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This journal is published to expand the academic activities and spread the knowledge, ideas and latest research in the field of ethics, trauma, and victimology. This journal publishes original research papers, review articles, case reports, letters to the editor and review of books on ethics, trauma, and victimology. This journal is supported by the Society for Prevention of Injuries and Corporal Punishment (SPIC) and Indo Pacific Academy of Forensic Nursing Science (INPAFNUS). This journal is supporting the aims of the SPIC and the INPAFNUS. This journal also highlights the achievements of the SPIC, INPAFNUS and their members.

This journal covers the various aspects of ethics, evidence-based medical ethics, ethical dilemmas and various dynamic issues related to ethics. It also covers the ethical issues related to Forensic Nursing Science, Forensic Odontology, and Forensic Psychiatry. It also covers the ethical aspects of Toxicology including Environmental Pollution. It covers issues related to all sorts of corporal punishment and their prevention, particularly in schools. It covers physical as well as psychological aspects of trauma and clinical forensic medicine related to all types of injuries and prevention of injuries. It covers all aspects of victimology including etiology, crime scene investigation, and prosecution.

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From the Editor's Desk

Dear Readers

A journey that started in 2015 has entered its 7th year with the support of authors, reviewers and members of the editorial board. As a result, the editorial board is presenting before you the first issue of its 7th Volume.

The progress of this journal is continuous and steady with the online submission and review process in the experimental stage. Gradually, we will be shifting totally to the online submission and reviewing the papers.

I will like to convey my gratitude to the SPIC and INPAFNUS for their continuous support to this journal. I would like to convey my thanks to all the members of both these organizations. I also appreciate and convey my thanks to all the authors for supporting this journal. Finally, I will be failing in my duty if I do not convey my thanks to the reviewers and the members of the editorial board who have provided me continuous support in publishing this journal and improving the standards of this journal.

Dr Rakesh K Gorea
Editor-in-Chief

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Perspectives of being a patient: Expectations, rights and responsibilities?

Rakesh Kumar Gorea

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ABSTRACT

From a healthy person when a person becomes a patient may be a matter of short duration or long duration depending upon the type of illness. A patient when reaches to the health provider have many expectations some of which is easy to fulfil others may be difficult to be met with. Care providers must know these expectations so that they know them, understand them and try to fulfil the possible expectations. Some of these may be enshrined in the rights of the patients and these rights of the patients have to be taken care of and it will be possible only when all medical and health professionals know well about it and in detail. Along with the expectations and rights of the patient there are responsibilities of the patient too which patients must fulfil to have a better experience and comforts in the different settings of the health professionals.

Keywords: Duties of the patient, Expectations of the patients, Rights of the patient.

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INTRODUCTION

What is a Patient?

A patient is a person under medical treatment or medical care or waiting for medical treatment or medical care¹ or a person who is receiving medical and dental care by a particular doctor when required.² A patient can be a child, adult or old man; male-female or third gender; normal or differently abled person and the expectations differ in the different categories.

Expectation of Patients

Many physicians may not know the expectations of the patients and it is very important that they should know these prospects. There are huge expectations from the physicians and other caregivers.

Patients expect a warm welcome with friendly staff as is done in the hotel industry or airline.³ The biggest expectation may be that he is properly listened to so that perspective of the patient can be understood by the treating physicians. The patient expects clear instructions from the treating physician. The patient expects empathy. The care and concern of the caregiver are very important to the patient. The patient expects that he should be able to communicate with the physician at any time during the day or night. Treatment should be initiated as soon as possible.⁴

In one of the studies the biggest expectation was that history taking should be very good (100%), Referral should be done promptly when required (98%) and listening by the doctor without interruption (87.7%) were followed. In a good number of people, priority was attentiveness (78.02%). The expectation of information regarding illness (75.79%), clear instruction about prescription (75.15%) and privacy concerns (75.0%) were almost at par followed by the partnership in decision making (72.92%), good treatment (70%) and

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dietary advice (67%). Greeting from the doctors (51.91%) and confidentiality (46.49%) was also desired.⁵ These expectations may vary depending upon the culture and regions. In one study in China, it was indicated that patients want a refund of the consultation fee if no medication was prescribed and only tests were written.⁶

Why Meet Patients' Expectation

Meeting patients' expectation may be challenging. But when the expectations are fulfilled that will result in a better outcome of the results in a treatment process. It will also reduce the suing by the patients as patients will be more satisfied.⁴

Precautions to be Taken by the Physician while Meeting the Expectations of the Patients

A physician should know that how to fulfil the expectation of the patients. There should a way to measure the expectations so that necessary precautions can be taken. These expectations can be measured in three domains viz health outcomes, individual clinicians and health care system.⁷

Physicians should see they do not get manipulated by the emotions of the patients and their relatives. While ordering tests, it must be explained to the patient why these tests are

needed. The patient must be informed about choosing a particular line of treatment and if there are options, the wish of the patients and the choice of the patient must be respected. If a patient wishes to consult another physician that must be respected and allowed or if a physician thinks another consultation is required with another specialist that must be taken.⁴

In the emergency, SCs are very important to be taken care of, which are core question of the patient, how to communicate and contact, collaborate and close the loop and should be taken into consideration while dealing with the patients.⁸

Waiting time in the OPD and the availability of the doctor on the phone are two main issues for the patients as far as expectation of the patients is concerned in one study and should be taken care of.⁹

With full honesty, the physician should balance the over-expectations of the patients with reality and should provide them with enough information so that they understand and also must listen to them completely before deciding anything and giving them all the options explaining the benefits and drawback of each option and should not hurry in listening to the final answer but should give them sufficient time and resources to reach the right conclusions.¹⁰

Rights of Patients

The rights of the patients are the basic rules governing the interaction of the patient with the medical caregivers and medical institutions. Usually, caregivers do not realize the rights of the patients.¹¹ Every patient has some rights. They were vague in India but now the Human rights Commission of India has provided the list of rights and these rights of the patients need to be displayed in every health care institute.¹²

These rights are right to Information; right to records and reports; right to emergency medical care; right to informed consent; right to confidentiality, dignity and privacy; right to a second opinion; right to transparency in rates and care as per prescribed rates; right to non-discrimination; right to safety and quality care according to the standards; right to choose alternative treatment options if available; right to choose the source for obtaining medicines or tests; right to proper referral and transfer, which is free from perverse commercial influences; right to protection for patients involved in clinical trials; right to protection of participants involved in biomedical and health research; right to take discharge of the patient, or receive the body of deceased from the hospital; right to patient education and right to be heard and seek redress of complaints.¹²

In an emergency, a patient cannot be refused treatment even if he cannot pay. The patient cannot be abandoned once the patient is accepted.¹¹ Patients have the right to participate in the health care decisions.³

Patients have many other rights e.g. not to be awakened from sleep unless it is medically necessary to give treatment, right to treatment to avoid unnecessary discomfort, right to information about his rights as a patient, right to be free from

all abuses and harassment, right of religious and spiritual services, right to appropriate pain management, right of not to be exploited financially and the right to be treated with respectful care by competent persons.¹³

In the USA patients have the rights as enshrined in the Health Insurance Portability and Accountability Act [HIPAA]. They have the right to informed consent as well as the right to opt for a treatment or refuse treatment and treated with respect, they enjoy the right to make a decision about end of life care, the right to obtain medical records and maintain the privacy of the records.¹⁴

A patient has the right to choose a health professional and refuse procedures that are against his religious beliefs.¹⁵ A patient has the right to explanation if he is to be transferred to another institution and know the identity of the treating professional. A patient has the right to leave the hospital but it should not prejudice the safety and health of other people and fully knowing the consequences of leaving the hospital. A patient has the right to tell his grievances without the fear of reprisal and the opportunity to settle these grievances amicably.¹⁶

Responsibilities of the Patient

If the patient has the rights simultaneously he has the responsibilities too to keep the appointments and be punctual to attend the appointments, respect the other health workers and caregivers, and respect the rules of the facility being used by him. A patient has also to help in limiting the visitors. A patient needs to provide correct history, help in investigations and follow the advised treatment. The patient should report if does not understand treatment or instructions and should take suggested precautions and report any changes in health condition and allergies, be responsible if not taking the suggested treatment and be responsible for payment of the bills. They need to respect the rights of others and property.¹³ They need help to measure pain and develop a pain management plan with their health professional. They need to be considerate of other patients too.¹⁶

Violation of Rights of Patient

If patients rights are violated this may fall under professional misconduct and professional negligence. For professional negligence a patient can sue the doctor in the civil or criminal court but has to prove that a medical professional had a pre-existing duty to treat and he had breached that duty due to which damage had been caused to the patient and breach of the duty had caused this damage to the patient.¹¹

Due to non-fulfilment of the expectations & violations of rights, there are complaints from the patients

Common complaints by the patients against the hospital are lack of orientation of room in the hospital, and deficiency of professionalism in the hospital staff, messy rooms, loss of personal belongings, noisy nursing stations and lack of sleep, communication deficit, not updating list of health providers in every shift, and health professionals entering the room without



knocking and patients not being listened to in their care.¹⁷ The nature of the complaints may vary from place to place and institution to institution.

In one of the studies, common grievances against the physician were of five types. In 38.8% there was a failure to fulfil expectations of the patients in the treatment and examination, promptly diagnose a failure in 20%, in 17% there was allegation of rudeness; practising beyond the area of concern and causing pain in 13% and inappropriate billing in 10%.¹⁸

Redressal of Patients' Complaints

“Grievance would only mean a grievance relating to any patient / client out of the implementation of the policies/rules or decisions of the Hospital”.¹⁹ There should be a grievance redressal policy of every medical and health institute. Every institute may have a different redressal mechanism. Usually, there is a Grievance Redressal Committee to take care of complaints and grievances.

Usually, after registering the complaint a preliminary enquiry is held and findings are shared with the concerned person for the resolution of the complaint. If still, the grievances persist a secondary investigation may be held for non-resolution of the complaint and discussed with the complainant for further resolution and the committee also suggests assessment, action to be taken or being reported to the higher authorities and further preventive measures.¹⁹

Complaints help in improving the safety of the patients. There should be a mechanism that should be rigorous to analyse and interpret the complaints. Monitoring of the complaints will definitely increase the safety of the patients.²⁰

The satisfaction rate of the patient is higher in the smaller places but patients of older age are more demanding.⁹ In another study, it was observed that younger women filed most complaints and these complaints were against the new recruits. Though it was seen that in 45% of cases there was no breach of standards of practice yet these complaints were resolved in 17% of the cases just by completing insurance forms, adjusting the bills and apologising.¹⁸

DISCUSSION

General niceties of the society apply to the medical profession and patient must be made comfortable as far as possible when the patient arrives in the medical setup. Greeting, smiling, made to sit comfortably, listened properly for complaints remembering no problem is too trivial for the patient for which patient is complaining, examined gently, explained about the disease in the language of the patient in which patient is comfortable, explained why the tests if required are necessary, instructed properly about the medication and diet. It is also important to explain what to do and what not to do. This will create a very good rapport and will help in better outcomes for the patients.

Doctors will too be benefitted by better compliance by the patients resulting in a better outcome for the patients.

In a health institute, there should be letterboxes where a patient can put the complaints. Phone numbers and email addresses should be prominently displayed where complaints can be sent. A nodal person should be there in a health setting to redress the grievances. The name of such a person should also be prominently displayed. Redressing the complaint should be time-bound.

Information and analysis of complaints of the patient can definitely improve the delivery of the health system in a better manner. It has been observed that assessment of the persons involved is not given due importance due to which improvements seems difficult.²¹

CONCLUSION

It must be remembered by the physicians and caregivers that as the cost may not be the primary consideration when patient choose the treating doctor other requirements e.g. transparency about success rate, giving them dignity and compassion, play an important role and these values must be adhered to.³ Therefore, all health professional should know the expectations and rights of the patient and take care of the rights of the patients to make the patient more satisfied for better health outcomes. The experience of the patient in a medical facility will become better if patients will fulfil their responsibilities too.

REFERENCES

1. Definition of PATIENT [Internet]. [cited 2021 Jun 2]. Available from: <https://www.merriam-webster.com/dictionary/patient>
2. PATIENT | meaning in the Cambridge English Dictionary [Internet]. [cited 2021 Jun 2]. Available from: <https://dictionary.cambridge.org/dictionary/english/patient>
3. Builders P. 11 Things Patients Want From Their Doctors [Internet]. Healthcare Marketing Agency. [cited 2021 Jun 3]. Available from: <https://www.practicebuilders.com/blog/11-things-patients-want-from-their-doctors/>
4. Lateef F. Patient expectations and the paradigm shift of care in emergency medicine. *J Emerg Trauma Shock.* 2011;4(2): 163–167.
5. Rahman M. Expectation of Patients from Doctors. *J Bangladesh Coll Physicians Surg.* 2010 Jan 25;26.
6. Wu D, Lam TP, Lam KF, Zhou XD, Sun KS. Doctors' views of patient expectations of medical care in Zhejiang Province, China. *Int J Qual Health Care.* 2017 Oct 1;29(6):867-873.
7. El-Haddad C, Hegazi I, Hu W. Understanding Patient Expectations of Health Care: A Qualitative Study. *J Patient Exp.* 2020 Dec 1;7(6):1724-1731.
8. Kessler CS, Tadisina KK, Saks M, Franzen D, Woods R, Banh KV, et al. The 5Cs of Consultation: Training Medical Students to Communicate Effectively in the Emergency Department. *J Emerg Med.* 2015 Nov;49(5):713-721.
9. Sebo P, Herrmann FR, Bovier P, Haller DM. What are patients' expectations about the organization of their primary care physicians' practices? *BMC Health Serv Res.* 2015 Dec;15(1):328.
10. How can doctors address patients' expectations? [Internet]. KevinMD.com. 2019 [cited 2021 Jun 3]. Available from: <https://www.kevinmd.com/blog/2019/02/how-can-doctors-address-patients-expectations.html>

11. Patient Rights: Confidentiality & Informed Consent [Internet]. [cited 2021 Jun 3]. Available from: https://www.emedicinehealth.com/patient_rights/article_em.htm
12. 17 rights of patients: Government releases a draft charter to uphold patient's rights [Internet]. DailyRounds. 2018 [cited 2021 Jun 3]. Available from: <https://www.dailyrounds.org/blog/17-rights-of-patients-government-releases-a-draft-charter-to-uphold-patients-rights/>
13. Patient Rights & Responsibilities [Internet]. [cited 2021 Jun 3]. Available from: <https://www.nashunhealthcare.org/patients-visitors/patient-rights-and-responsibilities/>
14. Facebook, Twitter, LinkedIn. Know Your Rights as a Patient in the American Healthcare System [Internet]. Verywell Health. [cited 2021 Jun 3]. Available from: <https://www.verywellhealth.com/patients-rights-2615387>
15. Patients Rights [Internet]. [cited 2021 Jun 3]. Available from: <https://samch.doh.gov.ph/index.php/patients-and-visitors-corner/patients-rights>
16. Patient Rights & Responsibilities | TCRH [Internet]. [cited 2021 Jun 3]. Available from: <https://www.tcrh.org/for-patients-and-visitors/patient-rights-responsibilities>
17. 10 most common patient complaints, grievances with hospitals [Internet]. [cited 2021 Jun 4]. Available from: <https://www.beckershospitalreview.com/quality/10-most-common-patient-complaints-grievances-with-hospitals.html>
18. Halperin EC. Grievances against physicians. *West J Med.* 2000 Oct;173(4):235-238.
19. Grievances Redressal Policy [Internet]. 2018 [cited 2021 Jun 4]. Available from: <https://cdn.s3waas.gov.in/s384f7e69969dea92a925508f7c1f9579a/uploads/2020/03/2020031931.pdf>
20. Reader TW, Gillespie A, Roberts J. Patient complaints in healthcare systems: a systematic review and coding taxonomy. *BMJ Qual Saf.* 2014 Aug 1;23(8):678-689.
21. Mirzoev T, Kane S. Key strategies to improve systems for managing patient complaints within health facilities – what can we learn from the existing literature? *Glob Health Action.* 2018 Jan;11(1):1458938.



Histopathological Evaluation of Burn Injury

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ABSTRACT

Background: Burns always have posed a threat to the sensitive human body. It is a common catastrophe today as burn injury cases are one of the common emergencies admitted to any hospital. In a medico-legal setting, the main difficulty arises when a burnt body found in unknown circumstances is brought for post-mortem examination. In such a case, a forensic expert has to opine whether the burn injuries sustained are antemortem or post-mortem. It is also of paramount importance to determine the age of burn injuries sustained. Aging of burn injuries by the naked eye is sometimes difficult and unreliable. By histopathological examination of burnt tissue, one can predict whether the victim was alive or dead when the fire was going on and determine the age of burn injuries.

Materials and Methods: The present cross-sectional study was carried out in the Department of Forensic Medicine & Toxicology, Pt. B.D.Sharma PGIMS, Rohtak. Total 3033 autopsies were conducted in the mortuary of the Department of Forensic Medicine & Toxicology, PGIMS, Rohtak, from November 5, 2011 to November 5, 2013. During that period, out of 486 cases reported burns, randomly 100 cases were selected for this study.

Results and Conclusions: In the present study, efforts were made to determine burn wound vitality and age by histopathological evaluation. The study revealed that the inflammatory infiltrate consisted mainly of polymorphonuclear leucocytes in initial stages (up to 3rd-day post-burn) with gradual lymphocytes, macrophages, and fibroblasts forming immature granulation tissue. On the 14th-day post-burn, the burn wound revealed repair by regeneration, increased collagen deposition, fibrosis, and granulation tissue formation. It was infiltrated with fibroblasts, macrophages, and lymphocytes. Our study demonstrated that evaluation of various histopathological changes occurring during the distinctive phases of burn wound healing help in the estimation of its vitality and age.

Keywords: Age of burn, Burn, Histopathological evaluation, Medico-legal, Vitality.

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INTRODUCTION

Forensic medicine deals with the application of medical knowledge to aid in the administration of justice. So far as the modes of sustaining burn injuries in India are concerned, the same is everywhere else, i.e., flames, thermal, scalds, and electrical burns. In our country, the most common manner of sustaining flame burns is accidental.¹

The main difficulty arises when a dead body is brought to a forensic expert for opinion in a state of partial skeletonization from burning as well as from advanced putrefaction or the body of a victim who has been killed or murdered by throttling, poisoning or by some other means. Later the body is burnt to conceal the crime and to make it appear like death from burning. As severe burning or charring of the body might produce artifacts of heat ruptures that may resemble lacerated or even incised wounds, differentiation requires differentiation. Therefore, differentiation of antemortem and post-mortem burns need to be affirmatively ascertained. It is also of paramount importance whether a burn injury has a vital reaction, and if so, how long before the burn injury has been sustained.

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Forensic experts can determine how long a victim has been exposed by estimating the age of burn injuries. However, the aging of burn injuries by the naked eye is sometimes difficult and unreliable.² By histopathological examination of burnt tissue, one can surely predict whether the victim was alive or dead when fire was going on and determine the age of burn injuries. Walcher pointed the importance of studying the lesions microscopically in order to distinguish between antemortem and post-mortem injuries. According to him, the leucocytic reaction was the earliest histological sign of

inflammation. The pavement of the inner vessels walls by leucocytes and the beginning of their extravasation may be seen during the first hours after wounding.³

Mallik described histological methods of distinguishing antemortem and post-mortem burns using burns inflicted experimentally on guinea pigs, burns of human skin obtained from autopsy examinations, and burns inflicted experimentally in amputated human tissues. In human burns, the earliest histological change in the antemortem burn was leucocytic infiltration at 6 hours after burning.⁴

The present study was conducted to assess the burn wound vitality and age by histopathological examination of burnt tissue.

MATERIALS AND METHODS

The present cross-sectional study was carried out in the Department of Forensic Medicine & Toxicology, Pt. B.D.Sharma PGIMS, Rohtak. Total 3033 autopsies were conducted in the mortuary of the Department of Forensic Medicine & Toxicology, PGIMS, Rohtak, from November 5, 2011 to November 5, 2013. During that period, out of 486 cases reported of burns, randomly 100 cases were selected for this study. The ethical approval was taken from Institutional Ethical Committee. After obtaining informed expressed consent, the relevant information regarding the case was collected from accompanying relatives, hospital records, and inquest papers. For the purpose of the study, burn injury was defined as a body lesion due to an external cause, either intentional (homicidal or suicidal) or unintentional (accidental) resulting from sudden exposure to thermal energy generated by agent host interaction. Criteria of selection of cases:-

1. All cases of burn injuries that have a definite history of flame burns were taken for the study.
2. The cases with different duration and survival times were studied.
3. Burn injuries due to electrocution, chemical and corrosives were not included.
4. Decomposed bodies and bodies with no specific history were not included.

Skin tissue was taken from the burnt and junctional area of the burnt and unburnt region and preserved in 10% formalin for fixation. The fixed tissues were processed, stained with routine H& E staining and subjected to histopathological examination.

The data was collected and compiled in an excel sheet and analyzed using SPSS (Software Package for Social Studies) version 20, and chi-square test and percentages were applied to find out any significant statistical difference between different groups, and if required, a logistic regression test was applied.

RESULTS

Histopathological examination of normal human skin revealed that it has two layers-outer epidermis and the inner dermis. The epidermis consists of five layers and is separated from the dermis by a basement membrane. The dermis forms the bulk of skin and consists of an upper papillary layer and the lower

reticular layer. It is composed of mature, fibrous connective tissue that contains capillaries, sweat glands, sebaceous glands, hair follicles, and nerve endings. The dermis is attached to underlying loose connective tissue, which consists primarily of adipose tissue (Figure 1).

As shown in Table 1, redline of demarcation was present in 39% of cases and absent in 61% of cases (Figure 2). Redness was present in 40% of cases and absent in 60% of cases. Blisters were present in 30% of cases and absent in 70% of cases. Pus was present in 61% of cases and absent in 39% of cases. Granulation Tissue was present in 51% of cases.

As shown in Table 2, Separation of epithelium and breaking of epithelium were present in 99% of cases, respectively. Vacuolization was present in 71% of cases. Petechial hemorrhages was present in 33% of cases. Epithelial cells were elongated and flattened in 72% of cases, respectively.

As shown in Table 3, Capillary dilatation was present in 59% of cases. Edema and congestion were present in 57 and 45 % of cases, respectively. Margination of leucocytes was present in 67% of cases. Infiltration of leucocytes was present in 95% of cases.

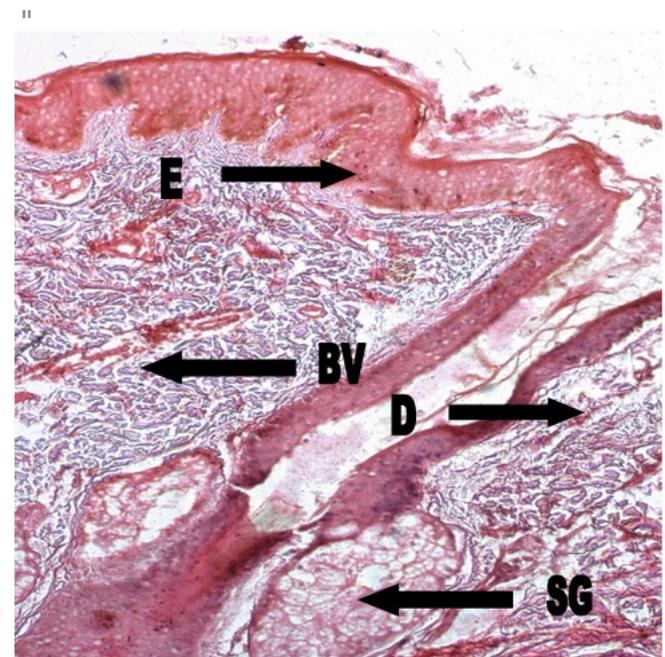


Figure 1: Photomicrograph of histology of normal unburnt skin showing intact epidermis [E], and dermis[D] showing redline of demarcation (H &E; 20x)

Table 1: Incidence and distribution of gross features of burnt skin

Gross features of burnt skin	Present	Absent
	No. (%)	No. (%)
Red line of demarcation	39 (39)	61 (61)
Redness	40 (40)	60 (60)
Blisters	30 (30)	70 (70)
Pus	61(61)	39 (39)
Granulation Tissue	51 (51)	49 (49)

Chi-square=23.3; p-value=.000



On the 3rd day post-burn, the burn wound revealed separation of the epidermis from dermis and breaking of epithelium, vacuolization of epidermal and dermal cells, petechial hemorrhages, congested and dilated capillaries with areas of necrosis, and formation of immature granulation tissue. The inflammatory infiltrate consisted mainly of polymorphonuclear leucocytes [Figure 3(a,b,c)]. On the 3rd to 7th day post-burn, the burn wound showed the presence of elongated and flattened epithelial cells. The inflammatory infiltrate consisted of lymphocytes and macrophages in the burn wound (Figure 4). On the 7th day post-burn, the burn wound revealed epidermal regeneration, neo-proliferation of small-sized blood vessels, inflammatory cells infiltration consisting primarily

of macrophages, lymphocytes, fibroblasts, and the presence of immature granulation tissue (Figure 5). On the 14th day post-burn, the burn wound revealed repair by regeneration, increased collagen deposition, fibrosis, and granulation tissue formation. In addition, it was infiltrated with fibroblasts, macrophages, and lymphocytes (Figure 6).



