

Observational Study to Estimate Time since Death on the Basis of Post-Mortem Staining, Rigor Mortis, Ocular and Putrefaction Changes in Dead Body

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ABSTRACT

Introduction: Estimation of time since death is an integral part of medicolegal investigations. Postmortem lividity is a bluish or reddish-purple discoloration due to capillo-venous distension with blood, at the undersurface of the skin of the dependant parts of the body. Rigor mortis is a post-mortem change which leads to stiffening of the body muscles because of chemical changes in the myofibrils. Putrefaction is degradation of tissue by microorganism activity, such as bacteria, fungi and protozoa. We have planned the observational study to estimate time since death by assessing various changes in dead body such as Postmortem staining, Rigor mortis and Putrefaction.

Materials and Methods: This was prospective & observational study conducted on 140 dead bodies brought for post-mortem examination at IGIMS mortuary covering the central Patna area from September 2016 to March 2018.

Results: Post-mortem staining was well developed and fixed in all cases between 6 hours to 24 hours after death. All cases examined between 3 hours to 24 hours after death rigor mortis was found to present in almost whole body. Putrefaction colour changes were found after 24 hours to 36 hours in iliac fossae as green in 83.33% cases while after 36 hours the whole body was greenish black in 100% cases.

Conclusion: Present study concluded that Post-mortem staining, Rigor mortis, Ocular and Putrefaction changes in dead bodies are very important to estimate time since death and should be accurately noted in all medico legal cases.

Key words- Dead body, Post-mortem staining, Rigor mortis, Putrefaction changes

INTRODUCTION

Estimation of time since death is an integral part of medicolegal investigations. Post-mortem Interval is defined as 'amount of time that has elapsed since the death of the decedent'. The key goal of estimating time since death at the scene of crime is to have a preliminary idea of the time of assault and for narrowing the field of suspects. ^[1]

Various methods have been tried to find out the time of death. These include study of physical, chemical, biochemical, histological and enzymatic changes which occur progressively in a dead body. Postmortem lividity is one of the physical changes useful for estimating time of death to a certain degree of accuracy.

Postmortem lividity or Postmortem staining is a bluish or reddish-purple discoloration due to capillo-venous distension with blood, at the undersurface of the skin of the dependant parts of the body, due to settling of blood in those areas due to pull of the gravity, when circulation to keep the blood in motion ceases. [2]

Post-mortem lividity is one of the important signs of death; it is also called the “darkening of death” because shortly after death, in from 20 minutes to 2 hours usually purple red blotches begin to appear in the skin. Within first 3-4 hours after death these livid blotches may be blanched out by pressure of the finger against the skin only to return when the finger is removed. The forensic significance of this change in the stability of the lividity is that if the position of the dead body has been changed after death but before lividity is fixed the findings of two different areas of distribution of lividity, such as in front and behind may serve as mute evidence that the body has been moved since death. [3]

There are several reports of the use of rigor mortis for estimating time since death. Death is immediately followed by total muscular relaxation termed as ‘Primary Muscular Flaccidity’ which is followed by muscular stiffening – ‘rigor mortis’. After a period of time (36 hours) rigor mortis gradually fades off and is followed by ‘Secondary Muscular Flaccidity’. [4]

Rigor mortis is a post-mortem change which leads to stiffening of the body muscles because of chemical changes in the myofibrils. It helps in estimating the time since death as well to recognize if the body was moved after death. The position of the body plays a major role in the establishment of rigor mortis as it is indicative of the position of the body at the time of death, unless the position is disturbed by external forces or putrefaction. At the scene of death, the body posture sometimes, needs correct forensic interpretations. [5]

The primary reason for the development of rigor mortis is the loss of adenosine triphosphate from the anoxic

tissue. Rigor mortis starts to develop 2-4 hours after death and develops fully by 6 to 12 hours and gradually dissipates until approximately 72 hours after death. [6] Classically, rigor is said to develop sequentially beginning from eyelids, jaw and neck followed by the limbs. The joints of the body become fixed when the rigor is fully developed, and the state of flexion of these joints depends upon the position of the trunk and limbs at the time of death. If the body is in the supine position then the large joints of the limbs become slightly flexed during the development of rigor. The joints of the fingers and toes are often markedly flexed due to the shortening of the muscles of the forearm and legs. [7]

Putrefaction or decomposition occurs as late post-mortem change and from various stages of putrefaction time since death can be estimated. Putrefaction is degradation of tissue by microorganism activity, such as bacteria, fungi and protozoa, which originate from normal biota in human body especially in gastrointestinal tract. [8,9]

Keeping this in mind, we have planned the observational study to estimate time since death by assessing various changes in dead body such as Postmortem staining, Rigor mortis and Putrefaction.

MATERIALS AND METHODS

The present study was conducted on dead bodies brought for post-mortem examination at IGIMS mortuary covering the central Patna area.

Study design- Prospective and Observational study

Study duration: 18 months

Sample size: 140 dead bodies

Source of data: Mortuary, Dept. of F.M.T, I.G.I.M.S., PATNA.

Dead patients in whom relatives had given written informed consent to include post-mortem data in the study were included.

Mutilated and decomposed dead bodies as well as dead bodies known to be suffering from HIV, Hepatitis B, Heatstroke, Septicaemia, Strychnine poisoning and

Pontine Haemorrhage were excluded from the study.

