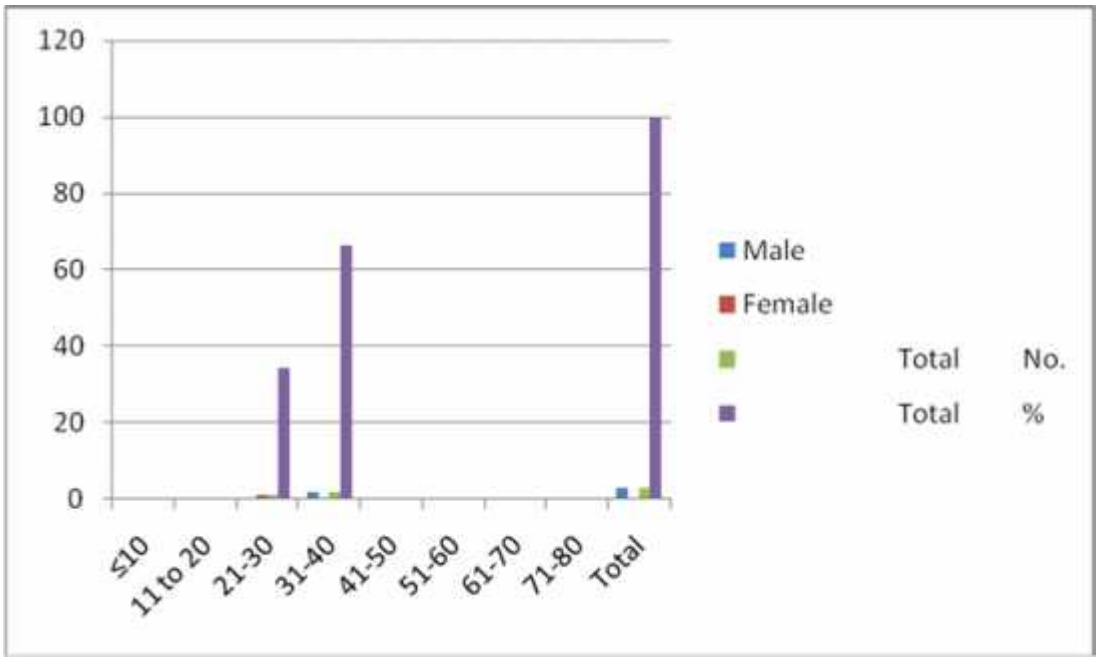
Profile of Age and sex wise distribution of hanging cases:

There were total no of 3 hanging cases. There were 2 (66.6%) males and 1(34.4%) female case. Maximum numbers of victims (2 cases, 66.6%) were in the age group 31-40 years, followed by 21-30 yrs (1 case, 34.4%).

Table 27: Profile of Age and sex wise distribution of hanging cases:

Age group (in years)	Male	Female	Total	
			No.	%
≤10	0	0	0	0
11-20	0	0	0	0
21-30	0	1	1	34.4
31-40	2	0	2	66.6
41-50	0	0	0	0
51-60	0	0	0	0
61-70	0	0	0	0
71-80	0	0	0	0
Total	**03**	**00**	**03**	**100**

Graph 27: Profile of Age and sex wise distribution of hanging cases:



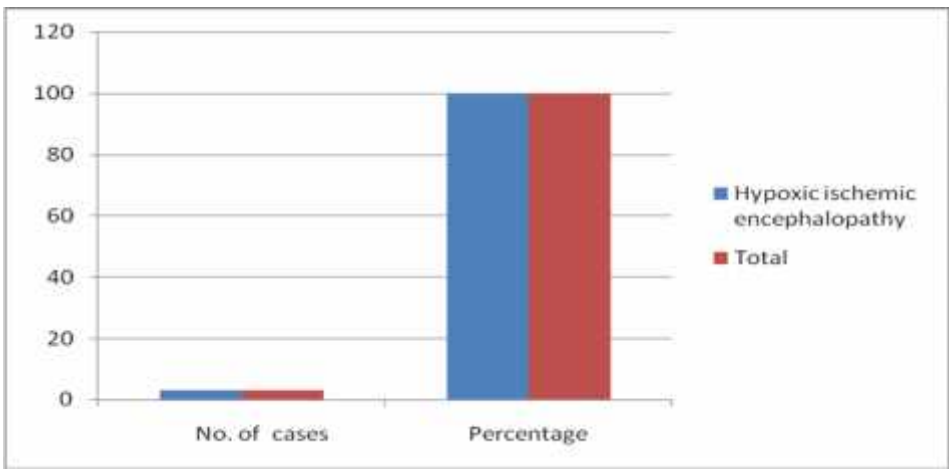
Profile of autopsy diagnosis of Cause of death for hanging cases:

In our present study, maximum cause of death was hypoxic ischemic encephalopathy 3 cases (100%).

Table 28: Profile of autopsy diagnosis of Cause of death for hanging cases:

Cause of death	No. of cases	Percentage
Hypoxic ischemic encephalopathy	03	100
Total	**03**	**100**

Graph 28: Profile of autopsy diagnosis of Cause of death for hanging cases:



Profile of clinical diagnosis of Cause of death for hanging cases:

In the present study, maximum cause of death was hypoxic ischemic encephalopathy 3 cases (100%).

Profile of comparison between the autopsy diagnosis and the clinical diagnosis for hanging cases:

It was observed that in all cases there was total agreement in the opinion for the cause of death between the autopsy diagnosis and the clinical diagnosis.

DISCUSSION

Profile of medico legal autopsies conducted during the study period (Table 1):

During the present study, a total of 100 medicolegal autopsies were conducted out of which 58 cases were of fatal RTA with lesions. Death due to fatal RTAs accounted for more than half (58%) of the total medicolegal autopsies conducted (i.e. more than half of unnatural deaths were due to RTAs). This result is significantly more when compared with results of studies conducted at, Government medical college, Chandigarh (42.18%)[30], AIIMS, New Delhi (35.5%)[31] PGIMS, Rohtak (29.8%)[32] Office of Judicial Medical Officer, Colombo (22.6%)[33] MLN Medical College, Allahabad (42.29%)[34]; KMC, Manipal (36.50%)[35] and RM College, Loni (24.1%)[36]. In the present study, all the victims of fatal RTA had lesions of one or the other systems of the body and had fracture of one or the other bone.

Age and sex wise distribution of cases of fatal RTA (Table 2):

Out of 58 cases, 43 (74%) were males and 15(26%) were females indicating that a large majority of victims were males. Male to female ratio was 2.8:1. Maximum number of victims (13 cases, 22.4%) was in the age group of 41 - 50 years followed by 21- 30 yrs (12 cases, 20.6%). Minimum of victims (2 cases, 3.4%) were found in the age group less than 10 years. Youngest victim was 2 year old female child and eldest was 69 years old male.