Figure 2: Photograph of burnt skin containing blood vessel [BV] & sebaceous gland [SG]

Table 2: Incidence of Histopathological findings of Burnt skin

Burnt Skin	Total number of cases	Percentage (%)
Separation of epithelium	99	99%
Breaking of epithelium	99	99%
Vacuolization	71	71%
Petechial hemorrhages	33	33%
Epithelial cells elongation	72	72%
Epithelial cells Flattening	72	72%

Table 3: Incidence of Histopathological findings of Junctional skin

Junctional Skin	Total number of cases	Percentage (%)
Capillary dilatation	59	59%
Oedema	57	57%
Congestion	45	45%
Margination of Leucocytes	67	67%
Infiltration of Leucocytes	95	95%

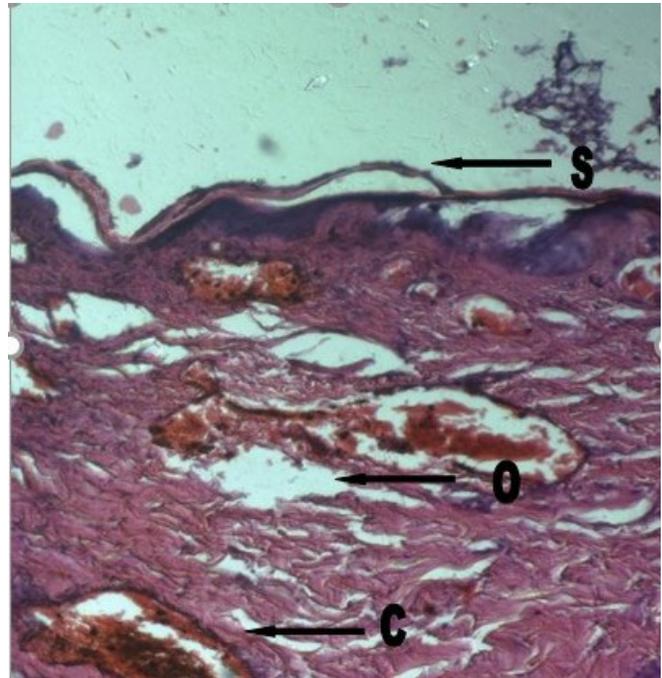


Figure 3a: Photomicrograph of skin, 3 days post-burn showing congestion [C], edema [O] and separation of epidermis from dermis [S] (H&E; 10x)

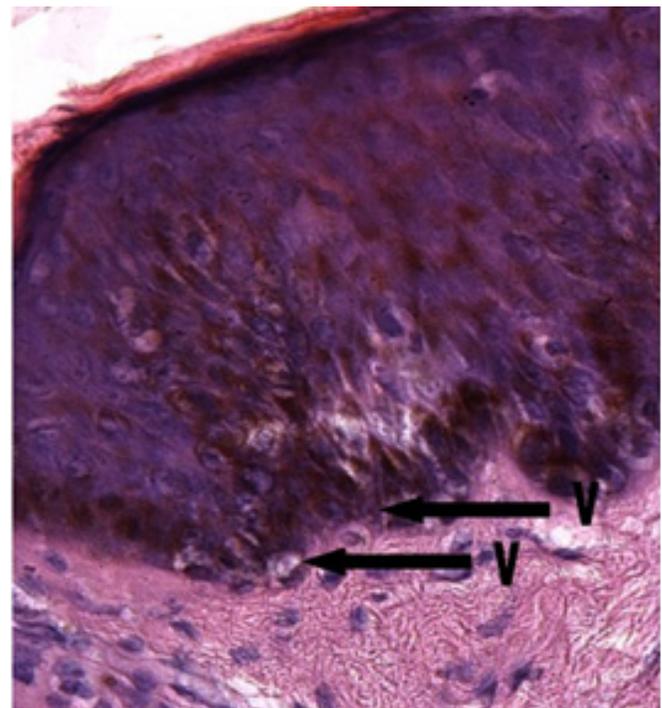


Figure 3b: Photomicrograph of skin, 3 days post-burn showing vacuolization [V] of basal cell layers (H&E; 40x)

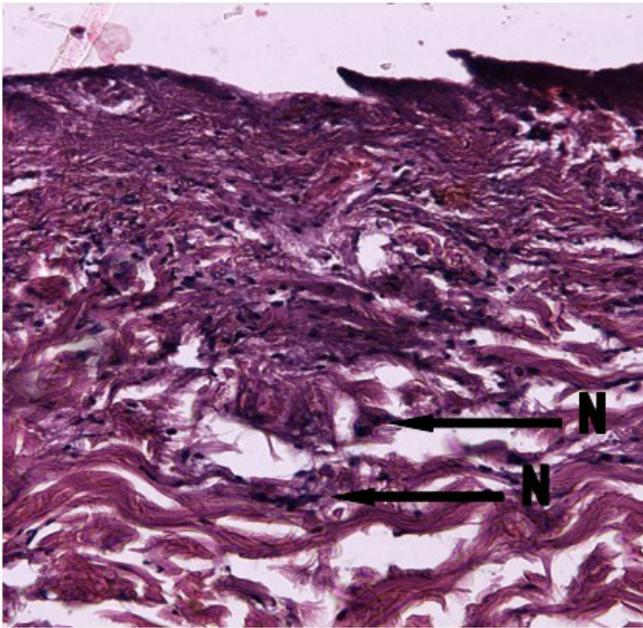


Figure 3c: Photomicrograph of skin, 3 days post-burn showing dermal infiltration by neutrophils [N] (H&E; 20x)

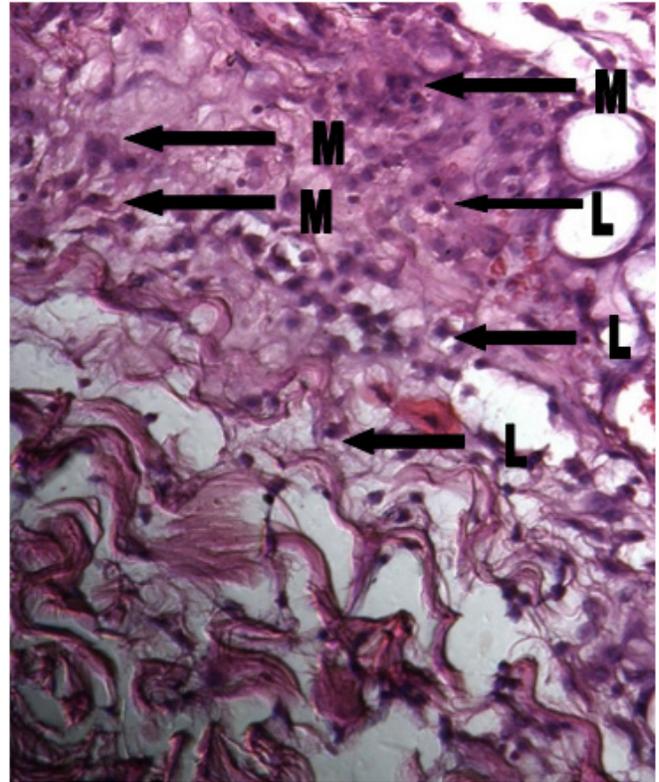


Figure 5: Photomicrograph of skin, 7 days post-burn showing dermal infiltration by lymphocytes [L] & macrophages [M] (H&E; 20x)

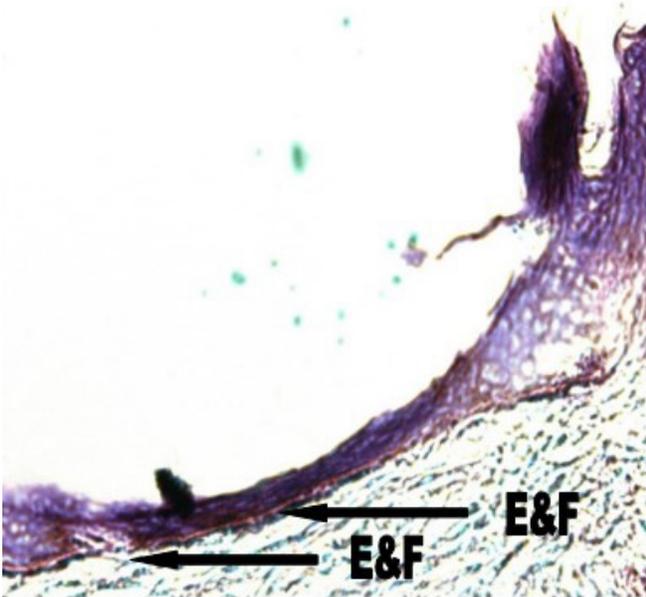


Figure 4: Photomicrograph of skin, 3 to 7 days post-burn showing elongation & flattening [E&F] of basal epithelial cells (H&E; 20x)

DISCUSSION

The histopathological findings of burnt skin are initially due to direct effects of thermal injury and subsequently due to inflammatory healing response.⁵ Therefore, it could be possible to estimate the vitality and age of burns by examining the order and time at which various cellular components of the healing process are present in burn wounds.

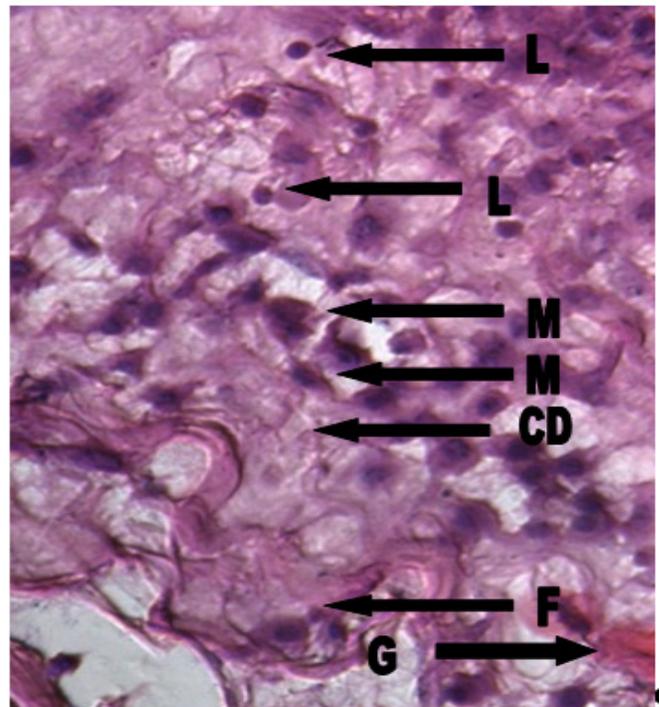


Figure 6: Photomicrograph of skin, 14 days post-burn showing Collagen deposition [CD], fibrosis [F], granulation tissue [G], and dermal infiltration by macrophages & lymphocytes (H&E; 20x)



Histopathological examination of the edge of a burn, including both the burnt area and adjacent grossly unburnt skin, may reveal vital reaction microscopically, consisting of acute inflammation, hemorrhage, edema, necrosis, and vertical streaming epidermal nuclei and homogenization of the dermal collagen. Skin shows petechial hemorrhages in deeper layers, epithelial cells are elongated, flattened and stained deeply with hematoxylin and eosin and vacuolization of epidermal and dermal layers is prominently seen. These findings help in differentiating antemortem burn from post-mortem burn.⁶⁻⁸

In the present study, histopathological examination of burnt and junctional skin, three days post-burn, revealed separation of the epidermis from dermis and breaking of epithelium, vacuolization of epidermal and dermal cells, petechial hemorrhages, congested and dilated capillaries with areas of necrosis, and formation of immature granulation tissue. The inflammatory infiltrate consisted mainly of polymorphonuclear leucocytes in initial stages with gradual involvement of lymphocytes and macrophages.

Haggag OG et al. in their study observed that on the 3rd-day post-burn, upper layers of dermis showed ulceration, and deeper layers of dermis showed the formation of granulation tissue, diffuse congested capillaries, tissue edema with areas of necrosis. Few tiny perivascular hemorrhages were present in the deep dermis and collagen was destructed. Infiltration of neutrophils was present in burn wounds of moderately-burned patients, but a few neutrophils were present in severely burned patients.⁹

Tarran et al. in their study concluded that the neutrophils were the first inflammatory cells to infiltrate the wound.¹⁰ Peng et al. observed that infiltrative reaction of leucocytes started at 3rd-day post-burn in victims who sustained moderate burns, but in severe burns, there was no infiltration until 1-week after-burn. The infiltration of neutrophils is due to a local increase in a neutrophil chemo-attractant. The delayed neutrophil infiltration in more severe burn wounds was related to the impaired production of local chemokines.¹¹

RJ Brennen, in his study, observed the presence of gross edema, separation of collagen fibers and separation of epidermis almost entirely from the underlying dermis. The capillaries of the dermis were dilated, and congestion was present. In addition, he observed increased numbers of round cells and polymorphonuclear leucocytes in the perivascular tissue. The deeper layers of the dermis showed granulation tissue containing numerous thrombosed capillaries surrounded by areas of microscopic debridement and loss of structure.¹²

Xu et al., on day three post-burn, observed vacuolization of epidermal cells, hyaline degeneration in collagen dermis, and infiltration of the dermis by inflammatory cells consisting mainly of neutrophils.¹³

In the present study, 3 to 7 days' post-burn biopsies showed elongated and flattened epithelial cells. The inflammatory infiltrate consisted of lymphocytes and macrophages in the burn wound. RJ Brennen, in his study, observed fragmentation of the thermally coagulated tissues, microscopic evidence of granulation, and infiltration of the burn wound with

lymphocytes and macrophages. Xu et al. on day 5 post-burn, observed superficial tissues in the dermis were liquefactive necrotized, and exfoliated. The dermis was infiltrated with inflammatory cells consisting mainly of neutrophils and occasional macrophages. A similar result was observed by Haggag OG et al in their study.

In the present study, 7 days' post-burn biopsies showed epidermal regeneration, congested blood vessels, inflammatory cells infiltration consisting primarily of macrophages, lymphocytes and fibroblasts, and the presence of immature granulation tissue. Haggag OG et al. in their study observed that on 7th day post-burn, the epidermis showed regeneration from the basal layer. Congested blood vessels, collagen deposition and edema, were detected in the dermis with the appearance of fibroblasts in clusters. In addition, the presence of neutrophils, lymphocytes, plasma cells, and a few mononuclear cells was noticed in the burn wound. Peng et al found a large number of leucocytes in burn wounds on the 7th-day post-burn. The cellular components consisted of polymorphonuclear leucocytes in the majority and a few lymphocytes and macrophages. Tarran et al. observed that when macrophages are abundant, the wound is probably a few days to weeks old.

In the present study, 2 weeks' post-burn biopsies revealed repair by regeneration, granulation tissue formation, fibroblasts, macrophages, and lymphocytes in burn wounds. Haggag OG et al., in their study on 14th day post-burn observed the same. They observed that there was epidermal growth, collagen fibers of the dermis were denser than normal, and numerous scattered fibroblasts. Mononuclear cells were the main cellular components in the burn wound. Tarran et al. and Peng et al. also observed the same. They found a formation of frank granulation tissues, neo-proliferation of blood vessels, and predominantly mononuclear cells in the burn wound. RJ Brennen, in his study, observed that between the 12th day to 18th day, the morphological structure of the upper layer of the dermis was entirely lost. Dissection of the collagen fibers and vacuolization were still evident. In some areas, there were still present some nests of white cells. Xu et al., on day 15 post-burn, observed that actively proliferated fibroblasts and neo-formative capillaries were visible in the dermis, accompanied by the infiltration of lymphocytes.

CONCLUSION

The present study concluded that its histopathological evaluation can fairly estimate the burn wound vitality and age. Such estimation is of paramount importance, particularly in criminal cases, when the victim is killed by some other means. Later, the body is burnt to conceal the crime and make it appear like death from burning.

REFERENCES

1. Sawhney CP, Ahuja RB, Goel A. Burns in India: Epidemiology and Problems in Management. *Indian Journal of Burns* 1993; 1(1): 1.

2. Ceechi R. Estimating Wound Age: Looking into the future. *Int. J Legal Med* 2010; 124(6):523-526
3. Rackallio J. Enzyme Histochemistry of Vital and Postmortem Skin Wounds. *Journal of Forensic Medicine* 1966; 13(2): 85.
4. Vij K. Thermal Deaths. In: *Textbook of Forensic Medicine and Toxicology*. 2nd ed. New Delhi. B I Churchill Livingstone. 2002.p. 319-328.
5. Sevitt S. Histopathological changes in burned skin. *Burns. Pathology and Therapeutic Applications*. Butterworth and Co. Ltd. 1957,p.18-27.
6. Reddy KSN, Murty OP. Thermal Deaths. *The Essentials of Forensic Medicine and Toxicology*. 34th ed. New Delhi. 2017. p. 305.
7. Rao D. Thermal Injuries. <http://www.forensicpathologyonline.com/>
8. El-Sayed YS. Time Course of Histomorphologic Features during Chronic Burn Wound Healing. *Forensic Medicine and Anatomy Research*. 2016;4:1-6
9. Haggag OG, Fouda AA, Eldin AAIS, Al-Aziz TAA, Mahmoud AA. Biochemical, Histopathological and Immunohistochemical Study of Burn Lesions in Patients Admitted to Benha Educational Hospital: A Prospective Study. *Egyptian J. Forensic Sci. Appli. Toxicol.* 2013;13(2):83-106
10. Tarran S,Langlois NE, Dziewulski P, Szynda T.Using the inflammatory cell infiltrate to estimate the ageof human burn wounds: A review and immune-histochemical study.*Med Sci Law*. 2006;46(2):115-126.
11. Peng D, Huang W, Shenhai A, Wang S. Clinical significance of leukocyte infiltrative response in deep wound of patients with major burns. *Burns*. 2006; 32(8): 946-950.
12. Brennan RJ, Rovatti B. Experimental Thermal Burns- A study of the immediate and delayed histopathological changes of the skin. [www.aloe.com/pdfiles/experimental thermal burns. pdf](http://www.aloe.com/pdfiles/experimental%20thermal%20burns.pdf).
13. Xu R.X, XiaS,Bradford SW. Physiological Healing Procedure and Histological Observation on Deep Second-Degree Burns Treated with BRT with MEBT/MEBO. *Burns Regenerative Medicine and Therapy*.2004. p.106-111.



A Study on Copycat Suicides and Werther Effect: Myth or Reality

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ABSTRACT

Suicide is a critical mental health problem, and during this COVID-19 pandemic, various mental health problems have arisen, leading to an increased tendency for suicides. It is difficult to believe if we lose someone due to suicide, especially if he/she is a popular figure in society, as it does not affect the family and friends of that person but also brings a sense of loss to the community. Copycat suicide is defined as duplication or copycat of another suicide that the person attempting suicide knows about either from the local knowledge or on account of depicting the original suicide on television and in other media.¹ Werther effect defines as a popular term for an increase in suicide rates that follow media coverage of suicides or are inspired by reading about others suicides or are linked to a friend or family member who committed suicide.²

In June 2020, a renowned Bollywood actor Sushant Singh Rajput was found dead, hanging from the ceiling fan at his house in Bandra, Mumbai, and the alleged manner of death was ruled to have been suicide.³ For around 3 months, all the media was covering this news.

The aim of this study is to assess the effect of media coverage of this case (i.e., Werther effect) on the increase in the cases of suicides by hanging (i.e., Copycat suicides) in the rural areas of Himachal Pradesh. Out of 249 medico-legal autopsies in 2020 during the period from June 14 to December 31, there were 28 cases of hanging which constitutes 11.24%, and if we compare it with 2018 and 2019, there were a total of 278 and 253 cases during this period, and amongst these cases, only 13 and 15 cases respectively of hanging were reported which constitutes 4.67 and 5.14%. This study shows that there is about 2 times increase in hanging cases after the death of this renowned actor. In June 2020, just after his death, there is a drastic increase in hanging cases, constituting 24%. Male predominance is more than females as males constitute 75% of cases, which is more than the females, which constitute only 25% of cases. The age group of 21-30 years shows more predominance as compared to the other age groups.

Keywords: Copycat Suicide, Hanging, Suicide, Werther Effect.

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INTRODUCTION

Suicide is a major concern in the Indian population. More than one lakh (one hundred thousand) lives are lost every year to suicides in our country. Suicide is a critical mental health problem and during this COVID-19 pandemic, various mental health problems have arisen leading to an increased tendency for suicides. The study titled "*Analysis of news media reports of suicides and attempted suicides during the COVID-19 lockdown in India*" said that there were 369 cases of suicides and attempted suicides during the COVID-19 lockdown compared to 220 reported suicides in the corresponding dates in 2019.⁴ Mental disorders occupy a leading position in the milieu of causation of suicide. The majority of studies note that around 90% of those who die by suicide have a mental disorder.⁵ Suicides reporting by the media is a common cause for the increase in the number of suicides. In our study, there is a drastic increase in the number of hanging cases after the news of the death of a renowned actor. Especially, exposure to media reports of a celebrity's death put forth a copycat effect on at-risk individuals.⁶

Copycat suicide is defined as duplication or copycat of another suicide that the person attempting suicide knows

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about either from the local knowledge or on account of the depiction of the original suicide on television and in other media.

Werther effect defines as a popular term for an increase in suicide rates that follow media coverage of suicides or are inspired by reading about others suicide are linked to a friend or family member who committed suicide.

In social sciences and in medicine, the term "Werther-effect" is used as a synonym for media-induced imitation effects

of suicidal behavior. One of the earliest known associations between the media and suicide arose from Goethe's novel *Die Leiden des Jungen Werthers* (The Sorrows of Young Werther). After its publication in 1774, young men began to mimic the main character by dressing in yellow pants and blue jackets. In the novel, Werther shoots himself with a pistol after being rejected by the woman he loves. Shortly after its publication, there were reports of young men using the same method to kill

themselves in acts of hopelessness.⁷ The "Werther-effect" term was coined by researcher David Phillips in 1974.⁸

MATERIALS AND METHODS

This study comprises all the Medico-Legal cases brought for the autopsy to the mortuary of Dr Rajendra Prasad Govt. Medical College, Kangra, situated at Tanda, from June 14 to December 31, 2020. Medical history and the history of the incident were obtained through hospital records and police information that accompanied the dead body and through brief interviews with the relatives of the deceased. The data obtained was computed, and descriptive analysis of baseline characteristics was analyzed and summarized with the data of the previous two consecutive years.

