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Current state of Disaster Victim Identification in India: Reflections and Future Prospects

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ABSTRACT-

Disaster Victim Identification (DVI) is crucial for providing closure to affected families and communities post-disasters. This paper comprehensively analyzes the current state of DVI in India, reflecting on past practices and proposing future possibilities. Exploring India's susceptibility to diverse disasters, the review evaluates the existing policy framework, emphasizing the pivotal role of DVI in disaster aftermaths. The paper particularly focuses into the importance of forensic odontology in victim identification, drawing insights from historical disasters and advocating for a comprehensive, multidisciplinary approach in disaster response planning. Consideration is given to key legislative responses, including the Disaster Management Act of 2005. Recommendations for enhancing DVI in India emphasize international best practices, an Identification Board, and biometric databases. Integration of forensic odontologists into disaster response teams and standardized protocols for dental evidence collection and analysis are crucial. In conclusion, the paper underscores the multifaceted aspects of disaster preparedness and victim identification, emphasizing the pivotal role of forensic odontology and advocating for strategic measures to elevate DVI in India in alignment with global standards and ethical considerations.

keywords: Disaster Victim Identification, Forensic Odontology, Disaster Management, Legislation, Identification Board, Biometric Databases, Preparedness, International Best Practices.

Introduction:

A disaster refers to a significant disruption in the functioning of a society, causing widespread human, material, or environmental losses that go beyond the affected society's ability to cope using its own resources. This term encompasses catastrophic events, mishaps, calamities, or grave occurrences resulting from natural or human-made causes, accidents, or negligence. The consequences include substantial loss of life, human suffering, property damage, destruction, environmental harm, and a strain on the affected community's coping capabilities.

The United Nations Disaster Relief Organization (UNDRO) characterizes a disaster as a serious disturbance causing extensive damage that exceeds the affected society's capacity to manage independently. The World Health Organization defines it as "a sudden ecologic phenomenon of sufficient magnitude to require external assistance."[1]

Disasters can be classified based on their origin (natural or man-made), weather-related extremes (floods, droughts, cyclones), geological extremes (earthquakes, volcanoes), and onset speed (rapid or slow). To address disasters, every nation formulates a program and emergency management system with the objective of proactive planning and post-active response to events such as floods, earthquakes, tsunamis, terrorist activities, etc. Proactive measures involve adopting a holistic and integrated approach, emphasizing planning, preparation, and prevention in the pre-disaster phase. Post-active responses encompass emergency assistance, rehabilitation, relief efforts, long-term maintenance, and disaster victim identification.[1,2]

Disaster Profile of India

India stands as one of the most disaster-prone countries globally, primarily due to its locational and geographical characteristics. The nation's susceptibility to numerous natural hazards, such as cyclones, droughts, floods, earthquakes, fires, landslides, and avalanches, is a result of its unique geographic and climatic conditions. The combination of these factors with socio-economic

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elements exposes the country to a wide range of disasters.

India faces risks emanating from both natural and human-induced factors, including unfavorable topography, environmental degradation, population growth, urbanization, industrialization, and flawed development practices. Out of India's 28 states and 8 union territories, a staggering 27 are vulnerable to disasters, highlighting the widespread nature of the risks the country encounters.

As per the 2009 National Policy on Disaster Management report by the Government of India, approximately 58.6% of India's landmass is susceptible to earthquakes of varying intensities on the Richter scale. About 12% of the total land area, equivalent to over 40 million hectares, is under the threat of floods and river erosions. Additionally, out of the 7,516 km coastline, 5,700 km is prone to tsunamis, storms, and cyclones. Moreover, 68% of cultivable land is at risk of drought.[3,4]

Global studies indicates a concerning upward trend in mass disasters, resulting in a higher toll on victims. In India, the period spanning 1991-2000 witnessed 59,072 fatalities due to disasters, and this figure increased to approximately 63,611 deaths in the subsequent decade (2001-2010). The severe drought experienced by ten states during 2015-2016 affected an estimated 330 million people, including 37 million children under the age of five.[5]