Our findings are similar to the results of following studies: In the study conducted at PGIMS, Rohtak [32], males were involved in 89.3% of cases and females in 11.7%. Commonest age group involved was 41-50 years (27.3%), followed by 21-30 years (20.6%). In other study done at Government Medical College, Jammu[37],

majority of the victims were males (88.13%), while females were involved in 11.87% of cases. Most commonly involved age group was 21-30 years (30%), followed by 31-40 years (19.2%). In all the above studies minimum number of victims were in the extremes of age. Similar findings have also been observed in other studies.[38, 39, 40, 41]

The male preponderance in fatal road traffic accidents may be due to the paternalistic nature of our society where males lead a more active life and most of the time is involved in outdoor activities such as driving and travelling. On the contrary, females mostly keep themselves indoor mostly due to cultural background and with the habit of watching TV programmes. Totally more than half (60%) of victims were in the age group 21 – 50 years. This may be due to the fact that persons of this age group lead more active life, more mobile and go out for work and keep themselves outdoors most of the time.

Profile of autopsy diagnosis of cause of death (Table 3):

In present study, cause of death was intracranial injuries (85%) in maximum number of cases. Among the 49 cases of intracranial injury, 47 cases showed fracture of skull. Next to intracranial injuries was hemorrhagic shock (7%), spinal cord contusion (5%) and septicaemia (3%).The findings of the present study is similar to the studies.[42, 43,44,45,46]

Profile of clinical diagnosis of cause of death (Table 4):

In our present study, cause of death was intracranial injuries (75%) in maximum number of cases. Next to intracranial injuries was spinal cord contusion (5%) and septicaemia (5%). Hemorrhagic shock 3%, pneumonia 3%, aspiration pneumonia, multi organ failure, pneumothorax, pulmonary embolism 2% each.

Profile of comparison between the autopsy diagnosis and the clinical diagnosis for fatal RTA cases (Table 5):

It was observed that in 6 (10%) cases out of 58 cases of the total RTA cases there was disagreement regarding the opinion of cause of death. In the other 52 (90%) of the cases there was complete agreement with respect to the cause of death. In a study conducted at Dundee on motor neuron disease the clinical diagnosis was confirmed at autopsy in 44 (100%) cases out of 44 cases, which matches with our study of 90% of total agreement.[15] In another study conducted at Manhasset there were 5 cases (10%) where autopsy revealed a major finding related to the cause of death that, if known prior to death, would have altered management.[17] In a study conducted at Kharian[27] in 15% of the cases there was discrepancy in diagnosis of cause of death between the clinical and the autopsy diagnosis which matches with our study. In a study conducted at Mexico, clinical diagnosis successfully addressed the cause of death in 40% of the cases. Low values for concordance between clinical diagnosis and autopsy diagnosis were present in 60% of the cases.[5] In another study conducted 248 institutions in America at least one major unexpected finding that contributed to patient's death was discovered in 39.7% of the total autopsies conducted[18] which are against our study findings. In a study conducted at Cleveland the discordance between clinical and autopsy diagnosis was 19.8% cases, in 44.4% of the discordant cases, management would have been modified had the autopsied diagnosis been made premortem.[19] In a study conducted at Brazil there was disagreement in 72% of the cases between the clinical diagnosis and the autopsy diagnosis. [21]

Profile of External injury for fatal RTA cases (Table 6):

In the present study external injuries were seen in 56 cases and the remaining 2 cases did not show any of the external injuries. External injuries were like abrasions, lacerations and contusions were seen. Injuries like incised or penetrating wounds were never encountered in our study. Abrasion type of external injuries were maximum (97%) followed by lacerations (93%) and contusions (93%). The findings of our study were similar to study done in Rothak.[32] According to a study done in Manipal, (D) [47], 87.20% of the cases showed associated external injuries, while the remaining 12.80% did not show any external injuries.

According to a study done by Ganveer GB et all[48], fracture of the bones was the common injury afflicted to the victims followed by multiple injuries like blunt injury, abrasions and lacerations.

Profile of Internal injury & Soft tissue involvement for fatal RTA cases (Table 7 & 8):

In present study internal injuries were classified like bone fracture and soft tissue injuries. Bone fracture was seen among 54 cases and soft tissue injuries were seen in almost all i.e. 58 cases. In our present study, soft tissue injuries were classified as head & neck, thorax, abdomen & pelvis. In head & neck, brain injuries were seen in 41 cases, spinal cord injury was seen in 3 cases and intracranial haemorrhages was seen in 50 cases. In thorax, lung injuries were seen in 7 cases and heart injuries in 2 cases. In abdomen, kidney injuries were seen in 1 case, spleen injuries were seen in 2 cases and liver injuries in 3 cases. In pelvis, no soft tissue involvement was seen. The findings were similar to study done by[44]. According to study done Jos, Nigeria [49], multiple fractures long bones without head injury accounted for 37.7%, followed by

head/upper spinal injuries 24.6%, crushed body injuries 22%, while, intra-abdominal organ injuries which accounted for 15.6%. Head was the most commonly involved region in our study and is similar to the studies done. [43,44,45]

Profile of Bone fracture for fatal RTA cases (Table 9):

In this study, bone fracture was seen in 54 cases. The bone fracture includes fracture of skull, ribs, lumbar vertebrae, pelvic bone & long bones. Skull fracture was seen in 47 cases. Ribs fracture in 12 cases, lumbar vertebrae fracture in 1 case, pelvic bone fracture in 2 cases and long bone fracture in 2 cases.

Fracture of skull was most commonly observed in the study conducted at Brisbane, Queensland (48.3%) [50]; PGIMS, Rohtak (51.6%) [32]; Birmingham Accident Hospital, Birmingham (52.18%) [51]; Office of Judicial Medical Officer, Colombo (71.37%) [33]; Birmingham and Werwickshire (60%). [52] However, number of cases with skull fracture (82%) is significantly higher in our study. In the first three studies, ribs fracture formed the commonest group next to skull fracture, and is similar to our finding. In the last two studies, the next most common fracture was of leg bones which are contrary to our result.

Profile of Internal Injury in head & neck for fatal RTA cases (Table 10):

In the present study, brain injury (laceration/contusion) was seen in 41 cases and all associated with fracture of the skull. The spinal cord injury was seen in 3, of which 01 case had fracture of skull. The intracranial haemorrhage was seen in 50 cases, of which 47 cases showed fracture of skull. The findings of our study are similar to study done at Rohtak[32].

