



# Investigating Unnatural Deaths Linked to Sexual Assault: A Forensic Analysis

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## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** Exploration of fatalities associated with sexual activity, encompassing both natural and unnatural occurrences, delving into elements such as physical strain and peculiar circumstances. Terminology like "dying in the saddle" is utilized to describe incidents during sexual intercourse. Although human sexuality is generally regarded as positive, it can, in some cases, result in fatal incidents. Natural deaths, often impacting males, are correlated with pre-existing medical conditions, including fatal cardiovascular events triggered by sexual exertion. Sexual violence, spanning from harassment to coerced penetration, remains a pervasive global issue. In Bangladesh, there are notable instances of sexual intimate partner violence against women.

**Aim of the Study:** The study aimed to represent the clinical characteristics and causes of unnatural death related to sexual assault.

**Methods:** This retrospective study, conducted at the Department of Forensic Medicine & Toxicology, Dhaka Medical College, Bangladesh, analyzed 15 autopsies over two years, from July 2021 to June 2023, focusing on suicides by hanging and poisoning. The research adhered to legal and ethical guidelines, obtaining informed consent from legal guardians. Inclusion criteria covered all ages and genders, with unnatural deaths related to sexual activities. Exclusion criteria included natural deaths. Cases were identified through autopsy records, additional examinations, police files,

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court proceedings, and input from witnesses. A team of five experienced forensic pathologists ensured an unbiased evaluation. Results were organized into tables and graphs, with statistical analysis using SPSS.

**Results:** This study analyzed 15 unnatural deaths, focusing on age distribution, gender, sexual assault patterns, locations, sexual activities, and causes of death. Victims aged 0-10 years constituted 46.67%, 11-20 years were 33.33%, and 21-30 years were 20.00%. Females comprised 93.33%. Sexual assaults occurred mainly by neighbors (40.00%), involved gang rape (20.00%), and stepfather rape (13.33%). Public places (33.33%) and other locations (40.00%) were common sites. The most prevalent type of injury was head trauma, accounting for 26.67%. Fatal injuries, burns, choking, and poisoning were equally significant, each contributing to 33.33% of cases. Falls from heights were identified as a major cause of death, comprising 20.00% of the reported incidents.

**Conclusion:** This research delves into the intricate aspects surrounding non-natural deaths occurring in the context of sexual activities, with a specific emphasis on suicides related to hanging and poisoning. It underscores the imperative for a nuanced comprehension of these incidents, drawing attention to possible misclassifications and advocating for precise forensic evaluations. The findings underscore the necessity for increased awareness, education, and preventive measures to confront the social and cultural determinants that contribute to sexual violence.

*Keywords: Non-accidental deaths; sexual assault; forensic analysis.*

## 1. INTRODUCTION

Deaths related to sexual activity, whether natural or unnatural, can occur with or without the involvement of others [1]. The occurrence of death during sexual intercourse can be attributed to factors such as the physical strain of the activity or unusual extenuating circumstances. Euphemisms like "dying in the saddle" describe such incidents [2]. While human sexuality is generally associated with positive connotations, fostering relationships based on partnership, pleasurable satisfaction, relaxation, and reproduction, it is important to recognize that sexual activity can be linked to fatal incidents, whether natural or unnatural. Natural deaths, defined as those caused by pre-existing diseases, are discussed in medical and forensic literature concerning sexual activity. These cases form a relatively homogeneous group, predominantly affecting males. Fatal cardiovascular events triggered by sexual exertion, as well as instances of sexual activity with extramarital/non-related partners or masturbation, are reported in connection with these incidents [3-13]. Sexual violence encompasses a range of acts, from verbal harassment to forced penetration [1]. According to the World Health Organization (WHO), sexual violence is broadly defined as any sexual act, attempt to obtain a sexual act, unwanted sexual comments or advances, or acts directed against a person's sexuality through coercion, regardless of the relationship to the victim, and occurring in any setting [14]. WHO estimates that around 35% of women globally have experienced sexual and physical violations by an intimate or non-

