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FORENSIC ANALYSIS OF 100 MEDICOLEGAL AUTOPSY CASES: A RETROSPECTIVE STUDY

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Abstract

Background: Autopsy remains one of the most reliable tools in forensic death investigation, since it allows a systematic look at both the external and internal findings that together point toward cause and manner of death. Beyond individual cases, reviewing autopsy records over time also gives useful insight into demographic patterns, the types of injuries commonly seen, and how medicolegal deaths trend within a population. Objective: This study looked at the demographic profile of medicolegal autopsy cases along with the causes and manners of death, the pattern and anatomical location of injuries, and how often victims presented with a single injury versus multiple injuries. Materials and Methods: This was a retrospective, descriptive, cross-sectional study conducted in the Department of Forensic Medicine and Toxicology and the Medico-Legal Section of Liaquat University Hospital (LUH), Hyderabad, Sindh, Pakistan. Existing autopsy records were reviewed and 100 cases that met the inclusion criteria were selected for the study. Records that were blurred, illegible, or incomplete in terms of the information needed for analysis were left out. Data from the selected records were entered into a structured proforma prepared for the study and were then analyzed using basic frequencies and percentages. Results: Out of the 100 cases studied, 77 were male and 23 were female. Most victims fell in the 21–30-year age bracket, making up 31% of the total. Firearm injury was the leading cause of death, seen in 28% of cases, followed by blunt-force trauma (24%) and road traffic accidents (22%). When it came to manner of death, homicide accounted for the largest share at 38%, with accidental deaths making up 28% and manner remaining undetermined in 25% of cases. Among the different injury patterns recorded, lacerations were the most common finding (45%), followed by abrasions (37%) and firearm wounds (31%). Looking at where injuries were located on the body, cases involving multiple regions were most frequent (58%), while upper-limb injuries (42%) and chest injuries (40%) were also commonly noted. Most cases 87% had more than one injury, and only 13% showed a single isolated injury. Conclusion: Overall, the study points to young adult males as the group most commonly affected, with a considerable share of deaths resulting from violent or traumatic causes firearm injuries, blunt trauma, and road traffic accidents in particular. Homicide came out as the most common manner of death among the cases reviewed. These results reinforce why careful, systematic autopsy work and accurate record-keeping matter, both for individual medicolegal investigations and for building local data that future studies and forensic practice can rely on.

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1. Introduction:

1.1 Background of the Study

A medicolegal autopsy is carried out under appropriate legal authority to examine a deceased person and establish the cause and manner of death. It is typically ordered when death occurs suddenly and unexpectedly, or under circumstances that are unclear, suspicious, or otherwise unusual, including deaths suspected to be suicidal, homicidal, or accidental [1,2]. For this reason, medicolegal autopsy plays a significant part in assisting the police, government agencies, and other relevant authorities during the investigation of deaths.

By examining the external and internal structures of the body along with any injuries and other relevant post-mortem findings, a medicolegal autopsy aims chiefly to determine the cause of death. The information obtained can, in turn, help establish the nature, severity, and distribution of injuries and the extent to which they contributed to death [1,3].

Forensic evaluation of medicolegal autopsy cases takes in demographic characteristics, cause and manner of death, the types and distribution of injuries, and other relevant post-mortem findings. Such information matters because it offers epidemiological and medico-legal insight into patterns of death and injury within a population [4-7]. Road traffic accidents, firearm injuries, sharp-force injuries, blunt-force injuries, burns, and electrical injuries are among the traumatic events that may result in death, and deaths of suicidal, homicidal, or accidental origin often call for medicolegal investigation and autopsy to help establish the cause and manner of death.

Asphyxial conditions such as hanging and drowning, poisoning, or natural disease occurring under sudden, unexpected, or suspicious circumstances may likewise underlie other medicolegal deaths. Studying medicolegal autopsy cases in this way can reveal patterns in the causes and manner of death, the types of injuries involved, and their anatomical distribution [1,4,5]. A retrospective look at autopsy records can, moreover, provide baseline information on the patterns of medicolegal deaths within a particular population or jurisdiction and help build understanding of the injury patterns encountered in forensic practice.

It is with this in mind that the present study was conducted, analyzing 100 medicolegal autopsy cases with respect to demographic characteristics, categories of cause of death, manner of death, injury patterns, anatomical distribution of injuries, and the distribution of single and multiple injuries [4-7].

1.2 Importance of Medicolegal Autopsy in Forensic Investigation

Forensic investigation relies heavily on medicolegal autopsy because it helps determine the cause and manner of death through systematic examination of the deceased. Performed in cases of suspicious, sudden, unexpected, or unnatural death, it provides findings that assist the judicial system and other relevant authorities in investigating the circumstances surrounding death.

A thorough post-mortem examination helps identify and document external and internal injuries along with other relevant findings, which can in turn assist in determining the nature, site, extent, and severity of injuries and in assessing their relationship to the cause of death. Taken together with the available medico-legal information, these findings may also help distinguish between natural, accidental, suicidal, homicidal, and undetermined deaths.

In traumatic deaths particularly, medicolegal autopsy allows systematic examination and documentation of injuries such as blunt-force injuries, sharp-force injuries, firearm injuries, burns, and electrical injuries, while also providing information on the distribution and severity of injuries that feeds into the overall forensic assessment of the death.

Deaths associated with asphyxial conditions, poisoning, and sudden or unexpected natural disease are another area where medicolegal autopsy is important, since systematic examination of such cases contributes to determining the cause and manner of death overall.

Records from medicolegal autopsies are valuable for identifying patterns and distributions of causes and manners of death and injury within a population or jurisdiction, providing baseline data for forensic practice, supporting death

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investigations, and contributing to the development of appropriate injury-prevention strategies. In this sense, medicolegal autopsy forms an integral part of forensic medicine, connecting medical findings with the legal investigation of death.

1.3 Role of the Medicolegal Officer in Determining Cause and Manner of Death

The medicolegal officer conducts an autopsy to determine sudden, suspicious, unexpected, and unlawful deaths. The officer examines and documents all external and internal injury and pathological findings made during the post-mortem examination. The medicolegal officer determines the cause of death by evaluating injuries and disease, as well as other findings detected during the autopsy.

In addition, if necessary, the medicolegal officer can perform histopathological, chemical (toxicological), and DNA examinations to find additional data needed to determine the cause of death. For example, a histopathological examination allows identifying tissue damage. A toxicological examination detects the presence of toxins in the body, while a DNA test is required to identify the dead person. Moreover, DNA analysis can help determine the presence of any exogenous bodies. The manner of death is the second classification that needs to be made. It is related to the circumstances around the death and the fact of whether it was a natural, accidental, suicidal, homicidal, or undetermined case. It is the medicolegal officer who determines the manner of death after considering all of the information that was gathered during the post-mortem examination and other relevant circumstances.

1.4 Problem Statement

A complex range of traumatic, asphyxial, toxicological, and natural causes underlies medicolegal deaths, which makes their investigation an important aspect of forensic medicine. Systematic examination and proper documentation of relevant autopsy findings are required to accurately determine the cause and manner of death, and because demographic characteristics, causes of death, injury patterns, and anatomical distribution of injuries vary among different populations, continuous evaluation of medicolegal autopsy records remains important.

In many regions, however, institution-based data on the distribution of causes and manner of death, patterns of injuries, anatomical distribution of injuries, and the occurrence of single versus multiple injuries among medicolegal autopsy cases remain limited. A retrospective analysis of autopsy records can help fill this gap, offering useful information on the patterns and distribution of medicolegal deaths and injuries within a particular population or jurisdiction.

For this reason, systematic review of medicolegal autopsy records is important for identifying common categories of cause of death, patterns of injury, anatomical distribution of injuries, and the distribution of single and multiple injuries information that can contribute to a better understanding of the forensic characteristics of medicolegal deaths and provide baseline data for future research and forensic practice.

It is this need that the present study addresses, through a retrospective analysis of 100 medicolegal autopsy cases aimed at determining their demographic characteristics, categories of cause of death, manner of death, injury patterns, anatomical distribution of injuries, and distribution of single and multiple injuries.

1.5 Research Objectives

1. To determine the demographic distribution of medicolegal autopsy cases with respect to age and sex.
2. To identify the most common categories of cause of death among medicolegal autopsy cases.
3. To determine the distribution of the manner of death among medicolegal autopsy cases.
4. To determine the distribution of injury patterns among medicolegal autopsy cases.
5. To determine the anatomical distribution of injuries among medicolegal autopsy cases.
6. To determine the distribution of single and multiple injuries among medicolegal autopsy cases.