Profile of Intra cranial haemorrhage for fatal RTA cases (Table 11):

In present study, brain haemorrhages were classified as extradural haemorrhage, subdural haemorrhage, subarachnoid haemorrhage, intra cerebral/cerebellar haemorrhage and brain stem haemorrhage. Subarachnoid haemorrhage was most commonly seen (48 cases), followed by sub dural haemorrhage (44), extradural haemorrhage and intra cerebral/cerebellar haemorrhage (each in 8 cases). Least seen was brain stem haemorrhage (1 case). Subarachnoid haemorrhage was associated with subdural haemorrhage in 43 cases. Subarachnoid haemorrhage was associated with intracerebral haemorrhage in 8 cases. Subarachnoid haemorrhage was associated with extradural haemorrhage in 6 cases. Extradural haemorrhage was appreciated in only 8 cases. Extradural haemorrhage was sweaped out in most of the cases due to fracture of skull. Hence it was not appreciated at autopsy. All the 8 cases of extradural haemorrhage had fracture of the skull. Among the 44 cases of subdural haemorrhage, 41 had fracture of skull. Among the 48 cases of subarachnoid haemorrhage, 45 had fracture of the skull. Among the 8 cases intra cerebral/cerebellar haemorrhage, 7 had fracture of the skull. In the single case of brain stem haemorrhage, there was fracture of skull. Significant association was seen between subarachnoid and subdural haemorrhage in our study. According to various study, sub dural haemorrhage is the most common haemorrhage which differs from our study done. [32, 42,45,46,53]

Profile of Internal Injury in thorax for fatal RTA cases (Table 12):

In this study, injuries in thorax were classified as ribs fracture, thoracic vertebrae fracture, lung injury, heart injury and diaphragm injury. Ribs fracture was seen in 12 cases followed by lung injury in 06 cases and least was heart injuries in 1

cases. Most of the lung injuries were associated with rib fracture. All the cases involving heart showed fracture of ribs. The findings of the present study are similar to study at North Bengal[42] except in injuries associated with rib fracture.

Profile of Internal injury in abdomen and pelvis for fatal RTA cases (Table 13):

In present study, abdominal injuries were classified as stomach & intestine, liver, spleen, kidney, lumbar vertebrae and pelvis. Among them, spleenic injury was maximum, seen in 4 cases, followed by kidney, lumbar vertebrae & pelvis involvement in 3 cases, and then liver inn 2 cases. Injury to kidney and with spleen was seen in 1 case. Injury to spleen with pelvis fracture was seen in 1 case. According to other studies done, liver was the most commonly involved abdominal organs. [42, 45]

Profile of Internal injury in limbs for fatal RTA cases (Table 14):

In this study, lower limb bones fracture was seen in 3 cases and upper limb bones in 2 cases. Out of which 1 lower limb bone fracture was not associated with any other fracture. Among the 2 cases of upper limb bone fracture, 1 was associated with rib fracture where as other was associated with skull fracture. There was no involvement of any great vessels. The finding of our study is similar to the studies. [32, 46]

Profile of Age and sex wise distribution of cases of Burns (Table 15):

Out of 24 cases, 10 (41.6%) were males and 14 (49.4%) were females indicating that a large majority of victims were female. Maximum numbers of victims (8 cases, 33.3%) were in the age group 21 - 30 years, followed by 31- 40 yrs (5 cases, 20.8%). In a study conducted at Chandigarh it was found that the females aged 21 -25 years were the most common victims accounting for 37% of the total burn cases.[54] In another study conducted at Akola it was found that 80.8% were females and 71.9% belonged to the age group 21-40 years.[55] This is very similar with our study. Minimum victims were found in the age group of 01-10 yrs (1cases, 4.1%). and more than 70 years no cases were there. Youngest victim was 2 years old female child and eldest was 65 years old female. 70% of victims were between 11 to 40 years. Similar results were found in a study conducted at Manipal.[56]

Profile of autopsy diagnosis of Cause of death for Burns (Table 16):

In present study, maximum cause of death was septicemic shock 17 cases (70.9%) followed by hypovoluemic shock 6 cases (25%), neurogenic shock 1 case (4.1%). In the study conducted at Chandigarh septicemia was the cause of death in 65% of the cases.[54] In a study at Manipal the majority of the deaths 50.9% were due to septicemia.[56]

Profile of comparison of clinical and autopsy diagnosis for burns cases.

There was total agreement in the diagnosis for the cause of death between the clinical and the autopsy diagnosis.

Profile of Period of survival following Burns (Table 18):

In this study, 1 victim (4.1%) died within 24 hours after the accident, after 24 hours but within 48 hours 6 victims (25%) died. The cases which succumbed between 3 days to week were 16 (66.6%) and 1 case between 2 to 4 weeks. This result is similar with the study conducted in Nigeria where 66.7% of the deaths occurred within the first week of admission.[57]

Profile of percentage of burns (Table 19):

In present study 8 (33.5%) of the cases were with 71-80% of burns followed by 6 (25%) cases with 61-70% of burns. 4 (16.6%) cases each were found with 81-90% and 91-100%. In a study conducted in Chisinau 35 % of the cases were with 71-80% of burns which is similar to our study.[16]

Profile of age and sex wise distribution of poisoning cases. (Table 20):

Out of 8 cases, 5 (62.5%) were males and 3 (37.54%) were females. Maximum numbers of victims (3 cases, 50%) were in the age group 31-40 years, followed by 11- 20 yrs (2 cases, 25%), 31-40 (1case,12.5%), 41-50 (1 case,12.5%), 21-30 (1 case). In a study conducted at Davangere majority of the victims were males 57.15% and the commonest age group was between 31-40 years (42.29%) which is similar to our study.[58]

Profile of autopsy diagnosis of Cause of death for Poisoning. (Table 21):

In present study, maximum cause of death was organophosphorous poisoning 8 cases (100%) which matches with the study conducted at Davangere, which was 73.14%.[58]

Profile of comparison of clinical and autopsy diagnosis of cause of death.

It was observed that in 7 cases there was total agreement in the opinion for the cause of death between the autopsy diagnosis and the clinical diagnosis. In only one case clinical cause of death was given as aluminium phosphide poisoning whereas the autopsy diagnosis was organophosphorous poisoning. In a study at Manipal toxicological report showed positive for organophosphorous poisoning in 70% of cases.[59]

Profile of Age and sex wise distribution of fall from height cases (Table 23):

There were total no of 4 fall from height cases. All cases were males, (100%). There were no female cases. Maximum numbers of victims (2 cases, 50%) were in the age group 31-40 years, followed by 11- 20 yrs (2 cases, 50%). In a study conducted in Jammu, there were 74% of males with 49% of cases in the age group between 21-30 years.[60]

Profile of autopsy diagnosis of cause of death for fall from height cases. (Table 24):

In present study, maximum cause of death was haemorrhagic shock 3 cases (75%) and 1 case (25%) the cause of death was intracranial haemorrhage. In the study

conducted at Jammu, the cause of death was spinal cord injury 75% cases.[60] In our study the sample size was too less that was only 4 cases.

Profile of comparison of clinical and autopsy diagnosis for fall from height cases:

There was total agreement between the clinical and the autopsy diagnosis for the cause of death.

Profile of age and sex wise distribution of snake bite cases. (Table 25):

There were total no of 3 snake bite cases. All cases were males. There were no female cases. Maximum numbers of victims (2 cases, 66.6%) were in the age group 31-40 years, followed by 51-60 yrs (1 case, 34.4%). In a study conducted at Hyderabad, 76% of the cases were males and 71% of the cases were in the age group 21-50 years.[61]

Profile of comparison of clinical and autopsy diagnosis for snake bite cases.

It was observed that in all cases there was total agreement in the opinion for the cause of death between the autopsy diagnosis and the clinical diagnosis. Cause of death was given has neurotoxic snake bite and its complications.