RESULTS

In total, 249 cases were brought to the mortuary from June 14 to December 31, 2020; out of which 28 cases were of hanging (21 were of males and 7 were of females), constituting 11.2% of cases as compared to 13 cases of hanging out of 278 cases constituting 4.67% and 15 cases out of 253 cases constituting 5.9% in the years 2019 and 2018 respectively. (Figure 1)

In 2020 there were 28 cases of hanging; 21 male i.e., 75% as compared to 7 females, i.e., 25%. Whereas in 2019, there were 5 males, i.e., 38.4%, and 8 females, i.e., 61.5%. Similarly, in 2018, there were 9 males, i.e., 60%, and 6 females, i.e., 40%. (Figure 2)

In the present study, 13 (46.5%) out of 28 cases were in the age group of 21-30 years, while in the previous years, 2019 and 2018, the cases in this age group were 5 cases (38.4%) and 4 cases (26.6%) respectively (Figure 3).

The study also shows that out of 21 cases, 5 cases (23.8%) of hanging were reported from 14th to June 30, 2020 (16 days), i.e., immediately after this incidence (Figure 4).

DISCUSSION

In this study, there is an increase in the deaths due to hanging by about 6.5% and 5.3% as compared to two previous consecutive years, i.e., 2019 and 2018, respectively, which may be attributed to the Werther effect leading to copycat suicides.

Our study also shows that the age group of 21-30 years is more vulnerable to copycat suicides by hanging, constituting 46.4% of cases. Copycat suicide was the leading cause of death in those aged 21-30 years and the second leading cause of death in the age group of 31-40 years.

Males constitute 75% of cases which is more than the females constituting 25% of cases. To investigate whether there was a relationship between the sex of the celebrity and the sex of the person who committed copycat suicide, the data showed that males who died due to hanging were more as compared to females.

In this study, we have seen a drastic increase in the cases of hanging in June 2020 after the death of a renowned actor who was given excessive coverage in media.



Figure 1: Graph showing comparison of total number of autopsies and cases of Hanging in 2020, 2019 and 2018

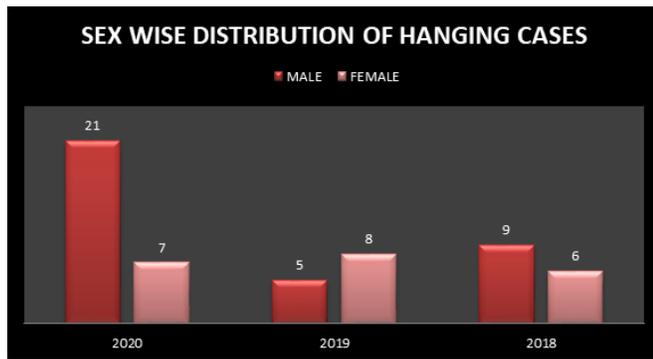


Figure 2: Graph showing Sex Wise Distribution of Hanging Cases in 2020 vs. 2019 and 2018

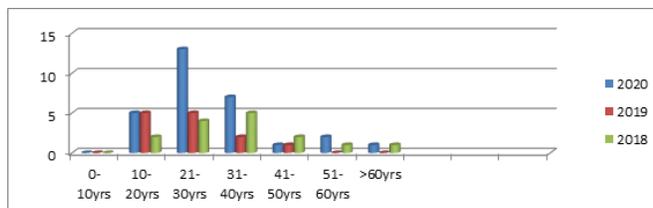


Figure 3: Age-wise distribution of hanging cases in 2020 vs 2019 and 2018

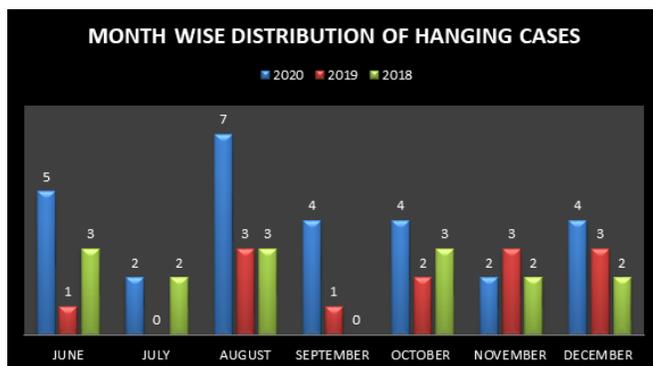


Figure 4: Monthwise distribution of cases of hanging



CONCLUSION

Social learning theory is a theory of learning process and social behavior which proposes that new behaviors can be acquired by observing and imitating others. As anticipation from this theory, if there is a greater coverage of suicides in the mass media, the copycat suicides also increase.⁹

Differential identification theory gives strong support for the increase in copycat suicides after the death of a renowned actor. It states that a person pursues criminal behavior to the extent that he identifies himself with real or imaginary persons from whose perspective his criminal behavior seems acceptable.¹⁰

Certain age groups, mainly 21-40 yrs age group, may respond more to the publicized suicide stories than their other age group counterparts. Individuals who commit suicide after a celebrity suicide are likely to be younger and prefer hanging as a method of suicide, which are more strongly associated with higher effect sizes of celebrity suicide.¹¹ Prerequisite of mental health service and increase of mental health care accessibility may help to prevent suicide and suicidal behaviors for vulnerable populations.

Werther's effect on copycat suicides was also explained earlier. From 1983 to 1986, there was a sharp increase in the number of suicides in Vienna, directly linked to a dramatic increase in their coverage in the media. In 1987 Australian Suicide Prevention launched a media campaign to change in the nature of press coverage of the suicides. As a result, after 1987, there was a drastic decrease in the number of suicides.¹² Therefore, there must be some guidelines and nature of press coverage on suicide cases of celebrities so that the direct relation between Copycat suicides and the Werther effect can be broken. So, at last, the Werther effect and copycat suicide are a reality or a myth, and our study shows that both are directly related to each other, and it is a reality, not a myth. And our media should change its quality and quantity of reporting so that suicides of vulnerable groups can be reduced as our society is easily attracted to the media world.

BIBLIOGRAPHY

1. Susan K.W, Richard H. *Abnormal Psychology*. 7th ed. New Delhi: Mc Graw Hill; 2015.p.62.
2. Segen JC. *Dictionary of Modern Medicine*. 1st ed. New York : Mc Graw Hill. 2012.
3. The Week, Entertainment section. HYPERLINK "<https://www.theweek.in/news/entertainment/2020/06/24/sushant-singh-rajputs-final-autopsy-report-confirms-suicide-rules-out-foul-play.html>" "Sushant Singh Rajput's final autopsy report confirms suicide; rules out foul play"; 24th June 2020.
4. The Wire, Health Section. 67% Increase in Reports of Suicidal Behaviour during Lockdown: Study; 9th December 2020.
5. Laxmi V, Sujit J, Jane P, Harvey W. Suicide in developing countries (2): Risk factors. *Crisis*. 2005;26(3):112-119.
6. Steven S. Celebrities and suicide: A taxonomy and analysis, 1948–1983. *American Sociological Review*. 1987 Feb; 52(3): 401-412.
7. David G.M. *Social Psychology*. 10th ed. New York: McGraw Hill. 2009
8. De Wyze, Jeannette (2005-03-31). HYPERLINK "<http://www.sandiegoreader.com/news/2005/mar/31/why-do-they-die/>" "Why Do They Die?"; San Diego Reader; Retrieved 2021-03-05.
9. Albert B. Hyperlink "https://web.archive.org/web/20131024214846/http://www.jku.at/org/content/e54521/e54528/e54529/e178059/Bandura_SocialLearningTheory_ger.pdf" "Social Learning Theory" (PDF). General Learning Corporation. Archived from HYPERLINK "http://www.jku.at/org/content/e54521/e54528/e54529/e178059/Bandura_SocialLearningTheory_ger.pdf" the original (PDF) on 24 October 2013.
10. Victor M. Matthews. *Differential Identification: An Empirical Note*. *Social Problems*. 1st ed. Canada: Winter publishing house; 1968 "<https://www.jstor.org/stable/i232896>": pp. 376-383.
11. Myung W, Won H.H., Fava M, Mischoulon D, Yeung A, Lee D et al. Celebrity Suicides and Their Differential Influence on Suicides in the General Population: A National Population-Based Study in Korea. HYPERLINK "<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4390591/>" *Psychiatry Investig*. 2015 Apr; 12(2): 204-211.
12. Niederkrotenthaler T, Sonneck G. Assessing the impact of media guidelines for reporting on suicides in Austria: interrupted time series analysis. *Australian and New Zealand Journal of Psychiatry*. 2007 June; 41(5):419-428.

Profile of Medico legal Autopsies Conducted at Tertiary Medico-legal Centre in Northern India

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ABSTRACT

The present study is a retrospective study of medico-legal autopsies conducted in the Department of Forensic Medicine and Toxicology MMIMSR Mullana, Ambala, India, from Jan 2016 to December 2020. During this period, 793 cases of medico-legal autopsies were done in the mortuary of MMIMSR, Mullana, Ambala. The majority of victims were male 670 (84.48 %) cases and female 123 (15.52%) cases. A maximum number of post mortem done in the age group 20-40 years was 385(48.56 %) cases and minimum in age group 0-10 year were 18 (02.26%) cases. In our study, 601 (75.78%) were married, 169 (21.31%) unmarried, and unknown 23 (02.99%) cases. Hindus were 660 (83.22%), Muslim 50(06.30%), and Sikh 83 (10.48%) cases. The total number of deaths from rural areas was 406(51.20%) cases, which is slightly higher than urban area 387 (48.80%) cases. Manners of death due to natural causes were 38 (04.97%) cases and unnatural 755 (95.20%) cases. In unnatural, (accidents 551 (69.44%), Suicides 186 (23.44%) and homicides 18 (02.24%) cases). A maximum number of death due to Head injury were 235 (29.64%), shock & hemorrhage 188 (23.70%), poisoning 124 (15.64%), others-skeleton and visceral injuries 81 (10.22%), hanging 44 (05.54%), heart attack 38(04.78%), Drowning 23(02.90%), Electrocution 14 (01.76%), strangulation 13(01.64%), burns 11(1.38%), alcoholic 10(01.26%), septicemia 10(01.26%) and snake bite 2(00.26%)cases. A maximum number of deaths occurring between 0-6 hrs of injury was 395(49.82%) cases, and a minimum number of deaths in 24-48 hrs of injury was 22(02.77%) cases.

Keywords: Autopsy, Hanging, Natural death, Poisoning, Unnatural death.

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INTRODUCTION

The term autopsy originated from ancient "Autopsia." Autopsy means ("Autos = self, Opsis = view) to see for oneself.¹ Necropsy (necros = dead, opsis = view) is the most accurate term for investigating the dissection of the dead body, but the autopsy term is commonly used and more popular.

There are two types of autopsies: forensic and clinical

Imhotep² is 2980-2900 BC considered a first medico-legal expert. Who were the chief justice and chief physician to Pharaoh Zoster, the king of Egypt? Bartolomeo daVarignana (AD 1302) performed the first medico-legal autopsy in Bologna, Italy.

Postmortem examination³ is an alternate term used for examination of the body after death to establish the identity of a body, when not known, determine the cause and manner of death, the time since death , and evaluate any disease or injury that may be present.

Whether the death was natural or unnatural and unnatural, whether it is homicidal, suicidal,^{4,5} or accidental.

In the case of newborn infants, whenever it was dead born or still born, and some other cases to know the viability of the fetus, an autopsy is conducted.⁶

A complete autopsy involves opening all three body cavities and all cranial, thoracic, and abdominal cavity organs.

Section 174 and 176CrPc code⁷ of criminal procedure (CrPc) mentions the concept of medico-legal autopsy during investigations of a sudden, suspicious and unnatural death.⁸

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All cases of unnatural death require complete and partial examination along with circumstantial evidence needed to ascertain the cause of death.

Aims and Objective

1. Demographic (Sex, age, religion, and area-wise) distribution of death.
2. Identity of an unidentified dead person
3. Whether death is natural or unnatural
4. Cause of death, time since death, and time between death and post mortem.

MATERIAL AND METHOD

The present study is a retrospective study of medico-legal autopsies conducted in the Department of Forensic Medicine and Toxicology MMIMSR Mullana, Ambala, India, from

Jan 2016 to December 2020. During this period, 793 cases of medico-legal autopsies were done in the mortuary of MMIMSR, Mullana, Ambala. The collection and process of data were made on Microsoft Office Excel 2007. The data was collected using a pre-designed format from post mortem register/records/ inquest papers and post mortem reports maintained in the department by keeping confidentiality strictly intact.

RESULTS

Table 1: Sex wise distribution of cases

Sex	No. of cases	Percentage
Male	670	84.48
Female	123	15.52
Total	793	100.00

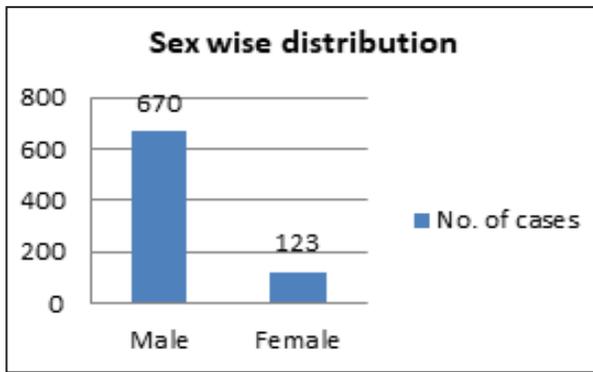


Figure 1: Sex wise distribution of cases

Table 2: Age wise distribution of cases

Years	Male	Female	Total cases	Percentage
0-10	16	02	18	02.26
10-20	76	19	95	11.98
21-30	174	42	216	27.24
31-40	144	25	169	21.32
41-50	116	14	130	16.40
51-60	84	14	98	12.36
>60	60	07	67	08.44
Total	670	123	793	100.00

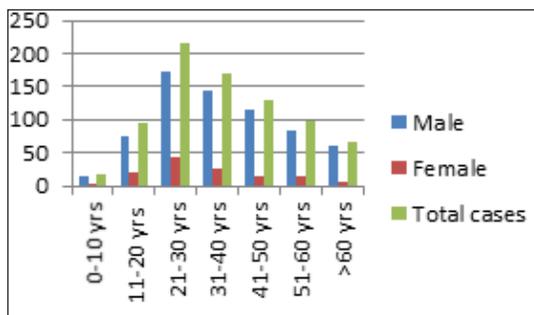


Figure 2: Age-wise distribution of cases

Table 3: Martial status distribution

	No. of cases	Percentage
Married	601	75.78
Unmarried	169	21.31
Unknown	23	02.99
Total	793	100.00

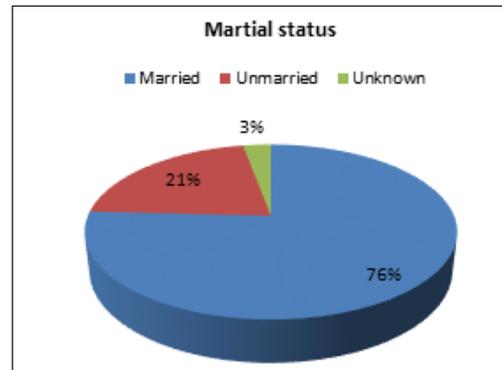


Figure 3: Martial status Distribution

Table 4: Area-wise Distribution of cases

	No. of cases	Percentage
Rural	406	51.20
Urban	387	48.80
Total	793	100.00

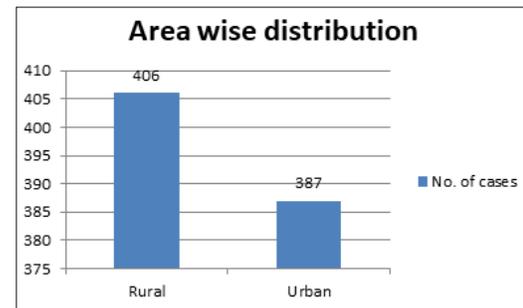


Figure 4: Area Wise Distribution of cases

Table 5: Religion Wise Distribution of cases

	No. of cases	Percentage
Hindu	660	83.22
Muslim	50	06.30
Sikh	83	10.48
Total	793	100.00

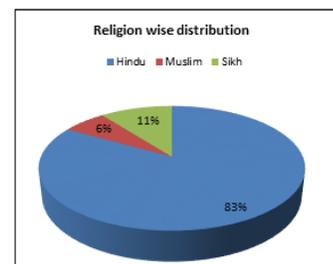


Figure 5: Religion Wise Distribution of cases

Table 6: Manner of Death

		No. of cases	Percentage
Natural	Heart attack	38	04.97
Unnatural	Homicide	18	02.24
	Suicide	186	23.44
	Accident	551	69.44
Total		793	100.00

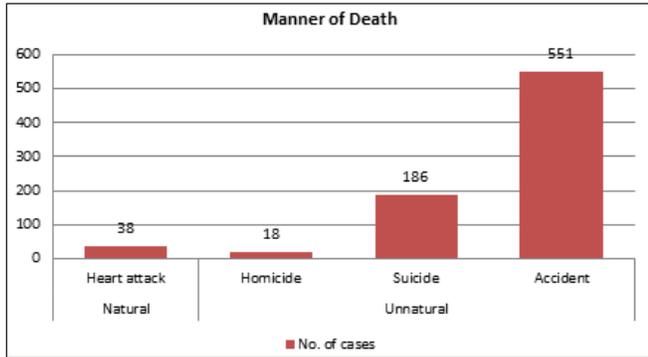


Figure 6: Manner of Death

Table 7: Cause of Death

	No. of cases	Percentage
Heart Attack	38	04.78
Shock & Hemorrhage	188	23.70
Head injury	235	29.64
Poisoning	124	15.64
Hanging	44	05.54
Strangulation	13	01.64
Electrocution	14	01.76
Drowning	23	02.90
Alcoholic	10	01.26
Snake Bite	02	00.26
Burns	11	01.38
Septicemia	10	01.26
Skeleton & visceral injuries	81	10.22
Total	793	100.00

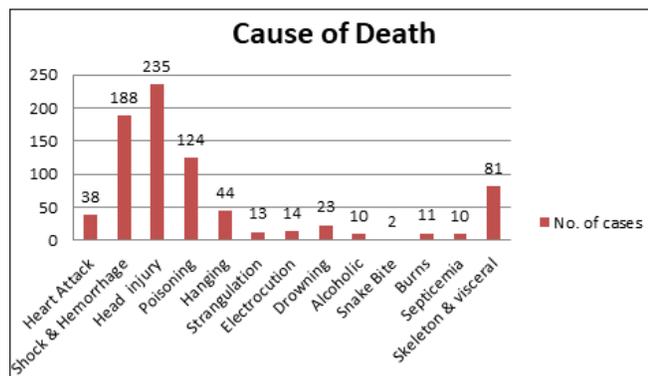


Figure 7: Cause of death

Table 8: Time between Injury and Death

Hours	No. of cases	Percentage
0-6	395	49.82
6-12	39	04.92
12-24	36	04.54
24-48	22	02.77
48-72	24	03.02
>72	62	07.82
Not Applicable	215	27.11
Total	793	100.00

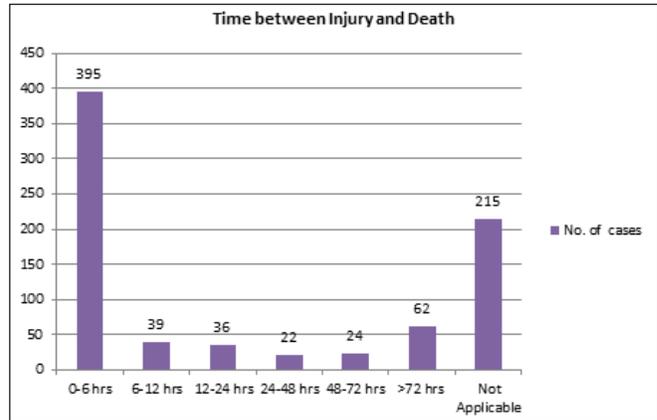


Figure 8: Time between Injury and Death

Table 9: Time between Death and Post Mortem

Hours	No. of cases	Percentage
0-6	60	07.56
6-12	158	19.92
12-24	397	50.08
24-48	97	12.24
48-72	34	04.28
>72	47	05.92
Total	793	100.00

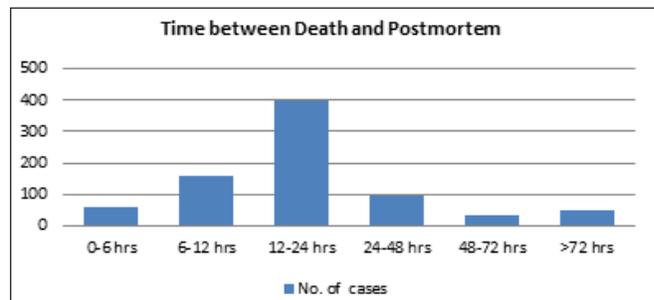


Figure 9: Time between death and postmortem examination

DISCUSSION

As in Table 1, Most victims were male 670 (84.48 %) cases and female 123 (15.52%) cases. A similar finding was observed in a study of Mujadlimath *et al.*⁹ Costache *et al.*¹⁰ Radhakrishna *et al.*¹¹,



Nora Abdellah *et al.*,¹² Khanna *et al.*,¹⁸ Saurav *et al.*,²¹ Patel JB²² and Wasnik RN *et al.*²³ males were in the range of 76.77% to 91.00% and females 9.00% to 24.23% cases. But the Bhabhor *et al.*¹⁷ observed a slightly lower incidence of males from 54.57 % to 69.00% cases. This is because males are generally earning members of society, and females usually doing household activity. So males are more prone to accidents, suicide, and violence-related deaths.

In a study conducted by us, the maximum number of post mortem done in the age group 20-40 years were 385(48.56 %) cases, and minimum in age group 0-10 years were 18(02.26%) cases (Table 1). Thus, the finding of the study are consistent with the findings of Mujalimath *et al.*,⁹ Radhakrishna *et al.*,¹¹ Abdellah,¹² Anderson *et al.*,¹³ Khana *et al.*,¹⁸ Junaidi,¹⁹ Patel *et al.*,²² and Wasnik *et al.*²³

According to Table 3 in our study 601 (75.78%) were married, 168(21.31%) unmarried and unknown 23 (02.99%) cases. Our study is homologous to the studies done by authors Mujalimath *et al.*,⁹ Radhakrishna *et al.*,¹¹ and Junaidi.¹⁹

As per Table 4, Hindus were 660 (83.22%), Muslim 50 (06.30%), and Sikh 83(10.48%) cases. Our finding resembled the study done by authors Mujalimath *et al.*,⁹ Radhakrishna *et al.*,¹¹ Khana *et al.*¹⁸ and Junaidi *et al.*,¹⁹ Kumar P *et al.*,²⁴ where it ranged Hindu 83.22% to 88.00%, Muslim 06.3 to 08 % cases and others 04 to 08 % cases.

As depicted in table no 5, the total number of deaths from rural areas was 406 (51.20%) cases, which is slightly higher than urban area 387 (48.80%) cases. Our study is Homologous to a study done by Azizuddin *et al.*¹⁹ who noticed a higher incidence of death in Rural area 57.5 to 67.9% as compared to urban areas 22.5% to 32.1% cases. But findings of Marina *et al.*¹⁰ are contrary to our study who noticed a higher incidence in urban areas 83.93%, than rural areas. This difference is due to prevailing population dynamics across India.

As depicted in Table 6, Manners of death due to natural causes were 38(04.97%) cases and unnatural 755(95.20%)cases. Our study is almost consistent with a study done by Junaidi *et al.*,¹⁹ Prithviraj *et al.*,¹⁵ who noted natural ranging from 04% to 6.9% and unnatural 93.1% to 96% But Mujalimath *et al.*,⁹ Radhakrishna *et al.*,¹¹ Shrivastava *et al.*,¹⁴ and Escoffery *et al.*,¹⁶ noticed significantly higher incidence of death due to natural 17.4% to 29.21% and unnatural 70.71% to 82.6% cases.

