ABSTRACT

Introduction: Cadavers play a crucial role in facilitating the study of anatomy, as a comprehensive understanding of human anatomy necessitates the dissection of human bodies. Additionally, cadavers are utilised for advanced laboratory work, workshops, and the training of surgical postgraduates. With the rapid proliferation of medical colleges across the nation and the existing institutions striving to increase their student intake, the supply of unclaimed bodies may no longer be adequate to meet the demands of these institutions. Consequently, the necessity for voluntary body donation becomes increasingly pertinent.

Aim: To assess the knowledge, attitude, and awareness regarding body donation among 1st-year MBBS students, healthcare professionals/doctors, and non teaching staff of a teaching institution in Eastern Uttar Pradesh, India.

Materials and Methods: This was a cross-sectional study conducted at Varun Arjun Medical College and Rohilkhand Hospital, Banthra, Shahjahanpur, Uttar Pradesh, India. The total number of study participants (n=230) was divided into three groups: 1st-year MBBS students (n=90), healthcare professionals/doctors (n=70), and non teaching staff (n=70). A self-designed and structured questionnaire containing 15 questions was used.

Results: In the MBBS and Doctors groups, all participants demonstrated familiarity with the study topic, while 95.7% of the non teaching group reported being unacquainted with the concept of body donation. Regarding the purpose of body donation, both MBBS students and Doctors indicated the dual purposes of organ donation/transplantation and medical teaching and research. Male respondents exhibited a notably positive attitude (96.6%) towards both purposes without reservation, while females showed a stronger inclination towards organ donation. When questioned about the procedure for donating the body, the MBBS students and non teaching staff displayed a lack of awareness regarding the process, with 89.5% of doctors being knowledgeable about the donation procedure.

Conclusion: Despite the considerable level of awareness regarding body donation, there exists a notable lack of motivation, which could be addressed through effective sensitisation and education initiatives. Enhancing the scenario of insufficient body donations could be accomplished through targeted awareness campaigns utilising both print and electronic media.

INTRODUCTION

Voluntary body donation refers to the voluntary act of offering one’s entire body after death for the purpose of medical education and research. The practice of donating bodies to science dates back to 1832, initially evidenced by the donation of the body of the British Utilitarian Philosopher Jeremy Bentham. Notably, India witnessed its first recorded instance of body donation in 1956 when Pandurang Sridhar Apte’s body was donated to B J Medical College in Pune, Maharashtra, India [1].

Proficiency in human anatomy serves as the cornerstone of a medical professional’s career. Cadaveric dissection has long been an essential component of anatomical study, providing a wealth of knowledge through the observation of numerous variations. The psychovisuo-tactile experience of cadaver dissection remains an unparalleled method for comprehending and retaining knowledge of human anatomy. Furthermore, cadavers are utilised for practicing surgical skills, facilitating skilled labs, workshops, and postgraduate training [2]. The emergence of cadaveric labs signifies a novel trend in medical education, indicating the irreplaceable role of dissection in learning anatomy, not only theoretically but also emotionally, fostering empathy and compassion in future physicians.

The historical significance of cadaveric dissection is evident in ancient India, where Sushruta conducted numerous human body dissections circa 500 BC [3]. Andreas Vesalius, the first medical student to dissect a human cadaver, continued this practice as a professor [4]. In the United States, the late 18th and early 19th centuries witnessed a surge in the popularity of dissection, leading to a shortage of cadavers met by the procurement of bodies from slaves and grave robbing, often targeting marginalised individuals [5]. Even anatomists resorted to dissecting their own family members, as demonstrated by William Harvey, renowned for his discovery of the circulatory system, who dissected his father and sister [6].

In Great Britain, the Murder Act of 1752 authorised the use of bodies of executed criminals for dissection. However, by the early 19th century, the rise of medical science and a decline in executions resulted in an increased demand for cadavers [7]. In India, the implementation of the Anatomy Act in 1948 mandated the provision of unclaimed corpses to hospitals and educational institutions for anatomical dissection, a practice uniformly followed across all states [8].

The proliferation of medical colleges in India has underscored the pressing issue of insufficient cadaver availability, mirrored in the low cadaver-to-student ratios, with the optimal ratio recommended at 1:10 but observed at 1:25 in various teaching institutions. Similarly, the country’s organ donation rate remains constrained by the limited availability of stored organs, leading to extensive waiting lists for organ transplants [9]. Although cadavers can be procured through various legal means, voluntary body donation remains a crucial source for anatomical dissection and medical education, emphasising the necessity for whole-body donation [2].
In India, voluntary body donation programs are still in their early stages, heavily reliant on the efforts of healthcare professionals, social workers, and non-governmental organisations in motivating individuals [2]. Consequently, the pertinent inquiry arises: are individuals sufficiently informed about the concept of body donation? This query prompted this survey, aimed to assess the knowledge, attitudes, and practices concerning ‘Body Donation’ among 1st-year MBBS students, healthcare professionals, and non teaching staff.