Profile of Age and sex wise distribution of hanging cases. (Table 27):

There were total no of 3 hanging cases. There were 2 (66.6%) males and 1(34.4%) female case. Maximum numbers of victims (2 cases, 66.6%) were in the age group 31-40 years, followed by 21-30 yrs (1 case, 34.4%). In the study conducted at New Delhi it was observed that 55% were females and the age group was between 15-20 years. The findings were against our study due to less number of cases.[62]

Profile of comparison of clinical and autopsy diagnosis of cause of death in hanging cases:

In the present study, maximum cause of death was hypoxic ischemic encephalopathy 3 cases (100%) and it was in total agreement with the clinical diagnosis. In the study conducted in India it was concluded that hanging leads to hypoxic ischemic encephalopathy.[63]

CONCLUSION

From this study it is concluded that medico legal autopsies revealed major unexpected findings that are of clinical importance and a continued emphasis on clinical and autopsy correlation is necessary for the improvement of the quality of patient care.

The deaths due to RTAs accounted for 58% of total medico legal autopsies conducted (i.e. more than half of unnatural deaths were due to RTAs). All the victims of fatal RTAs had injuries of one or other system. In this present study, cause of death was intracranial injuries (85%) in maximum number of cases. Next to intracranial injuries were hemorrhagic shock (7%), spinal cord contusion (5%) and septicemia (3%). This shows that intracranial injuries are most common fatal injuries in road traffic accidents in this region. This could be due to the fact that, the intracranial injuries cannot be treated successfully, even in tertiary level hospitals. This may be because of their physiological and anatomical configuration.

It was observed that in 6 (10%) cases out of 58 cases of the total RTA cases there was disagreement regarding the opinion of cause of death. In the other 52 cases i.e. in 90% of the cases there was complete agreement with respect to the cause of death.

In poisoning cases it was observed that in 7 cases there was total agreement in the opinion for the cause of death between the autopsy diagnosis and the clinical diagnosis. In only one case clinical cause of death was given as aluminium phosphide poisoning whereas the autopsy diagnosis was organophosphorous poisoning.

In this study, in burns cases maximum cause of death was septicemic shock 17 cases (70.9%) followed by hypovoluemic shock 6 cases (25%), neurogenic shock 1 case (4.1%). Out of 4 cases of fall from height maximum cause of death was hemorrhagic shock 3 cases (75%) and 1 case (25%) the cause of death was intracranial hemorrhage. Out of 3 snake bite cases, the cause of death in all the cases was due to neurotoxic snake bite. In hanging cases maximum cause of death was hypoxic ischemic encephalopathy 3 cases (100%). In all these cases there was total agreement for the cause of death between the autopsy diagnosis and the clinical diagnosis.

The overall disagreement for the diagnosis of cause of death between clinical and autopsy diagnosis was in 7(7%) cases, out of 100 cases studied. The accuracy of clinical diagnosis was correct in 93(93%) cases. In cases where there was disagreement, knowledge of the correct diagnosis would have altered therapy. Although the autopsy is being undermined, they are still the most accurate method of determining the cause of death and auditing accuracy of clinical diagnosis, diagnostic tests and death certification.

Clinical autopsy is no less important as it has contributed immensely to enrichment of medical knowledge since time immemorial. Thorough and in depth medical knowledge is the back bone of forensic medicine. Thus both clinical and forensic autopsies have a complimentary role towards each other. Comparison between the clinical and autopsy diagnosis of cause of death in both medicolegal autopsies and the clinical autopsies should be encouraged.

SUMMARY

The present study was a cross-sectional study conducted in KLES's Dr Prabhakar Kore Hospital & MRC, Belgaum during 1 year period from 1st January 2008 to 31st December 2008. During the study period, a total of 100 victims of medico legal cases who died in the KLES's Dr Prabhakar Kore Hospital and Medical Research Centre, Belgaum and subsequently autopsied were studied. The purpose of the study was to study the autopsy diagnosis of cause of death, compare it with the clinical diagnosis, evaluate the accuracy of clinical diagnosis cause of death and age and sex wise distribution of medico legal autopsies.

The predesigned and pretested proforma was used to collect the required data and following were the findings:

1) Out of 100 medico legal autopsies, 68 (68%) were males and 32 (32%) were females.
2) The largest number of victims was in the age group 31-40 years (28%).
3) Out of 100 cases, in all cases the autopsy diagnosis successfully addressed the cause of death.
4) Out of 100 cases in 93% of the cases there was complete agreement in the opinion for the cause of death between the clinical and the autopsy diagnosis.
5) Out of 100 cases in 7% of the cases there was difference in the opinion for the cause of death between the clinical and the autopsy diagnosis.
6) Out of 58 cases of RTA the clinical diagnosis of cause of death was in agreement with autopsy diagnosis in 52 (90%) of the cases, in 6 (10%) of the cases there was difference.

7) An intracranial injury alone was responsible for death in 44 cases (75%) followed by hemorrhagic shock in 4 cases (7%).

8) Out of 24 cases of burns, septicemia shock was the cause of death in 17 cases (70.9%) and there was total agreement in all the cases with the clinical diagnosis.

9) Out of 8 cases of poisoning the autopsy diagnosis of cause of death was organophosphorous compound poisoning in all the cases. The clinical diagnosis for cause of death was not in agreement in only 1 case (12.5%), in which it was given as aluminium phosphide poisoning.

10) Out of 4 cases of fall from height the autopsy diagnosis cause of death was hemorrhagic shock in 3 cases (75%) and in 1 (25%) case it was intracranial hemorrhage. There was total agreement with the clinical diagnosis.

11) Out of 3 cases of snake bite the autopsy diagnosis of cause of death was neurotoxic snake bite in all the cases which were in agreement with the clinical diagnosis.

12) Out of 3 cases of hanging the autopsy diagnosis of cause of death was hypoxic ischemic encephalopathy in all the cases which were in agreement with the clinical diagnosis.