According to Table 7, Number of death due to Head injury were 235(29.64%), shock& hemorrhage 188(23.70%), poisoning 124(15.64%), Skeleton & visceral injuries 81(10.22%), hanging 44(05.54%), heart attack 38(04.78%), Drowning 23(02.90%), Electrocutation 14 (01.76%), strangulation 13(01.64%), burns 11(1.38%), alcoholic 10(01.26%), septicemia 10 (01.26%) and snakebite 2(00.26%)cases. Our findings are similar to Mujalimath *et al.*,⁹ Abdellah *et al.*,¹² Bhabhor *et al.*,¹⁷ Junaidi *et al.*,¹⁹ Patel *et al.*²² and Wasnik *et al.*²³ Poisoning 12.13 to 17% cases and asphyxial death 8.6% cases. The trends of RTA in our study are similar to study of Radhakrishna *et al.*,¹¹ Junaidin *et al.*,¹⁹ Amakiri *et al.*,²⁰ and Odesanmi *et al.*,²⁵ RTA ranged 55.7% to 78% cases, In study conducted by Radhakrishna *et al.*,¹¹

found that death due to hanging were 40% and poisoning 25% cases which are also on higher side as compared to study done by us 5.54% and 15.64% cases respectively. In studies done by Mujalimath *et al.*,⁹ and Shrivastava *et al.*,¹⁴ noticed higher 22.6% to 37.5% cases of death due to burns as compared to our study of burns 1.38% cases. Deaths due to poisoning and hanging are generally found to be suicidal deaths because of the easy availability of commonly used pesticides /insecticides by the farming community to spray in fields or for preserving food grains at homes. The hanging death is generally found to be suicidal as seen in other parts of the country as an easy mode of committing suicide among the population.

Although this tertiary center is located in rural areas of this part of the state with no national highway nearby except one interstate highway, the maximum number of fatalities is 551(69.99%) in our study due to RSA/RTA. And above that 81 deaths, which are included in others skeleton and visceral injuries, are generally found to be due to RTA/RSA. Individual long bones of lower limbs/upper limbs or injuries to abdominal viscera like liver spleen had caused death. So this figure of RTA deaths goes even higher 632 (80.20%) deaths.²⁰ This might be due to the increasing number of fast-moving vehicles on the road and rash driving under the effect of intoxicants. Another reason for this is people are not following road safety norms while driving on the road.

As shown in Table 8, 395 (49.82%) persons died within 0-6 hours after sustaining injuries or any natural causality. 183 (23.07%) persons died within 6-72 hours after suffering any trauma disease. The rest of the cases were poisoning/snake bite, heart attack, and alcoholism, etc. in which time was mentioned as not applicable between injuries and death 215(27.11%) cases.

As per Table 9, the time elapsed between death and postmortem was determined as 12-24 hours in 397(50.08%) cases which form almost half of cases. In 81 (10.20%) cases, this time was estimated to be 48-72 hours or even more. In only 60(07.56%) cases, autopsy²⁶ was conducted within 6 hours of death.

CONCLUSION

793 autopsies were included in this study, and males were more than females. A maximum number of deaths were in the age group 20-40 years. Married persons constituted the majority compared to unmarried because young married persons are more exposed to the external environment being the earning member of society. Hindus being a majority in this part of the state, formed the bulk of cases. Shock & hemorrhage was the most common cause of death in RTA cases. In suicide, poisoning and hanging are the leading causes death in medico-legal cases. Suicidal deaths due to poisoning result from the easy availability of commonly used pesticides/insecticides by farming communities to spray in the field or preserve food grains at home. The hanging death is generally suicidal, as seen in other parts of the country as easy mode of committing suicide amongst the population.

The maximum number of deaths occurred in the first 6 hours (Golden hours) after sustaining injuries. The maximum number of post mortem conducted after 12-24 hours after death. The study will help policymakers make changes or improve medical sciences and public health policy for effective implementation of medical and public health services to the community.

REFERENCES

- Vij K. Text book of forensic medicine and toxicology, 4th edn, 2008; 24-22.
- "Imhotep". Collins Dictionary. n.d. Retrieved September 25,2014.
- Burton JL. A bite into the history of the autopsy: From ancient roots to modern decay. *Forensic Sci Med Pathol.* 2005;1:277-284
- Turecki G, Brent D. Suicide and suicidal behaviour. *Lancet.* 2016;387:1227-39. doi: 10.1016/S0140-6736(15)00234-2
- WHO Preventing Suicide: A Global Imperative. Geneva: World Health Organisation. 2014.
- Bhale, Chandrashekhar Prasad MD; Vare, Anil MD; Gupta, Akshi MD Fetal Autopsy—Categories and Causes of Death at a Tertiary Care Center, *The American Journal of Forensic Medicine and Pathology*: August 27, 2020 - Volume Publish Ahead of Print - Issue - doi:10.1097/PAF.0000000000000608
- Sections 174& 176 of the Code of Criminal Procedure. In: Basu's Criminal Court Handbook containing Criminal Major Acts, 10th ed 2007. Orient Publishing Company, New Delhi: 1973; pp. 134-36, 112-13.
- Kannan K, Mathiharan K. Ed. In: Modi-A textbook of Medical Jurisprudence and Toxicology. 24th Ed. LexisNexis Butterworth's Nagpur: 2012; p. 293, 295,297, 360.
- Mugadlimath A, Kadagoudar S, Sheelvant S, Bambeshwar K. Profile of Medicolegal Autopsy Cases at Tertiary Care Centre in Bagalkot, Karnataka. *Indian Journal of Forensic Medicine and Pathology.* 2017 Apr;10(2):63-66.
- Costache M, Lazaroiu AM, Contolenco A, Costache D, George S, Sajin M, Patrascu OM. Clinical or postmortem? The importance of the autopsy; a retrospective study. *Maedica (Bucur).* 2014 Sep;9(3):261-265. PMID: 25705288; PMCID: PMC4305994.
- Radhakrishna KV, Makhani CS, Sisodiya N, Chourasia S, Sarala M, Khan RN. Profile of medico-legal autopsies conducted at tertiary medico-legal centre in southwestern India. *International J of Healthcare and Biomedical Research.* 2015 Jan;3: 70-75.
- Abdellah N, Ghandour N, Ali H. A Retrospective Study of Autopsy Cases Carried out in Qena, Luxor and Aswan governorates, Upper Egypt during the Period of 2008–2011. *Zagazig Journal of Forensic Medicine.* 2018 Jan 1;16(1):76-90.
- Anderson RE, Hill RB, Broudy DW, Key CR, Pathak D. A population-based autopsy study of sudden, unexpected deaths from natural causes among persons 5 to 39 years old during a 12-year period. *Human pathology.* 1994 Dec 1;25(12):1332-1340.
- Shrivastava P, Som D, Nandy S, Saha I, Pal PB, Ray TG, Haldar S. Profile of postmortem cases conducted at a morgue of a tertiary care hospital in Kolkata. *J Indian Med Assoc.* 2010 Nov;108(11):730-733. PMID: 21510567.
- Meena PR, Punia RK. Socio-demographic profile of unnatural deaths: An autopsy based study at SMS Medical College, Jaipur. *Journal of Indian Academy of Forensic Medicine.* 2016;38(2): 160-164.
- Escoffery CT, Shirley SE. Causes of sudden natural death in Jamaica: a medico-legal (coroner's) autopsy study from the University Hospital of the West Indies. *Forensic science international.* 2002 Sep 26;129(2):116-121.
- Bhabhor R, Parmar A. Profile of medico-legal autopsies at a tertiary centre in bhavnagar region. *Journal of Indian Academy of Forensic Medicine.* 2018;40(4):383-386.
- Khanna Kunal, Pal Vijay, Malik Anil Kumar, Dagar Tarun, Garg Varun, Verma Madhur, Secondary data analysis of postmortem examination records at a teaching hospital in Northern India. *International Journal of health and allied sciences.*2020;9(2): 181-187.
- Junaidi KA, Pujar SS, Honnungar RS, Jirli PS, Koulapur VV, Ali K. Profile of Medicolegal Autopsy Cases at Tertiary Care Centre in Belagavi, Karnataka. *A One Year Retrospective Study. Medico Legal Update.* 2020 Apr 9;20(1):170-174.
- Amakiri CN, Akang EE, Aghadiuno PU, Odesanmi WO. A prospective study of coroner's autopsies in University College Hospital, Ibadan, Nigeria. *Medicine, Science and the Law.* 1997 Jan;37(1):69-75.
- Saurav C, Aayushi G, Behera C, Karthik K, Millo T, Gupta S. Medico-legal autopsy of 1355 unclaimed dead bodies brought to a tertiary care hospital in Delhi, India (2006-2012). *Med Leg J.* 2014 Sep;82(3):112-115. doi: 10.1177/0025817214533759. Epub 2014 May 28. PMID: 24871325.
- Patel JB, Chandegara PV, Patel UP, Parkhe SN, Govekar G. Profile of autopsy cases at New Civil Hospital, Surat: a retrospective study. *Int J Med Sci Public Health.* 2016 Jan 1;5(1):10-13.
- Wasnik RN. Trends of unnatural deaths in Nagpur, India. *Medico-Legal Update.* 2011;11(2):114-117.
- Kumar P, Singh R, Buri S, Pal C, Saini OP, Kumar S. Profile Of Medico-Legal Autopsy Cases Conducted At Tertiary Care Centre In Bikaner, Rajasthan: A One Year Retrospective Stud Y. *Hindu.*;734:90-62.
- Odesanmi WO. Forensic pathology in Nigeria: the Ife experience. *Medicine, Science and the Law.*1982 Oct;22(4):269-274.
- Burton JL, Underwood J. Clinical, educational, and epidemiological value of autopsy. *The Lancet.* 2007 Apr 28; 369(9571): 1471-1480.



A Comprehensive Overview of Forensic Entomology

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ABSTRACT

Arthropods comprise the most ubiquitous species globally that play a key role in the decomposition process of a corpse. The entomological analysis of species commonly associated with carrion can provide valuable insights in investigations which forms the basis of Forensic Entomology. Since historical times, entomological data has aided in resolving numerous medico-criminal cases. Estimation of post-mortem interval by careful analysis of insect fauna associated with a decaying corpse is the most prominent application of Forensic Entomology. However, the conditions surrounding a decomposing corpse are not always optimum, and the rate of decomposition is influenced by multiple factors that need to be considered by forensic entomologists. The present article provides a comprehensive overview of the field of Forensic Entomology, its various applications, limitations and advances through time.

Keywords: Autopsy, Diptera, Forensic Toxicology, Insecta, Post-mortem interval.

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INTRODUCTION

Human and animal cadavers serve as a source of nutrients and breeding grounds for insects in general, of which, about 400 species have been identified.¹ Of these, Arthropoda comprises the most extensive, ubiquitous biological phylum of our planet, outnumbering even the plants. They thrive and breed in environments such as corpses thereby playing a key role in their decomposition.² Arthropods such as Flies (Diptera), beetles (Coleoptera), mites (Arachnida), lice (Isopoda), harvestmen (Opiliones) have been found to be associated with corpses; varying species in larval, pupal, and adult stages have been demonstrated in carrion varying in size and stage of development, depending upon their biological preferences, the extent of the decomposition process and geographical location.³

Careful analysis of entomological findings pertaining to the insects dwelling in carrion can aid in discovering pieces of information critical for investigation concerned with the death of an individual that would otherwise be lost in the absence of awareness on the part of forensic personnel.⁴ The study and application of such entomological data with other forensic investigations in suspected criminal or medicolegal cases and civil proceedings have been termed "Forensic Entomology".⁵ In other words, Forensic Entomology bridges the science of entomology with forensic medicine and law. The applications of Forensic Entomology was segregated into three categories by Lord & Stevenson in 1986,⁶ which are illustrated in [Figure 1].

The study of various stages and species of insects demonstrated in carrion along various stages of decomposition, and its application in discerning the circumstances related to death and estimating the time elapsed constitutes the essence of medico-criminal Forensic Entomology.⁷ Unlike the estimated post-mortem interval (PMI) determined by means of a medical examination which is limited to not more than

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two days, entomological analysis has been demonstrated as a more reliable method in providing more precise data over long periods of time such as seasons or even years.^{7,8}

The present article provides a brief account of the ancient yet young field of Forensic Entomology, its various applications, limitations, and advances through time.

Historical account of Forensic Entomology

The earliest existing record of application of forensic entomology in literature has been depicted in a Chinese book

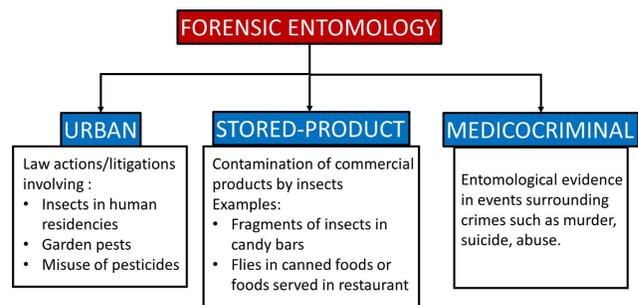


Figure 1: Categories of applications of Forensic Entomology

authored by Sung Tzu pertaining of criminal investigations entitled – "*The Washing Away of Wrongs*" in which flies were attracted to imperceptible bloodstains on a murder weapon.⁹ Maggots on corpses were illustrated in the 15th century on woodcuts - "*Dances of the Death*" and in the 16th-century ivory carvings – "*Skeleton in the Tumba*"⁴ terminology

Necrophagous insects comprising of flies, beetles and other taxa were enlisted in the former half of 19th century.¹⁰ French Doctor Bergeret provided the foremost application of entomological analysis for PMI in 1855 wherein the age of a skeletonized corpse of a child discovered behind a chimney was estimated by blowfly pupae and larval moths.¹¹ The utility of insects for the estimation of PMI and various problems associated with the process were further elaborated by Kraemer in 1857.¹² The first systematic research in Forensic Entomology was first reported in 1881 wherein Phorid flies and beetles were taxonomically identified from exhumated bodies in Saxonia¹³ and a similar report from exhumated bodies were provided by Hofmann in 1886.¹⁴ Through the generous efforts of Yovanovitch and Megnin across multiple publications from 1883-1896, the sequence of insect succession on carrion was delineated, which served as the foundation of modern-day science of Forensic Entomology.⁴ Towards the end of 19th century, up to eight successional waves of insects infesting on carrion were described in a comprehensive book pertaining to entomological science entitled '*La Faune des Cadavres*' which is undoubtedly the greatest contribution to

the field by Megnin.¹⁵ Consequently, the published in-depth knowledge about general fauna present on mummified or decayed corpses attracted interest of researchers towards the subject and the mould *Endoconidium megnini* was named in honour of the researcher.¹⁶

The Process of Decomposition

The sequential setting in of post-mortem effects in a fresh corpse such as stiffness (rigor) followed by stagnation of blood (livor), subsequent reduction of body temperature (algor), aid a pathologist in determining the time elapsed since death with reasonable accuracy in the early post-mortem period (1-3 days).¹⁷ These changes in the corpse are followed by its decomposition, thereby limiting the utility of thanatological evidence in later stages. Although the process of decomposition of a corpse is continuous, it would be pertinent to delineate its various sequential stages so as to make it understandable more easily. The overall process of decomposition can be divided into two primary stages, this first exhibiting bloating and active decay of carrion by maggots whereas the latter half is characterized by loss of seepage fluids and dispersal of post-feeding maggots characterizing advanced decay of prolonged duration ultimately resulting in dry or skeletal remains.¹⁸ A minimum period of three years is expected between the death and last stage, wherein only the debris remains.⁵ The decomposition sequence can be analyzed to reliably estimate the time of death over prolonged periods of time (Table 1). However, the accuracy of estimation is generally inversely

Table 1: Duration of various stages of post-mortem decomposition of the corpse in different environments

<i>Exposed corpse</i>	<i>Buried corpse</i>	<i>Submerged corpse</i>
Initial decay (0-2 days) Appears fresh but is decaying internally due to the presence of antemortem bacteria and nematodes	Fresh (3 days) The period from death to initial bloating. Ants feed actively on moist parts.	Submerged Fresh (1-2 days) Only hydrophilid beetles appear on carcass
Putrefaction (2-12 days) Swollen by gases produced by internal decay accompanied with odour	Bloating stage (3-7 days) Ants and Diptera predominate	Early floating (1-2 days) Blowflies and fruit-flies feed on floating abdomen of corpse Pronounced decay odour and gas bubbles evident on the water surface
Black putrefaction (12-20 days) Creamy flesh with black exposed parts. Strong odour owing to escaping gases	Deflation (7 to 30 days) <ul style="list-style-type: none"> • Strong odour owing to deflation of corpse • Parasites such as Hymenoptera appear • Colonies of fungi and bacteria get established on clumped fluids 	Floating decay (3-7 days) Blowfly eggs hatch on 3 rd day Larvae gain access through multiple holes created by maggot activity Staphylinid and hystericid beetles abundant.
Butyric fermentation (21-40 days) Carcass begins to dry out. Flesh has cheesy odour. The ventral surface of the body becomes mouldy due to fermentation	Disintegration: (30-60 days) Colonies of fungi and bacteria cover the carcass Mites (Caloglyphus) form the primary scavenger group	Bloated deterioration As the exposed surface reduces, maggots and beetles are forced into the water Maggots migrate by the 7 th day since exposed tissue is exhausted
Dry decay (post 40 days) Carcass almost dries out. A slow rate of decay	Skeletonization: (post 60-days) The carcass is predominated by ants, mites and flies. Spiders, centipedes and millipedes also appear.	Floating remains (4-14 days) Few maggots, flies and beetles feed on corpse. Many dead maggots on the water surface. Ends when the corpse sinks. Sunken remains (10-30 days) Decomposition of the corpse is completed by bacteria and fungi; only bones and a small number of flesh remains



proportional to the time elapsed since death making it more accurate in the early weeks.¹⁹

Insect Succession

Carrion progressing along the certain stages of decomposition tends to attract varying arrays of insects in a predictable chronological sequence called 'insect succession'.¹⁵ Recognition of the existing fauna would reveal the stage of decomposition and, subsequently, the time elapsed since death. The insects present on carrion the environment has been segregated into four categories based on their ecological role^{20,21} and are summarized in Table 2.

Beneath the cadaver, a seepage zone usually exists that tends to harbor a complex community of insects including mites and other arthropods that are collectively categorized as 'cryptozoics'.²³ Unless a forensic expert with sound knowledge of the entomological evidence is present at the scene of the crime, such rich zones of evidence tend to be missed out during investigation while the entire focus is laid upon collection of specimens from the corpse only.²⁵ Not much is known about their potential in the field of Forensic Entomology, thereby highlighting the need to conduct more research.

Several parameters influence the composition of a community of insects associated with carrion such as a season, geographical location, habitat. In cases involving the transport of a corpse from one type of habitat to another, variable succession patterns could provide valuable insight regarding the season of the year or location of death.⁷

The insect succession expressed on carrion may vary depending upon several other parameters such as habitat or seasonal climate. Careful identification of these patterns can provide an important insight into an investigation, such as identifying the season of the year at the time of death or whether the corpse was transported post-mortem after first colonization.⁷

Blowflies

Most frequently in cases where the corpse has access, various species of *Calliphoridae* (blowflies) appear on the cadaver and oviposit within the first few minutes to hours following death.²⁶ Thus, these earliest appearing arthropods initiate a biological clock whereby staging the developing progeny most frequently forms the basis of PMI estimation in forensic odontology. The life cycle of blowflies²⁷ commences with the hatching of larvae from the eggs (commonly referred to as 'maggots') that are necrophagic. Following adequate feeding, the larvae need to shed their cuticle (moult) in order to enable further growth which is termed as 'ecdysis', which results in the development of larval instar. The process occurs twice in the life cycle of a blowfly following which they migrate to a safe area and enter the post-feeding puparium stage comprising of the hardened cuticle of the third larval instar. The safe area could refer to stones or leaves in outdoor crime scenes and furniture or doors indoors. It is, thus, essential to extend the examination of carrion to its environment as well.⁷ Ultimately, the adult flies emerge, marking the completion of metamorphosis. The overall process is depicted in Figure 2.

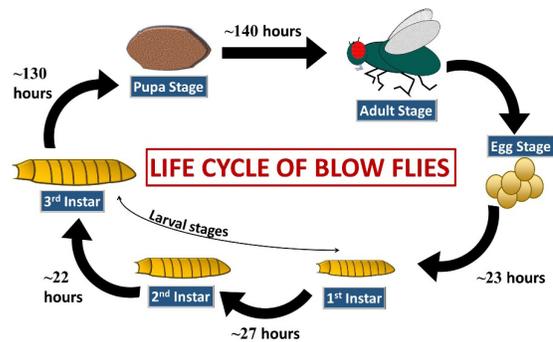


Figure 2: Life cycle of blowflies with approximate duration of each stage

Table 2: Categories of insects identified on a decomposing carrion

Sr No.	Category	Description	Examples
1.	Necrophages[15,22]	<ul style="list-style-type: none"> Species that primarily feed on carrion. Appear in early stages of decomposition Age determination of these insects is most commonly correlated to obtain an estimated PMI 	<p><i>Diptera (flies):</i> <i>Calliphoridae</i> (blowflies) <i>Sarcophagids</i> (flesh flies) <i>Coleoptera (beetles):</i> <i>Silphidae</i> (carrion beetles) <i>Dermestidae</i>(skin beetles)</p>
2.	Omnivores [20]	<ul style="list-style-type: none"> Feed on both the carrion and associated fauna May deplete necrophages, thereby retarding decomposition At present, limited potential for the provision of forensic information is known 	Various species of ants, wasps, and beetles
3.	Predators and Parasites [21,23]	<ul style="list-style-type: none"> Parasitize or devour immature flies, mites, nematodes, and other insects Some species are necrophagous in the early developmental stages that become predaceous later [24] May eliminate competing species Their role in the provision of forensic information is second to the necrophages. 	Hymenoptera, Uropodidae, Macrochelidae, Parasitidae, Parholaspidae
4.	Incidentals or adventive species [15,23]	<ul style="list-style-type: none"> Use the carrion as an extension of their natural habitat. Species-specific to the habitat of the scene of crime 	Spiders, Centipedes, pill bugs, and Springtails

The time elapsed since hatching of the blowfly egg can be determined based on maggot weight and temperature of the carrion niche.^{28,29} However, the larval size may not always be dependable as it may change significantly during the process of preservation depending upon its duration and the type of preservative used.³⁰ Furthermore, the oviposition activity of blowflies generally peaks during the afternoon since the arthropods are inactive at night.³¹ Thus, the possibility that a corpse infested by recently hatched maggots discovered in the afternoon could have been deposited there in the late evening of the day prior to its discovery should not be overlooked during forensic investigations. Conversely, eggs detected on the corpse at night would infer that death would have occurred during the daytime.

Methodology in Forensic Entomology

Collection of Specimens

A forensic entomologist must be thoroughly versed with all the possible zones present in and around the crime scene that could contain entomological evidence to ensure that potential areas of forensic importance do not go unnoticed. Various sites for the collection of samples from the crime scene may include – natural orifices, wounds and clothing/wrapping material of the corpse, underlying seepage zones, nearby carpets and doorframes. In the case of indoor crime scenes, one must

look in other rooms for any possible pieces of entomological evidence while collecting soil samples (10 cm depth) is recommended for outdoor crime scenes. The temperature of the body, crime scene, and environment must also be promptly noted. In addition, an attempt must be made to acquire local climatic data such as the daily range of temperature. It is recommended to preserve the specimens in 70-95% ethanal from a biosafety standpoint.³² The use of formalin should be avoided as it leads to loss of morphological and molecular preservation. A detailed guide for handling, preservation, and transport of entomological evidence in various stages was provided by Amendt *et al.*³²

Recommended Equipment for Forensic Entomology

A forensic entomologist must be acquired beforehand with a toolbox comprising of certain essential equipment (Table 3) that would be required during a crime-scene investigation.

