ORIGINAL ARTICLE

# Documentation of Oral Cavity in Deceased Individuals in a Teaching Hospital Mortuary in Northeast India

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## Abstract

***Background:*** The oral cavity, often overlooked in forensic investigations, harbours valuable clues that can significantly contribute to the understanding of postmortem changes and forensic diagnoses. ***Objective:*** This study endeavours to explore the demographic profile and document distinct features within the oral cavity related following death through the lens of forensic odontology. ***Methods:*** In this cross-sectional, observational study, data from 50 deceased individuals were collected and analyzed at a tertiary care medical institute and a national forensic science university. Ethical considerations were diligently addressed, with consent obtained from the deceased's next of kin. ***Results:*** Findings revealed notable demographic trends, with a majority of male individuals and the highest representation in the 31-40 age group. Suicide emerged as the most prevalent cause and manner of death, underscoring the need for comprehensive psychological assessments in forensic investigations. Temporal aspects of death highlighted the importance of timely examinations in preserving forensic evidence. Assessment of oral hygiene status and oral cavity characteristics provided valuable insights into postmortem changes and potential forensic implications. ***Conclusion:*** This study underscores the critical role of forensic odontology in enhancing the accuracy and reliability of forensic diagnoses, ultimately contributing to the advancement of forensic medicine and legal proceedings.


**Keywords:** oral cavity, postmortem changes, forensic odontology, cause of death, time since death, observational study.

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## INTRODUCTION

Forensic medicine plays a pivotal role in establishing the causes of injury and death, with distinct features observable in various parts of the body, including the oral cavity. Despite the potential of the oral cavity for forensic diagnosis, it is often neglected.[1] Forensic odontology, a recognized discipline, involves the identification, documentation, and preservation of oral tissue signs for legal evidence. An accurate examination of the oral cavity's morphology requires expertise in forensic odontology, emphasizing the need for qualified professionals in forensic investigations.[2] This research aims to study the demographic profile and to document distinct features in the oral cavity following death.

## METHODS

This cross-sectional, prospective, observational study spanning four months was done at a tertiary care medical institute where data was collected and National Forensic Science University where the results were analyzed and this manuscript written. The study included 50 deceased individuals brought to the mortuary during the study period, having no detectable disease, injury or deformity in the craniofacial region, chosen conveniently. Ethical approval was obtained,

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and informed consent was obtained from the deceased's relatives.

The independent variables taken into account for this study include Age Groups (0–10 years, 11–20 years, 21–30 years, 31–40 years, 41–50 years, 51–60 years, 61–70 years, and 71–80 years, Sex (male and female), Cause of Death (hanging, poisoning, drowning, and others), Manner of Death (natural, accidental, suicidal, or homicide), Time Since Death: Categorized into specific time intervals, Oral Hygiene Status (Good = No stains and no calculus, Average = Only stains, no calculus but involved more than 5 teeth, Poor = Stains and calculus both were present in all teeth), Color and Consistency of Lips: Including color variations and consistency (hardness) of lips, Color and Consistency of Gingiva: Including color variations and consistency (hardness) of gingiva.Position and Color of Tongue: Examining tongue position and color variations.

Study tools used were Y-type cheek retractor, battery torch, ultraviolet led torch.

A proforma documented information from the craniofacial region during postmortem, including age, sex, cause of death, time since death, oral hygiene status, and characteristics of the lips, gingiva, and tongue. The cases were both extra-orally and intra-orally examined and documented by photographs. Data were analyzed using Microsoft Excel software, version 7.0.

## RESULTS

Out of 50 cases examined, in demographics, the majority of the individuals (64%) were male, while 36% were female. The age group with the highest representation was 31-40 years old (32%), followed by 21-30 years old (22%). In Cause of Death, the most common cause of death was suicide (52%), followed by poisoning (26%), and hanging (24%). Only a small percentage of deaths were due to drowning (2%). In the manner of death, suicide was the most prevalent manner of death (52%), followed by accidents (24%). Homicide accounted for a tiny percentage (2%) of deaths. The majority of deaths (54%) occurred within 0-12 hours from the time of observation, 40% occurred between 12-24 hours, and 4% occurred between 24-36 hours. A significant portion of individuals had poor oral hygiene (64%) (Figure 1), followed by those with average oral hygiene (33%) (Figure 2). Only 6% of cases had good oral hygiene (Figure 3). In macroscopic examination, the majority of individuals had lips with a dark brown colour (72%), followed by black (6%). Lips were consistently hard in 100% of cases observed. The majority had pale-coloured gingiva (54%), while 30% had pigmented or dark coloured gingiva (Figure 4a, 4b). Gingiva consistency was hard in 50% of cases. The majority of tongues were in a normal position (82%). The most common tongue colour was white (45%), followed by grey (33%). We also documented anomalies of teeth such as spacing (Figure 6a), transposition (Figure 6b) and yellowish discoloration of tongue in a case of peritonitis (Figure 7).

