

Review Article

Body Farms : Should We Seriously Consider them in India?

Sunil M Doshi¹

Abstract

Background : Time since death is a crucial component of postmortem examination that provides valuable information despite being estimated within a range of certain hours, days or months. Parameters to measure time since death or postmortem interval are largely depending upon local environmental conditions. Body farms are platforms where forensic experts study human decomposition in prospective manner under different climatic conditions and ecological zones.

Conclusion : Currently, opinions pertaining to postmortem interval are based on textbooks or research papers which themselves are lacking in reflecting findings from prospective body farming studies in absence of availability of such facilities with India.

Key words : Body Farms, Time Since Death, Post Mortem Interval, Anthropology.

Taphonomy is the study of decaying organisms over time along with their process of fossilization as well as to understand how site ecology affects the process of decomposition which ultimately provides base to estimate postmortem interval or time since death¹. Much of the difficulty in determining time since death stems from the lack of systematic observation and research on the decomposition rate of the human body². As far as Indian researches are concerned; a study shows that only a handful of researches have focused on time since death in spite of it being an important component of every postmortem report in India³. The factors affecting time since death are highly localized and vary even from one spot to another. So, there is need to have prospective researches to actually understand the local factors and their influences on various parameters based on which the opinions about postmortem intervals are documented in postmortem reports. The only way to execute this is to establish body farms in India. Body farms are research facilities where forensic experts study human cadavers to learn how they decompose, or breakdown under different circumstances⁴. So basically, this facility offers a natural local environment to study real-time changes of decomposition, aiming to develop local standards for measuring time since death prospectively. Fresh human body, with known time since death, is to be reserved in a designated facility to allow its natural decay. Researchers will visit

Editor's Comment :

- Body-farming facilities provide a platform to study one of the most important objectives of an autopsy, estimation of time since death, in a prospective manner.
- Since the parameters for determining time since death depend largely on environmental and other local factors, the absence of such facilities in India forces forensic experts to rely mostly on Western texts when framing legal opinions.
- Therefore, this long-neglected area requires urgent attention in the present era to create more accurate standards tailored to the Indian subcontinent.

the facility at specified intervals to observe and document the changes after death that takes place in that particular setting.

Shift from Animal to Human Cadavers :

Non-human animal proxies have been used to study taphonomic changes with pigs being the most common choice⁵. However, Decomposition studies with pigs as proxies for human cadavers scientifically lacking in studying differences in decomposition sequences/rates relative to humans. Differences in decaying process between humans and pigs can have significant effects on estimation of human PMI using pig corpses. A study concluded that Standards for PMI estimation derived from porcine models may not directly apply to humans and may need adjustment⁶. The establishment of the Anthropological Research Facility (ARF), the Forensic Anthropology Center (FAC), at the University of Tennessee can be considered as beginning of modern era in forensic investigations related to estimating postmortem interval and which is also responsible for shifting researches from retrospective studies to prospective studies conducted in a controlled environment with

¹MD, Professor and Head, Department of Forensic Medicine, Dr N D Desai Faculty of Medical Science and Research Center, Dharmsinh Desai University, Nadiad, Gujarat 387001

Received on : 23/07/2024

Accepted on : 08/09/2024

possible manipulation of variables⁷. Currently, there are eight operational Human Taphonomy Facilities (HTFs) or body farms in the USA, one in Australia and one in The Netherlands, with plans to create another in Australia, Canada, and more in continental Europe⁸. In India, few scientists are working in this direction with aims and objectives pertaining to researches on postmortem interval, skeleton collection of Indian origin and providing services to law enforcement^{9,10}. However, with very limited resources available to them.

Working Pattern of Body Farms :

Body farms typically run on human bodies donated for this specific purpose. In earlier practices, unclaimed bodies were utilized, often with limited information about the donor in western countries. Data of consented donor is collected at the time of agreement for body donation ie, age, sex, occupation, medical conditions, family history, height, weight, habits, socio-economic status, education etc along with photographs. After death, these donated bodies are placed in various settings within the facility, such as open-air environments, inside model houses or cars, with windows either closed or open, until they are skeletonized. Each body is properly tagged to ensure identification can be maintained throughout the study till the skeletonization phase. Sometimes cages are used to protect bodies from scavengers like vultures and other animals. Throughout the process, meticulous records are kept regarding decomposition changes, insect activities, and weather conditions. These observations are documented either daily or at predetermined intervals, often accompanied by photographs. Lastly, entire skeleton is recovered and stored under the collection centres for further academic activities and anthropological researches.

Why it becomes need of Hour ?

Time since death is a crucial component of postmortem examination that provides valuable information despite being estimated within a range of certain hours or days or months. Numerous court judgements emphasize the importance of time since death and one can find end numbers of judgements where time since death or postmortem interval are discussed and taken in to account thoroughly¹¹⁻¹³. In one of the case, Hon'ble Allahabad high court quoted,

"Time since death It is very important from a medico-legal point of view that a medical jurist should always

be prepared to give an opinion as to the time which elapsed since death, when a body is brought to him for post-mortem examination. The points to be noted in ascertaining the time are warmth or cooling of the body, the absence or presence of cadaveric hypostasis, rigor mortis and the progress of decomposition. All these points have been discussed at full length, but it must be remembered that the conditions producing these changes vary so much in each individual case, that only a very approximate time of death can be given"

Currently, opinions pertaining to postmortem interval are largely dependent on textbooks or research papers which themselves are lacking in reflecting findings from prospective body farming studies. In absence of such facilities, Forensic experts often base their opinions on generalized data, which may not accurately reflect local environmental factors that can significantly influence the postmortem interval. For example, time of development of rigor mortis or marbling in northern part of India can be different from that of southern regions. To improve the reliability in estimating time since death, there is a clear need for the establishment of region-specific body farming facilities within India. These facilities would conduct research in controlled environments that reflect local conditions and allowing more accuracy by taking in to account the region-specific influencing factors. This approach would enhance the scientific basis for experts' opinions, ensuring that they are backed up by empirical evidences rather than generalized norms.