**MATERIALS AND METHODS**

This cross-sectional observational study was conducted from January-April 2022 at Varun Arjun Medical College and Rohilkhand Hospital, Banthra, Shahjahanpur, Uttar Pradesh, India, encompassing 1st-year MBBS students (n=90), healthcare professionals/doctors (n=70), and non teaching staff (n=70) within the age in range 18-65 years. Prior approval from the Institutional Ethics Committee (IEC) (IECVAMC-ANAT-DEC021) was obtained, and informed consent was secured from all participants.

**Inclusion criteria:** Individuals within the age range of 18-65 years, comprising 1st-year MBBS students, healthcare professionals/doctors, and non teaching staff affiliated with Varun Arjun Medical College & Rohilkhand Hospital. Voluntary participation was emphasised, ensuring the anonymity of all respondents.

**Exclusion criteria:** Participants who did not provide informed consent were excluded from the study.

A structured predesigned questionnaire was formulated [Annexure], comprising of 15 questions designed to gather information on socio-demographic features, knowledge of body donation, attitudes towards body donation, reasons for reluctance, factors influencing the decision not to complete the pledge form, and other facets related to body donation. The questionnaire primarily incorporated multiple-choice questions, featuring the most commonly anticipated responses, along with an additional open-ended option to allow participants to express their views freely.

The study encompassed three distinct participant groups: 1st-year MBBS students, healthcare professionals/doctors, and non teaching staff. MBBS students were included to gauge their awareness and attitudes toward body donation, considering their familiarity with the importance of body donation within the course curriculum. Healthcare professionals/doctors were also included in the survey to assess potential shifts in attitude regarding body donation following the completion of their medical training. Additionally, to contrast the attitudes among individuals less familiar with the concept of body donation and cadaveric dissection, non teaching staff were incorporated into the study, which included lab attendants, dissection hall attendants, storekeepers, artists, administrative staff and technical staff.

**STATISTICAL ANALYSIS**

The data obtained from the study was analysed using appropriate statistical methods. Descriptive statistics were employed to present the demographic characteristics of the participants, providing a comprehensive overview of the distribution of knowledge, attitudes, and awareness regarding body donation among the three participant groups. The data were filled in an Excel sheet and analysed using SPSS Version 26.0 (Chicago, Inc, USA) to draw appropriate interpretations and conclusions.

**RESULTS**

All 230 participants completed the questionnaire. The mean age was 18.5, 41, and 24 years for 1st-year MBBS students, doctors, and non teaching staff, respectively. The majority of participants in all groups were male, comprising 64.4%, 58.6%, and 85.7% of MBBS students, doctors, and non teaching staff, respectively. Approximately 90% of all participants identified as Hindus. Moreover, the educational background of the participants ranged from higher secondary education to postgraduate levels. All participants in the MBBS and Doctors groups exhibited familiarity with the study topic, in contrast to 95.7% of the non teaching group who reported being unacquainted with the concept of body donation [Table/Fig-1]. Regarding the purpose of body donation, both the MBBS students and doctors highlighted the dual purposes of organ donation/transplantation and medical teaching and research. Notably, healthcare professionals emphasised that body donation is a charitable and altruistic act for individuals seeking to contribute even after death. Conversely, 95.7% of non teaching staff expressed a lack of awareness about body donation [Table/Fig-2].

In the MBBS student group, 71.1% expressed a willingness to donate their bodies for both purposes. Male respondents exhibited a strongly positive attitude (96.6%) towards both purposes without hesitation, while females showed a greater inclination towards organ donation. In the doctors group, 45.7% responded negatively, primarily driven by female participants, while 42.9% expressed a willingness for organ donation/transplantation, with a higher male representation. Only a meager 11.4% expressed readiness for donation for both purposes. In the non teaching group, 72.9% of respondents expressed negative sentiments, with only 27.1% indicating a willingness to donate organs for life-saving purposes [Table/Fig-3]. Regarding opinion about positive attitude of body donation 76.2% MBBS student agreed to save someone’s life and facilitate medical teaching, while 78.9% of Doctors expressed their opinion to save someone’s life [Table/Fig-4].