1.6 Significance of the Study

As a source of scientific information for determining the causes and manners of death, medicolegal autopsy is important, and systematic analysis of autopsy records can provide useful

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information on demographic characteristics, causes and manners of death, patterns of injuries, anatomical distribution of injuries, and the occurrence of single and multiple injuries.

By analyzing 100 medicolegal autopsy cases, the present study provides baseline information on the demographic characteristics and forensic patterns of deaths examined at the study setting. Its findings may help identify commonly observed categories of cause of death, manners of death, injury patterns, and anatomical regions involved in fatal cases.

Forensic medicine and medico-legal practitioners, medico-legal authorities, law-enforcement agencies, and researchers may all find the findings of this study useful, given the institution-based data it provides on medicolegal deaths. This information may contribute to a better understanding of the local pattern of deaths and injuries and may serve as a reference for future forensic studies.

Beyond this, the findings may offer useful baseline information for public health and injury-prevention planning, particularly through the identification of commonly observed categories of accidental and other unnatural deaths. In this way, the study contributes to the existing body of knowledge in forensic medicine and provides locally relevant data that may support future research and improvement of medico-legal practices.

1.7 Scope of the Study

Through a retrospective review of available autopsy records, the present study focuses on the forensic analysis of 100 medicolegal autopsy cases, evaluating selected parameters including demographic characteristics, categories of cause of death, manner of death, injury patterns, anatomical distribution of injuries, and the distribution of single and multiple injuries.

Its scope includes medicolegal deaths of traumatic, asphyxial, toxicological, and natural origin, as documented in the available autopsy records, and it examines the distribution of different causes and manners of death, types of injuries, anatomical sites of injuries, and the occurrence of single and multiple injuries among the selected cases.

The study aims, more broadly, to provide baseline information on the forensic profile of medicolegal autopsy cases at the study setting, with findings that may contribute to a better understanding of local patterns of medicolegal deaths and injuries and may serve as a reference for future forensic research.

That said, the study is limited to the information available and documented in the medicolegal autopsy records, so the completeness and accuracy of the analyzed data depend on the quality and availability of the recorded information.

1.8 Operational Definitions

For the purpose of this study, the following operational definitions were used:

1.8.1 Medicolegal Autopsy

A systematic examination of a deceased person performed under appropriate legal authority to determine the cause and manner of death in cases requiring medicolegal investigation, including sudden, unexpected, suspicious, accidental, suicidal, homicidal, and other unusual deaths.

1.8.2 Forensic Analysis

For this study, forensic analysis refers to the systematic evaluation of documented demographic characteristics, categories of cause of death, manner of death, injury patterns, anatomical distribution of injuries, and the distribution of single and multiple injuries recorded in medicolegal autopsy records.

1.8.3 Retrospective Study

A study design in which previously recorded information or existing records are reviewed and analyzed to investigate defined variables or patterns.

1.8.4 Cause of Death

The disease, injury, or other condition responsible for causing death. In this study, causes of death were categorized according to the information documented in the medicolegal autopsy records.

The categories included:

Traumatic: Death resulting from injuries associated with road traffic accidents, firearm injuries, sharp-force injuries, blunt-force trauma, burns, or electrical injuries.

Asphyxial: Death associated with asphyxial conditions such as hanging, strangulation, or drowning.

Toxicological: Death resulting from poisoning or toxic exposure as documented in the autopsy records.

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Natural: Death resulting from a natural disease or pathological condition without an external traumatic cause.

1.8.5 Manner of Death

The circumstances under which death occurred. In this study, manner of death was categorized as natural, accidental, suicidal, homicidal, or undetermined.

1.8.6 Injury Pattern

The type or nature of injury documented during the examination of the deceased. Injury patterns included abrasions, contusions, lacerations, incised wounds, stab wounds, chop wounds, firearm injuries, fractures, burn injuries, electrical injuries, and asphyxial injuries/signs. Cases with no documented external injuries were also recorded.

1.8.7 Anatomical Distribution of Injuries

The anatomical location of documented injuries on the body. The anatomical regions assessed in this study included the head, face, neck, chest, abdomen, upper limbs, lower limbs, and multiple regions.

1.8.8 Single and Multiple Injuries

Single injury: A case in which one injury was documented.

Multiple injuries: A case in which more than one injury was documented.

2. Literature Review

2.1 Overview of Medicolegal Autopsy

Also referred to as a forensic autopsy, a medicolegal autopsy is a systematic post-mortem examination performed under appropriate legal authority to determine the cause and manner of death and to provide relevant medical information for legal investigation [9,10]. It is generally conducted when a death occurs suddenly, unexpectedly, suspiciously, or under circumstances that require medicolegal investigation. This distinguishes it from a clinical autopsy, which is primarily performed to study disease processes and evaluate clinical diagnoses, whereas a medicolegal autopsy focuses on determining the circumstances and medical cause of death in a legal context.

Cases involving suspected accidental, suicidal, homicidal, sudden, unexplained, or other unnatural deaths are where medicolegal autopsy is most commonly performed. The examination provides objective information regarding the deceased and may assist in evaluating injuries and other post-mortem findings relevant to determining the cause and manner of death.

Systematic external and internal examination of the body generally makes up a medicolegal autopsy. External examination involves assessment and documentation of identifying features and injuries, while internal examination identifies internal injuries, pathological conditions, and other findings that may contribute to determining the cause of death. The nature, type, number, and anatomical distribution of injuries may provide important information regarding the circumstances and possible mechanism of injury.

In traumatic deaths particularly, medicolegal autopsy is important because it allows detailed assessment of injuries resulting from road traffic accidents, firearm injuries, sharp-force injuries, blunt-force trauma, burns, and electrical injuries [15]. It is also relevant in deaths associated with asphyxial conditions, poisoning, and natural disease when the circumstances require medicolegal investigation, since the findings of the autopsy, together with available investigative information, contribute to determining the cause and manner of death.

A systematic review of medicolegal autopsy records can also offer useful epidemiological information regarding the distribution of causes and manners of death and patterns of injuries within a population, and retrospective analysis of such records may provide baseline information for understanding local patterns of medicolegal deaths and supporting future forensic research and medico-legal practice.

2.2 Classification and Purpose of Autopsy

Broadly, an autopsy is a systematic examination of a deceased human body performed to determine the cause of death and identify pathological or traumatic findings that may have contributed to death [9,11]. Autopsies may be classified according to their purpose and the circumstances under which they are performed, with medicolegal, clinical, academic, and research autopsies forming the commonly recognized categories.

2.2.1 Medicolegal Autopsy (Forensic Autopsy)

As a post-mortem examination performed under appropriate legal authority, a medicolegal autopsy

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is used to determine the cause and manner of death and, where relevant, to assess the mechanism of death [12]. It may also assist in documenting the nature, extent, and distribution of injuries and in the identification of unknown deceased persons. It is generally performed when the circumstances of death are unclear, suspicious, sudden, unexpected, or potentially unnatural, including suspected accidental, suicidal, and homicidal deaths, and it is conducted in accordance with the applicable laws and procedures of the jurisdiction.

Determining the cause and manner of death, evaluating and documenting external and internal injuries, assessing findings relevant to the mechanism of death, and providing medical information that may assist the legal investigation all count among the main purposes of a medicolegal autopsy.

2.2.2 Clinical Autopsy (Hospital Autopsy)

Primarily performed to study diseases, their effects on the body, complications, and responses to treatment, a clinical autopsy may be used to confirm or clarify a clinical diagnosis and evaluate the effectiveness of medical management. Its purpose, unlike that of a medicolegal autopsy, is medical rather than legal, and it is generally performed according to applicable institutional and consent requirements.

2.2.3 Academic Autopsy (Teaching Autopsy)

Performed primarily for educational purposes, an academic or teaching autopsy allows medical students, trainees, and other relevant learners to observe and understand pathological changes and their relationship to disease processes through post-mortem examination.

2.2.4 Research Autopsy

A research autopsy, by comparison, is performed to obtain information for scientific investigation in areas such as forensic medicine, pathology, epidemiology, and other biomedical fields, with findings that may contribute to the development of scientific knowledge and improved understanding of disease, injury, and patterns of death.