Challenges ahead :

The primary challenge is obtaining human cadavers. The donation of bodies for academic and research purposes has its inherent sensitivity due to cultural, religious, caste and regional considerations. In India, there is a shortage of human cadavers for medical education due to low awareness, strong religious beliefs and customs as well as concerns about whether donated bodies will be treated with respect and dignity or not¹⁴. Therefore, spreading awareness about this novel concept of body farming among Indian citizens and encouraging sufficient body donations for this purpose would be challenging. However, unidentified and unclaimed bodies can still be valuable for research, provided appropriate facilities and regulations are in place. If a virtual autopsy satisfies the important objects of conducting routine postmortem, dissection can be omitted to preserve the body for the purpose of body farming.

The second challenge involves obtaining financial support from the state governments or central government, as the case may be. This concept requires acceptance not only from the public but also from the government. In India, where mortuary facilities often lack adequate infrastructure, resources and sanitation in many places^{15,16}, chances are negligible for the administration to consider this concept. The third challenge is to designate suitable locations and gaining acceptance from local communities. In the US, initial resistance to such facilities was observed among scientists, citing concerns such as odour, scavenger activity, the sight of dead bodies, groundwater contamination etc. In India, where population density is much higher, finding locations away from human activities for such facilities would be challenging. Significant amount of expenditure would be required to develop such landscapes with secure boundaries to prevent unauthorized access and to maintain the confidentiality and decorum of the site. The fourth challenge is to have human resources to operate these facilities. Experts with Master's in forensic medicine are essential for conducting researches and managing body farms. Later on, specialized courses can be developed in collaboration with universities to train experts in this particular field. These professionals can then be recruited within law enforcement agencies and other relevant institutions to support investigations effectively.

CONCLUSION

To conclude, Body farm, not only does it serve the purpose of providing platform to conduct semi-controlled actualistic research to test hypotheses using large samples of human bodies with known PMI and to compare patterns and rates of decomposition between climatic and ecological zones¹⁷, but also it creates opportunities for anthropologists, osteologists and forensic experts to more effectively assist law enforcement in solving crimes.

Funding : None

Conflict of Interest : None

REFERENCES

- 1 Varlet V, Joye C, Forbes SL, Grabherr S — Revolution in death sciences: body farms and taphonomics blooming. A review investigating the advantages, ethical and legal aspects in a Swiss context. *International Journal of Legal Medicine* 2020; **134**: 1875-95.
- 2 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 Sciences* 1990; **35**(1): 103-11.
- 3 Doshi SM — Trend of researches in Forensic Medicine and Toxicology: An Indian scenario. *Journal of Indian Academy of Forensic Medicine* 2019; **41**(4): 232-6.
- 4 Washburne S — Clues in Corpses: A Closer Look at Body Farms. United Kingdom: Greenhaven Publishing LLC. 2017.
- 5 Haglund WD, Sorg MH, editors. Advances in forensic taphonomy: method, theory, and archaeological perspectives. CRC Press; 2001 Jul 30.
- 6 Keough N, Myburgh J, Steyn M — Scoring of decomposition: a proposed amendment to the method when using a pig model for human studies. *Journal of Forensic Sciences* 2017; **62**(4): 986-93.
- 7 Shirley NR, Wilson RJ, Jantz LM — Cadaver use at the University of Tennessee's anthropological research facility. *Clinical Anatomy* 2011; **24**(3): 372-80.
- 8 Williams A, Rogers CJ, Cassella JP — Why does the UK need a Human Taphonomy Facility? *Forensic Science International* 2019; **296**: 74-9.
- 9 Insaaf. Investigative scientific & anthropological analysis facility [Internet]. Org.in. [cited 2024 Jul 9]. Available from: <http://www.insaaf.org.in/index.html>
- 10 Holla A — Telling the bane from the bone [Internet]. Mumbai Mirror. 2010 [cited 2024 Jul 9]. Available from: <https://mumbaimirror.indiatimes.com/others/sunday-read/telling-the-bane-from-the-bone/articleshow/16033803.cms>
- 11 Vijay Bahadur @ Pahdai vs State of U.P [Internet]. indiankanoon.org. 2019 [cited 2024 Jul 10]. Available from: <https://indiankanoon.org/doc/17040079/>
- 12 Sooraj vs The State of Kerala [Internet]. indiankanoon.org. 1993 [cited 2024 Jul 10]. Available from: <https://indiankanoon.org/doc/1880018/>
- 13 Appellant vs The State of Assam [Internet]. indiankanoon.org. 2022 [cited 2024 Jul 10]. Available from: <https://indiankanoon.org/doc/133991621/>
- 14 Rokade SA, Gaikwad AP — Body donation in India: Social awareness, willingness, and associated factors. *Anatomical Sciences Education* 2012; **5**(2): 83-9.
- 15 Hussain AJ, Mohiddin SK — Mortuary management and public health. *Journal of Indian Academy of Forensic Medicine* 2021; **43**(2): 145-8.
- 16 Khilji S, Nigam M, Nigam K — Variation in Resource Supply of Mortuary for Autopsy at Tertiary Care Center-A Nation-Wide Survey. *Journal of Indian Academy of Forensic Medicine* 2024; **46**(1): 35-8.
- 17 Wescott DJ — Recent advances in forensic anthropology: decomposition research. *Forensic Sciences Research* 2018; **3**(4): 278-93.