Post-mortem Applications of Forensic Entomology

Determination of Post-Mortem Interval

PMI is the interval of time that has elapsed between death and recovery of the body.³² Estimation of PMI is the most important application of Forensic Entomology in medicolegal cases. The possibility that the extent of decomposition of a corpse

Table 3: Recommended equipment for entomological forensic investigation

Group	Equipment	Purpose
1. Documentation equipment	Protocol sheets	Writing down details related to crime scene and specimens
	Dark graphite pencil or pen with indelible ink	
	Camera/ Video recorder	Photographic documentation
	Standard measurement scale. Example: ABFO scale no. 2	To be used while photographing specimen to ensure quality and identify distortion
	Labels	For identification of specimens
2. Collection equipment	Fine and coarse paintbrushes (moistened)	For collecting eggs
	Spoons	For collecting maggots
	Forceps (varying spring tensions and sizes)	For collecting insects of corresponding stages Fine – immature/fragile insects Medium – adult insects
	Shovel or trowel	For a collection of soil and leaf-litter samples, including buried larvae
	Handheld insect capture net	For catching flying insects
3. Temperature recording equipment	Thermometer	for measuring the body and ambient temperatures, as well as the larval mass temperature
	Temperature data logger	Measurement of the temperature of crime-scene for a number of days following the discovery of a dead body
4. Storage and Transport	Tissue paper	For handling eggs and living larvae
	Vials and storage boxes of different sizes	Preservation of collect insect specimens
	Reusable ice packs in cooler bag	For storing living insect specimens
	Ethanol (70-95%)	For storage of dead specimens
	Sticker, Sealing Wax, Tapes	Material for sealing the samples
	Durable plastic or paper bags	for storage of soil samples and leaf litter specimens



could be calculated by means of entomological data subject to certain limitations was first suggested by Krahmer.¹² The carrion in question would have a set of fauna associated with it from which the PMI can be estimated by two approaches depending on the extent of decomposition. Some flies such as *C. vicina* colonize the cadavers and oviposit as early as within only a few hours of death, while other species such as *L. sericata* may appear after 2 days and *L. argyrostoma* after 3-5 days [21]. In the earlier stages of decomposition, detection of deposited eggs of the respective species and developed in carrion have been confirmed to provide a PMI closest to the actual period ranging up to 10 days.³³

Another approach to determining PMI would be applicable in cases of advanced stages of decomposition by means of observing the arthropod community present on the carrion and relating it to the expected insect successional pattern.¹⁸ Estimates of PMI up to 52 days have been successfully obtained by using the entomological succession approach, and with adequate data, it may be extrapolated to a much longer time interval.³⁴ Both the approaches have demonstrated the possibility of exact assessment of the PMI of cadavers as long as the collection of insects was performed in a coordinated and standardized manner so as to avoid any loss of evidence.³³

Age Determination of Insects

Besides observing the developmental stages of blowflies, the determination of the age of the oldest individual insects in a fauna can also aid in the derivation of the time elapsed since death, especially in cases of indoor investigations. Ageing the oldest insects on a body would provide the minimum time when the adult females of the species first gained access after death, referred to as 'minimum post-mortem interval'.³² Standard rules and guidelines dictate that the species must be correctly identified by means of reliable identification keys before proceeding with their age determination.³² Various methods have been employed to obtain the minimum duration of development for the oldest stage of insects present in a carrion fauna. Enumeration of cuticular bands that are added daily to the skeletal apodemes of blowflies could directly be employed in the calculation of their age.³⁵ Another method for age estimation of flies involves measuring the pteridine levels in the eyes of adult screw worm flies, which is an excretory product stored in fresh or dried specimens following sequestration.³⁶ However, the accuracy of minimum post-mortem interval provided by any method would be questionable since the developmental process of insects is dependent on multiple parameters such as available source of diet, diapause, competition amongst species and maggot generated heat.^{8,19} These factors can lead to false perception in each model of age estimation, and integral assessing the interactions between them makes the process even more complex analogous to a Gordian knot.³⁷

The optimal temperature required for the development of an insect ranges between definite upper and lower values termed as 'upper developmental threshold' and 'lower developmental

threshold', respectively. The threshold values are species-specific and vary between different life stages; temperatures beyond these values adversely affect the development of insects.³² Therefore, within the limits of the threshold values, an insect would require a specific amount of accumulated heat from the time of its oviposition to the time of its hatching which is assumed to have a linear relation to the rate of development.⁸ The approach of 'thermal summation' measures, by means of hand-held digital infrared thermometers, the thermal time i.e. the temperature value multiplied by time and is calculated in terms of acquired degree-hours (ADH) or acquired degree-days (ADD).³⁸ Measurement of ADH or ADD can be extended to each developmental stage (egg, instar, pupa) requiring a specific number to complete their development.³⁹

Recent advances in genetic research have demonstrated age dependency of genetic expression for several products in blowfly pupae.⁴⁰ For example, an altered pattern of expression rates by three genes was utilized for the prediction of age in eggs of *L. sericata* in a study by Tarone *et al.*⁴¹

Factors Affecting the Decay Rate of Carrion

Temperature

Temperature, access by insects, and depth of burial were identified as the three most influential environmental factors in the rate of corpse decay in a study of 150 corpses.⁴² Decomposition of corpses proceeds most rapidly when the environmental temperatures are warm, positively correlated with a greater carrion insect population.⁴³ After a year post-burial, the degree of decomposition of bodies buried in the summer months is generally higher as compared to those interred in the cold winter period.⁴⁴ The continuous feeding and metabolic activity by many maggots tend to generate a substantially higher temperature than the ambient one; the process is termed 'maggot mass effect'.²⁹ The level of the heat generated may have species-specific effects, subsequently influencing the entire fauna present on the carrion. A study had demonstrated tolerance of higher temperature due to maggot mass by *Chrysomya rufifacies* but complete 'burning out' of *Lucilia cuprina* species population.⁴⁵ The generated heat could also reduce the cooling effect of the mortuary refrigeration units prior to autopsy.¹⁹ It could also introduce a false perception in ADH calculations, thus, emphasizing the need for urgent forensic pathological examination of corpses that are heavily colonized by larval masses.⁴⁶ The rate of temperature change in a corpse may also be affected by other conditions such as the amount of body fat, presence or absence of clothing, exposure of the corpse to sunlight, the velocity of wind, especially in case of outdoor deaths or submergence of a corpse in water.³³ Researchers have reinforced Casper's rule stating that "At a tolerable similar average temperature, the degree of putrefaction present in a body lying in the open air for one week (month) corresponds to that found in a body after lying in the water for two weeks (months), or lying in the earth in the usual manner for eight weeks (or months)".⁴⁷

Exposure and Concealment

Infestation of flies and subsequent oviposition first occurs at the orifices of the corpse.⁴⁸ Besides naturally existing ones, the contrived orifices such as gaping wounds or stabbing serve as a rich source of nutrition for the maggots thereby attracting them in greater numbers consequently speeding up the process of decomposition.^{42,48} The size of carcass also affects its attractiveness to insects wherein the Calliphoridae species tend to be attracted to those of larger size while some other necrophagous insects prefer to oviposit on smaller carcasses such as rodents or even snails.⁴⁸ Thus, newly born infants that have a much smaller body size are not so prone to putrefaction owing to fewer microorganisms being present in their orifices having not breathed or swallowed food and tendency to be wrapped in absorbent materials which bars the access of insects to the body and also creates a dry environment.⁴⁹ Burned or charred flesh also creates a similar dry environment that has been found to reduce the attractiveness of the corpse to blowflies.⁵⁰ Restoration of moisture of a dried carcass to levels acceptable by the carrion feeders may occur in a rainy environment.⁵¹

Restricting the access of carrion insects to a body by wrapping in clothing or burying would obviously retard its decomposition rate.⁴² Blowfly invasion of the corpse can be delayed for up to several days if the corpse is wrapped in multiple layers of blankets.⁵² Most Diptera cannot colonize buried or concealed corpses; thus, a different composition of carrion-associated fauna comprising of Phoriade such as *Megaselia scalaris* can be expected in such cases.^{53,54} In case of an investigation pertaining to buried Indian remains, numerous empty fly pupal cases and scarabeid beetles but no adults were detected on the bodies indicating that the infestation must have occurred originally before burial when the bodies were exposed to air; correlation with the known values of time from insect succession models, a period of exposure of three weeks was determined and confirmed later.⁵⁵

Aquatic Environment

The decomposition of a corpse in an aquatic environment is entirely different as compared to one exposed to air or buried in the land. Submergence of a corpse in water retard the decomposition process to a rate roughly half of that on land owing to restriction of access to common necrophages, reduced insect activity and a cooler environment.⁴⁸ Roughly, six stages of decomposition in aquatic environment traversing from submerged fresh, floating decay to sunken remains have been described by Merrit and Wallace, although a definitive insect succession model comprising of sequential waves of colonization of a corpse in aquatic habitat has not been identified.⁵⁶ Not much is known about the role of freshwater or marine arthropods in the decomposition of a corpse; however, those identified of forensic importance include Ephemeroptera (mayflies), Trichoptera (caddis flies) and Diptera (true flies). These insects utilize the carrion both as a food source and breeding site but are not obligatory macrophages.⁴⁸ Therefore, their utility in estimation PMI is even more difficult since

their appearance may vary according to the season and other conditions of the aquatic system.

Terrestrial arthropods can survive for a variable amount of time when the corpse is transferred to an aquatic environment. Simpson stated that "Fleas are drowned in twenty-four hours or so. If immersed for twelve hours they require about an hour for revival, and after eighteen to twenty hours' immersion, a period of some four to five hours. Body-lice usually die in twelve hours".⁵⁷ Species such as *Demodex* can survive for a week in aquatic habitat and when such species can have a basis for estimating the PMI in cases wherein the bodies have been submerged in water for short periods of time.⁵⁸ A similar case was reported wherein live terrestrial fly larvae were found on the body and trousers of a murdered corpse in a tank of seawater used for firefighting. The killer's confession confirmed that the victim was killed earlier and moved the body to a tank for only a short time where it was discovered; the fly pupae related to those on the body were also identified on the seat of vehicle used to transport the corpse.⁵⁹ Identification of larvae in submerged and floating corpses is difficult since the morphological distinctions are often lacking in the collected specimen. The possibility of DNA probe in identifying insects from their bodies or even fragmented parts in such cases.⁶⁰

Geographic Variation

Different species of insects may be found associated with carrion in different areas such as rural or urban, some of which can be exclusive to a certain habitat.⁴⁸ The species of blowflies with wide geographical distributions that are most commonly a part of forensic entomological investigations also exhibit intraspecific variations and microclimatic differences depending upon the geographical location.^{21,19} There is a growing concern amongst forensic entomologists as these differences in the biology of blowflies may reflect unstudied aspects that need to be emphasized and could have forensically important implications. Identification of species-specific to a certain habitat or an alteration in insect succession pattern could indicate post-mortem transport of a corpse.⁶¹ Conversely, one should exercise caution when using data collected for a particular region or area for estimation of PMI. It would, therefore, be advantageous to have a forensic entomologist with local rearing experience of the specific insect in question.

The factors influencing the decomposition of the corpse is illustrated in [Figure 3].

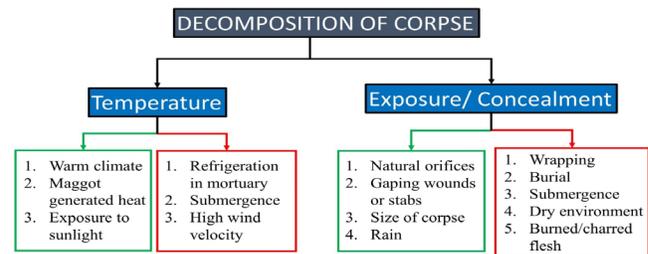


Figure 3: Factors influencing decomposition rate of corpses. Green boxes indicate factors accelerating the decomposition process; Red boxes indicate factors retarding the decomposition process.



Antemortem Applications of Forensic Entomology

While most of the cases described above were centred around the determination of PMI on the basis of entomological data, entomological evidence can provide important insights regarding antemortem circumstances.

Discerning Antemortem Circumstances of Death

In one case of homicide, bites of chigger *Eutrombicula belkini* detected on both, crime-scene investigators and a suspect determined that the suspect had been at the scene of the crime earlier.⁶² However, drying of post-mortem ant bites can also give the impression of chemical or cigarette burns or frictional lesions⁶³ while scattered stains of blood made by fleas may resemble those from traumatized blood vessels;⁶⁴ these should be carefully considered while discerning antemortem scenario. Previous findings have suggested that ABO blood typing of the corpse is not affected by trail-marking contamination of ants and mites.⁶⁵ Yet another case detailed the use of maggot development to determine the period of child neglect wherein maggots had developed in the faecal matter inside the diaper of a 16-month-old abandoned child and had also infested the genital and rectal areas.⁶⁶

Detection of Antemortem Drugs and Toxins

Detection of drugs such as phenobarbital, benzodiazepines, and tricyclic antidepressants in maggots developing on a corpse derived the interest of researchers towards the potential use of entomological analysis for detecting certain substances in decomposing tissues.⁶⁷ Qualitative as well as quantitative analysis of traces of chemical substances recovered from maggots present on extensively decomposed bodies have well-documented applications in forensic investigations.⁶⁸ Reports of suicide cases consisting of forensic investigations for detection of traces of phenobarbital⁶⁹ and cocaine⁷⁰ have further highlighted the potential of entomological analysis for detection of antemortem drugs and toxins. The growth rates of maggots feeding on corpses overdosed with certain drugs may be accelerated^{70,71} (eg: cocaine, heroin or morphine) or retarded⁷² (e.g.: organophosphate malathion) or even cease completely when they are killed⁷³ (eg: kerosene, gasoline, chloroform, ether). Therefore, the possibility of underestimation when presence of morphine in the corpse is not considered while calculating the PMI cannot be overlooked.⁷⁴

The advantage offered by the toxicological analysis of Diptera larvae feeding on carrion is that it can provide valuable information about antemortem circumstances and location of death for periods as long as 10 weeks post-mortem.⁶⁷ An example of this utility of toxicological analysis was the demonstration of low mercury concentration in Diptera larvae from a decomposing body discovered in an area affected by mercury pollution, indicating that the body was not from the area where it was located it was found.⁷⁵ The toxicological findings guided the police investigators to certain areas that were relatively free of mercury pollution which led

to successful tracking of the victim and resolved the case. Drugs and toxins may also be identified through empty pupal cases left behind or excreted material from beetles, several years after the death.^{76,77} Therefore, adequate toxicological investigations must be undertaken for a comprehensive drug screening in bodies whenever there is a suspected relevance of drugs with death.⁷⁸

Molecular Techniques in Forensic Entomology

Since blowflies are most important in forensic entomological investigations, abundant genetic research pertaining to their analysis has been conducted. Most of them focus on mitochondrial encoded the gene for cytochrome oxidase.⁷⁹ The polymerase chain reaction technique enables amplification of the suitable regions of the genome, allowing identification of arthropods in cases where the morphologically unsuitable or fragmented body parts of insects are obtained.⁸⁰ The technique is also particularly advantageous in terms of efficiency as compared to more time-consuming rearing of the larvae to adults for identification which tend to delay investigatory procedures or fail at times.⁷ Identification of genetic material of victim from within the gastrointestinal tract of maggots is yet another molecular implication of Forensic Entomology.⁸¹ This approach is particularly preferable in cases when the source of food for maggots is irresolute for instance, when only maggots are found at the scene of a crime without any corpse or when multiple food sources are present. In such cases, identifying individual-specific DNA in maggots can associate them with a specific corpse.⁸²

However, the advanced molecular techniques are not free of limitations in that apart from their frequent unfeasibility and unavailability in various settings such as rural areas, closely related species may show identical sequences or even reflect hybridization.⁸³ To overcome such situations, alternative techniques such as Restriction Fragment Length Polymorphism analysis have been suggested that restrict the analysis to only a selected area of a nucleotide sequence which may aid in eliminating false inclusions.⁸⁴

Possible Role of Forensic Odontologists

The fact that maggots first appear near the oral cavity of a corpse highlights the potential role of a forensic odontologist in entomological investigations.⁴⁸ Infestation of maggots or Diptera larvae can pervade in the wounds or oral cavity of living humans or animals as well, suggesting an antemortem period of neglect.⁸⁵ Such neglect may occur in cases of abandoned infants,⁸⁶ elderly in nursing homes, homelessness, alcoholism, bedridden individuals.⁸⁷ The extent of the duration of antemortem neglect can be estimated by the age determination of these infested maggots.⁸⁸ This possibility of antemortem infestation by flies must not be overlooked when estimating PMI for suspected cases of neglect. Conversely, false perception of an antemortem infestation can occur even when the arthropods arrive on the body after death. The insight offered by a forensic odontologist in ascertaining the

periodontal health and overall oral hygiene status could provide clarity in terms of antemortem neglect. Blowfly evidence from human saliva along with toxicological analysis of human saliva can further be correlated in suspected cases.⁸⁹

Forensic Entomology in Court of Law

The integration of forensic evidence in a medicocriminal investigation requires the presentation of characteristic morphology, various physical parameters involved and composition of arthropod species identified on a corpse. It has been pointed out that the subdivisions used to describe insects associated with a decomposing corpse are ambiguous and may not be clearly distinguishable in practice.⁹⁰ Nevertheless, the description of these stages provides a valuable chronological reference for explaining the results to a jury. Furthermore, the circumstances surrounding the dead body in every case are different which may significantly alter the final values derived from entomological data. Therefore, to ensure that the entomological data obtained from a crime scene is reliable, reproducible, and valid, certain standards and guidelines have been established which would provide quality assurance and accreditation of Forensic Entomology in the courtroom.⁹¹

Several authors have formulated and suggested protocols for collecting and presenting entomological evidence. A guide for the collection of entomological evidence from corpses was provided by Lord & Burger in 1983,⁹² which was later elaborated with the addition of guidelines for subsequent sample handling in a compendious Forensic Entomology Manual authored by Smith.²¹ A comprehensive checklist for crime-scene entomologists and autopsy pathologists was developed by Catts & Haskell in 1991 in a manual entitled 'Entomology and Death: a procedural guide'.²⁵ However, the standards may vary for jurisdiction systems across different geographical areas since each location has its own distinct environmental conditions.

Entomologists may not always have the opportunity to be present at the scene of crime owing to certain conditions. At times, useful evidence may go unnoticed at the crime scene due to lack of training or awareness about what to look for or retrieving the entomological evidence.⁹² This problem should be tackled in two stages. First, a specific certified curriculum training program for reinforcement of the credibility of forensic entomologists should be established. Secondly, the forensic entomologists can arrange trial drills with local death-scene investigators for the collection of entomological data from the crime scene.⁹³ Forensic investigations involve coordination between personnel from various fields such as law-enforcement agencies, medical examiners, entomologists, pathologists, technicians, botanists, anthropologists to ensure a proper understanding of the evidence recorded at the crime scene and during autopsy.⁴⁶

CONCLUSION

Forensic entomology has proved its utility in resolving numerous cases of medico-criminal and toxicological forensic

investigations throughout the years. Even so, it cannot be denied that analysis of entomological evidence in itself presents with certain limitations owing to circumstances surrounding the corpse, such as submergence of corpse or loss of morphology of maggots. Undoubtedly, recent advances in molecular techniques and generous efforts of researchers are able to provide a solution to these existing problems, consequently widening the scope with a renewed interest in the field. Need for developing standard entomological data references specifically to various geographical locations necessitate further research throughout the globe. Emphasis should be laid on the inclusion of a forensic entomologist in the crime-scene investigation team to gain a reliable understanding of the complex interactions between the environment and the corpse and collection of specimens that could be perplexing for other forensic personnel. Overall, the discipline of Forensic Entomology needs further exploration and research to tackle the existing problems in the field using modern-day advancements in order to establish global standards for entomological evidence.

REFERENCES

1. Anderson GS, Cervenka VJ, Haglund W, Sorg M. Insects associated with the body: their use and analyses. In: Haglund WD, Sorg MH. *Advances in forensic taphonomy: method, theory, and archaeological perspectives*. CRC Press, New York. 2002;173200.
2. Budd GE, Telford MJ. The origin and evolution of arthropods. *Nature*. 2009 Feb;457(7231):812-817.
3. Illingworth JF. Insects attracted to carrion in Southern California. *InProc Hawaii Entomol Soc* 1926;6:397-401.
4. Benecke M. A brief history of forensic entomology. *For Sci Int*. 2001 Aug 15;120(1):2-14.
5. Keh B. Scope and applications of forensic entomology. *Annual review of entomology*. 1985 Jan;30(1):137-154.
6. Lord W, Stevenson J. *Directory of Forensic Entomologists*. Washington DC: Am. Reg. Prof. Entomol. 2nd ed.1986;pp-42
7. Amendt J, Richards CS, Campobasso CP, Zehner R, Hall MJ. *Forensic entomology: applications and limitations*. Forensic science, medicine, and pathology. 2011 Dec;7(4):379-392.
8. Greenberg B, Kunich JC. *Entomology and the law: flies as forensic indicators*. Cambridge University Press, Cambridge 2002.
9. McKnight B. *The Washing Away of Wrongs: Forensic Medicine in Thirteenth-Century China*. Ann Arbor: Univ. Michigan. 1981;pp-181.
10. Orfila MJ. *Traité de médecine légale*. Labé; 1848.
11. Bergeret M. Infanticide, momification naturelle du cadavre. *Ann Hyg Publique Med Leg*. 1855;4:442-452.
12. F.L. Kraemer, *Handbuch der gerichtlichen Medizin für Aerzte und Juristen*, Schwetschke & Sohn, Braunschweig, 1857, p. 625.
13. Motter MG. A contribution to the study of the fauna of the grave. A study of on hundred and fifty disinterments, with some additional experimental observations. *Journal of the New York Entomological Society*. 1898 Dec 1;6(4):201-231.
14. Hofmann, Observation de larves de Diptères sur des cadavres exhumes (Observation on Diptera larvae on exhumated corpses), *C.R. Séances Soc. Ent. Bel*. 74 (1886) 131-132
15. Megnin JP. *La faune des cadavres Encyclopedie Scientifique des Aide-Memoire*. Paris: Masson, Gauthier-Villars et Fils; 1894. p. 1-224.