Religion-wise, an equal number of Hindu participants expressed positive attitudes toward donating their bodies for both dissection and organ donation (33.7%), with a similar percentage (35.6%) displaying a negative attitude towards body donation. Females exhibited a strong desire to donate their bodies for both purposes, whereas the majority of Muslim participants (65.4%) expressed a
negative stance, with only 26.9% indicating a willingness for organ donation. All Christian participants expressed a willingness to donate their bodies for both dissection and organ transplantation [Table/Fig-5].

Despite a majority of participants expressing willingness to donate their bodies, none had completed the pledge form to date across all groups [Table/Fig-10]. The reasons behind this decision are outlined in [Table/Fig-11], revealing that religious and familial barriers were not significant factors. Conversely, all doctors and the majority of MBBS participants (93.3%) expressed a keen interest in promoting and raising awareness in society about body donation. The lack of awareness among the non teaching staff regarding body donation was evident, with 51.4% leaving this question unanswered. It became apparent that the main barrier for non teaching staff was the lack of knowledge [Table/Fig-12].

DISCUSSION
The study of the human body forms the foundation of surgery and medicine, primarily reliant on the dissection of human cadavers, which provide unparalleled opportunities for students and medical researchers to gain comprehensive insights and develop new surgical techniques [10]. Cadaver workshops conducted by...
institutes specialising in surgical sciences play a pivotal role in training postgraduates, particularly in endoscopic procedures, thereby facilitating skill development in medical science.

In conducting this study, it became evident that limited research had been undertaken in this area. Notably, all participants in the MBBS and Doctors groups exhibited familiarity with the study topic, unlike the non teaching group, where a significant portion displayed a lack of acquaintance with the concept of body donation. This disparity could be attributed to the early exposure of newly admitted students to the Anatomy Act, the importance of cadaver dissection, the process of cadaver procurement for dissection, and cadaver preservation techniques. Additionally, students were required to undertake a "Cadaveric Oath" before commencing dissection, leading to their curiosity about body and organ donation. When inquired about the purpose of body donation, both the MBBS students and healthcare professionals were aware of the purpose; especially the latter were aware that body donation is a charitable and altruistic act for donors who want to make use of their body even after death. Amongst the non teaching group, 95.7% responded with 'no idea' about body donation. Consequently, enhancing levels of awareness and motivating the non teaching group emerged as a critical necessity, as emphasised in this study.

In the MBBS group, 71.1% expressed their willingness to donate their bodies. Male respondents showed a strongly positive attitude for both purposes without any hesitation, whereas females were more inclined towards organ donation. Boulware LE et al., and Alashek W et al., also stated that males are more inclined towards body donation than females [11,12]. They found that the educated class is more prone to body donation than less educated individuals who are less willing to do so. Surprisingly, in the Doctors group, 45.7% answered negatively, with females being more in number. However, 42.9% opted to donate their bodies, with males expressing a greater willingness. Only a small percentage, 11.4%, were ready for donation for both purposes, with male doctors showing a positive attitude. Many doctors are hesitant to consider the notion of the dissection of their own bodies due to personal attachment and concerns about the proper utilisation of their bodies [10]. An additional concern arises from a dilemma among medical professionals that their donated bodies may not be treated with the expected level of dignity and respect [10]. Moreover, while anatomists actively advocate for body donation, their specific attitudes towards this practice remain relatively unknown. Notably, both the general population and the medical community display a preference for organ donation over whole-body donation [11]. In Turkey, only 15.7% of anatomists express a willingness to donate their bodies, citing various reasons for their reluctance, including concerns about being dissected by their colleagues, familial disapproval, disrespectful treatment of cadavers, and religious beliefs [13].

In the non teaching group, the majority of respondents (72.9%) expressed an absolute negative choice towards body donation, with only 27.1% willing to donate organs to save someone's life. The most common reason for the lack of body donation in India is a lack of awareness. Only 22% of the general population is aware that bodies can be donated [9]. Alashek W et al., attribute the impediments to cadaveric donations in the Libyan population to insufficient awareness, discomfort regarding the handling of the body, and apprehensions regarding religious implications [12]. Religious beliefs and spirituality are responsible for low cadaveric donation, with Hindu participants responding equally with positive (33.7%) and negative (35.6%) attitudes towards body donation, while the majority of Muslim participants expressed a negative attitude (65.4%). All Christian participants enthusiastically wished to donate their bodies for both purposes - dissection and organ transplantation. These findings highlight the impact of religious beliefs, which are deeply associated with individuals and can be challenging to change [14].