**Table 1:** Distribution of cases based on demographic data and postmortem findings.

| Variables | Frequency | Percentage |
|---|---|---|
| **Age group (in years)** | | |
| 0 –10 | 1 | 2% |
| 11–20 | 5 | 10% |
| 21 –30 | 11 | 22% |
| 31–40 | 16 | 32% |
| 41 –50 | 4 | 8% |
| 51 –60 | 10 | 20% |
| 61-70 | 0 | 0% |
| 71-80 | 3 | 6% |
| **Sex** | | |
| Male | 32 | 64% |
| Female | 18 | 36% |
| **Cause of Death** | | |
| Hanging | 12 | 24% |
| Poisoning | 13 | 26% |
| Drowning | 1 | 2% |
| Others | 24 | 48% |
| **Manner of Death** | | |
| Natural | 11 | 22% |
| Accident | 12 | 24% |
| Suicide | 26 | 52% |
| Homicide | 1 | 2% |
| **Time since Death (in hours)** | | |
| 0–12 | 27 | 54% |
| 12 –24 | 20 | 40% |

| Variables | Frequency | Percentage |
|---|---|---|
| 24 –36 | 2 | 4% |
| 36 –48 | 0 | 0% |
| 48 –60 | 1 | 2% |
| **Oral Hygiene Status** | | |
| Good | 3 | 6% |
| Average | 16 | 33% |
| Poor | 30 | 64% |
| **Lips** | | |
| **Colour of Lips** | | |
| White | 0 | 0% |
| Gray | 11 | 22% |
| Yellow | 0 | 0% |
| Red | 0 | 0% |
| Dark Brown | 36 | 72% |
| Black | 3 | 6% |
| **Consistency of Lips** | | |
| Soft | 0 | 0% |
| Hard | 50% | 100% |
| **Gingiva** | | |
| **Colour of Gingiva** | | |
| Natural | 0 | 0% |
| Pale | 27 | 54% |
| Dark | 8 | 16% |
| Pigmented | 15 | 30% |
| **Consistency of Gingiva** | | |
| Soft | 0 | 0% |
| Hard | 50 | 50% |
| **Tongue** | | |
| **Position of Tongue** | | |
| Normal | 41 | 82% |
| Protruded | 9 | 18% |
| **Colour of Tongue** | | |
| White | 8 | 45% |
| Gray | 6 | 33% |
| Yellow | 2 | 11% |
| Red | 0 | 0% |
| Dark Brown | 2 | 11% |
| Black | 0 | 0% |