16. Hunziker. Observations during the exhumation on the graveyards of Basel. Under special consideration on the fauna and flora of the graves), Frankf.Z. Pathol. 22 (1919) 147-207
17. Henge C, Madea B, Knight B, Nokes L, Krompecher T. The estimation of the time since death in the early postmortal interval. Arnold, London. 1995.
18. Early M, Goff ML. Arthropod succession patterns in exposed carrion on the island of O'ahu, Hawaiian Islands, USA. 1. Med. Entomol. 1986;23:520-531
19. Catts EP. Problems in estimating the post-mortem interval in death investigations. J Agric Entomol. 1992;9:245-255.
20. Early M, Goff ML. Arthropod succession patterns in exposed carrion on the island of O'ahu, Hawaiian Islands, USA. Journal of Medical Entomology. 1986 Sep 19;23(5):520-531.
21. Smith, K. G. V. A Manual of Forensic Entomology. London: British Museum (Natural History), Comstock. 1986:pp-205.
22. Nainis I, Marchenko M, Kazak A. A calculation method for estimating by entomofauna the period during which the body had remained in the place where it was found. Sud. Med. Ekspert. 1982;25:21-23.
23. Goff M. Gamasid mites as potential indicators of post-mortem interval. in Acarology, ed. G. P. Channabasavanna, C. A. Viraktamath, New Delhi: Oxford & IBH. 1989;1:443-450.
24. Goodbrod JR, Goff ML. Effects of larval population density on rates of development and interactions between two species of *Chrysomya* (Diptera: Calliphoridae) in laboratory culture. Journal of Medical Entomology. 1990 May 1;27(3):338-343.
25. Catts EP, Haskell NH. Entomology and death: a procedure guide. Clemson, SC: Joyce's Print Shop. 1991. pp. 180
26. Bourel B, Callet B, Hédouin V, Gosset D. Flies eggs: a new method for the estimation of short-term post-mortem interval?. Forensic science international. 2003 Jul 29;135(1):27-34.
27. Kamal AS. Comparative study of thirteen species of sarcosaprophagous Calliphoridae and Sarcophagidae (Diptera) I. Bionomics. Annals of the Entomological Society of America. 1958 May 1;51(3):261-71.
28. Williams H. A model for aging of fly larvae in Forensic Entomology. Forensic Sci. Int. 1984;25:191-99
29. Wells JD, LaMotte LR. Estimating maggot age from weight using inverse prediction. J Forensic Sci. 1995;40:585-590
30. Adams ZJO, Hall MJR. Methods used for the killing and preservation of blowfly larvae, and their effect on post-mortem larval length. Forensic Sci Int. 2003;138:50-61.
31. Greenberg B. Nocturnal oviposition behaviour of blow flies (Diptera: Calliphoridae). J Med Entomol. 1990;27:807-810.
32. Amendt J, Campobasso CP, Gaudry E, Reiter C, LeBlanc HN, Hall MJ. Best practice in forensic entomology—standards and guidelines. International journal of legal medicine. 2007 Mar;121(2):90-104.
33. Amendt J, Krettek R, Niess C, Zehner R, Bratzke H. Forensic entomology in Germany. Forensic Science International. 2000 Sep 11;113(1-3):309-14.
34. Schoenly K, Goff ML, Wells JD, Lord WD Quantifying statistical uncertainty in succession-based entomological estimates of the post-mortem interval in death scene investigations: a simulation study. Am Entomol. 1996;42:106-112
35. Comaby B. 1974. Carrion reduction by animals in contrasting tropical habitats. Biotropica. 6:51-63
36. Thomas D, Chen A. Age determination in adult screw-worms (Diptera: Calliphoridae) by pteridine levels. J. Econ. Entomol. 1989;82:1140-44
37. Villet MH, Richards CS, Midgley JM. Contemporary precision, bias and accuracy of minimum post-mortem intervals estimated using development of carrion-feeding insects. In: Amendt J, Campobasso CP, Goff ML, Grassberger M, editors. Current concepts in Forensic Entomology. Dordrecht: Springer; 2010. p.109-137.
38. Baskerville GL, Emin P. Rapid estimation of heat accumulation from maximum and minimum temperatures. Ecology. 1969;50:514-517
39. Higley LG, Haskell NH. Insect development and Forensic Entomology. In: Byrd JH, Castner JL, editors. Forensic Entomology—the utility of arthropods in legal investigations. Boca Raton: CRC Press. 2010. p. 389-405.
40. Zehner R, Amendt J, Boehme P: gene expression analysis as a tool for age estimation of blowfly pupae. For Sci Int Genet Suppl. 2009;2:292-293
41. Tarone AM, Kimberley C, Jennings MS, Foran DR. Aging blow fly eggs using gene expression: a feasibility study. J Forensic Sci. 2007;52:1350-1354.
42. Mann RW, Bass WM, Meadows L. Time since death and decomposition of the human body: variables and observations in case and experimental field studies. Journal of Forensic Science. 1990 Jan 1;35(1):103-111.
43. Rodriguez W, Bass W. Insect activity and its relationship to decay rates of human cadavers in east Tennessee. J. Forensic Sci. 1983;28:423-432.
44. Morovic-Budak A. Experiences in the process of putrefaction in corpses buried in earth. Med Sci Law. 1965;5:40-43
45. Williams H, Richardson AM. Growth energetics in relation to temperature for larvae of four species of necrophagous flies (Diptera: Calliphoridae). Australian Journal of Ecology. 1984 Jun;9(2):141-152.
46. Campobasso CP, Introna F. The forensic entomologist in the context of the forensic pathologist's role. Forensic Sci Int. 2001; 120:132-139.
47. Giertsen JC. Drowning. In: C. G. Tedeschi, W. G. Eckert, L. G. Tedeschi. Forensic medicine, a study in trauma and environmental hazards, Philadelphia, Saunders. 1977:1324.
48. Amendt J, Krettek R, Zehner R. Forensic entomology. Naturwissenschaften. 2004 Feb;91(2):51-65.49.
49. Littlejohn, H. 1925. Forensic Medicine. pp. 1-11, 76. London: Churchill. pp. 285.
50. Avila FW, Goff ML. Arthropod succession patterns onto burnt carrion in two contrasting habitats in the Hawaiian Islands. Journal of forensic science. 1998 May 1;43(3):581-586.
51. Fuller ME. The insect inhabitants of carrion: a study in animal ecology. Aust. Coun. Sci. Ind. Res. Bull. 1934; 82. pp 62.
52. Goff ML. Problems in estimation of post-mortem interval resulting from wrapping of the corpse: a case study from Hawaii. Journal of Agricultural Entomology. 1992 Oct 1;9(4):237-243.
53. Campobasso CP, Di Vella G, Introna F. Factors affecting decomposition and Diptera colonization. Forensic Sci Int. 2001;120:18-27.
54. VanLaerhoven SL. Ecological theory and its application in Forensic Entomology. In: Byrd JH, Castner JL, editors. Forensic Entomology—the utility of arthropods in legal investigations. Boca Raton: CRC Press; 2010. pp. 493-518.
55. Ubelaker D, Willey P. Complexity in Arikara mortuary practice. Plains Anthropol. 1978;23(79):69-74.
56. Merritt RW, Wallace JR. The role of aquatic insects in forensic

- investigations. *Forensic Entomology: The utility of arthropods in legal investigations*. 2001:177-222.
57. Simpson K. *Forensic Medicine*. London: Arnold. 6th ed. 1969; pp 361.
 58. Nom MS. *Demodex folliculorum*. Incidence, regional distribution, pathogenicity. *Dan. Med. Bull.* 1971;18:14-17
 59. Arutjunov, A. M. The use of entomological data in a forensic medicine examination. *Sud.-Med. Ekspert.* 1963;6:51-52
 60. Johnson DW, Cockburn AF. Insect identification using DNA probes. *Arch. Biochem. Physiol.* 1992;82:113-117.
 61. Catts EP, Goff ML. Forensic entomology in criminal investigations. *Annual review of Entomology.* 1992 Jan;37(1):253-272.
 62. Webb J, Loomis R, Madon M, Bennett S, Green G. The chigger species *Eutrombicula belkini* Gould (Acari: Trombiculidae) as a forensic tool in a homicide investigation in Ventura County, California. *Bull. Soc. Vector Ecol.* 1983;8:141-146
 63. Campobasso CP, Marchetti D, Introna F, Colonna MF. Postmortem artifacts made by ants and the effect of ant activity on decompositional rates. *Am J Forensic Med Pathol.* 2009;30:84-87.
 64. Lucas A. *Forensic Chemistry and Scientific Criminal Investigation*. London: Arnold. 4th ed. 1945. 340 pp.
 65. Grace J, Wood D, Grunbaum, B. Effect of Argentine ant contamination on ABO blood typing of human saliva samples. *Bull. Entomol Soc Am.* 1986;32:147-149.
 66. Lord, W. D, Rodriguez, W. C. *Forensic Entomology: the use of insects in the investigation of homicide and untimely death*. Prosecutor. 1989;22:41-48.
 67. Kintz P, Godelar B, Tracqui A, Mangin P, Lugnier AA, Chaumont AJ. Fly larvae: a new toxicological method of investigation in forensic medicine. *J For Sci.* 1990 Jan 1;35(1):204-207.
 68. Introna F, Dico CL, Caplan YH, Smialek JE. Opiate analysis in cadaveric blowfly larvae as an indicator of narcotic intoxication. *J For Sci.* 1990 Jan 1;35(1):118-122.
 69. Beyer JC, Enos WF, Stajic M. Drug identification through analysis of maggots. *J For Sci.* 1980 Apr 1;25(2):411-412.
 70. Goff ML, Omori AI, Goodbrod JR. Effect of cocaine in tissues on the rate of development of *Boettcherisca peregrina* (Diptera: Sarcophagidae). *J Med Entomol.* 1989;26:91-93.
 71. Goff ML, Brown WA, Hewadikaram KA, Omori AI. Effects of heroin in decomposing tissues on the development rate of *Boettcherisca peregrina* (Diptera: Sarcophagidae) and implications of this effect on estimation of post-mortem intervals using arthropod development patterns. *J Forensic Sci.* 1991;36:537-542.
 72. Gunatilake K, Goff LL. Detection of organophosphate poisoning in a putrefying body by analyzing arthropod larvae. *Journal of Forensic Science.* 1989 May 1;34(3):714-716.
 73. Rivers R. Embalming artifacts. *J. Forensic Sci.* 1978;23:531-535.
 74. Bourel B, Hodouin V, Martin-Bouyer L, Becart A, Tournel G, *et al.* Effects of morphine in decomposing bodies on the development of *Lucilia sericata* (Diptera: Calliphoridae). *J Forensic Sci.* 1991;44:354-358.
 75. Nuorteva P, Nuorteva SL. The fate of mercury in sarcosaprophagous flies and in insects eating them. *Ambio.* 1982;11:34-37.
 76. Pien K, Laloup M, Pipeleers-Marichal M, *et al.* Toxicological data and growth characteristics of single post-feeding larvae and puparia of *Calliphora vicina* (Diptera: Calliphoridae) obtained from a controlled nordiazepam study. *Int J Leg Med.* 2004;118:190-193.
 77. Miller ML, Lord WD, Goff ML, Donnelly B, McDonough ET, Alexis JC. Isolation of amitriptyline and nortriptyline from fly puparia (Phoridae) and beetle exuviae (Dermeestidae) associated with mummified human remains. *J Forensic Sci.* 1994;39:1305-1313.
 78. Levine B, Golle M, Smialek JE. An unusual drug death involving maggots. *Am J Forensic Med Pathol.* 2000;21:59-61.
 79. Wells JD, Introna F, Di Vella G, Campobasso CP, Hayes J, Sperling FA. Human and insect mitochondrial DNA analysis from maggots. *J Forensic Sci.* 2001;46:685-687.
 80. Wells JD, Stevens JR. Application of DNA-based methods in Forensic Entomology. *Annu. Rev. Entomol.* 2008 Jan 7;53:103-120.
 81. Campobasso CP, Linville JG, Wells JD, Introna F. Forensic genetic analysis of insect gut contents. *Am J Forensic Med Pathol.* 2005;26:161-165.
 82. Zehner R, Amendt J, Schütt S, Sauer S, Krettek R, Povolny D. Genetic identification of forensically important flesh flies (Diptera: Sarcophagidae). *Int J Leg Med.* 2004;118:245-247.
 83. Stevens JR, Wall R, Wells JD. Paraphyly in Hawaiian hybrid blowfly populations and the evolutionary history of anthropophilic species. *Insect Mol Biol.* 2002;11:141-148.
 84. Wells JD, Wall R, Stevens JR. Phylogenetic analysis of forensically important *Lucilia* flies based on cytochrome oxidase I sequence: a cautionary tale for forensic species determination. *Int J Leg Med.* 2007;121:229-233.
 85. Droma EB, Wilamowski A, Schnur H, Yarom N, Scheuer E, Schwartz E. Oral myiasis: a case report and literature review. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology.* 2007 Jan 1;103(1):92-96.
 86. Goff ML, Charbonneau S, Sullivan W. Presence of fecal material in diapers as a potential source of error in estimations of post-mortem interval using arthropod development rates. *Journal of Forensic Science.* 1991 Sep 1;36(5):1603-1606.
 87. Sherman RA. Wound myiasis in urban and suburban United States. *Arch Intern Med.* 2000;160:2004-2014.
 88. Benecke M. Neglect of the elderly: Cases and Considerations. In: *Proceedings of the Meeting of the European Association of Forensic Entomologist, Frankfurt 2003 Apr* (pp. 2-5).
 89. Durdle A, Mitchell RJ, van Oorschot RA. The use of forensic tests to distinguish blowfly artifacts from human blood, semen, and saliva. *J For Sci.* 2015 Mar;60(2):468-470.
 90. Schoenly K, Reid W. Dynamics of heterotrophic succession in carrion arthropod assemblages: discrete series or a continuum of change? *Oecologia.* 1987;73:192-202.
 91. VanLaerhoven SL. Ecological theory and its application in forensic entomology. In: Byrd JH, Castner JL, editors. *Forensic entomology—the utility of arthropods in legal investigations*. Boca Raton: CRC Press; 2010. p. 493-518.
 92. Lord WD, Burger JF (1983) Collection and preservation of forensically important entomological materials. *J For Sci.* 1983;28:936-944
 93. Haskell NH, Williams RE. Collection of entomological evidence at the death scene. *Entomology & Death: A Procedural Guide.* 1990:82-97.



Legal Issues in Medical Practice in Malaysia

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ABSTRACT

The health regulatory system in Malaysia is solely relying on complaints made by members of the public which mean a legal intervention is required in a case of medical negligence. Based on the number of claims and medical negligence cases reported in Malaysia, legal issues pertaining to medical practice have become a profound concern by medical doctors. Legal issues in medical practice are circulating in various aspects of care which comprise consent, confidentiality, doctor-patient relationship, documentation or record keeping and many others. There will be positive and negative implications congruent with these legal issues in medical practice. One of the negative implications is the medical doctors will unconsciously practice defensive medicine due to fear of impending medical litigation. On the other hand, due to the fear of impending medical litigation, medical doctors will become more aware and concern about the legal issues in medical practice. As a result, they will continuously improve their practice, quality of care which leads them to be more confident in practicing medicine.

Keywords: Legal Issues, Medical Practice, Medical Issues, Malaysia.

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INTRODUCTION

Malaysia has a dual system of healthcare services that is government and private healthcare services. In the government sector, healthcare services are governed by the Ministry of Health (MOH) which include a range of activities and responsibilities from treatment, promotion, rehabilitation to medical research. National health policies and major decisions on resource allocations are under the jurisdiction of the MOH. Meanwhile, these policies, and the operational management of the medical, pharmaceutical and dental services, as well as quality assurance, are delegated to State Directors of Health who are accountable to the Minister of Health at the central level. On the other hand, in relation to the private sector, the Private Healthcare Facilities and Services Act (PHFSA) 1998 was introduced by the government to regulate and control private health providers in complying to the standards of medical and health-related services.

Apart from the MOH, there are several regulating bodies in Malaysia such as the Malaysian Medical Council (MMC) and the Malaysian Medical Association (MMA). The primary functions of the MMC are to register medical doctors intending to practise in Malaysia and to ensure the standard of practice is acceptable and reasonable (Malaysian Medical Council (MMC), 1987). Meanwhile, the MMA is a professional representative body of the medical doctors with its main objectives are to promote the interest of the profession of medicine and to assist in maintaining the professional standards of medical ethics (Malaysian Medical Association (MMA), 1997). Apart from these three bodies, there are other entities which also involved in regulating the Malaysia healthcare services such as Medico-legal Society of Malaysia (MLSM) (Rosnah & Abdullah, 2017).

The health regulatory system is primarily governed by the following sources: the Federal Constitution, Acts of Parliament,

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judicial decisions, the Penal Code (which is the primary source of criminal law in Malaysia) and guidelines and circulars issued by the MOH, the MMC and the Director-General of Health. Apart from that, Malaysia's legal systems are designed and influenced by English common law (Choong, 2012). By virtue of Section 3 of the Civil Law Act 1956, Malaysia courts are allowed to apply the English common law and the rules of equity as administered in the English countries, however, only for matters that are not explicitly provided for by those sources mentioned earlier. Besides that, Malaysian judges have also made reference to judgments passed in other Commonwealth jurisdiction as well (Choong, 2012). Nevertheless, the health regulatory system is solely relying on complaints made by members of the public which mean a legal intervention is required in a case of medical negligence. The intervention of law in the area of medical practice raises convoluted legal issues, which most of the time co-exist with ethical and religious dilemmas.

Based on the number of claims and medical negligence cases reported in Malaysia, legal issues pertaining to medical practice have become a profound concern by medical doctors (Hambali & Khodapanahandeh, 2014). Due to the

facts that legal issues in medical practice are relatively new in Malaysia, thus, there has been a lack of comprehensive data or statistics available in this area. However, referring to other indicators such as the compulsory requirement of indemnity subscription by medical doctors in order to renew their Annual Practice Certificates (APCs), amount of damages awarded by the court and rise in premium paid by medical doctors for protection against malpractice suits, support the allegation that there is increasing in trends on medical negligence cases in Malaysia (Radakrishan, 2003). Furthermore, according to the annual report published by the MOH, there is also an upsurge in the amount of compensation paid for medical negligence ranging from RM1.2 million in 2006 to RM 20.1 million in 2015 and RM13.4 million in 2017 (Ministry of Health (MOH) Malaysia, 2017). Legal issues in medical practice are circulating in various aspects of care which comprise consent, confidentiality, doctor-patient relationship, documentation or record keeping and many others.

RESEARCH METHODS

This study was conducted using a library-based research method which includes the analysis of the primary sources (i.e. legislation, law cases and guidelines), and secondary sources from Malaysia. This study examines the existing legal practice in Malaysia and the approach involves both conceptual and argumentative analysis on explored theories and precedented judicial decisions. The case law, articles and journals will be searched via google scholar and online databases such as LexisNexis, Hein Online, BM Journal, PubMed, Scopus, Wiley Online Library, Science Direct, and CLJ Law. All journals that are published in Malay and English language without any limitation of publication period will also be included in this study. All the legal and ethical issues involve individuals below the age of maturity (below 18 years old) will be excluded from this study.

DISCUSSION

Consent

The MMC Guideline on Consent states that any medical interventions including any examinations, procedures, treatments and research, require valid consent from patients. For that reason, consent is regarded as a fundamental prerequisite in a doctor-patient relationship (Malaysian Medical Council, 2016). Consent with regard to medical practice is defined as an agreement or permission from a patient to the attending medical doctor to conduct any necessary investigations in order to diagnose and to treat the patient (Tengku Zainuddin, Abdul Rahim, & Rajamanickam, 2015). Concept of consent was introduced in the western countries as early as eighteenth century through the case of *Slater v Baker and Stapleton* [1967] and the concept has evolved significantly since then. Having said that, only in 1957 the doctrine of informed consent was accentuated formally into the legal and medical practice (Beauchamp, 2011). Informed consent is also founded by the ethical principle

of respect for patients autonomy (Beauchamp & Childress, 2009). The legal issues with regard to informed consent are frequently focusing on the disclosure of information. A patient who has the capacity to make a medical decision will determine whether to accept or refuse the proposed treatment based on the information disclosed by his medical doctor (A K Abdul Hamid, 2002; Beauchamp, 2011).

Disclosure of Information

Failure to disclose information is one of many legal issues in medical practice which may affect the validity of consent significantly to the extent that failure of disclosing relevant information may render even a written consent invalid (Jackson, 2016). It is worth note-taking, that without valid consent, a medical procedure or an operation performed by a highly-skilled surgeon may overturn into an assault or battery instead as seen in the case (Jackson, 2016; Kassim, 2008). Similarly in Malaysia, failure to disclose information which deemed to be material to a patient may hold a doctor liable for breach of duty (Tengku Zainudin, Che Ngah, Abdul Rahim, & Mohd Shariff, 2012). As a consequence, the patient may bring the doctor a legal action under the law of torts (P N Jahn Kassim, 2008; Malaysian Medical Council, 2016).

This is exemplified in the case of *Tan Ah Kau v Government of Malaysia* [1995], where the court decided that the surgeon was negligent for the failure of disclosing the risk of immediate postoperative paralysis. As a result, the two consent forms which were signed by the patient were concluded as invalid. In this case, the patient was suffered from a prolapsed disc due to a slow progressive low-grade astrocytoma. The patient was asked to sign two blank forms without information on the risk of paralysis, the differential diagnosis of a prolapsed disc and the histopathological findings. As testified by the expert witness, in this case, a patient with a low-grade astrocytoma would commonly have about 20 to 30 years to live before developing a paralysis which is often gradually in manner. Therefore, if this information were to be informed to the patient or in fact, most of the patients would decide to forego the surgery. The surgeon had clearly exercised his paternalistic approach through his failure of disclosing the relevant and necessary information as well as misconstrued that the two blank consent forms signed by the patient as the act of consenting to the proposed treatment. For that reason, it is incumbent on the medical doctors to provide adequate information to their patients even though the 'adequacy' index remains at a moot point.

Another example is the case of *Foo Fio Na v Dr Sook Mun Foo & Anor* [2007] 1 MLJ 593.

In this case, the patient was involved in a motor vehicle accident (MVA) and was brought to the Assunta Hospital where she underwent two surgeries which resulted in total paralysis. The patient claimed that she was never informed about the risk of paralysis involved in both surgeries despite there was two consent attained from the patient during her admission at the Assunta Hospital. The first consent which was claimed to be given by the patient at the emergency department did not encompass the purpose of the first surgery and at the time,



the patient was being assured by the doctor that it was only a minor procedure. Meanwhile, the second consent was a consent form on which the patient's thumbprint was affixed while the patient was totally paralysed and without any witness. Under those circumstances, the judge concluded that the surgeon was negligent in providing advice to the patient on the inherent and material risks of the proposed surgery, and both consents were rendered to be not valid. The judgment was then followed by the case of *Dominic Puthuchery & Ors v Dr Goon Siew Fong & Anor* [2007] 5 MLJ 552 and many other cases.

Spousal Consent

The theory of autonomy advocated by the western countries conventionally endorses an independent role of a patient as an individual in making a medical decision for himself in his best interest (Dochin, 2001). Whereas, realistically, patients are individuals who are living with inter-dependent relationships and prominently in a familial, multicultural, and multireligious such as Malaysia. Thus, in the process of obtaining informed consent from a patient, the role (i.e. as a spouse, parents, or a child) and responsibility of which the patient might hold in the patient's life should be taken into the medical doctor (Lin, Kan, & Chen, 2012).

For example, in the case of *Gurmit Kaur v Tung Shin Hospital & Anor* [2012] 4 MLJ 260, the court has acknowledged the role of spousal in giving consent to reproductive surgery. In this case, the patient was a mother of four children was referred to the medical doctor for a cervical polyp which caused the patient to suffer from prolonged menstrual bleeding and pain. Upon scan, the medical doctor realized the patient's uterus was enlarged due to a fibroid and offered the patient a hysterectomy. The patient claimed that she persistently informed the medical doctor about her plan to conceive again. Having said that, the patient underwent the proposed surgery which she thought was a surgery to remove her fibroid and to stop the bleeding. During her follow up with the medical doctor and upon asking about when she could conceive again, that she was informed that the medical doctor had removed her uterus and she will not be able to conceive at all. In this case, the court held that the medical doctor was negligent and liable to disclose the information pertaining to the nature of the hysterectomy (i.e. removal of a uterus). The court also emphasized that it was the duty of the medical doctor to get the patient's husband to consent as the nature of the hysterectomy (i.e. reproductive surgery) and as required by the hospital's consent form.

In addition to the above case, the case of *Abdul Razak v Raja Badrul Hisham & Ors* [2013] 10 MLJ 34, the spousal consent has been extended to a non-reproductive surgery. In this case, the patient was diagnosed with intestinal obstruction and was referred to the surgeon which he offered to the patient for emergency surgery. The patient refused to a Ryle's tube insertion and as a result, the patient died due to aspiration pneumonia which could be prevented by inserting the Ryle's tube. The court held that the surgeon was negligent due to failure of disclosing the risk of death to the patient and her

husband as well as the court has recognized that the patient's spouse to be an authorized person who has the capacity to consent on behalf of the patient. In facts, prior to the surgery, the patient was claimed to be dependent on and had always delegated her autonomy in making medical decisions to her spouse. Furthermore, the patient's husband admitted that, if he was informed about the risk of death, he would have not proceeded with the surgery or would try to persuade and convince the patient to insert the Ryle's tube.