Significant historical disasters in India, such as the Mandi Dabwali school fire (1995), the super cyclone in Orissa (1999), the Bhuj earthquake (2001), the Kumbakonam school tragedy (2004), the Kashmir earthquake (2005), the 2004 Indian Ocean earthquake (Tsunami), and the Uttarakhand disaster (Himalayan Tsunami), emphasize the critical need for the implementation of a comprehensive and cross-disciplinary approach in disaster response planning and victim identification.[1-5]

Disaster Management in India

The Disaster Management Act of 2005 marked a significant response by the Government of India to disasters such as the 2001 Bhuj Gujarat earthquake and the 2004 Tamil Nadu tsunami. This legislative action led to the establishment of the National Disaster Management Authority (NDMA) on December 23, 2005, overseen by the Prime Minister, and State Disaster Management Authorities (SDMAs) guided by respective Chief Ministers. The NDMA's primary policy objective is to create a safer and disaster-resilient India by formulating a comprehensive, proactive, multidisciplinary, and technology-driven strategy for disaster management through collaborative efforts of government agencies and non-governmental organizations.[3]

The Disaster Management Act defines disaster management as an integrated process encompassing planning, organizing, coordinating, and implementing measures for the prevention, reduction of risk, readiness, prompt response, assessment of severity, rescue and relief, and rehabilitation and reconstruction in the aftermath of any disaster.

Key agencies involved in disaster management include:[2-6]

- National Disaster Management Authority (NDMA): Headed by the Prime Minister, responsible for supervising, directing, and controlling the National Disaster Response Force (NDRF).
- National Executive Committee (NEC): Comprised of ministerial members from the Government of India, including the Union Home Secretary as Chairperson, responsible for preparing the National Plan for Disaster Management.
- State Disaster Management Authority (SDMA): Headed by the Chief Minister, assisted by the State Executive Committee (SEC) in advising on disaster management at the state level.
- District Disaster Management Authority (DDMA): Headed by the District Collector, Deputy Commissioner, or District Magistrate, overseeing the implementation of disaster management guidelines at the district level.
- Local Authorities: Including Panchayati Raj Institutions, Municipalities, District and Cantonment Boards, and Town Planning Authorities, responsible for controlling and managing civic services.

The key focus areas of NDMA policy are rescue, relief, and rehabilitation.

Disaster Victim Identification (DVI)

Disaster Victim Identification (DVI) involves the use of established methods to positively identify deceased victims in the aftermath of a catastrophic event, a critical process, especially when multiple individuals have lost their lives. Scientifically proven techniques are employed to determine the identities of those who have perished in a single incident.

While each disaster is unique, they commonly result in a significant number of fatalities. Despite the top priority being the preservation of life during major incidents,

disaster response teams often overlook the essential aspect of Disaster Victim Identification (DVI) in their plans. DVI, as a distinct discipline, is gaining importance following recent disasters, recognizing the significance of establishing the identity of the deceased for humanitarian, emotional, legal, and administrative reasons.[7]

The complexity of victim identification in the aftermath of a disaster can vary significantly, depending on various factors such as the context (closed vs. open), the number of fatalities, extent of body fragmentation/decay, availability of ante-mortem reference material, acquisition of medical and dental records, legal and jurisdictional issues, and internal and external documentation and communication problems.

Traditionally, the emphasis in disaster aftermath has been on managing the living and the injured, while the management of deceased individuals is often overlooked. Once it is established that a missing person has met an unfortunate fate, concerted efforts must be made to recover the body along with any personal belongings. An unnamed body may remain unidentified, posing challenges for the deceased person's family in accepting it for the final rites. Several identification methods are routinely employed in this process.[5–7]

1. Least reliable methods:

- Visual recognition by accompanying persons/family members.
- Personal effects.

2. Scientific methods:

- Fingerprints.
- Dental records.
- Skeletal characteristics.
- Medical conditions.
- Serology.
- Photographic methods.
- Hair.

3. Identification by exclusion.

The process of identification depends on factors like visual recognition and fingerprints, which may encounter limitations in situations such as mass disasters or burials where human remains are significantly damaged. Scientific identifiers must possess uniqueness, stability, and pre-death recording for validity. Dental evidence stands out as a valuable means of identification due to its accessibility, non-invasive attributes, and durability against various challenges.