2.2.5 Purpose of Medicolegal Autopsy

Of these categories, the medicolegal autopsy holds particular importance in forensic practice because it provides systematic medical findings relevant to death investigation [13,14]. Its purposes include determining the cause and manner of death, assessing injuries and other significant post-mortem findings, and providing objective information that may assist in the investigation and legal proceedings. Understanding the classification and purpose of autopsy is therefore important for selecting the appropriate type of post-mortem examination according to the circumstances and objectives of the case.

2.3 Role of Autopsy in Cause and Manner of Death Determination

By providing objective medical findings that assist in determining the cause and manner of death, medicolegal autopsy plays an essential role in forensic investigation [9]. A systematic post-mortem examination allows the forensic pathologist to evaluate external and internal injuries, pathological conditions, and other relevant findings that may have contributed to death.

The cause of death is the disease, injury, or other condition responsible for the death. Establishing it involves a thorough examination of the deceased body for evidence of trauma, disease, poisoning, asphyxia, or other conditions. The nature, extent, and distribution of injuries, together with relevant internal findings, may help pin down the cause of death and how far injuries or disease contributed to the fatal outcome.

Distinct from both the cause and manner of death is the mechanism of death, which refers to the physiological process through which the cause of death results in death. Mechanisms may include severe blood loss, respiratory failure, brain injury, or other physiological disturbances, and although it may be considered during forensic evaluation, it remains a separate concept.

Manner of death is a different question: it describes the circumstances in which death occurred. Natural, accidental, suicidal, homicidal, and undetermined make up the commonly recognized categories. Its determination requires weighing autopsy findings together with available investigative information, and in traumatic deaths, the type, nature, number, and anatomical distribution of injuries can provide important clues for evaluating the circumstances surrounding death.

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In cases involving asphyxia, characteristic findings such as ligature marks, petechial hemorrhages, and other relevant post-mortem findings may assist in evaluating conditions such as hanging and strangulation, although such findings should be interpreted together with the complete autopsy examination and available case information rather than being treated as independently diagnostic.

Medicolegal autopsy therefore provides an important medical basis for determining the cause of death and contributes to assessing the manner of death by correlating post-mortem findings with the circumstances of death and other available investigative information.

2.4 Demographic Characteristics of Medicolegal Autopsy Cases

Because they help describe the distribution of deaths within a population, demographic characteristics are important in evaluating medicolegal autopsy cases. Variables such as age and sex can provide useful epidemiological information and may help identify differences in the patterns of medicolegal deaths.

As an important demographic factor, age may influence the pattern and circumstances of death, with the distribution of causes and manners of death varying among age groups due to differences in lifestyle, behavior, exposure to hazards, and underlying health conditions [16]. Younger and middle-aged individuals may be more frequently involved in traumatic and unnatural deaths, while older individuals may have a greater proportion of deaths associated with natural diseases, though the overall pattern may vary according to the characteristics of the population and geographical area being studied.

Sex is another important demographic characteristic in medicolegal death investigations, and studies from different populations have commonly reported differences in the distribution of medicolegal deaths between males and females. Such differences may be influenced by variations in exposure to occupational and environmental hazards, interpersonal violence, accidents, and other circumstances associated with death, so the distribution of deaths by sex may provide useful information about the demographic pattern of medicolegal cases within a particular population.

Comparing medicolegal death patterns between different populations and geographical regions is also made possible through analysis of age and sex distribution. Identifying the demographic groups represented in autopsy records can contribute to understanding the population characteristics associated with different types of death.

Retrospective assessment of demographic characteristics is thus an important component of medicolegal research, since analysis of age and sex distribution provides baseline information about the demographic profile of deceased individuals and may contribute to a better understanding of patterns of medicolegal deaths within the study population.

2.5 Causes of Death in Medicolegal Autopsy Cases

One of the primary objectives of a medicolegal autopsy is determining the cause of death, which refers to the disease, injury, or other condition responsible for initiating the sequence of events leading to death [17]. Its determination matters for medicolegal investigations, legal proceedings, death certification, and epidemiological assessment.

Broadly, causes of death in medicolegal practice may be categorized according to the nature of the fatal condition, and for the purpose of this study, causes of death are categorized as traumatic, asphyxial, toxicological, and natural.

2.5.1 Traumatic Causes of Death

Traumatic causes of death are, at their core, physical injury produced by an external force or agent. Road traffic accidents, firearm injuries, blunt-force trauma, sharp-force injuries, burns, electrical injuries, falls all of these fall under this heading, and assessing the nature, severity, number, and distribution of injuries matters for determining their contribution to death.

As an important cause of traumatic death, road traffic injuries may produce injuries involving multiple anatomical regions. Firearm injuries, meanwhile, may result in death through mechanisms such as severe blood loss, destruction of vital structures, or other serious complications [15]. Blunt-force injuries may produce soft-tissue injuries, fractures, and internal trauma, while sharp-force injuries, including incised and stab wounds, may cause fatal hemorrhages or injury to

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vital structures; burns and electrical injuries may likewise result in fatal outcomes and require appropriate post-mortem assessment.

2.5.2 Asphyxial Causes of Death

Asphyxia is a condition in which oxygen supply or utilization is impaired badly enough to cause serious physiological disturbance, potentially death. Hanging, strangulation, and drowning are its common medicolegal forms.

Congestion, cyanosis, petechial hemorrhages, pulmonary edema, and other findings depending on the type and circumstances of asphyxia may appear as post-mortem findings in asphyxial deaths, although these findings are generally non-specific and should be interpreted together with the complete post-mortem examination and available investigative information. In suspected hanging or strangulation, examination and documentation of the ligature mark and surrounding tissues may provide important information for death investigation.

2.5.3 Toxicological Causes of Death

Toxicological deaths stem from exposure to poisonous or toxic substances drugs, chemicals, and other toxic agents among them. Depending on the case, poisoning may occur in accidental, suicidal, or homicidal circumstances.

In suspected poisoning cases, the circumstances of death and autopsy findings may be weighed together with available toxicological information to determine whether a toxic substance contributed to or caused death. Where required and available, appropriate biological specimens and tissues may be submitted for toxicological examination, and interpreting toxicological findings requires correlation with the clinical history, circumstances, autopsy findings, and laboratory results.

2.5.4 Natural Causes of Death

Natural deaths are matter of disease or pathological conditions rather than external trauma or violence. Even so, a medicolegal autopsy may still be required when a natural death occurs suddenly, unexpectedly, or under circumstances that call for legal investigation.

Cardiovascular diseases, cerebrovascular diseases, respiratory diseases, infectious diseases, and other significant pathological conditions may all be identified as natural causes in medicolegal autopsy practice. A systematic post-mortem examination helps identify relevant disease processes and determine whether a natural condition adequately explains the death.

2.5.5 Summary

Systematic assessment of the available autopsy findings, and where available and relevant, investigative and laboratory information, is required for accurate determination of the cause of death. Classifying deaths into traumatic, asphyxial, toxicological, and natural categories facilitates the systematic analysis of medicolegal autopsy cases and also provides useful information regarding patterns of death within the study population, contributing to forensic research and medico-legal practice.

2.6 Manner of Death in Forensic Investigations

An important component of medicolegal death investigation is determining the manner of death. Unlike the cause of death, which refers to the disease, injury, or other condition that leads to death, the manner of death refers to the circumstances in which the death occurred, and its accurate determination matters for forensic investigations, legal proceedings, death certification, and public health surveillance.

Determining the manner of death rests on a combined assessment of autopsy findings and available investigative information the circumstances of death, scene examination, police investigation, witness statements, medical history, and relevant laboratory findings among them. No single autopsy finding can settle it alone. The available information has to be weighed collectively to reach the most appropriate classification.

The major categories of manner of death include natural, accidental, suicidal, homicidal, and undetermined.

2.6.1 Natural Death

Natural death refers to death resulting from a disease or natural pathological process rather than an external injury or poisoning. Cardiovascular diseases, cerebrovascular diseases, respiratory diseases, infections, and other pathological conditions are common natural causes. A medicolegal autopsy may still be performed when

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such a death occurs suddenly, unexpectedly, or under circumstances requiring legal investigation, particularly when the cause or circumstances remain unclear.

2.6.2 Accidental Death

Accidental death results from an unintended event, without any intention to cause death. Road traffic accidents, falls, accidental drowning, electrocution, burns, and accidental poisoning are common examples. Autopsy examination helps document the injuries and pathological findings and check whether they are consistent with the reported circumstances of the death.

