

OBSERVATIONAL STUDY TO ASSESS RELATION OF COOLING OF DEAD BODY WITH SEASONAL VARIATION IN BIHAR STATE**¹Saroj Kumar Ranjan, ²*Pinki Kumari, ³Aman Kumar, ⁴Sanjeev Kumar and ⁵Bindu Kumari**^{1,2}Senior Resident, Department of Forensic Medicine and Toxicology, IGIMS, Patna.³Professor and Head, Department of Forensic Medicine and Toxicology, IGIMS, Patna.⁴Associate Professor, Department of Forensic Medicine and Toxicology, IGIMS, Patna.⁵Intern, Kurji Holi Famil Hospital, Patna.***Corresponding Author: Pinki Kumari**

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Article Received on 24/08/2019

Article Revised on 13/09/2019

Article Accepted on 03/10/2019

ABSTRACT

Introduction: Estimation of time since death is an integral part of medicolegal investigations. Cooling of body after death (i.e. Algor Mortis) in relation to environmental temperature in various seasons has its medico-legal importance in connection with determination of time since death. Keeping in this mind, we have planned the study with the objective to evaluate effects of atmospheric temperature over the cooling of dead body in different seasons. **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:** After 36 hours in all cases bodies were found to be cooled to the level environmental temperature. Although the rate of fall of temperature is higher in colder seasons, but time taken by the body to cool to the level of environmental temperature has been observed more in colder season than the summer seasons. **Conclusion:** This study concludes that cooling of dead body to the level of environmental temperature varies greatly depending on the seasonal variation. In Patna region, cooling of dead bodies takes longer time in winter season as compared to summer season.

KEYWORDS: Cooling of dead body, Time since death, seasonal variation, environmental temperature).**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]

The post-mortem examination is performed to know the possible aspect of causation of death and time since death of an individual for the benefit of society via the agency of administration of justice. An error in observation of post-mortem finding may lead to conviction to an innocent or acquittal to guilty, and either way proving deleterious to the society.

Cooling of body after death is also known as Algor Mortis.^[2] The meaning of algor is coldness and Mortis is after death. Now a day's recording of temperature of dead bodies has its medico-legal importance in connection with determination of time since death.^[3] Cooling of body or algor mortis is due to loss of all physical, chemical and metabolic functions of the body after death.^[4] In a living person body temperature is

maintained at a level by heat gain equal to heat loss.^[5] After death there is no heat gain but there is constant loss of body heat until it comes to the level of environmental temperature. This phenomenon is completed by the help of conduction, convection, radiation and evaporation. It is variable and depends upon various factors including the atmospheric temperature of a particular region.

In Patna (Bihar) which is grassland of north India has four primary climate ie. Summer, winter, spring and rainy season. All have different atmospheric temperature which affects the algor mortis to a large extent.^[6,7]

Keeping in this mind, we have planned the study with the objective to evaluate effects of atmospheric temperature over the cooling of dead body in different seasons.

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 from September 2016 to March 2018.

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.

Materials

- Laboratory thermometer (for environmental temperature)
- Clinical thermometer (for rectal temperature)
- Scalpel with blade
- Dead body

Method

On arrival of dead body screening of challan paper and inquest paper brought by constable was done. The probable time of death, condition of clothing, the place from where the body is brought, the cause of death as suspected by the witness and I.O was recorded.

The actual condition of body along with the clothing was noted and atmospheric temperature was recorded with the help of thermometer. At the same time rectal temperature was also recorded. The subhepatic temperature was recorded by putting an incision of ½ inch at right hypochondrium deep down peritoneum the tip of thermometer was placed under surface of liver.

The atmospheric temperature, the rectal temperature and the subhepatic temperature was recorded at every half hourly interval up to three hour. Six such temperature recording were recorded.

The seasonal variation was also recorded which was grouped in 4 subhead for each primary season as categorised below-

S1 – Summer – April, May, June, July.

S2 – Rainy -August, September.

S3 – Winter – October, November, December, January.

S4 - Spring -February, March.

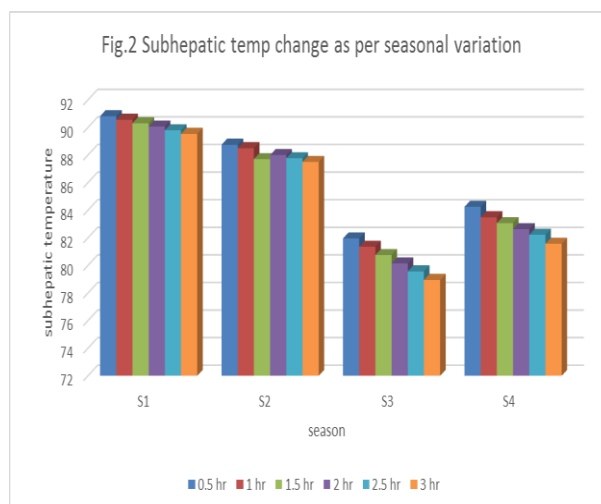
3. RESULTS

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

After 36 hours in all cases bodies were found to be cooled to the level environmental temperature. Although the rate of fall of temperature is higher in colder seasons, but time taken by the body to cool to the level of environmental temperature has been observed more in colder season than the summer seasons because body

temperature has to fall for longer range in cold season due to low temperature in cold season.