Confidentiality

The principle of confidentiality denotes the maintenance of privacy, by not sharing or divulging doctor-patient privileged or entrusted information to a third party (Ghalia, Amanullah, Zakariyah, & Muhsin, 2018). Protection to private information affords confidentiality with unrestricted information and communication between a medical doctor and a patient. Therefore, diagnosis and treatment plans are based on the patients' preferences and wishes at the forefront. Confidentiality acknowledges respect for a patient's autonomy and encourages patients to instil their trust in medical doctors. The source of the obligation of confidentiality can be found in the common law in which deeply adopted by the Malaysian courts and various existing legislation and guidelines. Due to that, confidentiality is also one of the aspects of medical practice that has a probability of generating several challenging conflicts and legal issues. Having said that, confidentiality is neither absolute rights of patients nor the unconditional duties of medical doctors as there are circumstances where breaching of confidentiality is permissible according to the MMC's Guidelines on Confidentiality and legal precedents of the Malaysian courts.

The disclosure of a patient's medical information may result in more harm to the patient physically or psychologically, for example, termination of employment. The disclosure may pose a threat to the patient's intellect or his family, for example, divorce, inheritance or even lineage (Ghalia et al., 2018). In the context of Malaysia, the repercussion will be greater as the community is more family-oriented with social order. For those reasons, confidentiality should not be breached lightly except after considering and exploring all other avenues and implications of sharing the information (Peterson, 2018). Family members, relatives, friends and media are often requesting information about patients' medical conditions (Lo B, 2013). For certain patients, a consultation with the presence of his family members and relatives is requested by the patients themselves in where disclosing the patient's medical information is compelling (Beauchamp, 2011). At the same time, there are patients who refuse to disclose their medical information with their spouses, family members and children. Therefore, a medical doctor should always evaluate the whole circumstances and make their own judgement whether breaching of confidentiality is appropriate and permissible or there are any legal issues attached with a possible impending legal suit for medical negligence. Although parameters of

confidentiality may differ according to jurisdiction and medical practice (i.e. forensic, pediatric or others), there are five commonly practiced exception in other countries where breaching confidentiality are permissible (Merideth, 2007):

- a. Patient consents
- b. Court order
- c. Referral
- d. Mandatory by the law.
- e. Public interest or duty to a third-party

Meanwhile, according to Section 3 of the MMC Guideline on Confidentiality disclosure on confidential information are permissible under the three following circumstances:

- a. when the law requires disclosure;
- b. when the patient consents; or
- c. to protect the public interest.

The similarities lie on the patient's consent, legal obligation and public interest. Here, the medical doctor's decision revolves around his understanding of circumstances as a whole and conviction towards the benefits of himself, patient, third party and the public. For example, during this Covid-19 pandemic, breaching of confidentiality about a patient's positive Covid-19 test has become an obligation and a legal duty of the medical doctor on the grounds of public interest.

Breaching of confidentiality without consent from the patient was recently illustrated in the case of *Lee Ewe Poh v Dr Lim Teik Man and Another* [2011] 4 CLJ 397. This case involved a female patient who underwent a procedure called Stapler Haemorrhoidectomy, whose a photograph of her intimate part was taken by the surgeon while she was under anesthetic. The photographs were a reference for pre and post-procedure which was for documentation purposes, however, without the patient's knowledge and consent. The court ruled that the surgeon was liable for breaching confidentiality despite his explanation that such practice was in accordance with accepted medical practice and merely to facilitate his explanation to the patient during the follow-up. The court also justified that the breach of confidentiality was also on the grounds that there is publication involved to the fact the hospital nurse was able to access such confidential information. Although in the case, there was no direct evidence that the photographs had been disseminated by the surgeon for other malicious reasons. Although the facts of this case are exceptional, the case also highlights the significance of consent before taking any images of patients unless in situations where photographs are absolutely necessary and there is no opportunity to seek for the patient's consent.

Documentation

Till up to date, majority of government hospitals in Malaysia are still operating via the conventional method where they are still using paper-based medical records (Ariffin, Ismail, Kadir, & Kama, 2018). A good documentation practice (GMP) whether handwritten or electronic is vital in ensuring the continuity of care as adequate documentation enable medical doctors to reconstruct their management and treatments plans at any time without solely rely on their memory (The Medical

Protection Society, 2014). Besides that, the documentation should also, therefore, be comprehensive and adequate to allow another medical doctor either who is also treating the patient to carry out previous plans or seeing the patient upon a referral. For that reason, GMP is one of the elements that constitute a good medical practice (Malaysian Medical Council, 2006). Documentation or medical records may also be required for legal purposes, for example, as evidentiary documents during court proceedings and most of the time will influence the court's judgement over medical negligence litigation. This has been shown in those cases discussed previously which involved inadequate documentation, or incomplete consent forms (see *Gurmit Kaur v Tung Shin Hospital & Anor* [2012] and *Abdul Razak v Raja Badrul Hisham & Ors* [2013]).

Consent Form

A requirement for written consent has been enacted in Regulation 47(3) Part VIII of the Private Healthcare Facilities And Services Regulations 2006, which requires all private hospitals (in Malaysia this is also applicable to government hospitals) to incorporate consent form into their standard operating procedure (SOP) and routine documentation. As mentioned formerly, consent form has substantive evidentiary value in medical litigation apart from a tool to obtain informed consent from patients. Nonetheless, the consent form may still observe as inadequate, hence, disputable even though the form is embodied with the patient's signature (Nghah, 2005). It is being argued consistently by medical doctors pertaining to the inconclusive of information that should be written on the consent form. The reason for such argument is in medical practice, it is unrealistic to include all information in a form, and at the same time, the provision of information written in the consent form will still provide minimal protection to the medical doctor in charge (Nghah, 2005).

Medical Records

A medical record is a primary document which contains all medical information of a patient and recorded by a medical doctor or other healthcare workers (Malaysian Medical Council, 2006). By virtue of Regulation 44(1) of the Private Healthcare Facilities and Services Regulations 2006 states that "A patient's medical record is the property of a private healthcare facility or service", however, a medical doctor should still obtain the patient's consent before sharing or disclosing information, or medical report/record to a third party except in certain circumstance as hitherto mentioned here. Therefore, any discussion and decision by the patient, in regard to whom the information or medical report/record may be released must be documented in the medical record which includes the patient's wishes of non-disclosure at any time, even after death, must also be recorded. Non-compliance of failure to adhere to this practice may render a medical record as adverse evidence towards medical doctors in a medical negligence suit. It is worth pointing out that audio and visual recordings also form a part of the patient's medical record. They are therefore subject to similar expectations regarding confidentiality and consent.



In medical negligence litigation or a complaint, a medical record is essential documentary evidence for both medical doctors and patients (Mokhtar, 2020). In the event of errors or negligence by a medical doctor who has treated a patient, the medical doctor may encounter civil action from the patient claiming for damages from the court (Kassim, 2007). On one hand, a patient's medical record is most likely the substantial evidence that can defend the medical doctor and the hospital for vicarious liability. The copy of the medical record would be registered as evidence of that case and ironically, at the same time, the medical record would be used by the patient's lawyer as evidence of negligence. On top of that, the patient's medical record will be the main source of information which must be referred by the medical doctor in supporting his statement (Govindasamy, 2017). Subsequently, the testimony will be in accordance with the information stipulated in the medical record as evidence in the court. Therefore, adequacy, accuracy and clarity of the medical record serve a significant key role in determining the decision of the court besides the witnesses (Govindasamy, 2017).

Another legal issue in medical practice (specifically in forensic medicine) which related to criminal cases (for example, murders, assault or rapes) all particular of crimes must be documented by the examining medical doctor or the forensic specialist (MOH, 2015). They are required to document or record their findings meticulously based on their examination on the victim in the medical record which will be submitted to the local authorities for further investigations or as evidence in a criminal proceeding (Govindasamy, 2017; MOH, 2015). All findings sometimes act as a leading clue to capture or to initiate a criminal charge against the perpetrator if a hearing is required.

CONCLUSION

There are many other legal issues in medical practice that has emerged at this recent time such as related to telemedicine, clinical trials, vaccination and competency. Telemedicine has slowly become the preferred delivery of healthcare services and enormous legal issues attached to this online consultation are still novel and unclear (Abdul, 2010). Further studies on telemedicine and those mentioned previously and recommendation of solutions which correspond to Malaysia's healthcare setting are necessary.

There will be positive and negative implications congruent with these legal issues in medical practice. One of the negative implications is the medical doctors will unconsciously practice defensive medicine due to fear of impending medical litigation. Subsequently, will discourage the medical doctors to assist patients or to get involved in the process of decision-making. On the other hand, due to the fear of impending medical litigation, medical doctors will become more aware and concern about the legal issues in medical practice. As a result, they will continuously improve their practice, quality of care which leads them to be more confident in practicing

medicine. It is a fairly expectation of proactive role from patients due to vast exposure of health and medical information which is widely accessible. Medical doctors are still conceded greater responsibility in regard to the informed consent, confidentiality and documentation, however, that does not mean patients will be denied the rights to medical decision-making.

Informed consent may still be an ideal practice or an effective tool in promoting a shared-decision making which unites the medical paternalism and patients' autonomy. As discussed above, even where the public interest requires disclosure, it is paramount for medical doctors to confine the information to the extent strictly necessary. In other words, the fact that it is in the public interest to reveal even some aspects of a patient's medical condition does not justify disclosing all the details at all. As for genetic information concerns both the patients involved and their family members, which in turn, produce a legal conflict and issue between the doctors' duty to uphold patient's confidentiality and their general duty to protect the public interest. While it is important to preserve patients' confidentiality, medical doctors should also consider informing patients' family members suffering from genetic diseases as such information may be impacted their future health and life profoundly.

Medical doctors should always provide a safe environment and assurance to patients during the consultations. With that, patients would become more transparent, engaging and expressing with regard to their concerns and expectation to their medical doctors. A clearly expressed expectation between a patient and a doctor is important to ensure effective communication which builds a strong doctor-patient relationship. As a conclusion, it is necessary to balance between the legal issues and their implications towards medical practice. A doctor-patient relationship should also constitute honesty, trust, understanding and effective communication. Effective communication required good communication skill from medical doctors as it will contribute greatly to the success of informed consent.

REFERENCES

Case Law

1. *Abdul Razak bin Datuk Abu Samah* (claimed as a widower to Fatimah @ Rohanib Zainal, on behalf of the deceased) v *Raja Badrul Hisham bin Raja Zezeman Shah & Ors* [2013] 10 MLJ
2. *Foo Fio Na v Dr Sook Mun Foo Anor* [2007] 1 MLJ 593
3. *Gurmit Kaur v Tung Shin Hospital & Anor* [2012] 4 MLJ 260
4. *Slater v Baker* [1767] 2 WilsKb 359, 95 Er 860
5. *Tan Ah Kau v The Government Of Malaysia* [1995] MLJU 183
6. *Tarasoff v Regents of the University of California* (1976) 551 P 2d 334,
7. *W v Edgell* [1990] 1 All ER 835.

Legislation

8. Private Healthcare Facilities and Services Regulation 2006.

Journals

9. Hamid AA. How much should doctors tell their patients?. *Med J Malaysia*. 2002 Jun;57(2):133-135.
10. Abdul TF. Ethical and legal issues in telemedicine: prospects and challenges (Master's thesis, Kuala Lumpur: Ahmad Ibrahim Kulliyah of Laws, International Islamic University Malaysia, 2010).
11. Beauchamp TL. Informed consent: its history, meaning, and present challenges. *Cambridge Quarterly of Healthcare Ethics*. 2011 Oct;20(4):515-523. doi:10.1017/S0963180111000259
12. Beauchamp T L, Childress JF. Respect for Autonomy. In *Principles of Biomedical Ethics* (6th ed., pp. 99-148). New York: Oxford University Express. 2009.
13. Ngah AC. Informed consent in Malaysia: an overview. *Journal International de Bioéthique*. 2005;16(1):143-161. doi:10.3917/jib.161.0143
14. Choong KA. Malaysia. *Medical Law, United Kingdom*. 2012.
15. Dochin A. Understanding autonomy relationally: toward a reconfiguration of bioethics principles. *J Med Philos*. 2001;26:368-374.
16. Ghalia B, Amanullah M, Zakariyah L, Muhsin SM. Medical Ethics in the Light of Maqāṣid Al-Sharī'ah: A Case Study of Medical Confidentiality. *Intellectual Discourse*. 2018 Jun 12;26(1):133-160.
17. Govindasamy K. Medical Records From The Perspective Of Medico Legal. 2017. Retrieved from <http://www.myhealth.gov.my/en/medical-records-perspective-medico-legal/>
18. Hambali SN, Khodapanahandeh S. A review of medical malpractice issues in Malaysia under tort litigation system. *Glob J Health Sci*. 2014;6(4), 76-83. doi:10.5539/gjhs.v6n4p76
19. Jackson E. *Medical Law: Text, Cases, and Materials*: Oxford University Press. 2016.
20. Jahn Kassim PN. Medical negligence litigation in Malaysia. 2007.
21. Jahn Kassim PN. Medical Negligence Law in Malaysia. Petaling Jaya, Malaysia: International Law Book Services. 2008.
22. Lin ML, Kan WM, Chen CH. Patients' perceptions and expectations of family participation in the informed consent process of elective surgery in taiwan. *Asian Nurs Res (Korean Soc Nurs Sci)*. 2012;6(2):55-59. doi:10.1016/j.anr.2012.05.001
23. Lo B. Resolving Ethical Dilemmas A Guide for Clinicians. 2013.
24. The Constitution, Articles and By-Laws, 1997.
25. Guideline on Medical Records and Medical Reports, 2006.
26. Malaysian Medical Council. Malaysian Medical Council Guideline: Consent for Treatment of Patients by Registered Medical Practitioners. 14. 2016.
27. Code of Professional Conduct. 1987.
28. Merideth P. The Five C's of Confidentiality and How to DEAL with Them. *Psychiatry (Edgmont)*. 2007 Feb 1;4(2):28.
29. Ministry of Health (MOH) Malaysia. Annual Report 2017. 2017. Retrieved from Putrajaya.:
30. One Stop Crisis Centre: Policy and Guidelines for Hospitals, 2015.
31. Mokhtar MF. The Law and Challenges to Access Medical Record for Medical Negligence Claims in Malaysia. *Jurnal Undang-undang dan Masyarakat*. 2020 Sep 1;26:43-50. doi:10.17576/juum-2020-26-05
32. Ariffin NA, Ismail AK, Kadir IK, Kamal J. Implementation of electronic medical records in developing countries: challenges & barriers. *Int J Acad Res Prog Educ Dev*. 2018;7:187-199. doi:10.6007/IJARPED/v7-i3/4358
33. Peterson JL. Confidentiality in medicine: how far should doctors prioritise the confidentiality of the individual they are treating?. *Postgraduate medical journal*. 2018 Oct 1;94(1116):596-600. doi:10.1136/postgradmedj-2018-136038
34. Rosnah N, Abdullah W. Medical Regulation in Malaysia: Towards an Effective Regulatory Regime. *Policy and Society*. 2002 Jan 1;21(1):96-124. doi:10.1016/s1449-4035(02)70005-2
35. Zainudin TN, Rahim AA, Rajamanickam R. Consent to medical treatment and the autonomous power of adult patients: The Malaysian legal position. *Mediterranean Journal of Social Sciences*. 2015 Aug 18;6(4):418. doi:10.5901/mjss.2015.v6n4s3p418
36. Zainudin TN, Anisah CN, Rahim AA, Shariff AA. The meaning of a valid consent to medical treatment in Malaysia: Tan Ah Kau V Government of Malaysia revisited. *Pertanika J Soc Sci Human*. 2012 Jun 1;20:35-42.
37. The Medical Protection Society (Producer). *Medical Records*. 2014.



The Epidemic Disease Act 1897 and its Amendment - A Perspective

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ABSTRACT

The Epidemic Disease Act was enacted in 1897 to stop the spread of bubonic plague outbreak in Bombay at that time. The Act gives powers to the central and state government to take special measures and prescribe regulations to prevent the spread of dangerous epidemic disease. The act was invoked many times in the country since then and the last was in 2018 to prevent the spread of cholera in a Gujarat village. The covid-19 pandemic made the country to a standstill and the government machinery, health care workers and officials are working day night to contain the virus. The most unfortunate thing that happened in our country is unprovoked abuse, harassment and violence on the people who are at the forefront to implement preventive strategies by the public. The government felt that The Epidemic Disease Act was insufficient to protect the workforce and a new ordinance was brought to amend the Epidemic Disease Act of 1897. The ordinance has introduced a bill in both sections of parliament and now became an act. Both the act and its amendment are discussed here.

Keywords: Covid pandemic, Epidemic disease, Health care personal, The act of violence.

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INTRODUCTION

The Epidemic Diseases Act, 1897 is an act promulgated by former British India Government in Mumbai to deal with bubonic plague during that time.^{1,2} The act was introduced to control the epidemic by providing special powers to authority to implement containment measures and thus preventing the spread of the disease. The main purpose of this act was to empower State and Central governments for the prevention and spread of any epidemic disease.

The 123 years old Act empowers the state governments to take special measures and prescribe regulations in an epidemic. It defines penalties for disobedience of these regulations. The Act also protects a person acting in good faith from any legal proceeding arising out of his actions as per the provisions of the act. The most recent use of the act was in Maharashtra in 2009 during the outbreak of³ H1N1 influenza and also in Gujarat in 2018 during Cholera outbreak.⁴ The act again became relevant during the year 2020.

Health care workers involved in COVID-19 related curative and preventive measures are being attacked in various countries and the situation is pretty bad in our country. They are subjected to abuse and violence while they are involved in their work to contain the virus. This especially happens when they trace out the cases and contacts in the community. There are many reports from various parts of the country that the health care workers are subjected to unprovoked violence from the common people. The Government of India wanted to curb this menace of humiliation and attack on health care workers and officials who are in the forefront of pandemic prevention. With this aim, President of India promulgated the Epidemic Diseases Amendment Ordinance 2020⁵ to amend the Epidemic Diseases Act, 1897 on April 22, 2020. Later during

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September 2020, the ordinance has introduced a bill in both houses of parliament and passed. The various provisions of this amendment and existing provisions of the epidemic disease act are discussed below.

Health Care Service Personal, Property and act of Violence

A new section has been inserted which defines a health care service personal, property and act of violence in the context of an epidemic disease.

Health care service personal includes a doctor, nurse, paramedical worker and community health worker. Any person to whom a power is given to take measures for preventing the outbreak and spread of disease also included in the ambit of health care service personal. A clinical establishment, a mobile medical unit, any facility for quarantine and isolation of patients during an epidemic are included as *property* as per the ordinance.

Act of violence includes: (i) Causing hindrance to a duty of health care service personal, (ii) Preventing a health care

service personal from doing his work, (iii) Harassment which has an impact on the living and working condition of health care service personal, (iv) harm, injury, hurt, intimidation or danger to the life of health care service personal and (v) loss or damage to property or documents in the custody of health care service personal.

Travel and Segregation

The original act gives power to the state government for inspection of travelling persons and segregation of them if suspected. A government can detain such a person intending to sail or arriving in the country.

There was a section in the Epidemic Disease Act of 1897 which gives power to the central government for taking measures to inspect ship or vessel arriving or leaving at any port. It looks ironic in this modern era where the modes of conveyance are many. The amendment added bus or train or goods vehicle or aircraft leaving or arriving at any land or port or aerodrome in addition to ship or vessel.

Penalty existed Before Amendment Ordinance

The persons disobeying the regulations of provisions of the act is punishable under section 188 of the Indian Penal Code. This is the only penalty incorporated in the Epidemic Disease Act 1897. Disobedience to the provisions of the act attracts simple imprisonment up to one month or a fine of up to two hundred rupees or both. If the disobedience causes danger to human life, health or safety, the punishment is imprisonment up to six months or a fine of up to a thousand rupees or both. More aggressive punishments are incorporated in the new ordinance in addition to this section.

Penalty Inserted by Amendment Ordinance

Any act of violence against a health care personal and causing damage to the property is punishable with imprisonment and a fine. The minimum imprisonment is three months and this can be up to five years. The fine is fifty thousand rupees to two lakhs rupees. The victim can enter into a compromise and can drop the case against the accused.

If the act of violence causes grievous hurt to the health care personal the punishment is more. The minimum imprisonment is six months and this can be up to seven years and with a fine. The fine is one lakh rupees to five lakhs rupees. The victim cannot enter into a compromise.

Both of the above are non bailable offences too. In addition to the punishment, the court can determine compensation also for the hurt that occurred to the health care personal. In case of damage to property, the court can decide compensation also. The compensation payable is twice the amount of market value of the damaged property. In the case of non-payment of compensation, there are provisions for recovery from land revenue.

The amendment makes it clear that the investigation must be completed within a period of thirty days from the date of registration of the first Information report and the trial within a period of one year.

CONCLUSION

The Epidemic Disease act 1897 gives authority for the state government to take special powers and prescribe regulations when a dangerous epidemic disease occurs. But the law does not define an epidemic disease and when it becomes dangerous. The amendment brought in mainly to prohibit violence against health care workers and damage to property in which health care workers have a direct relation to the epidemic. Both the original act and the amendment are into administrative dealing of dangerous epidemic disease and not into any scientific aspect. The respective departments and authorities are coming out with scientific regulations as and when required depending on the warrant of current situations. When a global pandemic occurs, the most ideal is to have a common law for the whole country with administrative dealing and scientific efforts.

REFERENCE

1. The Epidemic Disease Act of 1897. Act No 3 of 1897
2. Arnold D. Science, technology and medicine in colonial India. United Kingdom: Cambridge University Press; 2000: p143.
3. Epidemic Diseases Act: What it means' Economic Times, August 05, 2009, available at <https://economictimes.indiatimes.com/epidemic-diseases-act-what-it-means/article-show/4859450.cms?From=mdr>, accessed on August 25, 2020 at 01 p.m
4. A 123-year-old law, once used to imprison freedom fighters, is India's primary weapon against coronavirus' QZ, March 23, 2020, available at <https://qz.com/india/1820143/india-battles-coronavirus-with-british-era-epidemic-diseases-act/>, accessed on August 28, 2020 at 01.30 p.m.
5. Ministry of law and justice, The Epidemic Disease (Amendment) Bill 2020



Sports Related Orofacial Injuries: A Review Of 'On-Field Management' By Dentist

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ABSTRACT

Sports-related dental injuries are very common among athletes. Many of these injuries can lead to permanent damage in their aesthetics, reflecting back on their confidence and performance. It is very important to immediately treat sports-related injuries and hence, prevent future permanent complications. Sporting events in India are organized without appointing a dentist "on the field," which leads to reduced chances of attending to the orofacial injuries immediately. A good amount of literature is available regarding the management of dental injuries in the dental office. Since there is no information available regarding 'on field' immediate management of these injuries, we have tried to provide collective information regarding immediate management of dental injuries occurring 'on field' by the dental professional.

Keywords: Immediate dental management, On-field dental management, Sports-related dental injuries, Sports orofacial fracture, Tooth avulsion, Tooth fracture.

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INTRODUCTION

Dental injuries are one of the most commonly found Orofacial injuries in sportspersons. Sports dentistry is the branch of dentistry, which involves the prevention and treatment of orofacial sports injuries and related oral diseases.¹

There is a higher risk of dental injury in sports that involve direct contact, including boxing, football, cricket, kabaddi, baseball, wrestling, etc. To prevent sport-related oral and facial injuries, the sportsperson should have adequate knowledge regarding the occurrence, severity, and prevention of trauma. But in spite of all these preventive measures, sports players tend to suffer from dental trauma frequently.²

Due to the lack of awareness, many athletes are unaware of the health implications of a traumatic injury. In sports, there exists a high potential of incurring severe head and orofacial injuries. Many of these injuries can lead to permanent damage in their aesthetics, reflecting back on their confidence, resulting in emotional stress and adversely affecting their performance. The dentist plays an imperative role in educating athletes, coaches, and patients about the importance of preventing and managing orofacial injuries in sports. Traumatic dental injuries represent 18-30% of all oral pathologies, and a considerable number of these are sports-related. The overall pooled prevalence of dentofacial injuries in combat sports was approximately 30%.³ It is very important to immediately treat sports-related injuries and hence, prevent future permanent complications.^{4,5} Sporting events in India are organized

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without appointing a dentist "on the field," which leads to reduced chances of attending to the orofacial injuries immediately.