2.6.3 Suicidal Death

Suicidal death refers to death resulting from a self-inflicted act performed with the intention of causing one's own death. Hanging, poisoning, firearm injury, and jumping from a height are common methods. In medicolegal investigations, suspected suicidal deaths are evaluated by correlating autopsy findings with the circumstances of death and other available investigative information, so as to distinguish them from accidental or homicidal deaths.

2.6.4 Homicidal Death

Homicidal death refers to death caused by the actions of another person through firearm injuries, blunt-force injuries, sharp-force injuries, strangulation, burns, poisoning, or other forms of violence. Autopsy findings such as the nature and distribution of injuries, defensive injuries, and internal injuries may provide important evidence, but the final determination of homicide still requires correlation with the investigative circumstances and other available evidence.

2.6.5 Undetermined Death

Undetermined death applies where the available medical, forensic, and investigative information simply isn't enough to classify the manner of death as natural, accidental, suicidal, or homicidal.

Importance of Determining the Manner of Death

Because it assists law enforcement authorities in directing further investigation and may carry significant implications for legal proceedings, determination of the manner of death is important in medicolegal investigation. It also contributes to accurate death certification and mortality statistics [18]. Analysis of the manner of death can provide information about patterns of accidental, suicidal, and homicidal deaths and may contribute to the development of appropriate preventive strategies and future forensic research.

2.7 Injury Patterns Observed in Medicolegal Autopsy Cases

An important component of medicolegal autopsy examination is the analysis of injury patterns. It provides information about the nature and characteristics of injuries and may assist in understanding the possible mechanism of injury and its contribution to death, and when correlated with other autopsy and investigative findings, it may also contribute to assessing the circumstances and manner of death.

Depending on the type of injury and the available documentation, injuries observed during a medicolegal autopsy may be described according to their nature, location, number, size, shape, direction, and depth. A systematic assessment of these features helps document the extent of trauma and evaluate the possible mechanism by which the injuries were produced.

Abrasions, contusions, lacerations, incised wounds, stab wounds, chop wounds, firearm injuries, fractures, burns, and electrical injuries make up the common injury patterns encountered in medicolegal autopsy cases.

2.7.1 Abrasions

Damage to the epidermis caused by friction, pressure, or contact between the skin and a rough surface produces abrasions, which are superficial injuries commonly associated with road traffic accidents, falls, assaults, and dragging. In appropriate circumstances, the appearance and distribution of an abrasion may provide information about the nature and direction of the applied force.

2.7.2 Contusions

Commonly known as bruises, contusions are injuries produced by blunt-force impact resulting in damage to small blood vessels and extravasation of blood into the surrounding tissues. Their location, size, shape, and distribution may provide information about the site and nature of the applied force.

2.7.3 Lacerations

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Lacerations are tears of the skin and underlying tissues caused by blunt-force trauma. Their margins are commonly irregular or ragged, and they may be associated with tissue bridges, surrounding abrasions, or contusions. Road traffic accidents, falls, assaults, and other forms of blunt-force trauma are typical settings in which they occur.

2.7.4 Incised and Stab Wounds

As sharp-force injuries, incised and stab wounds differ in one key respect: an incised wound is generally longer on the skin surface than its depth, whereas a stab wound is typically deeper than its surface length. Examination of these wounds may provide information about the type of sharp-force injury and the possible characteristics of the causative object.

2.7.5 Chop Wounds

Produced by heavy sharp-edged instruments, chop wounds are sharp-force injuries that may show features of both sharp-force and blunt-force trauma and may be associated with underlying bone damage or fractures. Their characteristics and distribution are documented during medicolegal examination and may contribute to the assessment of the circumstances of injury.

2.7.6 Firearm Injuries

Caused by the discharge of a firearm, firearm injuries may include entrance wounds, exit wounds, or retain projectiles [15]. During autopsy, the location and characteristics of firearm wounds, associated tissue damage, projectile tracks, and internal injuries are documented when present, and these findings may contribute to assessing the nature and severity of firearm-related trauma.

2.7.7 Fractures

Fractures are breaks or discontinuities in bone caused by traumatic forces. Blunt-force trauma, falls, road traffic accidents, firearm injuries, or crushing forces may all produce them, and the location and type of fracture can provide information about the severity and nature of the trauma.

2.7.8 Burn Injuries

Exposure to thermal, chemical, electrical, or other sources capable of producing tissue damage results in burn injuries. During autopsy examination, the location, extent, and characteristics of burns are documented, and in suspected fire-related deaths, additional findings may be considered to assess whether the individual was alive during exposure to the fire, in conjunction with other available investigative and laboratory findings.

2.7.9 Electrical Injuries

The passage of electrical current through the body results in electrical injuries. External findings may include electrical contact marks, although their appearance can vary, and medicolegal examination includes documentation of external findings and assessment of associated internal injuries or other trauma when present.

2.7.10 Asphyxial Findings

Petechial hemorrhages, congestion, cyanosis, and pulmonary edema are among the findings that may be associated with asphyxial deaths, and in cases of hanging or strangulation, injuries or marks involving the neck may also be present. These findings are nonspecific and should be interpreted together with the circumstances of death, external and internal examination, and other available investigative findings.

Forensic Importance of Injury Pattern Analysis

Analysis of injury patterns matters in forensic medicine largely because it provides systematic documentation of the nature, location, extent, and characteristics of injuries. These findings may assist in assessing the possible mechanism of injury, and when correlated with investigative information, may contribute to determining the manner of death. That is why systematic documentation and analysis of injuries remain essential components of medicolegal autopsy examination.

2.8 Anatomical Distribution of Injuries

An important aspect of medicolegal autopsy examination is the anatomical distribution of injuries. Analysis of the location of injuries provides information about the regions of the body affected and the extent of trauma, and when interpreted together with other autopsy and investigative findings, the distribution of injuries may also contribute to assessing the possible mechanism and circumstances of injury.

Injuries documented during a forensic autopsy are recorded according to their anatomical location, with commonly assessed regions including the head and scalp, face and neck, thorax, abdomen, upper limbs, lower limbs, and multiple body

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regions. The location and distribution of injuries matter for assessing the extent of trauma and documenting the overall injury pattern.

2.8.1 Head and Scalp Injuries

Commonly encountered in traumatic deaths, including those resulting from road traffic accidents, falls, assaults, and firearm injuries, head and scalp injuries may include abrasions, contusions, lacerations, and fractures, with or without associated intracranial injuries. The presence and severity of head injuries may contribute significantly to determining the cause of death.

2.8.2 Facial Injuries

Abrasions, contusions, lacerations, and fractures involving the facial structures may all appear as facial injuries. Their location and characteristics may provide information about the nature of the trauma and the possible mechanism of injury, and facial injuries may also occur in association with injuries involving other regions of the body.

2.8.3 Neck Injuries

Hanging, strangulation, sharp-force trauma, firearm injuries, or blunt-force trauma may all give rise to neck injuries. Findings may include external marks or injuries to the neck and, when documented, injuries to underlying soft tissues or structures. Assessing neck injuries is particularly important in suspected asphyxial deaths and should be interpreted together with the circumstances of death and other autopsy findings.

2.8.4 Thoracic Injuries

Because the thorax contains vital organs and major blood vessels, severe injuries to this region may result in life-threatening complications. Thoracic injuries may include abrasions, contusions, lacerations, fractures, and penetrating injuries, and such injuries may be encountered in road traffic accidents, firearm injuries, sharp-force trauma, and blunt-force trauma.

2.8.5 Abdominal Injuries

Blunt-force or penetrating trauma may result in abdominal injuries, which may include injuries to internal organs and associated internal hemorrhages when documented. Abdominal injuries are commonly encountered in road traffic accidents, firearm injuries, stab wounds, and other forms of significant trauma.

2.8.6 Upper Limb Injuries

Abrasions, contusions, lacerations, fractures, and sharp-force injuries may all present as upper limb injuries. Their location and characteristics may provide information about the nature of trauma, and in some cases, injuries to the hands and forearms may be described as defensive injuries when their characteristics and circumstances support such an interpretation.

2.8.7 Lower Limb Injuries

Road traffic accidents, falls, blunt-force trauma, and other traumatic events may all result in lower limb injuries, which may include abrasions, contusions, lacerations, fractures, and other soft-tissue injuries. They may occur alone or in association with injuries involving other anatomical regions.

2.8.8 Multiple-Region Injuries

Involving more than one anatomical region of the body, multiple-region injuries may occur in high-impact traumatic events such as road traffic accidents, falls from height, assaults, and other severe trauma. The presence of injuries involving multiple regions may indicate extensive trauma and should be assessed together with the severity and nature of individual injuries.