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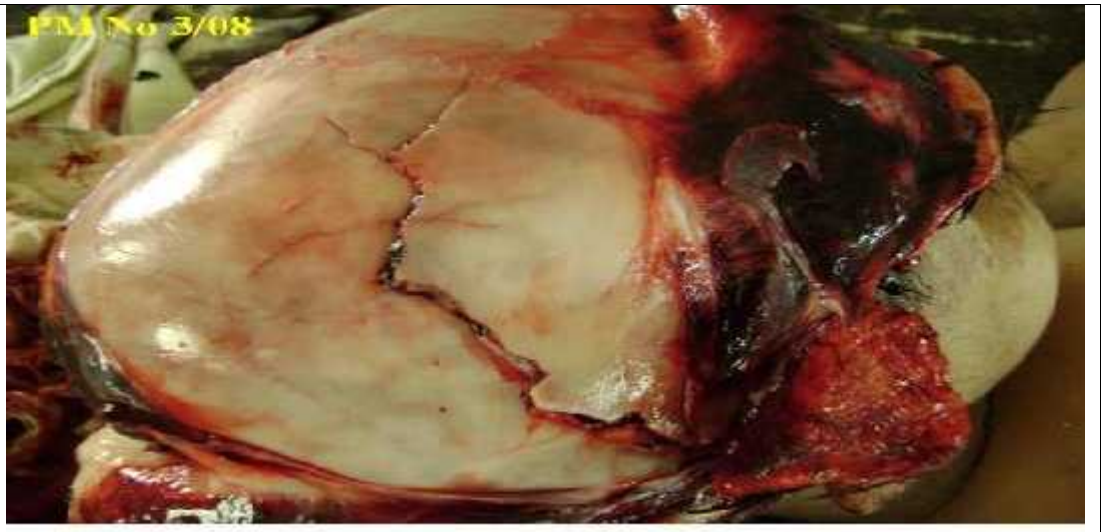
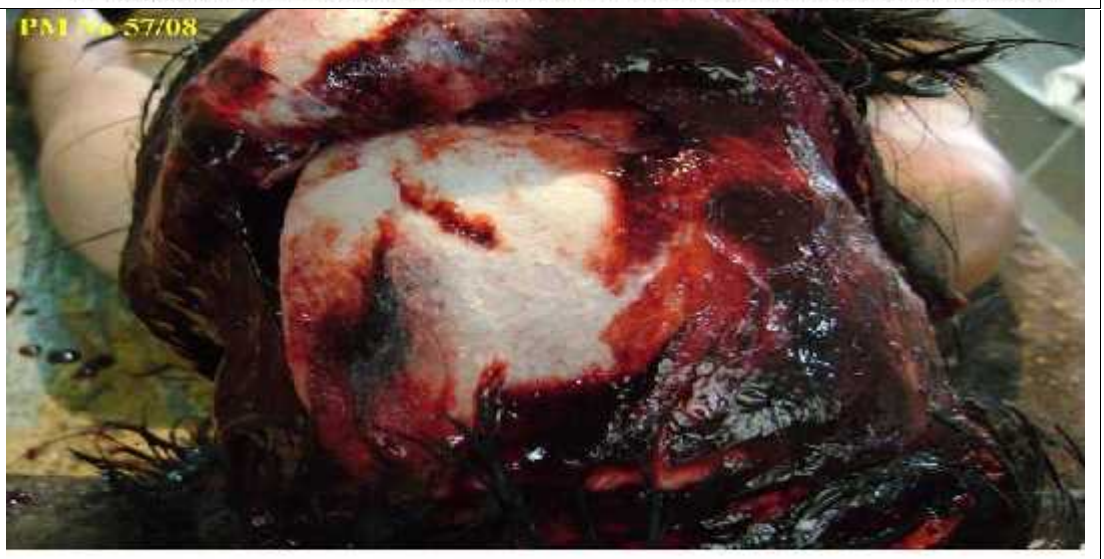
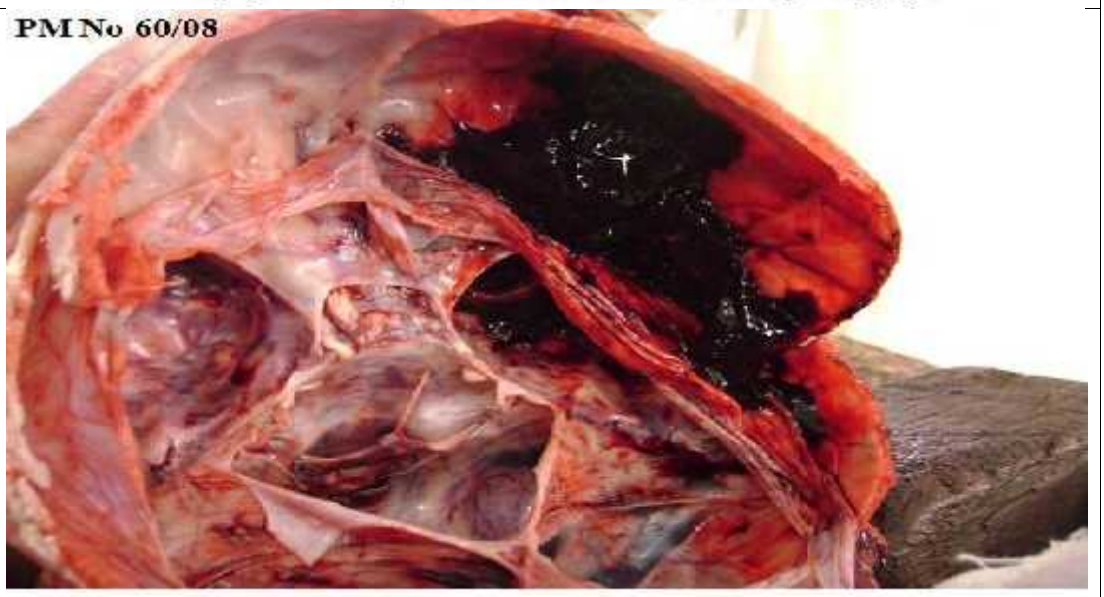


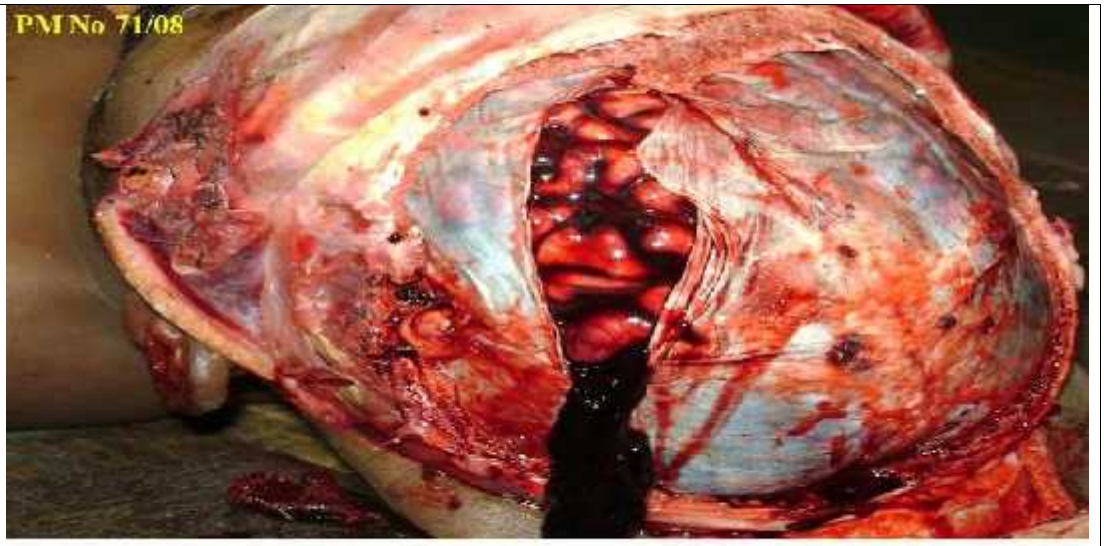
Photograph No. 1 Showing Linear fracture of the Skull on reflection of Scalp.