Disaster victim identification (DVI) is often considered a subset of humanitarian forensic action, involving the application of forensic science to humanitarian activities. This includes the use of forensic science and forensic medicine in post-conflict environments, mass graves, or cases involving missing persons, with the primary goal of restoring identity to the deceased, ensuring "dignity in death," and providing answers to family members and the community.

The responsibility for leading a disaster response typically falls on the government in the affected area. However, international organizations like the International Committee of the Red Cross and International Criminal Police Organization (INTERPOL)[17] are ready to assist in DVI, deploying highly specialized skills and multidisciplinary teams. Responses involve collaboration between people from multiple countries, agencies, and disciplines working towards a common goal under challenging circumstances. This raises ethical questions about the value of different human bodies in death, highlighting the social, economic, political, and cultural contexts in which disaster response and forensic science take place.

Death with Dignity

Death is a complex event where the realms of religion, science, culture, tradition, beliefs, and the after-death concept intersect. The treatment of the deceased involves not only a scientific or religious perspective but is deeply entwined with cultural practices, traditions, and the value assigned to the dead body. Disposal of the corpse in a brutal or negligent manner is seen as an act of extreme violence, as the dead are believed to possess rights and dignities upheld through the rituals, practices, and beliefs of the living.[8]

T. M. Wilkinson explores the reasons to respect the dead, emphasizing their interests. He considers the perspective of the family, the necessity of dealing with unclaimed bodies, and the issue of the public display of bodies solely donated for such purposes. It is a reflection on how individuals would like to be treated in death, aspiring for dignity, identification, appropriate last rites, mourning, remembrance, closure for the family, and justice.[9]

Article 21 of the Indian Constitution extends the right to a dignified life not only to the living but also to the deceased. Even in death, individuals are entitled to respectful and dignified treatment of their bodies in alignment with their

traditions, culture, and religion. This right encompasses not only the departed individual but also their family members, allowing them to perform last rites in accordance with religious customs. The right to a decent burial is considered an integral aspect of an individual's dignity, acknowledged as part of the right to life under Article 21 of the Indian Constitution.[10]

So, Respectful management of dead bodies should encompass various considerations:[8-10]

- Prioritize dignified handling, avoiding mass burials.
- Protect bodies from desecration through appropriate storage.
- Acknowledge the emotional distress of the deceased's relatives, keeping them informed about procedures.
- Exercise caution to prevent identification errors.
- Treat all bodies with equal respect, regardless of identification status.
- Restrict media access to photos and records, especially for unidentified cases.
- Preserve the privacy of victims and their relatives.
- Respect cultural and religious needs, conducting last rites in accordance with customs.

Disaster Victim Identification and Forensic Odontology

Dental analysis stands out as a crucial and dependable tool in the identification process during mass fatality incidents, emphasizing its importance in the Interpol guidelines, where odontology is acknowledged as a primary or standalone identifier. This implies that once authorities confirm identification through dental information, no additional supporting evidence is deemed necessary.[11,12]

In the context of disasters, particularly those involving mass casualties from events like floods and earthquakes, dental identification plays a pivotal role. These situations have become increasingly recurrent in India over the last few decades. Following a mass disaster, the use of dental data becomes one of the most reliable methods for identifying individual victims. Forensic odontologists analyze the dentition of deceased individuals, considering factors such as missing, decayed, filled, extracted, or modified teeth. Post-mortem data is then compared to ante-mortem records available with dentists. Oral features are also evaluated, providing valuable information for the identification of individuals who may not have undergone extensive dental treatment. Even individuals who have lost all their teeth can potentially be identified based on jawbone anatomy or distinguishable dentures in terms of shape, size, manufacturer, and composition. Additionally, dental data can provide insights into an individual's age, race, and sex. Dental anomalies, such as missing teeth or supernumerary teeth, further contribute to the identification process.[13,14,18]

In cases where conventional dental identification methods fall short, biological material like DNA becomes a crucial link to establish identity. Advances in DNA technology have positioned forensic DNA profiling as the gold standard for identifying unknown remains. The primary goal of DNA profiling in disaster victim identification is to extract maximum genetic information from highly compromised samples. Dental tissue, resistant to incineration, immersion, trauma, mutilation, and decomposition, serves as an excellent reservoir of DNA.[7,15]

Recommendations for Strengthening Disaster Victim Identification in India:

Disaster Victim Identification (DVI) represents a challenging and demanding process, and unfortunately, India, like many developing countries, lacks organized plans for the identification of mass disaster fatalities. The country lags behind in both the theoretical and practical aspects of Disaster Victim Identification, particularly concerning dental data.