Forensic Significance of Anatomical Distribution

What makes the anatomical distribution of injuries important in forensic assessment, ultimately, is that it provides a systematic description of the regions of the body affected by trauma. The location and distribution of injuries may assist in assessing the nature and possible mechanism of injury, and when correlated with other autopsy and investigative findings, may contribute to determining the cause and manner of death. Accurate documentation of anatomical injury distribution also feeds useful information into the analysis of injury patterns in medicolegal autopsy cases.

2.9 Review of Previous Studies

In Pakistan, several retrospective and cross-sectional studies have evaluated the demographic characteristics, causes and manners of death, and other findings observed in medicolegal autopsy cases. These studies provide useful information

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regarding regional patterns of medicolegal deaths and demonstrate the importance of systematic analysis of autopsy records in forensic practice.

An audit of medicolegal autopsies at the Department of Forensic Medicine and Toxicology, Liaquat University of Medical and Health Sciences, Jamshoro, and the Medico-Legal Section of Liaquat University Hospital was conducted by Kazi et al. The study included 91 medicolegal autopsy cases collected from March 2016 to February 2017, with males constituting 62.6% of the cases and females accounting for 37.4%. It highlighted the importance of auditing medicolegal autopsy records for identifying local patterns of death and supporting improvements in medico-legal services [1].

An observational study involving medicolegal autopsy cases at Lahore General Hospital was conducted by Zaheen et al., evaluating demographic characteristics and autopsy findings and reporting a predominance of male victims among the cases examined. The findings demonstrated the importance of systematic documentation and analysis of autopsy records for determining the causes and manners of death and for establishing baseline forensic data [2].

In a further study, Zaheen et al. investigated medicolegal autopsies performed at Lahore General Hospital to assess the cause, manner, and modalities of death, emphasizing the importance of complete post-mortem examination and systematic evaluation of demographic characteristics, injuries, and other autopsy findings in establishing the cause and manner of death [3].

A retrospective study of medicolegal autopsies performed at Khawaja Muhammad Safdar Medical College, Sialkot, was conducted by Qamar et al., evaluating the demographic profile, causes of death, and manners of death among medicolegal autopsy cases. The findings demonstrated a predominance of male victims and highlighted the contribution of traumatic and violent causes of death in medicolegal autopsy practice [4]. More recently, Afridi et al. examined demographic and seasonal patterns of medicolegal injuries in Peshawar, further underscoring how injury patterns and demographic profiles can vary by region within Pakistan [8].

Taken together, these studies demonstrate variation in the causes and manners of medicolegal deaths among different institutions and geographical regions, though a predominance of male victims and young or working-age individuals has been reported consistently. Traumatic and violent deaths, including firearm injuries, road traffic injuries, blunt-force injuries, and sharp-force injuries, constitute important categories of medicolegal deaths reported in forensic practice [1–4,8].

The reviewed literature, overall, demonstrates that retrospective analysis of medicolegal autopsy records is useful for identifying demographic patterns, causes and manners of death, and injury characteristics. The distribution of these variables may nonetheless differ according to geographical location, population characteristics, and institutional setting, which is why institution-based studies are important for generating region-specific forensic data and establishing local patterns of medicolegal deaths [1–4].

2.10 Research Gap

Considerable national and international literature is available on medicolegal autopsies, yet demographic characteristics, causes and manners of death, injury patterns, and autopsy findings may vary between populations and geographical regions. Differences in population characteristics, patterns of violence, road traffic injuries, and medico-legal practices may contribute to these variations.

Published studies in Pakistan have addressed different aspects of medicolegal deaths, including demographic characteristics, causes and manners of death, and specific categories of traumatic and unnatural deaths [1–4,8]. Based on the literature reviewed for the present study, however, limited institution-based evidence was identified that evaluated multiple variables simultaneously, including demographic characteristics, causes and manners of death, injury patterns, anatomical distribution of injuries, and the distribution of single and multiple injuries.

The present study addresses this gap directly, retrospectively analyzing 100 medicolegal autopsy cases with respect to demographic characteristics, causes and manners of death, injury patterns, anatomical distribution of injuries, and the

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distribution of single and multiple injuries. The findings are expected to provide baseline information regarding the forensic profile of medicolegal autopsy cases and may serve as a reference for future research and improvement of medico-legal practices.

Chapter 3: Materials and Methods

3.1 Study Design

A retrospective descriptive cross-sectional study design was used to conduct the present study [19]. It involved the review and analysis of previously documented medicolegal autopsy records to evaluate demographic characteristics, causes and manners of death, injury patterns, anatomical distribution of injuries, and the distribution of single and multiple injuries.

This retrospective approach was chosen because it allows systematic evaluation of existing autopsy records to identify patterns and trends in medicolegal deaths without influencing the original cases.

In total, the study included 100 medicolegal autopsy cases recorded between 03 January 2025 and 25 December 2025, with relevant information extracted from the available records according to predefined variables included in the research proforma. Information not related to the study objectives was excluded from data extraction.

3.2 Study Setting

The Department of Forensic Medicine and Toxicology and Medico-Legal Section, Liaquat University Hospital (LUH), Hyderabad, Sindh, Pakistan, was where the present study was conducted.

Medicolegal cases requiring post-mortem examination including sudden, suspicious, accidental, suicidal, homicidal, and unexplained deaths are handled by the Medico-Legal Section of LUH. Relevant medicolegal autopsy records containing demographic information, cause and manner of death, injury findings, and other documented post-mortem observations are maintained by the concerned department.

Access to previously documented medicolegal autopsy records required for the analysis of demographic characteristics, causes and manners of death, injury patterns, and anatomical distribution of injuries was provided by the study setting.

3.3 Study Duration

A retrospective review of medicolegal autopsy records documented between 03 January 2025 and 25 December 2025 formed the basis of the study.

Available records were reviewed during this period and relevant information extracted according to the predefined research proforma, with only information relevant to the study objectives recorded and unnecessary information excluded from the analysis.

3.4 Study Population

Medicolegal autopsy cases recorded at the Medico-Legal Section of Liaquat University Hospital (LUH), Hyderabad, during the defined study period made up the study population.

Cases that had undergone medicolegal post-mortem examination were included, with relevant information regarding demographic characteristics, cause and manner of death, injury patterns, anatomical distribution of injuries, and single or multiple injuries extracted from the available autopsy records.

Traumatic, asphyxial, toxicological, and natural causes were all represented among the selected cases, according to the information documented in the records.

3.5 Sample Size

One hundred medicolegal autopsy cases made up the sample size of the present study, selected from the available medicolegal autopsy records maintained at the Medico-Legal Section, Liaquat University Hospital (LUH), Hyderabad, within the defined study period. Cases were included according to the predefined eligibility criteria and the availability of sufficient information required for the study variables [20].

3.6 Sampling Technique

A consecutive non-probability sampling technique was used, with available medicolegal autopsy records meeting the inclusion criteria during the study period reviewed consecutively until 100 eligible cases were obtained.

Records that did not contain sufficient or readable information required for the study were excluded per the predefined exclusion criteria.

3.7 Inclusion Criteria

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The following criteria were used for inclusion of cases in the present study:

1. Medicolegal autopsy cases examined at the Medico-Legal Section, Liaquat University Hospital (LUH), Hyderabad.
2. Cases recorded during the study period from 03 January 2025 to 25 December 2025.
3. Cases that underwent legally authorized medicolegal post-mortem examination.
4. Cases with sufficient documented information regarding relevant study variables, including demographic characteristics, cause of death, manner of death, and injury findings where applicable.
5. Cases belonging to different categories of medicolegal deaths, including traumatic, asphyxial, toxicological, and natural causes of death.

3.8 Exclusion Criteria

The following criteria were used for exclusion of cases from the present study:

1. Cases without a medicolegal autopsy examination.
2. Cases with insufficient information required for analysis of the study variables.
3. Records in which important information such as cause of death, manner of death, or relevant injury findings was unavailable.
4. Blurred, illegible, faint, or poorly scanned records or certificates from which the required information could not be reliably extracted.
5. Records that were inaccessible or otherwise unsuitable for data extraction.
6. Duplicate records or multiple entries referring to the same autopsy case.
7. Records containing information that could not be reliably interpreted for the purposes of the study.

3.9 Data Collection Tool (Research Proforma)

A structured research proforma was developed to systematically record and organize relevant information obtained from the available medicolegal autopsy records. The proforma was designed according to the objectives of the study and included variables related to demographic characteristics, cause and manner of death, injury patterns, anatomical distribution of injuries, and the distribution of single and multiple injuries.