Variation in rectal and subhepatic temperature of dead bodies over observation period of 0.5 hour, 1 hour, 1.5 hour, 2 hour, 2.5 hour and 3 hour as well as various seasons viz. S1, S2, S3 and S4 were recorded and shown graphically in Fig.1 and Fig.2 respectively.



Also, fall in rectal and subhepatic temperatures in seasons S1, S2, S3 & S4 were shown graphically in Fig.3, Fig.4, Fig.5 and Fig. 6 respectively.

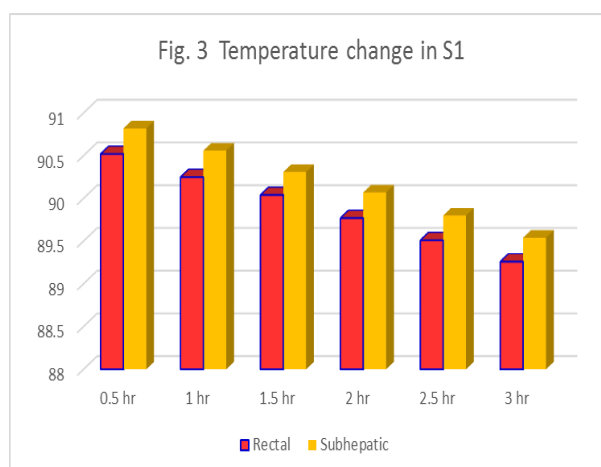


Fig. 4 Temperature change in S2

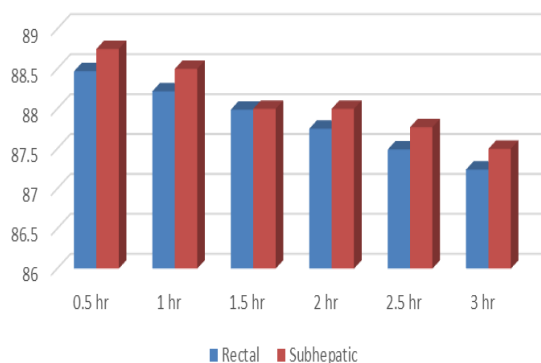


Fig. 5 Temperature change in S3

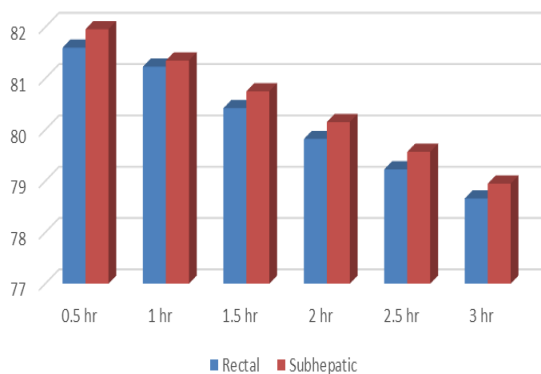
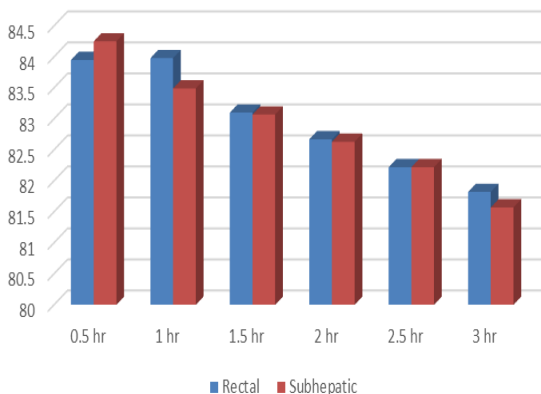


Fig.6 Temperature change in S4



4. DISCUSSION AND CONCLUSION

It was observed in this study that the rate of cooling of dead bodies in Patna, Bihar was variable in different seasons. It is because of the fact the atmospheric temperature in this part of India is greatly variable in different season group as compared to other part of India. The difference between the body temperature and surrounding atmosphere is wide and naturally the dead body has to cool of the variable range of temperature.

The temperature difference between the atmosphere and the dead bodies was greater in winter and lesser in summer so that time taken to cool the body were found to be very much variable.^[8]

Conclusions from these observations made during summer and winter were categorically noted. Again these conclusions from time elapsed since death has been noted in different time schedules.

Cadaveric changes noticed on the dead bodies within 6 hours after death:

Cooling of the body in Summer season

In most of the cases bodies were found to be above the environmental temperature however its level was very much variable.

Cooling of the body in winter season

The dead bodies were found having the variable temperature. However in most of the cases it has been found to be lowered by 5°F to 12°F from normal body temperature, 98.6°F.

Cadaveric changes observed 12 hours to 18 hours after death

Summer: Cooling of body-Most of the cases rectal temperature were observed to be lowered by 10°F to 24°F from normal body temperature but in some cases it was found to have the same temperature as that of the mortuary.

Winter: Cooling of body - most of the cadavers were completely cooled down to atmospheric temperature.

Cadaveric changes observed 18 hours to 24 hours, 24 to 36 hours, 36 to 48 hours, 48 to 72 hours and 3 to 5 days after death in both summer & winter: Body temperature was equal to environmental temperature in most of the cases.

This study concludes that cooling of dead body to the level of environmental temperature varies greatly depending on the seasonal variation. In Patna region, cooling of dead bodies takes longer time in winter season as compared to summer season.

5. REFERENCES

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