Photograph No. 2 Showing Linear fracture of the Skull and bleeding in Scalp Layer

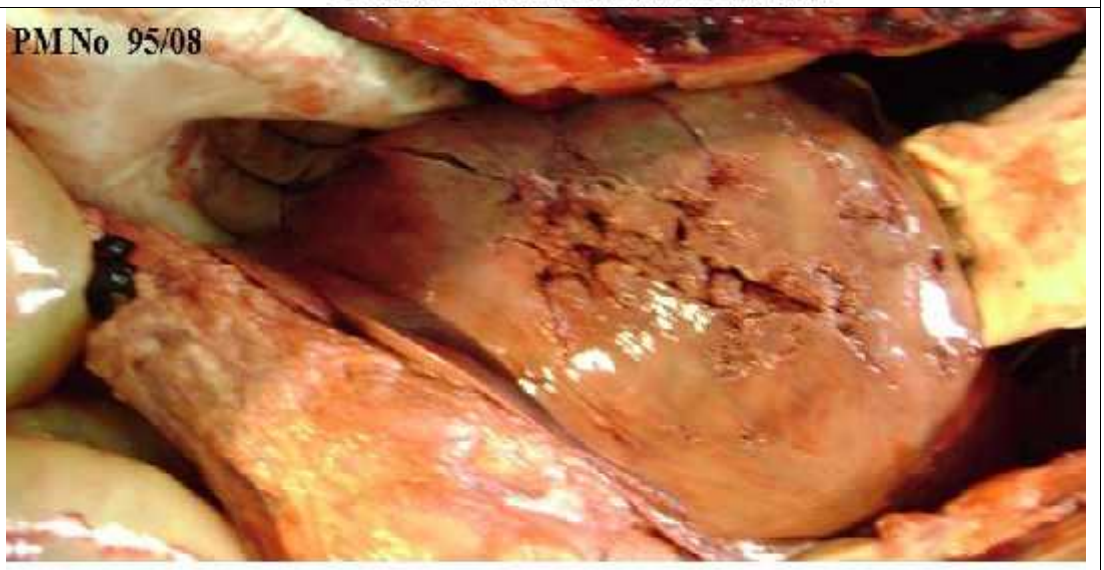


Photograph No. 3 Showing Extra Dural Haemorrhage.



Photograph No. 4 Showing Sub Dural Haemorrhage

Photograph No. 5 Showing Sub Arachnoid Haemorrhage



Photograph No. 6 Showing Laceration of Liver.

ANNEXURE – II

INFORMED CONSENT

This study is undertaken to compare clinical and autopsy diagnosis of cause of death at K.L.E.S' S Prabhakar Kore Hospital and MRC, Belgaum - A one year cross sectional study, during the period 1st January 08 to 31st December 2008. The cases autopsied during this period are included in this study. We ask that you read this form and ask any questions you may have before agreeing to give consent for collecting the required data.

Information regarding bio-data of the victim and circumstances of the accident will be collected from you, by asking questions as entered in the questionnaire. This interview may cause psychological discomfort to you. Injuries as well as other postmortem findings will be recorded at the time of autopsy procedure. If required, photographs will be used ensuring that the identity of the subject won't be revealed, but kept confidential to the extent permitted by law.

As such there is no direct benefit on the part of the subject but you will be providing information for the welfare of the society.

All the information collected during this study will be kept confidential to the extent permitted by law. Information, which identifies the subject, will not be released unless required by the court. Information from this study may be published, but the identity of the subject won't be revealed.

You will not be paid or offered any gifts during the study.

Your decision whether or not to participate will not affect the usual procedure. If you decide to participate, you are free to withdraw at any time.

During the study period if the case proved to be a case other than that intended in the study your participation in this study will be withdrawn without your consent.

Consent to participate in this study:

I give consent to carry out the study on the deceased by **Dr. Hemanth Raj M.N**, by signing on the line below, I have gone through the question form in detail/ read to me/ made me understand in my own language.

Signature of the participant or legally authorized representative

Name of-the deceased

Name of the parents/relatives/guardians.

Signature of parents/relatives/guardians.

Experimenter's name Experimenter's Sign

Dr. Hemanth Raj. M. N

Date:

ANNEXURE – III

PROFORMA

"COMPARISON OF CLINICAL AND AUTOPSY DIAGNOSIS OF CAUSE OF DEATH AT K.L.E.S'S PRABHAKAR KORE HOSPITAL AND MRC, BELGAUM - A ONE YEAR CROSS SECTIONAL STUDY"

PROFORMA FOR DOCUMENTATION OF DETAILS OF SUBJECTS

I. General particulars

1. Serial Number :
2. P.M Number and Date :
3. Cr/UDR Number: _____ of _____ PS.
   U/S: _____
   Ref. from P.S _____
4. Name :
5. Age :
6. Sex :
7. Address :

8. Date and time of admission to hospital :
9. Date and time of death :
10. Identification marks :
    a.
    b.
11. Clinical history and findings :

ANNEXURE – III

PROFORMA

12. Radiological (X-ray findings or C.T Scan) :

13. Clinical cause of death :

14. Autopsy findings :

    a. External examination :

        i. Post mortem changes :

        ii. External injuries :

        iii. Stains and clothing's :

    b. Internal examination :

        i. Head :

            - Skull fracture :
            - Brain lesions :

        ii. Neck :

        iii. Thorax :

        iv. Abdomen :

        v. Upper and lower limb :

        vi. Genitalia :

15. Organs for chemical analysis / Histopathological study :

16. Time since death :

17. Cause of death :

ANNEXURE – IV

KEY TO MASTER CHART

Sl. No.	-	Serial number
M	-	Male
F	-	Female
PS	-	Police Station
E.D.H	-	Extra Dural Haemorrhage
S.D.H	-	Sub Dural Haemorrhage
S.A.H	-	Sub Arachnoid Haemorrhage
Intra Ce/Cer	-	Intra Cerebral/Cerebellar Haemorrhage
Brain S.He	-	Brain Stem Haemorrhage
ICH	-	Intracranial Haemorrhage
HS	-	Haemorrhagic shock
SCC	-	Spinal cord contusion
SS		Septicaemic shock
MOF		Multi organ failure
HI		Head injury
S		Shock
OPP		Organo phosphorous poisoning
SII		Severe inhalation injury
APP		Aluminium phosphide poisoning
hs		Hypovoluemic shock
PT		Pneumothorax
PE		Pulmonary embolism
MI		Multiple injuries
AP		Aspiration pneumonia
CC		Cervical cord contusion
ARF		Acute renal failure
HIE		Hypoxic ischaemic encephalopathy
SB		Neurotoxic snake bite