The research proforma consisted of the following sections:

Section A: General Information

Case Number: _____

Autopsy Number: _____

Date of Autopsy: ____ / ____ / _____

Hospital/Institute: _____

Examined By: _____

Section B: Demographic Profile

Age (years): _____

Age Group:

☐ 0–10
☐ 11–20
☐ 21–30
☐ 31–40
☐ 41–50
☐ 51–60
☐ >60

Sex:

☐ Male
☐ Female
☐ Other/Not documented

Section C: Cause of Death

☐ Road Traffic Accident
☐ Firearm Injury
☐ Sharp-Force Injury
☐ Blunt-Force Trauma
☐ Hanging
☐ Strangulation
☐ Drowning
☐ Burns
☐ Poisoning
☐ Electrocution
☐ Natural Disease
☐ Other: _____

Section D: Manner of Death

☐ Natural
☐ Accidental
☐ Suicidal
☐ Homicidal
☐ Undetermined

Section E: Injury Pattern

☐ Abrasion
☐ Contusion
☐ Laceration

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☐ Incised Wound
☐ Stab Wound
☐ Chop Wound
☐ Firearm Injury
☐ Fracture
☐ Burn Injury
☐ Electrical Injury
☐ Asphyxial Findings
☐ No External Injury
☐ Other: _____

Section F: Anatomical Distribution and Number of Injuries

Anatomical Site:

☐ Head
☐ Face
☐ Neck
☐ Chest
☐ Abdomen
☐ Upper Limb
☐ Lower Limb
☐ Multiple Regions

Number of Injuries:

☐ Single
☐ Multiple

3.10 Data Collection Procedure

A retrospective review of medicolegal autopsy records maintained at the Medico-Legal Section, Liaquat University Hospital (LUH), Hyderabad, formed the basis of data collection. After obtaining the required institutional permission, relevant information from eligible autopsy records was extracted and documented using the predefined research proforma.

Demographic characteristics, including age and sex, as well as cause and manner of death, were reviewed for each selected autopsy record. The documented autopsy findings were evaluated with particular emphasis on injury patterns, anatomical distribution of injuries, and the number of injuries, categorized as single or multiple.

Where clearly documented and relevant to the study, information on additional investigations such as viscera preservation, histopathological examination, and toxicological analysis was also recorded, while records or certificates that were blurred, faint, illegible, or otherwise unsuitable for reliable data extraction were excluded from the final analysis.

Completeness, consistency, and accuracy were checked for all collected data before analysis, and the confidentiality and privacy of the deceased individuals were maintained throughout the study through the use of case identification numbers rather than personal identifiers.

3.11 Study Variables

The variables included in the present study were obtained from the structured research proforma used for data collection.

The study variables included:

Demographic variables: age, age group, and sex.

Cause of death: traumatic, asphyxial, toxicological, and natural causes, according to the documented autopsy findings.

Manner of death: natural, accidental, suicidal, homicidal, and undetermined.

Injury pattern: abrasion, contusion, laceration, incised wound, stab wound, chop wound, firearm injury, fracture, burn injury, electrical injury, asphyxial findings, and no external injury, where documented.

Anatomical distribution of injuries: head, face, neck, chest, abdomen, upper limb, lower limb, and multiple regions.

Number of injuries: single or multiple.

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3.12 Data Analysis Plan

Organized, reviewed, and analyzed according to the objectives of the study, the collected data underwent descriptive statistical analysis to summarize the demographic characteristics, causes and manners of death, injury patterns, anatomical distribution of injuries, and distribution of single and multiple injuries among the medicolegal autopsy cases [20].

Frequencies and percentages were used to present categorical variables, with findings summarized in tables and, where appropriate, represented graphically using suitable charts to facilitate interpretation.

Patterns and trends within the selected medicolegal autopsy cases were identified from the analyzed data, describing the distribution of causes, manners, and injury characteristics within the study population.

3.13 Ethical Considerations

Prior to data collection, ethical approval and permission to conduct the study were obtained from the relevant institutional authorities, and the study was conducted in accordance with applicable ethical principles for retrospective research involving medicolegal records.

Since the study was based on previously documented autopsy records, it did not involve direct interaction with deceased individuals or their relatives, and only information relevant to the research objectives was extracted from the records.

Throughout the research process, confidentiality and privacy of the information were maintained. Personal identifiers were not included in the research database, and each case was assigned a unique identification number; the collected information was used solely for academic and research purposes.

No unnecessary personal or identifying information was extracted from the records.

1. Results

4.1 Demographic Characteristics

4.1.1 Sex Distribution

A total of 100 medicolegal autopsy cases is included in the present study. Of these, 77% were males and 23% were females, showing a higher proportion of male victims over female victims in medicolegal autopsy cases.

Sex	Frequency (n)	Percentage (%)
Male	77	77%
Female	23	23%
Total	100	100%

Table 4.1.1: ***Sex distribution of medicolegal autopsy cases***

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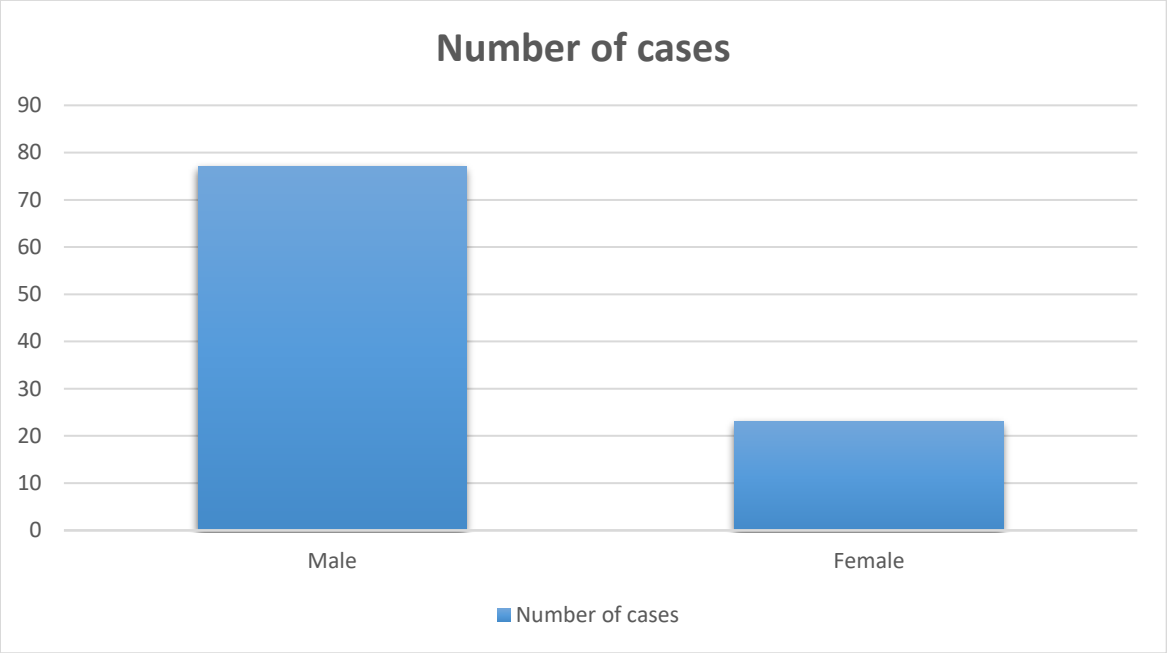


Figure 4.1.1 Bar Graph Showing Sex Distribution

4.1.2 Age Distribution

The 21–30 years age group showed the highest frequency, comprising 31 cases (31%), followed by 31–40 years with 18 cases (18%) and 11–20 years with 15 cases (15%). The 41–50 years age group accounted for 10 cases (10%), followed by 51–60 years with 8 cases (8%), 61 years and above with 7 cases (7%), and 0–10 years with 6 cases (6%), while age was undetermined in 5 cases (5%).