intimate partner during their lifetime [15]. In Bangladesh, specific statistics on sexual violence are limited, but it is reported that nearly 60% of Bangladeshi men engage in violent behaviors towards their intimate partners [16]. Bangladesh has the second-highest prevalence of sexual intimate partner violence against women globally, following Ethiopia (58.6% vs. 49.7%) [14]. Data from Odhikar, a Bangladeshi human rights organization, reveals that between 2001 and 2019, at least 14,718 individuals (including 6,900 women and 7,664 children) were raped in Bangladesh, with 2,823 cases involving gang rape [17]. The highest reported trend in rape incidence occurred between 2002 and 2003, with a gradual decline in 2008. However, a surge in sexual violence, including rape, was observed in Bangladesh in 2020, with 13 reported rape incidents daily in the first four months of the year [18]. By the end of 2020, there were at least 1,627 reported rape victims and 317 gang rape incidents, compared to 1,080 and 294, respectively, in 2019 [18]. This study aims to provide an overview of the various situations in which unnatural fatal events may occur in a sexual context. The study aimed to represent the clinical characteristics and causes of unnatural death related to sexual assault.

## 2. MATERIALS AND METHODS

This prospective investigation involved the examination of 15 autopsies to analyze fatalities attributed to suicide, specifically by hanging and poisoning. The research was carried out at the Department of Forensic Medicine & Toxicology, Dhaka Medical College, Dhaka, Bangladesh,

spanning two years from July 2021 to June 2023. It adhered strictly to legal and ethical guidelines. The investigative team retrieved historical data from the hospital's chronological register and treatment records stored in the record room. Opinions were formulated based on autopsy findings, supplemented by additional investigations as needed. Before data collection, a comprehensive overview of the study was presented, and informed consent was obtained from the legal guardians of the study participants. Guardians were also informed of their right to withdraw from the study at any point in time.

**Inclusion criteria:**

- All age.
- Both male and female.
- Unnatural death related with sexual activities.

**Exclusion criteria:**

- Natural death cases.
- Accidental death cases.

Unnatural deaths linked to sexual activities were identified through a comprehensive analysis of autopsy records, additional examinations (such as histological and toxicological assessments), information from death scenes detailed in police files, court proceedings, and, when available, input from sexual partners or witnesses present during the sexual incidents. The scope of this investigation encompasses all instances of unnatural deaths related to sexual activities occurring shortly before, during, or after death, as well as cases where injuries resulting from sexual practices led to delayed deaths occurring days later. To ensure a thorough and unbiased evaluation and selection process, a maximum of five experienced forensic pathologists conducted the study. The collected information was systematically organized and presented in tables or graphs based on its relevance, with each visual aid accompanied by detailed explanations to facilitate a comprehensive understanding. Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS) program on the Windows platform. Mean values with standard deviations represented continuous parameters, while categorical parameters were expressed in frequency and percentage.

**3. RESULTS**

This study examined 15 cases of unnatural deaths, providing insights into various factors

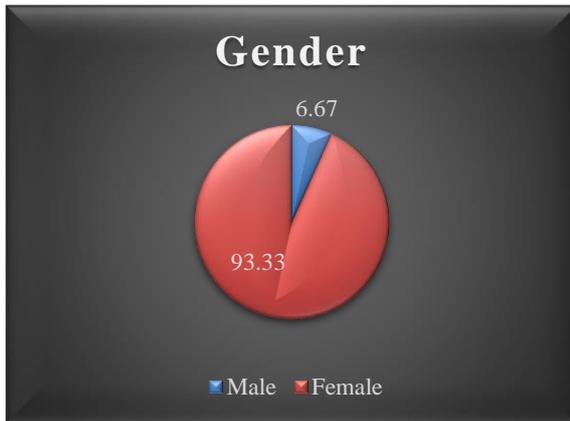
such as age distribution, gender composition, patterns of sexual assault, locations of the incidents, types of sexual activities, and causes of death. The age distribution of the study population, as depicted in Table 1, reveals that a significant portion (46.67%) of the cases involved individuals aged 0-10 years. Additionally, 33.33% of cases were in the 11-20 years age group, and 20.00% were aged >20 years. The study predominantly included females, constituting 93.33% of the total population, as illustrated in Fig. 1. Regarding the nature of sexual assaults, Table 2 outlines that neighbors raped 40.00% of victims, 20.00% experienced gang rape, 13.33% were subjected to rape by stepfathers and only one was raped by stranger. The distribution of rape locations is presented in Table 3, indicating that public places and other locations accounted for the highest frequencies at 33.33% and 40.00%, respectively. Own houses and schools had relatively lower frequencies, with 20.00% and 6.67%, respectively. The results in Table 4 present a comprehensive overview of the causes of non-accidental deaths linked to sexual assault, involving a total of 15 cases. Notably, head injuries emerge as the predominant cause, accounting for 20.00% of fatalities whereas falls from height contribute significantly at 20.00% of head injury. The diverse range of causes includes fatal injuries, burns, choking and poisoning each representing 13.33% of the cases however, a unique case of death by biting was found 6.67%.