Sl No	AutopsyNo	P.S	Name	Age(yrs)	Sex	Time of incidence	Survival			Type of case							Head & neck														Thorax								Abdomen												Upper Limbs						Lower Limbs						CT findings												Organs For C.A	Organs For H.P.E	microbiology	Clinical cause of	Autopsycause Of Death
																	External			Internal											External			Internal					External			Internal						Bone Fracture			External			Internal			External			Internal			ICH				skull #					spinal #							
																				Bone Fracture		Viscera				Haemorrhages								Bone Fracture		Viscera																																											
							<24hrs	>24hr<1w	>1w<2w	RTA	Burns	Poison	Assault	Snake bite	Fall from height	Hanging	Abrasion	Laceration	Contusion	Skull	Facial	Cerebrum	Cerebellum	Brainstem	Sp.Cord	E.D.H	S.D.H	S.A.H	Intra Ce.	Brain S.He	Abrasion	laceration	contusion	Ribs	ThoracicV	Lungs	Heart	Diaphragm	Abrasion	Laceration	Contusion	Stomach&Intestine	Kidneys	Spleen	Liver	Bladder	Genitalia	Lumbar vertebre	Sacral Vertebre	Pelvis	Abrasion	Laceration	Contusion	Vessels	Soft Tissue	Bone Fracture	Abrasion	Laceration	Contusion	Vessels	Soft Tissue	Bone Fracture	EDH	SAH	SDH	ich	linear	basilar	communited	depressed	others	cervical	thoracic	lumbar					
1	1	KAT	SYN	22	M	8PM			+		+						+		+			cg	cg														cg	cg					+	cg	cg	cg																																			+	SS	SS
2	2	MAR	NAM	50	M	9AM		+		+							+	+	+									CT+	CT+		+	+	+	X +																																	CT+		CT+													MOF	HI
3	3	RUG	FS	26	M	9PM		+		+							+	+	+	+															X +									CT +													X +											+												ICH	ICH
4	4	BIG	HS	45	M	7PM	+				+										cg	cg														cg	cg					+	cg	cg	cg																																			+	SS	SS
5	5	MAR	HK	35	M	9PM		+		+							+	+	+	+							CT+	CT+																																								CT+	CT+														ICH	ICH
6	6	NT	CH	7	M,	4PM		+		+							+	+	+	+		CT +					CT+																																												CT+														ICH	ICH
7	7	GP	RBA	18	M	9AM	+			+							+	+	+	+		CT +	CT +					CT+																																								CT+					+	+								ICH	ICH
8	8	APMC	CHA	53	M	1OPM			+	+							+	+	+																																	CT +																															ich	ICH
9	9	SUT	CGC	46	M	7PM	+				+										cg	cg														cg	cg					+	cg	cg	cg																																				S	S
10	10	BR	SLK	19	F	5PM			+	+							+	+	+	+		CT +	CT +					CT+																																								CT+												+	+		OPP	OPP
11	11	ST	VBB	30	F	9PM					+										cg	cg														cg	cg					+	cg	cg	cg																																				SII	S
12	12	CPI	BGP	17	F	8PM			+			+										cg	cg														cg	cg						cg	cg	cg																																	+			OPP	OPP
13	13	GR	MSP	8	M	5PM			+	+							+	+	+	+		CT +	CT +				CT+	CT+																																								CT+	CT+														ICH	ICH
14	14	KGD	DDP	44	M	11AM				+							+	+	+								CT+	CT+																																								CT+	CT+														ich	HI
15	15	MUG	VIV	17	F	2PM	+					+									cg	cg														cg	cg						cg	cg	cg																																	+			APP	OPP
16	16	NT	MH	19	M	8AM	+			+							+	+	+																X +		CT +																																													ich	HI
17	17	APMC	GH	30	F	8AM					+										cg	cg														cg	cg					+	cg	cg	cg																																			+	SS	SS
18	18	NSG	SH	26	F	8PM		+		+							+	+	+	+						CT+	CT+	CT+																																						CT+	CT+	CT+													ich	HI
19	19	NT	BR	40	M	9AM		+			+									cg	cg														cg	cg					+	cg	cg	cg																																			+	SS	SS
20	20	RB	SH	69	F	2AM		+			+									cg	cg														cg	cg					+	cg	cg	cg																																			+	SS	SS
21	21	RB	AAS	38	M	01AM		+				+							+		cg	cg														cg	cg						cg	cg	cg																																	+			OPP	OPP
22	22	SKR	RA	28	M	9AM		+				+							+		cg	cg														cg	cg						cg	cg	cg																																	+			OPP	OPP
23	23	BIL	RS	64	M	11PM	+			+							+	+	+	+		CT +					CT+	CT+																																								CT+	CT+														hs	HS
24	24	KNP	SM	36	M	8PM		+		+							+	+	+	+		CT+				CT+	CT+	CT+			+	+	+																																	CT+	CT+	CT+													PT	MI
25	25	SUD	RG	47	M	1PM		+		+							+	+	+	+		+	+					+			+	+	+	+		+									+																					+															MOF	HI
26	26	APMC	SP	55	M	3PM		+		+							+	+	+									+			+	+	+	+																																					+															SS	PN
27	27	HB	SIP	18	M	5PM		+		+							+	+	+	+							+	+			+	+	+	+											+																					+	+		+					+								ich	ICH
28	28	GK	JS	24	M	4PM	+								+																						L																																																	HS	HS
29	29	ST	BSK	38	F	5PM				+							+	+									+	+			+	+	+	X +																																				+	+															PE	HS
30	30	HUK	GSA	54	M	6PM		+		+									+		+						+			+	+	+																																						+															hs	hs
31	31	CHG	KR	35	F	4PM			+	+										+								CT+									X +																																				CT+																ich	ICH
32	32	TPS	MGK	22	F	5PM	+			+							+	+	+	+		+					+	+							+		+																																		+	+															ich	ICH
33	33	YK	KRM	44	M		+			+							+	+	+	+		CT +					CT +	CT +			+	+	+			+																																			CT +	CT +		+												ich	HI
34	34	APMC	RSP	54	M	10PM	+			+							+	+	+	+		+					+	+			+	+	+																											+						+		+	+															Pn	HI
35	35	TS	NGP	55	M	7AM			+	+							+	+	+	+		+					+	+										+																																		+	+															ich	ICH
36	36	CH	RM	64	M	8PM		+		+							+	+	+	+							+	+	+																																								+	+	+	+													ICH	ICH
37	37	NIP	VR	33	M	4PM	+			+							+	+	+	+							+	+			+		+	+																																						+	+							+								CC	CC
38	38	NAG	PR	28	M	7AM		+		+							+	+	+	+		+						+																			US +																									+															hs	hs
39	39	DWD	MH	49	M	9PM	+								+																																																															+													HS	HS
40	40	NT	FL	62	M	1PM	+			+							+	+	+	+							+	+																																										+	+															ich	ICH
41	41	APMC	SA	19	M	8PM		+		+							+	+	+																																																												+										ICH	ICH
42	42	ST	ALL	39	F	3PM	+			+							+	+	+													+	+	+	+		+	+		+		+		+	+																																							ICH	ICH
43	43	KGD	PR	27	M	8PM		+		+							+	+	+	+								+																																													+															ARF	ARF
44	44	YKD	DL									+										cg	cg														cg	cg					+	cg	cg	cg																																				S	S
45	45	HK	BR	58	F	8AM			+	+							+	+	+	+							CT +	CT +																																								CT +	CT +		+												ICH	ICH
46	46	CH	RS	44	M	8PM	+			+							+	+	+	+							+	+																																										+	+															ICH	ICH
47	47	SKR	SG	26	M	8PM					+										cg	cg														cg	cg					+	cg	cg	cg																																			+	SS	SS
48	48	CH	SN	24	F	4PM										+																					cg	cg						cg	cg	cg																																				HIE	HIE
49	49	JK	MA	14	F	3PM					+										cg	cg														cg	cg					+	cg	cg	cg																																			+	SS	SS
50	50	NT	JP	33	M	7PM		+			+									cg	cg														cg	cg					+	cg	cg	cg																																			+	SS	SS