Table 4.1.2 ***Age Distribution of Medico legal Autopsy Cases***

Age group (years)	Frequency (n)	Percentage (%)
0–10	6	6%
11–20	15	15%
21–30	31	31%
31–40	18	18%
41–50	10	10%
51–60	8	8%
61- above	7	7%
Undetermined	5	5%
Total	100	100%

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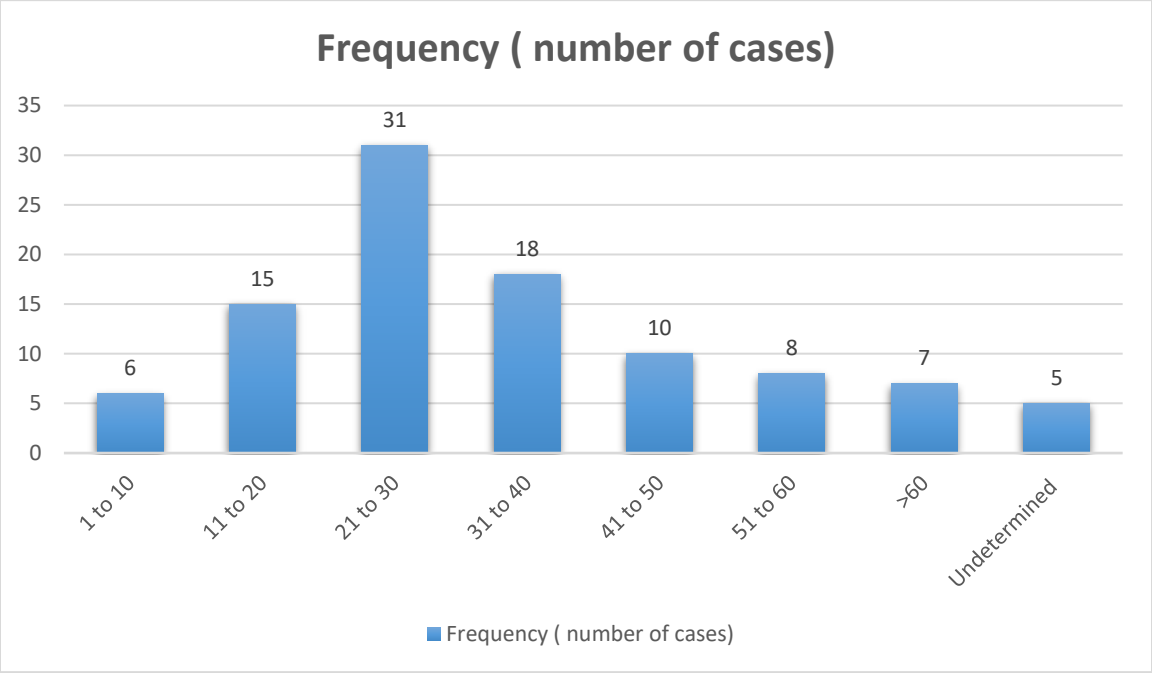


Figure 4.1.2 Bar graph showing age distribution of medicolegal autopsy cases.

4.2 Distribution of Causes/Categories of Death

Firearm injury was the most frequently recorded cause/category of death among the 100 medicolegal autopsy cases, accounting for 28% of cases, followed by blunt-force trauma (24%) and road traffic accidents (22%). Hanging and burns each accounted for 6% of cases, while sharp-force injuries accounted for 5%; natural disease accounted for 3%, drowning for 2%, and strangulation, poisoning, electrocution, and other causes each accounted for 1% of the cases.

Table 4.2 *Distribution of cause/ Category of death*

Cause/Categories of death	Frequency (n)	Percentage (%)
Firearm injury	28	28%
Blunt-force trauma	24	24%
Road traffic accident	22	22%
Hanging	6	6%
Burns	6	6%
Sharp-force injury	5	5%
Natural disease	3	3%
Drowning	2	2%
Strangulation	1	1%

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Poisoning	1	1%
Electrocution	1	1%
Other	1	1%
Total	100	100%

4.3 Distribution of Manner of Death

Homicidal deaths were the highest among the 100 medicolegal autopsy cases, with exactly 38 cases (38%) of the homicidal type. Accidental deaths accounted for 28 cases (28%), while in 25 cases (25%) the manner of death could not be determined. Suicide constituted 5% of the deaths, compared with 4% for natural deaths making homicidal deaths, by a clear margin, the largest category in this study.

Table 4.3. ***Distribution of Manner of Death***

Manner of death	*Frequency (n)*	*Percentage (%)*
Homicidal	38	38%
Accidental	28	28%
Undetermined	25	25%
Suicidal	5	5%
Natural	4	4%
Total	100	100%

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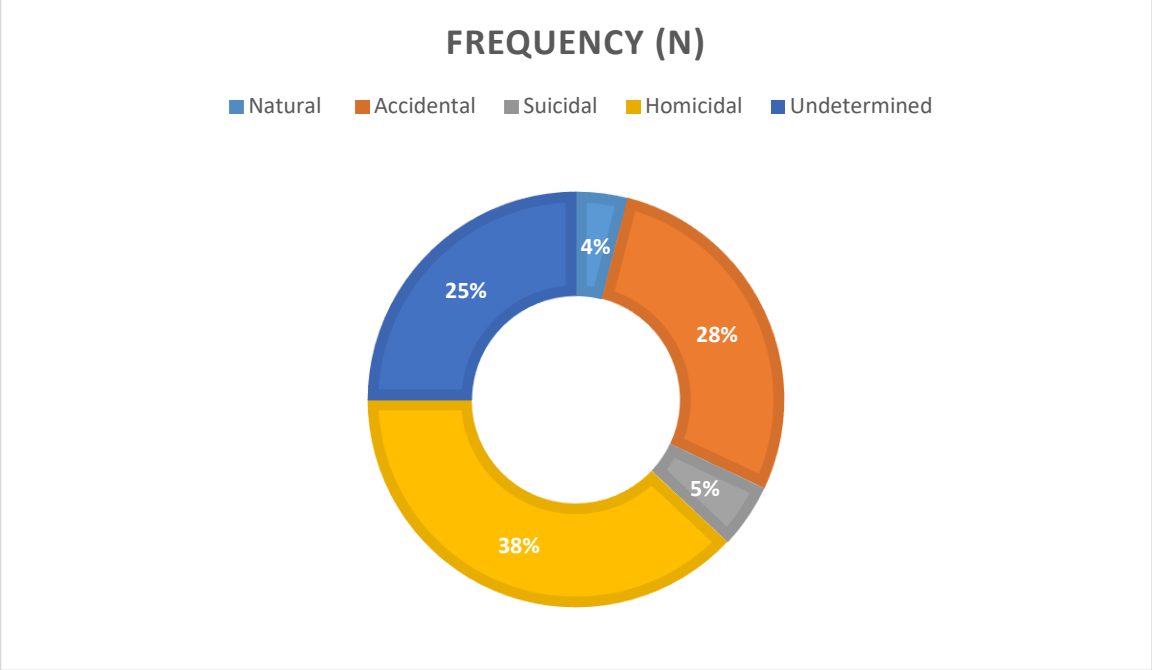


Figure 4.3. Distribution of Manner of Death among Medicolegal Autopsy Cases

4.4 Injury Pattern

Occurring in 45% of cases, lacerations were the most frequently observed injury pattern, followed by abrasions (37%) and firearm injuries (31%). Fractures were present in 29% of cases, while contusions occurred in 20%. Asphyxial signs and burn injuries were documented in 13% and 12% of cases, respectively, and no external injuries were documented in 12% of cases. Electrical injuries occurred in 3%, while incised wounds and stab wounds each occurred in 4% of cases; chop wounds and other findings were each recorded in 1% of cases. Because multiple types of injuries could be present in the same case, the frequencies and percentages are not mutually exclusive and therefore do not sum to 100%.

Table 4.4. *Distribution of Injury Patterns Among Medicolegal Autopsy Cases*

S. No.	Type of injury	Frequency (n)	Percentage (%)
1	Laceration	45	45%
2	Abrasion	37	37%
3	Firearm injury	31	31%
4	Fracture	29	29%
5	Contusion	20	20%
6	Asphyxial injuries	13	13%
7	Burn injury	12	12%
8	No external injuries	12	12%

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9	Stab wound	4	4%
10	Incised wound	4	4%
11	Electrical injury	3	3%
12	Chop wound	1	1%
13	Other	1	1%

4.5 Anatomical Distribution of Injuries

Occurring in 58% of cases, multiple-region injuries were the most frequently observed. Upper-limb and chest injuries were also frequently observed, at 42% and 40% of cases respectively. Head injuries were present in 36% of cases, while abdominal injuries occurred in 32%; facial and lower-limb injuries were each present in 27% of cases, whereas neck injuries were observed in 24%. Because injuries could involve more than one anatomical site in the same case, the frequencies and percentages are not mutually exclusive and therefore may exceed 100%.