**Figure 1.** Good Oral Hygiene

**Figure 2.** Average Oral Hygiene

**Figure 3.** Poor oral hygiene


**Figure 4.** Examination of colourof the gingiva: (a) dark; (b) pale.

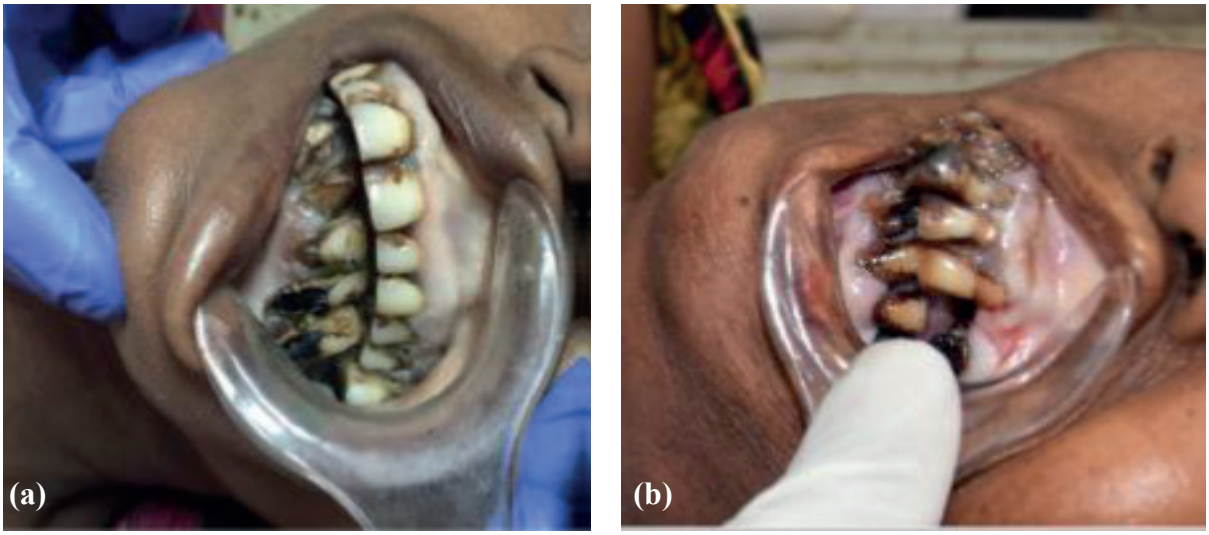


**Figure 5.** Examination of teeth (a) stains and calculus with erosion (b) attrition and abrasion.

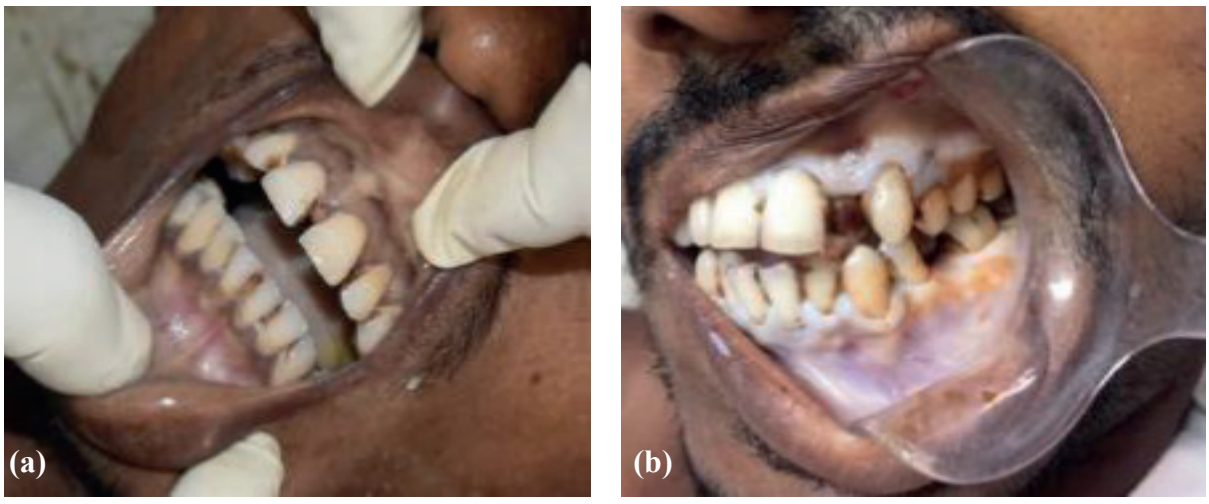


**Figure 6.** Examination of teeth anomalies (a) spacing with pigmented gingiva, (b) transposition of teeth.

**Figure 7.** Yellow coloredtongue observed in peritonitis case.

## DISCUSSION

Forensic odontology, a critical discipline within forensic medicine, has significant potential in unraveling mysteries surrounding injury and death, particularly through the examination of the oral cavity.[3,4] Despite its importance, the oral cavity is often overlooked in forensic investigations. This study underscores the necessity of incorporating expertise in forensic odontology to accurately diagnose and document crucial features related to the cause of death, focusing on distinct features within the craniofacial structure. Current research provides valuable insights into the characteristics of the deceased individuals' oral cavities. We aimed to establish correlations between various demographic and forensic variables and the oral cavity's features. A notable majority of the deceased individuals were male, with the most represented age group falling within 31-40 years, followed closely by 21-30 years. Such demographic patterns might reflect broader societal trends regarding mortality rates and causes of death within specific age brackets. In terms of cause and manner of death, the study identified suicide as the most prevalent cause, emphasizing the importance of understanding psychological factors and mental health issues in forensic investigations. Temporal aspects of death, such as the time since death, offer crucial insights into postmortem changes and decomposition rates. The majority of deaths occurred within 0-12 hours from observation, underlining the importance of timely forensic examinations to preserve evidence and ascertain accurate cause of death determinations. The study's assessment of oral hygiene status and oral cavity characteristics provides valuable data for forensic odontologists and pathologists. The majority of individuals exhibited poor oral hygiene, suggesting potential correlations between oral health status and overall health outcomes. Previous researchers have found tongue bite injuries as a diagnostic criterion for death in epileptic seizures.[5] Furthermore, observations regarding the colour and consistency of lips, gingiva, and tongue contribute to our understanding of postmortem changes and their forensic significance. For instance, the prevalence of dark brown lips and pale-coloured gingiva may indicate postmortem changes, while consistent hardness in lips suggests potential implications for forensic identification and analysis. Individuals who abuse cannabis typically experience inferior oral health compared to non-users, facing elevated risks of dental caries and periodontal diseases.[6] Another research depicted that the cases examined exhibited a pink appearance in the teeth.[7] In cases of hypoxic death and histotoxic deaths, microscopic examination of oral tissues showed noticeable cytoplasmic vacuolation and the presence of arc-shaped nuclei.[8] In burnt bodies beyond recognition, craniofacial structure investigation and antemortem radiograph comparison are important.[9] Also, visible anterior dentition documentation from photographs can be useful in forensic odontology.[10]

## CONCLUSION

This study highlights the critical role of forensic odontology in forensic investigations, particularly in documenting distinct features within the oral cavity related to the cause of death. By integrating multidisciplinary approaches and employing rigorous methodologies, future research can further elucidate the forensic significance of oral cavity characteristics, ultimately enhancing the accuracy and reliability of forensic diagnoses and legal evidence.

**Conflict of Interest:** The authors declare no conflicts of interest.

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**Ethical Clearance:** The study was approved by the Ethics Review Committee of Agartala Government Medical College and Hospital Tripura, India.

**Authors' Contribution:** Conceptualization, investigation and data curation: ID, Formal analysis, validation, visualization, manuscript writing, review & editing: ID, AN.

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