51	51	AT	KS	62	M	1PM	+								+					+																																												+					+									HS	HS
52	52	CH	YP	64	F	11AM	+								+					+																																																										ICH	ICH
53	53	NT	AIK	28	M	5PM		+		+							+	+	+	+		CT +					CT +	CT +		CT +																																			CT +	CT +		+											ICH	ICH
54	54	KI	BP	49	M	8PM		+				+								+		cg	cg													cg	cg						cg	cg	cg																														+			OPP	OPP
55	55	LOP	CP	54	M	7PM	+			+							+	+	+	+		+	+				+	+																																					+	+													HS	ICH
56	56	KI	MP	41	M		+			+							+	+	+	+		+					+	+			+	+	+	+		+	+								+																				+	+		+											Pn	ICH
57	57	NT	AG	48	M	11PM			+	+							+	+	+	+							+	+						+																															+	+		+											ICH	ICH
58	58	BE	AB	31	F	8PM	+			+							+	+	+	+		+					+	+																																					+	+													PP	PP
59	59	BA	NA	39	M	4PM	+			+							+	+	+	+		+				+	+	+	+					+																														+	+	+	+												ICH	ICH
60	60	MAR	MFN	65	M	2PM				+							+	+	+	+		CT +				CT +	CT +	CT +	CT +					CT +																														CT +	CT +	CT +	CT +												HI	HS
61	61	MAH	HAB	58	M	11AM			+	+							+	+	+	+		CT +				CT +	CT +	CT +																																				CT +	CT +	CT +		+											ich	ich
62	62	JK	HMK	50	M	8PM		+		+							+	+	+								CT +	CT +																																					CT +	CT +													ICH	ICH
63	63	LOP	MPM	14	F	1AM	+			+							+	+	+												+	+	+	+		+	+																																								CRF	CRF
64	64	NT	ASP	35	F	8PM		+			+											cg	cg													cg	cg					+	cg	cg	cg																																	S	S
65	65	KT	RHM	10	M	7PM			+	+							+	+	+																																																										ICH	ICH
66	66	KT	MA	31	M	4AM		+				+								+		cg	cg													cg	cg						cg	cg	cg																														+			OPP	OPP
67	67	BIL	MAL	19	F	10PM			+		+											cg	cg													cg	cg					+	cg	cg	cg																																+	SS	SS
68	68	JK	RS	22	M	11PM		+		+							+	+	+	+		CT +				CT +	CT +	CT +	CT +																																			CT +	CT +	CT +	CT +												AP	ICH
69	69	MUR	MMP	36	M	8PM		+		+							+	+	+	+		+				CT +	CT +	CT +								CT +																												CT +	CT +	CT +													ICH	ICH
70	70	BR	AK	64	F	5AM		+		+							+		+																									CT +						CT +																												hs	hs
71	71	MAH	KP	23	M	7PM		+		+							+	+	+	+		CT +					CT +	CT +																																					CT +	CT +													ICH	ICH
72	72	RA	MAH	9	M	11AM		+		+							+	+	+	+		CT +				CT +	CT +	CT +																																				CT +	CT +	CT +													HPT	HS
73	73	KP	NA	69	M	2PM		+		+							+	+	+	+		CT +				CT +	CT +	CT +																																				CT +	CT +	CT +		+											HI	HI
74	74	KP	BA	28	M	8AM	+			+							+	+	+	+		+					+	+																																					+	+													hs	hs
75	75	KP	CH	64	M	8PM			+							+				+																cg	cg						cg	cg	cg																																	HIE	HIE
76	76	SKR	SR	59	M	10AM		+		+							+																											US +																																		HI	HI
77	77	BA	VE	37	F	2PM		+		+							+	+	+	+		CT +	CT +				CT +	CT +																																					CT +	CT +		+											ICH	ICH
78	78	CH	KP	52	M	1PM			+	+							+																																+												+																ICH	ICH
79	79	NSG	NA	25	M	1PM		+								+																				cg	cg						cg	cg	cg																																	HIE	HIE
80	80	MMPS	AN	25	F	2PM			+	+							+	+	+	+		CT +	CT +			CT +	CT +	CT +																																				CT +	CT +	CT +													hs	hs
81	81	BG	SR	19	F				+		+											cg	cg													cg	cg					+	cg	cg	cg																																+	SS	SS
82	82	SIN	RA	23	F	8PM		+		+							+	+	+																																																										ICH	ICH
83	83	BAG	VIV	58	M	8PM	+			+							+	+	+	+		CT +					CT +	CT +																																					CT +	CT +													MOF	MOF
84	84	GAT	GA	30	M	8PM	+			+							+	+	+	+		+					+	+																																					+	+													ARF	ARF
85	85	BAN	SU	46	F	2PM	+							+						+		cg	cg													cg	cg						cg	cg	cg																																	SB	SB
86	86	CH	LB	47	M	3PM		+		+							+	+	+	+		CT +			+	CT +	CT +	CT +																																				CT +	CT +	CT +							+						CC	CC
87	87	APMC	GB	53	M	4AM								+								cg	cg													cg	cg						cg	cg	cg																																	SB	SB
88	88	RPS	SH	2	F	2PM					+											cg	cg													cg	cg					+	cg	cg	cg																																	SII	hs
89	89	YR	AN	35	M	11PM			+					+								cg	cg													cg	cg						cg	cg	cg																																	SB	SB
90	90	KAT	SYN	22	F	8PM			+		+						+		+			cg	cg													cg	cg					+	cg	cg	cg																																+	SS	SS
91	91	YR	SIV	28	F	9PM			+		+											cg	cg													cg	cg					+	cg	cg	cg																																+	SS	SS
92	92	BIG	HS	45	M	7PM	+				+											cg	cg													cg	cg					+	cg	cg	cg																																+	SS	SS
93	93	RB	SH	69	F	2AM		+			+											cg	cg													cg	cg					+	cg	cg	cg																																+	SS	SS
94	94	NT	SRI	42	F	2PM		+				+										cg	cg													cg	cg						cg	cg	cg																														+			OPP	OPP
95	95	NT	BR	40	F	9AM		+			+											cg	cg													cg	cg					+	cg	cg	cg													+																			+	SS	SS
96	96	APMC	GH	30	F	8AM					+											cg	cg													cg	cg					+	cg	cg	cg																																+	SS	SS
97	97	BG	SR	19	F				+		+											cg	cg													cg	cg					+	cg	cg	cg																																+	SS	SS
98	98	SUT	CGC	46	M	7PM	+				+											cg	cg													cg	cg					+	cg	cg	cg																																	S	S
99	99	KT	SBT	39	M	8AM		+				+										cg	cg													cg	cg						cg	cg	cg																														+			OPP	OPP
100	100	SUT	CGC	46	M	7PM	+				+											cg	cg													cg	cg					+	cg	cg	cg																																	S	S