The existing policy framework by the National Disaster Management Authority (NDMA) primarily focuses on rescue, relief, and rehabilitation, with insufficient emphasis on victim identification. To address this deficiency, the Government of India should formulate policies that prioritize primary scientific methods like fingerprint analysis, comparative dental analysis, and DNA fingerprinting. International systems of identification should be incorporated into the national framework, and a multidisciplinary team of forensic experts, including forensic medical experts, anthropologists, fingerprint experts, and odontologists, should be deployed with proper training and drills to enhance identification percentages.[3]

Establishing an Identification Board equipped with infrastructure such as morgues, triage units, and identification units is essential. Rapid collection of ante-mortem data can be facilitated by collaborating with the Aadhaar UID Databases.[16] Additionally, India can leverage its unique biometric identification system, Aadhaar, by

supplementing it with other biometric patterns like dental and DNA records. Introducing a policy towards the establishment of DNA databases, modern instruments, and legislative mandates for maintaining comprehensive medical and dental records by healthcare professionals will further strengthen the identification process.

India must acknowledge the importance of disaster victim identification and the role of dental analysis. A formally constituted Identification Board and consensus on Standard Operating Protocols for the collection, preservation, and analysis of dental evidence can significantly enhance post-mortem procedures. The establishment of a uniform National Dental Record Database or protocols for accurate ante-mortem data collection can mitigate discrepancies arising from inaccurate data entry or translations. Routine dental check-ups with appropriate radiography should be integrated into primary care services, contributing to a broad-based national ante-mortem dental record repository.

To enhance the disaster victim identification process, Forensic Odontologists should be included in Disaster Victim Identification Teams, and logistical requirements should be considered at the central level. Technical knowledge must be integrated with scientific knowledge, including the use of specialized victim identification software. Addressing the procurement of ante-mortem dental data from other countries in the era of globalization is crucial, and National Institutes can play a role in designing educational curricula for forensic odontology.

Disaster victim identification is a complex process, and India needs comprehensive planning based on international guidelines. The lack of organized plans, standard operating procedures, and consistent guidelines for ante-mortem dental data collection poses challenges. Strengthening training programs, ensuring uniform recording formats, and addressing disparities in dental care access are essential for building capacity and responding effectively to mass disasters in India. The NDMA policy should prioritize scientific methods for disaster victim identification, recognizing the rights of the deceased and their families to dignified treatment even in death.

Conclusion

The process of disaster victim identification is highly sensitive and demands extreme caution. Each incident provides unique learning opportunities, emphasizing the importance of effective learning from past experiences to avoid repeating mistakes. To enhance disaster resilience, it is essential to train a team of forensic experts as part of preparedness measures.

Introducing dental repositories as an addition to the existing Aadhaar UID Databases could serve as a valuable ante mortem repository. The incorporation of forensic odontologists into disaster victim identification (DVI) teams has proven to be highly efficient, as evidenced by experiences such as the Thailand tsunami.

The maintenance of dental records emerges as a crucial aspect in disaster situations, with ante-mortem records serving as a primary component for dental identification.

National institutions such as the University Grants Commission and Dental Council of India can play a significant role in developing a specialized curriculum and modules for educational and training programs focused on forensic odontology. This can be incorporated as part of continuing dental education programs.

Regularly scheduled drills and rehearsals are crucial because improper execution of exercises renders even the most well-devised plans ineffective. Training constitutes an integral component of capacity building, as individuals with proper training respond more effectively to diverse disaster situations.

In summary, enhancing disaster preparedness, incorporating forensic expertise, and maintaining comprehensive dental records are essential steps in improving the effectiveness of disaster victim identification processes.

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