Table 4.5. ***Anatomical Distribution of Injuries Among Medicolegal Autopsy Cases***

S. No.	Anatomical site	Frequency (n)	Percentage (%)
1	Multiple Regions	58	58%
2	Upper limb	42	42%
3	Chest	40	40%
4	Head	36	36%
5	Abdomen	32	32%
6	Face	27	27%
7	Lower limb	27	27%
8	Neck	24	24%

4.6 Frequency of Single and Multiple Injuries

Multiple injuries were more frequently observed than single injuries among the 100 medicolegal autopsy cases, documented in 87 cases (87%), whereas 13 cases (13%) had a single injury it means the majority of cases involved multiple injuries.

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Table 4.6. *Distribution of Single and Multiple Injuries*

S. No.	Injury pattern	Frequency (n)	Percentage (%)
1	Multiple injuries	87	87%
2	Single injury	13	13%
	Total	**100**	**100%**

Chapter 5: Discussion

5.1 Overview of the Study Findings

By assessing demographic characteristics, causes and manner of death, injury patterns, anatomical distribution of injuries, and single versus multiple injuries across 100 medicolegal autopsy cases, the present study found a predominance of male cases, with the 21–30 years age group being the most frequently represented. Firearm injury was the most common cause/category of death, while homicide was the most frequent manner of death. Lacerations were the most commonly documented injury pattern, multiple-region injuries were the most frequent anatomical distribution, and multiple injuries were observed in the majority of cases.

5.2 Demographic Characteristics

Males constituted 77% of the medicolegal autopsy cases in the present study, while females accounted for 23%, and the 21–30 years age group was the most frequently represented, accounting for 31% of cases. This predominance of young adult males is consistent with the pattern commonly reported in medicolegal autopsy studies, where males of economically and socially active age groups are frequently represented among unnatural deaths a higher proportion that may be associated with greater exposure to traffic, occupational hazards, violence, and other risk factors.

5.3 Causes/Categories of Death

Accounting for 28% of cases, firearm injury was the most frequent cause/category of death in the present study, followed by blunt-force trauma (24%) and road traffic accidents (22%). This predominance of traumatic causes indicates a substantial burden of violence and accidental trauma among the studied medicolegal cases, comparable with previous studies reporting trauma (particularly firearm injuries) and road traffic accidents (as important causes of medicolegal deaths).

5.4 Manner of Death

Accounting for 38% of cases, homicidal death was the most common manner of death in the present study, followed by accidental deaths (28%) and undetermined deaths (25%), while suicidal and natural deaths accounted for 5% and 4% respectively. This predominance of homicidal deaths is consistent with the high proportion of firearm and other traumatic injuries observed in the study.

5.5 Injury Patterns

At 45%, lacerations were the most frequently observed injury pattern, followed by abrasions (37%), firearm injuries (31%), and fractures (29%). The high frequency of these injuries reflects the predominance of traumatic deaths in the study, and as multiple injury types could occur in the same case, the percentages were not mutually exclusive and therefore did not total 100%.

5.6 Anatomical Distribution of Injuries

At 58%, multiple-region injuries were the most frequently observed, followed by upper-limb (42%) and chest injuries (40%). Head injuries accounted for 36%, while abdominal injuries accounted for 32%. This involvement of multiple anatomical regions reflects the severity and extensive nature of trauma in many medicolegal cases, and since individual cases could involve injuries at more than one site, the percentages were not mutually exclusive.

5.7 Single and Multiple Injuries

At 87%, multiple injuries were documented far more often than single injuries (13%). This high frequency indicates that many medicolegal deaths

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involved extensive or more than one injury, particularly in traumatic cases.

5.8 Overall Forensic Significance

Taken together, the findings demonstrate that medicolegal autopsy provides important information regarding the cause and manner of death, injury patterns, and anatomical distribution of injuries. The predominance of traumatic deaths, homicidal deaths, and multiple injuries highlights the importance of systematic external and internal examination in medicolegal investigations, and the findings may also provide useful baseline information for forensic practice and future research.

Chapter 6: Conclusion and Recommendations

6.1 Conclusion

In this retrospective study of 100 medicolegal autopsy cases, a predominance of young male victims and traumatic causes of death was demonstrated. Firearm injuries were the most frequent cause/category of death, while homicide was the most common manner of death; lacerations were the most frequently observed injury pattern, multiple-region injuries were common, and multiple injuries were documented in the majority of cases. Overall, these findings highlight the importance of systematic medicolegal autopsy examination and proper documentation for determining the cause and manner of death and understanding fatal injury patterns.

REFERENCE

1. Kazi SAF, Nayhoon WA, Qadri NA, Arain R, Kazi H, Bibi I. An audit of medicolegal autopsies at a tertiary care hospital of Sindh, Pakistan. J Peoples Univ Med Health Sci Nawabshah. 2018;8(2):138-142.
2. Zaheen U, Sukhera KH, Hassaan M, Mirza M, Mustafa TA, Ramzan S. An observational study on autopsies. Pak J Med Health Sci. 2023;17(1):307-308. doi:10.53350/pjmhs2023171307.
3. Zaheen U, Fazli MAS, Sarwer A, Sukheria KH. To establish the cause, manner and modalities of death in medicolegal autopsies performed at Lahore General Hospital. Pak J Med Health Sci. 2021;15(8):2187.
4. Qamar A, Imran Ali KS, Hussain AG, Altaf F, Butt US. Retrospective study of medicolegal autopsies conducted at Khawaja Muhammad Safdar Medical College Sialkot. Pak J Physiol. 2023;19(4):36-38. doi:10.69656/pjp.v19i4.1601.
5. Mirza FH, Hassan Q, Naz R, Khan M. Spectrum of medico-legal deaths in metropolis of Karachi: an autopsy based study. Pak J Med Dent. 2013;2(4).
6. Mirza FH, Langah IA, Hasan Q. Fire arm weapon injuries in Karachi in relation to mortality & morbidity: an 8-years study from 2007-2014. Pak J Med Dent. 2017;6(1).
7. Aziz F, Qasim AP, Khaliq S, Naheed K, Qasim JA. Spectrum of firearm related deaths in Multan City: autopsy based study. Ann Punjab Med Coll. 2018;12(1):28-30. doi:10.29054/apmc/2018.154.
8. Afridi HK, Ali SA, Khan R, Khattak MA, Wasif M, Khan MB, et al. Unveiling patterns of medicolegal injuries: a demographic and seasonal perspective from Peshawar. J Saidu Med Coll Swat. 2025;15(4):646-653. doi:10.52206/jsmc.2025.15.4.1342.
9. Saukko P, Knight B. Knight's Forensic Pathology. 4th ed. Boca Raton (FL): CRC Press; 2016.
10. DiMaio VJM, Molina DK. DiMaio's Forensic Pathology. 3rd ed. Boca Raton (FL): CRC Press; 2022.
11. Dolinak D, Matshes EW, Lew EO. Forensic Pathology: Principles and Practice. 1st ed. Burlington (MA): Elsevier Academic Press; 2005.
12. Spitz WU, Spitz DJ, Fisher RS, editors. Spitz and Fisher's Medicolegal Investigation of Death: Guidelines for the Application of Pathology to Crime Investigation. 5th ed. Springfield (IL): Charles C Thomas; 2020.
13. Payne-James J, Jones RM, editors. Simpson's Forensic Medicine. 14th ed. Boca Raton (FL): CRC Press; 2019.
14. Prahlow JA. Forensic Pathology for Police, Death Investigators, Attorneys, and Forensic Scientists. New York: Humana Press; 2010.

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15. DiMaio VJM. Gunshot Wounds: Practical Aspects of Firearms, Ballistics, and Forensic Techniques. 3rd ed. Boca Raton (FL): CRC Press; 2015.
16. Byard RW. Forensic Pathology of Infancy and Childhood. 2nd ed. Cham: Springer; 2014.
17. World Health Organization. International Statistical Classification of Diseases and Related Health Problems. 11th Revision. Geneva: World Health Organization; 2019.
18. World Health Organization. Medical Certification of Cause of Death: Instructions for Physicians. Geneva: World Health Organization.
19. Hulley SB, Cummings SR, Browner WS, Grady DG, Newman TB. Designing Clinical Research. 4th ed. Philadelphia: Wolters Kluwer; 2013.
20. Daniel WW, Cross CL. Biostatistics: A Foundation for Analysis in the Health Sciences. 10th ed. Hoboken (NJ): Wiley; 2013.