Dead bodies were observed from their arrival till the 72 hours for changes like Postmortem staining, Rigor mortis and Putrefaction and various observation were noted in different time intervals viz. 3 to 6 hours, 6 to 12 hours, 12 to 18 hours, 18 to 24 hours, 24 to 36 hours and > 36 hours.

RESULTS

In the present study total 140 cases were examined in which 114 cases were male and 26 cases were female.

The total cases observed was of different type of case in which 58% RTA is highest in number, 23% Firearm injury, 10% Poisoning, 7% Hanging, 1% Acute

gastroenteritis and remaining 1% were died due to Electrocutation.

Post-mortem staining

In the cases examined between 3 hours to 6 hours after death it was well developed but not fixed in most cases.

In all cases examined between 6 hours to 24 hours after death it was well developed and fixed.

In all cases examined in between 24 hours to 36 hours after death, in 25% cases post-mortem hypostasis were found to be fully developed and fixed and in 75% cases it was found to be faded due to decomposition.

In between 36 hours to 48 hours after death post-mortem hypostasis found to be faded in 100% cases.

Table No.1 Status of post-mortem staining in different post-mortem interval.

TSD (Hrs.)	PMS not developed	PMS partially developed	PMS well develop but not fixed	PMS fully developed and fixed	PMS faded	Total
3 to 6	0	0	28(87.50%)	4(12.50%)	0	32
6 to 12	0	0	0	39(100%)	0	39
12 to 18	0	0	0	22(100%)	0	22
18 to 24	0	0	0	33(100%)	0	33
24 to 36	0	0	0	3(25%)	9 (75%)	12
>36	0	0	0		2 (100%)	2

TSD= Time since death, PMS=Post-mortem staining, Hrs=hours

Rigor mortis

In present series of cases rigor mortis was found to be an important observation by which time elapsed since death can be determined judiciously. All cases examined between 3 hours to 24 hours after death rigor mortis was found to present in almost whole body.

In the cases examined during 24 hours to 36 hours after death rigor mortis were found to be present in all over the body in 16.66% cases, whereas in 83.33% cases it was absent.

In the cases examined after 36 hours after death rigor mortis were found to be disappeared from the whole body in 100% cases.

Table No.2 Status of rigor mortis in different time interval

TSD (Hrs.)	RM present	RM absent	Total
3-6	32 (100%)	0	32
6-12	39 (100%)	0	39
12-18	22 (100%)	0	22
18-24	33 (100%)	0	33
24-36	2 (16.66%)	10 (83.33%)	12
>36	0	2 (100%)	2

TSD= time since death, RM =rigor mortis, Hrs.=hours

PUTREFACTION OR DECOMPOSITION

1. Colour changes

In 18 to 24 hours after death, feature of decomposition present as a greenish discoloration in right iliac fossa seen in 12.12% cases. As a whole no colour change was found in any case examined before 18 hours after death.

Between 24 hours to 36 hours after death iliac fossae were green in 83.33% cases.

After 36 hours the whole body was greenish black in 100% cases.

2. Marbling of skin

In the cases examined in first 18 hours after death no marbling of skin were noted.

In between 18 hours to 24 hours after death it was observed in 12.12% cases. Where as in between 24 hours to 36 hours after death it was observed in 83.33% cases.

In has been observed in all cases examined in between 3 days to 5 days.

3. Distention of abdomen

Between 18 hours to 24 hours, abdomen was found to be not distended in 87.87% cases.

During the period of 24 hours to 36 hours after death, the percentage of cases in which abdomen was not found distended was 16.66%.

In the cases examined after 36 hours, the abdomen was found to be distended in 100% cases.

Table No.3 Satus of Decomposition in different post-mortem interval.

TSD (Hrs.)	Decomposition		total
	Present	Absent	
3-6	0	32 (100%)	32
6-12	0	39 (100%)	39
12-18	0	32(100%)	22
18-24	4 (12.12%)	29 (87.87%)	33
24-36	10 (83.33%)	2(16.66%)	12
>36	2 (100%)	0	2

TSD= Time since death, Hrs. = Hours

DISCUSSION AND CONCLUSION

Conclusions from these observations made were categorically noted in different time schedules to estimate time since death.

In the present study, Post-mortem staining was well developed during 3 hours to 6 hours after death but gets fixed between 6 to 12 hours.

Camps (1976) states that lividity appears in 0.5 hr and well marked in 6-10 hour, [10] Polson et. al (1985) states lividity appears in patchy mottled form within 0.5 to 2 hours which enlarge to produce extensive discoloration in 6-12 hours. Di Maio (2001) states lividity usually evident in 0.5 to 2 hours and gradually, usually reaches maximum coloration at 8-12 hours and fixation of postmortem lividity can occur before 8-12 hours. [11] The findings of present study are more or less same as discussed above with those of other authors.

In the present study, Rigor mortis was found to present in almost whole body between 3 hours to 24 hours after death. In the cases examined during 24hours to 36 hours after death rigor mortis were found to be present in all over the body only in 16.66% cases whereas it disappeared from the whole body in 100% cases after 36

hours. This finding is consistent with Deepak et al which stated that Rigor mortis starts within 2-3 hours and takes about 12 hours to develop, persists for another 12 h, and takes about 12 h to pass off. [12]

Present study concluded that Post-mortem staining, Rigor mortis, Ocular and Putrefaction changes in dead bodies are very important to estimate time since death and should be accurately noted in all medico legal cases.

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