**Table 1. Age distribution of the study population (N=15)**

Age range (in years)	Frequency (n)	Percentage (%)
0-10	7	46.67
11-20	5	33.33
>20	3	20.00
<b>Total</b>	<b>15</b>	<b>100.00</b>

**Table 2. Distribution of the study population based on raped by (N=15)**

Raped by	Frequency (n)	Percentage (%)
Known Person		
Neighbor	6	40.00
Stepfather	2	13.33
Father	1	6.67
Teacher	1	6.67
Partner	1	6.67
Unknown Person		
Gang rape	3	20.00
Stranger	1	6.67



**Fig. 1. Sex distribution of the study population (N=15)**

**Table 3. Rape location of the study (N=15)**

Location	Frequency (n)	Percentage (%)
Own house	3	20
Public place	5	33.33
Hostel	1	6.67
Other	6	40.00
<b>Total</b>	<b>15</b>	<b>100</b>

**Table 4. Cause of death (N=15)**

Cause of death	Frequency (n)	Percentage (%)
Fell from height	3	20.00
Head injury	3	20.00
Other Fatal injuries	2	13.33
Burn	2	13.33
Choking	2	13.33
Poisoning	2	13.33
Bite to death	1	6.68
<b>Total</b>	<b>15</b>	<b>100.00</b>

#### 4. DISCUSSION

The current study aims to offer an overview of the diverse circumstances surrounding death related to sexual activities, seeking a better understanding of the phenomenon of unnatural death within this context. In addition to specific findings at the death location or statements provided by the sexual partner or offender, autopsies may reveal anogenital injuries or histological evidence of sperm in body cavities, which can be interpreted as indicators of sexual activity. The obtained results suggest that instances of unnatural death in this context can manifest under various circumstances.

Therefore, these cases extend beyond autoerotic fatalities or sexual homicides and appear to be more intricate than natural deaths linked to sexual activity [12]. Incorrect conclusions about the classification of death, such as suspicions of suicide or sexual homicide leading to homicide investigations, could arise. Attempts to avoid such investigations and the shame linked to the true circumstances of death might prompt family members, particularly male ones, to modify the death scene before medical professionals or authorities arrive. In terms of sexual activities, whether consensual or not, the findings show a higher number of females. The gender distribution in our study aligns with the outcomes of previous research, possibly indicating the relative physical vulnerability of female victims compared to male offenders [19,20]. While inadvertent intoxications may have taken place, there is also the possibility that the instances of fatalities could be linked to a phenomenon known in literature as "Chem Sex." This term refers to the deliberate use of narcotics or drugs, particularly stimulants, before or during sexual activities to enhance and prolong sensations of desire [21-23]. This pattern of behavior is primarily observed within the demographic of male homosexuals. However, it is important to note that the studies investigating this phenomenon specifically focused on pre-selected and interviewed individuals within the male homosexual population [22,23]. The findings of the current investigation indicate that females engage in heterosexual activities involving the use of drugs. This observation aligns with recent research by Lawn et al., reinforcing the notion that drug use is not exclusive to males in such contexts [24]. Moreover, engaging in physical activity during sexual encounters may decrease tolerance thresholds for any substances consumed, potentially resulting in a life-threatening situation. Healthcare professionals, including general practitioners and emergency medicine providers, should educate potential users about these potential dangers. In instances of fatalities linked to non-consensual sexual activities, all individuals involved or implicated as potential offenders were male, except one female. These findings align with observations made by Chan et al. in both 2009 and 2016 [19,20]. Consistent with the findings reported by Chan and Heide, as well as Beauregard and Radojevic et al., the primary factors leading to mortality were instances of bleeding resulting from sharp force and incidents of strangulation [19,20,25]. Radojevic et al. posit the presence of a sexual