Many articles have given prevention modalities, in-depth management of dental trauma in the dental office, and creating awareness to sportsmen and coaches for immediate actions to be taken after dental injury, but there is no collective data available about "on immediate field management by the dentist" for dental injuries, occurring due to sports. Also, there is a lack of specific protocol or universal guidelines in the literature regarding "on-field management by the dentist" for sports dental injuries.

Hence the aim of this article is to provide collective information regarding the immediate management of dental injuries occurring on the field' by the dental professional.

Sports injuries have been discussed as follow,

1. Intra-oral teeth and periodontium-related injuries.
2. Intra-oral lip, tongue-related injuries.
3. Extra-oral injuries.

INTRAORAL TEETH AND PERIODONTIUM RELATED INJURIES

Intraoral dental injuries can be classified as hard tissue and periodontal. The 1992 WHO-Andreasen system is the commonly utilized system for the classification of the dental hard tissues and pulp and the periodontium. It is subdivided into eight descriptive classes of hard tissue injuries and six descriptive classes of injuries to the periodontium.^{5,6}

AVULSION: It can be described as complete displacement of a tooth from the socket owing to trauma.

First aid and management on the field by the dentist.

- Pick up the tooth without touching the root part. Check for the dentition. Deciduous teeth should not be reimplanted. Treatment for avulsion is carried out only for permanent dentition.
- Dentist should gently clean the tooth with cold water if it is dirty (max 10 s) and reposition it. After it is placed back to its original position, bite on a handkerchief to keep the tooth in position.
- Ideal period for replantation of an avulsed tooth is considered to be within 5 to 10 minutes after exfoliation. As more periods are elapsed after the tooth is out of the socket, the risk of ankylosis increases and which is the scenario in most cases. If the extraoral dry time is more than 20 minutes, the successful reimplantation is less likely to happen, and if the time is surpassed 60 minutes, there is a very negligible chance of successful reimplantation.



Figure 1: Avulsion

Table 1: WHO-Andreasen classification of dental and periodontal traumas

Hard tissue injuries	Periodontal injuries
Infraction	Concussion
Enamel fracture	Subluxation
Enamel and dentin fracture	Avulsion
Enamel, dentin fracture involving the pulp	Intrusion
Root fracture	Extrusion
Alveolar bone fracture	

- To avoid damage to the periodontal ligaments, the root surface should not be touched with fingers and should not be cleaned aggressively.⁷
- If it is not possible to reimplant the avulsed tooth immediately, it should be kept and carried in a storage medium, in preference order of,
- The storage of any remnant of the tooth is also extremely beneficial to the success of functional and esthetical replacement as it keeps the periodontal tissue viable, which is essential for the reattachment of the PDL fibers.^{8,9}
- If the tooth is contaminated due to debris, then the tooth should be held by its crown and should be cleaned with water or normal saline; only after properly orienting the position of the crown by observing the adjacent teeth, it should be reimplanted in the empty socket.^{8,10}
- Once replanted, the tooth may be splinted and kept in a stable position using a temporary cement material or adhesive tape followed by systemic antibiotics for proper healing of periodontal and pulpal tissue.¹¹
- Players who have replantation and splinting of avulsed teeth should wait at least 2 to 4 weeks to return to the field and are advocated the use of mouthguard and face mask for protection.^{8,12}
- After checking the tetanus status, a recommendation for taking as booster vaccinations are taken into consideration.⁷

"Adding my personal experience during my school days, while playing cricket with a season ball which had cost to our wicket-keeper a permanent loss of both maxillary central incisors after trauma to the teeth with the ball, while wicket-keeping behind the stumps as the keeper was not wearing a helmet. If I had known about the reimplantation procedure, we could have saved the teeth of the wicket-keeper".

DISPLACEMENT/LUXATION OF TOOTH

If a tooth is loosened or pushed out of position from the socket. I have mostly seen after mild blunt trauma to the anterior segment of teeth. There can be lateral luxation, extrusion, intrusion of teeth.

On-field Management

The displaced tooth should be gently moved and guided by the dentist to its normal position by applying mild pressure.

Application of cold compress over an oedematous area, local anesthesia may be given¹³.

Crown Fracture

Depending on the involvement of the enamel, dentin and pulp crown fractures can be classified as¹⁴,

Enamel infraction	Incomplete fracture of enamel without loss of tooth structure.	No immediate treatment required but referral to the dentist must be given
Enamel fractures	Fracture of only the outer layer of the tooth (the enamel).	No immediate treatment required but referral to the dentist must be given



Enamel and dentin fracture	Fracture of outer enamel and an inner dentinal layer of the tooth. A tooth may be sensitive to cold or air.	If the presence of mild sensitivity, capping can be performed on the field with readily available calcium hydroxide cement.
Enamel, dentin fracture involving the pulp	Exposure of the pulp means it has bacterial contamination, which can lead to necrosis of the pulp and/or abscess. The tooth may have the appearance of bleeding or may display a small red spot.	Capping the pulp with a readily available calcium hydroxide is recommended until definitive dental care is achieved.

- After the lip, tongue, or teeth, the athlete's overall status should be evaluated. Vitals, breathing, and neurological status should be checked.
- Simple lacerations may stop bleeding after applying pressure or may be closed with sterile dressings, tissue glues. The deep lacerations with continuous nonstop bleeding should be immediately referred for surgical interventions.
- Apply pressure to the lacerations of the lip or tongue by covering the wound with the gauze until the blood flow slows down. The wound should be examined, cleaned, and a decision for suture placement should be made.
- Most studies recommend that adhesive should be used for superficial cuts smaller than 4 cm while sutures are used for deeper and larger lacerations.¹⁶

Description On-field treatment

Root Fracture

- A horizontal impact may lead to root fracture, which the mobility of the fractured segment can determine.
- Bleeding from the teeth is noted in case of root fractures. Efforts should be taken to slow down and stop the bleeding by applying pressure.
- Depending on the location of the root fracture, treatment varies.
- Referral to the dental clinic should be given for definitive treatment.¹⁵

OTHER INTRAORAL INJURIES

LIP, Tongue Injuries

- Lip and intraoral injuries, including injuries of the tongue, have been reported to make up almost 25% of all sports-related maxillofacial injuries.



Figure 2: Luxation of central and lateral incisor.

Table 2: A storage medium

Hank's Balanced Salt Solution
Cold milk
saliva of the patient itself or inside the patient's cheek
Saline
Water

EXTRAORAL INJURIES

Facial Abrasions and Contusion

- Mild facial abrasions, which are superficial, should be cleaned and washed for removal of debris, antiseptics should be applied, most abrasions will heal in a few days.
- Deep, severely bleeding wounds should be immediately referred for surgical interventions. Contusions are one of the most common soft-tissue injuries in the athlete, ranging from mild to very severe.
- Most of the time contusions heal on their own within few weeks; ice packs during the initial hours help to reduce the signs and symptoms of inflammation in the localized area of the trauma.^{16,17}

Oral and Maxillofacial Fractures

- Post severe blow to the facial structures may lead to various fractures depending on the location of the blow and the direction of the impact. Hematomas and intraoral lacerations usually indicate significant underlying injury such as maxillary or zygomaticomaxillary fractures.
- Severe injury may lead to damage to the underlying structures, such as nerve, muscle, and bone, resulting in serious cosmetic defects or loss of functions if not treated.
- The movements of facial expression are tested by movements of the eyebrows, eyes, smile, forehead. A deficit in any of these would suggest injury to one of the branches of the facial nerve. Inability to open, trismus or pain in the cheek or near the ear suggests fracture and injury to the zygomatic complex or the zygomatic arch.
- General examination and palpation of orofacial structures are performed. Inspect for hematomas, bimanual palpation of maxilla and over mandible is done. Mobility, crepitus, or step deformity along with tenderness may suggest a fracture of oral and maxillofacial complex. An intraoral examination and palpation should be performed. Dentoalveolar fractures should be referred to the surgeon for reduction.
- Local application of icepacks over the hematomas, analgesics should be prescribed.¹⁷⁻¹⁹

- In case of unconsciousness after trauma, the primary motto should be emergency care; dental treatment should be performed at the dental clinic after gaining consciousness.

TMJ Injuries

- Trauma to the mandible may lead to dislocations, acute capsulitis.
- TMD trauma's common signs and symptoms include jaw ache, earache, headache, decreased range of motion, and clicking and crepitus of the joint.
- Self-limiting dislocations can be taken care of easily, and they don't require any further management.
- TMJ dislocations involving a non-self-limiting displacement of the condyle can be taken care of by manually guiding the jaw back to the position by giving downward, backward and upward pressure to the mandible by placing the thumb over the occlusal surface of molars bilaterally and supporting the base of the mandible with remaining fingers¹⁵.

EMERGENCY DENTAL KIT FOR SPORT EVENTS¹⁵

A dental emergency kit should be kept ready on the field with the following items,

Gloves, mask, Mouth mirror, Probe.

Torch, scissor, suture material, needle, normal saline, wire cutter, pliers.

Zinc oxide eugenol cement, calcium hydroxide cement/pulp capping agent, mixing pad, spatula.

Gauze piece, cotton, iodine, antiseptic liquid.

Anaesthetic spray, painkiller spray, local anaesthesia.

The save-a-tooth solution, cold milk.

CONCLUSION

Even though many awareness modalities have been implemented for sportsmen, coaches regarding sports dental injuries, due to lack of knowledge about dental anatomy to the layman, only a dentist can provide proper immediate dental management, which will lead to a better prognosis.

Most of the sports dental injuries can be taken care of by providing proper immediate treatment and care, and hence it should be mandatory for sports events to appoint a dentist 'on the field' for management of sports injuries, which not commonly implemented in India.

Implanting a mobile dental van/clinic with a well-equipped dental setup in the vicinity of the sports events can be considered to reduce the time lapse after trauma.

The sports events and the schools where children play outdoor sports on a regular basis can also require immediate dental help. Hence it should be mandatory for schools to have a dentist on call.

At present many sporting events around the globe are organized without appointing a dentist on the field. It is very important to immediately treat sports-related injuries for a better prognosis and prevent future permanent complications.

Even though 'on field' immediate treatment for sports injuries is carried out, further dental referral should be made mandatory for evaluation and follow-ups.

REFERENCES

1. Sports dentistry: Role of dentist in protecting a winning smile
2. Assessment of knowledge, attitude, and practices toward orofacial injuries among students engaged in sports from Davangere city: A cross sectional survey Veeresh DJ, Apoorva Shukla, Abhirami Srikanth1, Anshul Jain1, Bishakha Lalanil
3. Polmann H, Melo G, Conti Réus J, Domingos FL, de Souza BD, Padilha AC, Duque TM, Porporatti AL, Flores-Mir C, De Luca Canto G. Prevalence of dentofacial injuries among combat sports practitioners: A systematic review and meta-analysis. *Dental Traumatology*. 2020 Apr;36(2):124-40.
4. Castaldi CR. Sports Dentistry. *ASDC journal of dentistry for children*. 1989;56(3):236.
5. Traumatic Dental Injuries Resulting from Sports Activities; Immediate Treatment and Five Years Follow-Up: An Observational Study
6. Andreasen JO, Lauridsen E, Gerds TA, Ahrensburg SS. Dental Trauma Guide: A source of evidence-based treatment guidelines for dental trauma. *Dent Traumatol* 2012; 28(5): 345-350. [http://dx.doi.org/10.1111/j.1600-9657.2011.01059_1.x] [PMID: 22994505]
7. Andersson L, Andreasen JO, Day P, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. *Dent Traumatol*. 2012;28:88-96.
8. American Academy of Pediatric Dentistry. Guideline on Management of Acute Dental Trauma. http://www.aapd.org/media/policies_guidelines/g_trauma.pdf. Accessed February 12, 2012
9. Emerich K, Kaczmarek J. First aid for dental trauma caused by sporting activities. *Sports Med*. 2010;40:361-366.
10. Rosenberg H, Rosenberg H, Hickey M. Emergency management of a traumatic tooth avulsion. *Ann Emerg Med*. 2011;57:375-377.
11. Spinis E, Savasta A. Prevention of traumatic dental lesions: cognitive research on the role of mouth guards during sport activities in paediatric age. *Eur J Paediatr Dent*. 2007;8:193-198.
12. Huffman EA, Yard EE, Fields SK, et al. Epidemiology of rare injuries and conditions among United States high school athletes during the 2005-2006 and 2006-2007 school years. *J Athl Train*. 2008;43:624-630.
13. Bakarčić D, Hrvatin S, Maroević M, IvančićJokić N. First aid management in emergency care of dental injuries—knowledge among teachers in Rijeka, Croatia. *Acta Clinica Croatica*. 2017 Mar 1;56(1):110-6.
14. Josell SD, Abrams RG. Managing common dental problems and emergencies. *Pediatric Clinics of North America*. 1991 Oct 1;38(5):1325-1342.
15. Smith WS, Kracher CM. Sports-related dental injuries and sports dentistry. *Dent Assist*. 1998 May 1;67(3):12-126.
16. Physiopedia contributors. Facial and Dental Injuries in Sports Medicine [Internet]. Physiopedia, ; 2020 Oct 17, 16:12 UTC [cited 2021 Mar 28].
17. Kaufman BR, Heckler FR. Sports-related facial injuries. *Clinics in sports medicine*. 1997 Jul 1;16(3):543-562.
18. 1. Le Fort R Experimental study of fractures of the upper jaw: I and II. *Revue Chirurgi*.
19. 2. Le Fort R Experimental study of fractures of the upper jaw: III. *Revue Chirurgi de Paris*.



Hooch Tragedy in Majha Region of Punjab, India

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ABSTRACT

Due to rampant unemployment, the youth does not hesitate in engaging themselves in any work/job from where they can earn their livelihood. The underground trade of drug trafficking, drug peddling, and drug abuse is prevalent in this part of India for decades. This illicit trade affects the economy of the State and causes the physical, social, and mental degeneration of the persons consuming it. Recently about 150 people were affected after consuming illicit distilled spurious liquor in the Majha region of Punjab, and more than 100 people died due to it. Some of the cases were admitted to the hospital attached to Government Medical College, Amritsar. Out of these admitted cases, few of them succumbed to poisoning whose Forensic autopsies were conducted by the Department of Forensic Medicine & Toxicology, GMC, Amritsar. The meticulous autopsy findings and the scientific interpretation of the analysis of the detected methanol alone or along with ethyl alcohol reported by the chemical examiner to Punjab government led to the establishment of a definite cause of death which helped the investigating agencies in apprehending the people involved in these criminal activities.

Keywords: Ethyl alcohol poisoning, Hooch Tragedy, Methyl alcohol poisoning, Spurious liquor.

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INTRODUCTION

Methanol, known as methyl alcohol or wood alcohol, is a chemical with the formula CH³OH. Methanol is a light, volatile, colorless, flammable liquid with a distinctive odor very similar to, but slightly sweeter than, that of ethanol and produced as a by-product of the distillation of wood. It is used as antifreeze, solvent, fuel, and denaturant for ethanol.¹

Accidental, mass killing, suicidal, methanol poisonings can occur both in developed and developing countries.²⁻⁴ Most acute methanol toxicity cases result from accidental ingestion. Methanol is not highly toxic, but it is metabolized to toxic metabolites like formaldehyde and formic acid, which cause metabolic acidosis, blindness, cardiovascular instability, and death.⁵⁻⁸ The minimal lethal dose of methanol in humans has been assumed to be 1 gram per kg of body weight.⁹ Methanol is fatal due to CNS depressant properties and effects of metabolites,¹⁰ and converted to formaldehyde which is converted to formic acid.¹¹ Formic acid inhibits mitochondrial cytochrome c oxidase, causing the symptoms of hypoxia at the cellular level and causing metabolic acidosis.¹²

CASE REPORT

The Hooch tragedy of the Majha region of Punjab claimed 125 lives in July–September 2020. The first deaths were reported in the village of Amritsar district on the night of 29th July 2020. The death toll reached 121 on 7th August 2020, which included 15 from Amritsar, 92 from adjoining districts of Amritsar, i.e., Tarn Taran district, and 14 from Gurdaspur District. Some of the cases were admitted to the hospital attached to Government Medical College, Amritsar. The patients presented to the emergency department with pain abdomen, breathing difficulty, nausea, vomiting, sudden loss of vision. Almost all

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the patients gave a history of ingestion of alcohol before the onset of symptoms. Forensic autopsies were conducted by the Dept. of Forensic Medicine & Toxicology, GMC, Amritsar.

Postmortem finding favoring Cyanosis, froth at mouth and nostrils, neck veins prominently dilated and congested with dark-colored hypostasis. Generalized visceral Congestion was present. The lungs were heavy, voluminous, and edematous, with subpleural multiple Tardieu spots present. The stomach contained brownish-colored liquid with a spirituous odor (Figure 1). The viscera was preserved for qualitative and quantitative analysis of poison, if present and for HPE, and sent to the state Chemical Examiner, Govt of Punjab, Kharar, and Prof & Head, Dept Pathology, Govt Medical College, Amritsar, Punjab, India.

The chemical examiner's report revealed ethyl and methyl alcohol in the viscera sent for Examination. The Blood Alcohol Concentration varied from 69 mg/100 mL to 195.5 mg/100mL. The cause of death was declared a failure of the brain's function due to severe acidosis resulting from methyl alcohol poisoning.

Punjab Government also announced aINR 2 lakh compensation for each of the families of the deceased. The Punjab government suspended seven excise officials and



Figure 1: Showing submucosal haemorrhages on stomach mucosa.

six police officials. Police have managed to arrest a total of 37 people involved in the worst hooch tragedy Punjab has witnessed in three decades.

DISCUSSION

Symptomatology noted in most of our cases was very similar to the reported series.¹³⁻¹⁶ However, the incidence of shock and unconsciousness was higher since this series refers only to the fatal cases.

Intoxication with methyl alcohol can occur with ingestion, inhalation of methanol vapor, or absorption through the skin. Methanol is oxidized to formaldehyde and then quickly oxidized to formic acid, both in vivo and in vitro.¹⁴ It is these metabolic products, which have a toxic action. The time interval between the ingestion of adulterated drink and presentation with symptomatology is due to time taken for methanol metabolism. The minimum time interval was around 12 hours in our series, whereas the maximum latent period was 120 hours. Bonnets et al.¹³ reported a latent period of 40-72 hours while Ravichandran et al.,¹⁶ 4-60 hours. The death occurred in less than 48 hours after symptoms appeared

in 75% of the cases. In 25% of cases, death was a late event, occurring 5 to 10 days after consuming the drink.

REFERENCES

1. Barceloux DG, Bond GR, Krenzelok EP, Cooper H, Vale JA. American Academy of Clinical Toxicology Ad Hoc Committee on the Treatment Guidelines for Methanol Poisoning. American Academy of Clinical Toxicology Practice Guidelines on the Treatment of Methanol Poisoning *Journal of Toxicology. Clin Toxicol* 2002; 40: 415-446.
2. Bonnets IL Jr, Cony FH, Mitchell GL Jr, Cooper MN. Acute methyl alcohol poisoning: a review based on experiences in an outbreak of 323 cases. *Medicine* 1953; 32:431-463.
3. Bucaretschi F, De Capitani EM, Madureira PR, Cesconetto DM, Lanaro R. Suicide attempt using pure methanol with hospitalization of the patient soon after ingestion: case report. *Sao Paulo Med J* 2009; 127: 108-110.
4. Epker JL, Bakker J. Accidental methanol ingestion: case report. *BMC Emerg Med* 2010; 10: 3.
5. Gender A, Manly H, Churchill D, Hollomby D. Hemodialysis for methanol intoxication. *Amer J Med* 1978; 64:749-758.
6. Jacobsen D, McMartin KE. Antidotes for methanol and ethylene glycol poisoning. *J Toxicol Clin Toxicol* 1997; 35: 127-143.
7. Kaplan K. Methyl alcohol poisoning. *Amer J Med Sci* 1962; 244:170-174.
8. Liesivuori J, Savolainen H. Methanol and formic acid toxicity: biochemical mechanisms. *Pharmacol Toxicol* 1991; 69: 157-163.
9. Martin-Amat G, McMartin KE, Hayreh SS, Hayreh MS, Tephly TR. Methanol poisoning: ocular toxicity produced by formate. *Toxicol Appl Pharmacol* 1978; 45: 201-208.
10. McMartin KE, Martin-Amat G, Noker PE, Tephly TR. Lack of a role for formaldehyde in methanol poisoning in the monkey. *Biochem Pharmacol* 1979; 28: 645-649.
11. Mowry JB, Spyker DA, Brooks DE, McMillan N, Schauben JL. 2014 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 32nd Annual Report. *Clin Toxicol* 2015; 53: 962-1147.
12. Paasma R, Hovda KE, Jacobsen D. Methanol Poisoning and Long Term Sequelae-a Six Years Follow-up after a Large Methanol Outbreak. *BMC Clin Pharm* 2009; 9: 5.
13. Ravichandran R, Dudani RA, Alongside AE, Chamber KP, Acharya VN. Methyl alcohol poisoning (experience of an outbreak in Bombay). *J Postgrad Med* 1974; 30:69-74.
14. Røe O. Species differences in methanol poisoning. *Crit Rev Toxicol* 1982; 10: 275-286.
15. Schep LJ, Slaughter RJ, Vale JA, Beasley DM. A seaman with blindness and confusion. *BMJ* 2009; 339: b3929.
16. Sejersted OM, Jacobsen D, Ovrebø S, Jansen H. Formate concentrations in plasma from patients poisoned with methanol. *Acta Med Scand* 1983; 213: 105-110.



Dear Sir,

Through this letter, I want to bring to your notice **World Trauma Day**. Every year, **17th October** is celebrated as World Trauma Day as a reminder of the importance of saving and protecting lives during emergencies. This day highlights the increasing rate of accidents and injuries causing death and disability across the world and the need to prevent them.

Trauma means any injury caused to the body, which may be caused due to multiple reasons like road traffic accidents, fall from height, fires, burns, violence and crimes. Road Traffic Accident (RTA) is a leading cause of trauma across the world. Every year, about 5 million people die from injuries across the world. In India, it is estimated that approximately one million people die and 20 million are hospitalized every year due to injuries.

The burden of disability due to trauma is increasing tremendously at an alarming rate. It increases the morbidity and mortality rate, and also affects the national productivity on account of the younger population being mainly involved in road accidents.

It is the duty of all of us to act responsibly and remember, “prevention is always better than cure”. Trauma due to Road Traffic Accident can be easily prevented by staying alert. So, we must help ourselves as well as others by acting responsibly.

Safety Points to Remember

Follow the road safety rules carefully and pay attention to the warning signs and traffic signals while driving. We should always wear a helmet while riding a two-wheeler. We must avoid distractions like mobile phones while on road. We should always keep a first aid safety kit in our vehicle.

Do not move the person from the place of an accident without any professional's help. In case of a head or spinal injury. Moving the injured person may cause serious back or neck injuries. We should all the emergency helpline number and get adequate help at the earliest possible. Remember that every second is crucial for the injured person. It is important that the injured receives medical care in the golden hour (Emergency Phone Numbers). Call the police to report the details of the accident.

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REFERENCES

1. www.indg.in; ncrb.gov.in
2. www.nimhans.kar.nic.in
3. www.gemplers.com; morth.nic.in

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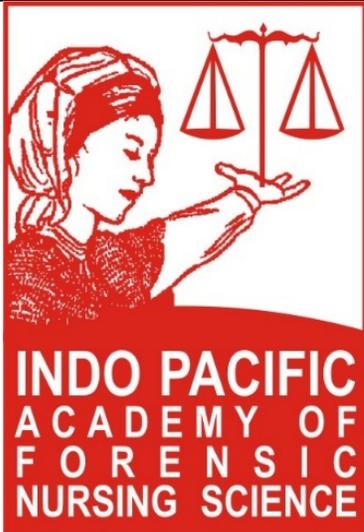
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