component in cases involving multiple stab wounds [25]. Consistent with the findings of Beauregard et al. and Schmidt and Madea, our study reveals that fatal strangulation predominantly occurs in cases involving minors [26,27]. In this current research, instances where individuals assert self-defense after causing the death of a man who made sexual advances are not explicitly categorized as sex-related homicides. Instead, they are perceived as more likely to stem from interpersonal conflicts. We posit that these cases should not be overlooked when examining the diverse circumstances surrounding unnatural deaths linked to sexual activities. In alignment with Geberth's findings, these scenarios predominantly manifest in the context of homosexual homicides [26]. The findings of the current research reveal that strangulation stands out as the leading cause of death in incidents of autoerotic accidental deaths. It is imperative to recognize the inherent peril associated with utilizing strangulation as a technique for pleasure enhancement, rendering it devoid of any possibility of "safe play." Given the frequent depiction of neck compression on readily accessible adult content websites, medical professionals should be alert to the potentially life-threatening nature of such activities. It is crucial to acknowledge that the influence of imitation may extend beyond adults to include inexperienced teenagers and young adults in search of sexual exploration. From our perspective, addressing this issue in the sexual education of young individuals, alongside subjects like sexually transmitted diseases and pregnancies, could contribute significantly to the prevention of such tragic deaths. Open and frank discussions about this topic should be encouraged among medical professionals, encompassing general practitioners, pediatricians, and emergency care providers. This is especially important when addressing sexual health matters or handling cases involving potential survivors of such practices. A 2016 American study involving interviews with 2,021 individuals reported that approximately 20% had experiences with enthrallment, 30% with striking buttocks, and 13% with playful flogging [28]. In Australia, a survey of 19,307 individuals revealed that around 1.8% of participants had encountered BDSM [29]. This current investigation found comparable percentages of injuries, showing no significant distinctions in the nature or severity of the injuries. Consequently, these results are not deemed helpful in differentiating between autoerotic and consensual sexual acts. Our study aligns with

clinical research indicating that anogenital injuries may be present or absent in both consensual and non-consensual acts [30-36]. Forensic and clinical professionals should take note of these findings when interpreting anogenital injuries. In cases of suspected death preceding sexual activity, it is crucial to conduct histological examinations on sperm. Moreover, these samples can facilitate molecular analyses to identify individuals involved in sexual activities if they are already in a database. However, it is essential to consider that the absence of sperm does not rule out penile penetration and could be attributed to factors like lack of ejaculation or sterilization. Additionally, the presence of sperm in a body cavity might result from transfer from another body region, such as via a hand or an object. From a medical standpoint, neither the presence of sperm, anogenital injuries nor intentionally inflicted fatal injuries can serve as conclusive evidence to distinguish between consensual and non-consensual sexual activities. This determination should be within the purview of police investigations and judicial judgments. In instances of death following sexual activities, as well as cases involving unconscious, injured survivors, forensic and clinical physicians should conduct an impartial assessment through thorough examinations and documentation.

**Limitations of the study:** The forensic analysis of unnatural deaths linked to sexual assault, despite its comprehensiveness, has limitations. Its retrospective design relies on autopsy records, subject to historical data availability and accuracy issues, potentially leading to underreporting. The focus on suicides by hanging and poisoning may exclude other modes of unnatural deaths related to sexual activities, limiting generalizability. The study's location-specific approach in Dhaka, Bangladesh, may not fully capture diverse socio-cultural contexts and the prevalence of sexual violence in other regions. The small sample size of 15 cases may constrain statistical power and limit generalizability. The exclusive focus on unnatural deaths excludes exploring consensual sexual practices and potential health implications.

## 5. CONCLUSION AND RECOMMENDATIONS

In conclusion, this research illuminates the intricate and multifaceted aspects of unnatural deaths associated with sexual activities, explicitly focusing on suicides involving hanging and

poisoning. The study highlights the necessity for a nuanced comprehension of the circumstances surrounding such deaths, emphasizing the potential for misclassification and stressing the significance of precise forensic assessments. Recommendations stemming from this study call for increased awareness among healthcare professionals, law enforcement, and the general public regarding the various situations in which unnatural fatal events may transpire during or after sexual activities. It underscores the imperative to address social and cultural factors contributing to sexual violence, as evident in the study's findings on rape cases. Moreover, the research advocates for the implementation of educational and preventive measures to mitigate risks linked to certain sexual practices, such as the intentional use of substances for heightened sensations. Additionally, the study underscores the crucial role of accurate forensic examinations in cases of suspected unnatural deaths related to sexual activities, shedding light on the limitations of medical evidence in distinguishing between consensual and non-consensual acts.

## CONSENT

Informed consent was obtained from the legal guardians of the study participants.

## ETHICAL APPROVAL

As per international standard or university standards written ethical approval has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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