The Hindu religion subscribes to the theory of incarnation, indirectly emphasising the significance of body donation by highlighting the transient nature of the physical form. In Islam, the principle of saving lives is paramount, and a majority of Muslim scholars endorse organ donation within ethical boundaries. Christians widely support organ and tissue donation, with Catholics viewing it as an altruistic act of assistance and service. Pope John Paul II explicitly advocated for organ donation, stating that the Catholic Church would actively promote the necessity of organ donors and encourage Christians to embrace it as a testament to their generosity and brotherly love, as long as it adheres to ethical principles [14,15].

MBBS students and non teaching staff exhibited unawareness regarding the procedure of body donation. 89.5% of doctors knew about the process of donation. Among MBBS students, 83.3% and among non teaching staff regarding body donation, with 68.4% were aware that body donation should be done as early as possible after death. This data was similar to a study done by Panshewdikar PN et al., but it differed from the study conducted by Hiwarkar MP et al., where the percentage was only 35% [16,17]. All the doctors stated that the body should be donated within 24 hours after death. Despite a high percentage of participants expressing their willingness to donate their bodies, no one had filled out the pledge form yet, regardless of their groups. There was a higher discrepancy between approval for body donation and actually pledging for body donation.

All the doctors and the majority of MBBS participants (93.3%) were keen to promote and spread awareness in society about body donation. However, there was a lack of awareness and motivation among the non-teaching staff regarding body donation, with 51.4% of them leaving the question unanswered. The attitude of society towards body donation significantly affects the availability of organs and cadavers. There is a pressing need to raise awareness about the significance of body donation and foster a more positive societal mindset towards this practice. Introducing comprehensive body donation programs and establishing dedicated centres within all medical colleges should be made mandatory. A multifaceted approach involving electronic and print media, as well as extensive public outreach led by political and religious figures and influential personalities, should be adopted to initiate widespread awareness campaigns. NGOs and social workers can play a pivotal role in spearheading these initiatives. Emphasising the sanctity of the act of "Donation" (daan) can prove instrumental during these campaigns. Additionally, to encourage body donation, donors and their families should be accorded social honors, recognition, and appropriate incentives, such as access to healthcare facilities.

To ensure that donors feel assured about the respectful treatment of their bodies, it is crucial to guarantee that their remains will be cremated after dissection. The ashes may then be respectfully disposed of by the respective medical institute or returned to the closest relative for alternative arrangements, if desired. To instill a sense of reverence among students for the invaluable gift of donated bodies and the intentions of the donors behind such contributions, it is imperative to underscore the significance of respectful cadaver handling. Easily accessible guidance and assistance concerning body donation should be made available to those willing to partake. Furthermore, comprehensive counseling for the next of kin of the donor is essential to honor the donor’s wishes, and their consent for the body donation of their loved ones is crucial. In instances where certain medical colleges receive an excess number of cadavers, it is imperative to establish appropriate legal provisions allowing for the transfer of cadavers between states and between different medical colleges. Emphasising intercollege cooperation and making body donation cells mandatory for all medical colleges are critical steps in ensuring the effective implementation of the program.

The general population should be convinced to accept that it is best to donate their bodies after death, either for organ/body donation and actually pledging for body donation.
or for the purpose of research in medical education. The present project will definitely play a significant role in creating a social wave for the noble act of body donation for educational purposes or organ transplantation, which is of utmost need in our country at the present moment.

Body donation serves as a voluntary act that can potentially save valuable human lives or contribute to the advancement of medical science. The primary purpose of such donations is to provide medical colleges with necessary cadavers for teaching and research endeavors. Despite the persistent demand for cadavers and various proposed solutions to bolster the supply, the number of voluntary body donations remains disappointingly low. A significant contributing factor to this scarcity is the general lack of awareness in society. Insufficient knowledge, motivation, and awareness have led to a severe shortage of cadavers in both private and government-affiliated medical colleges. In light of the rapid progress in medical science and the increasing success of transplant surgeries, the disparity between the number of recipients and willing donors remains significant. It is crucial for healthcare professionals to actively bridge this gap, starting from the early stages of medical education and continuing throughout their careers. Therefore, it is imperative to comprehend the impact of the educational process on medical students and their attitudes toward both organ and body donation [18].

Therefore, it is suggested that more knowledge and education are required regarding the concept of body/organ donation so that the responses would not only be for organ donation for organ banks but also for dissection purposes in medical colleges to provide unparalleled opportunities for medical students to study the human body. Medical colleges and anatomists should embark on more enlightenment campaigns regarding voluntary body donation by conducting medical exhibitions and explaining that this is a noble act.

Limitation(s)

Only limitation of the study was unwillingness of some of the participants to involve in the study and subsequently they were excluded from the study.

CONCLUSION(S)

This study highlights the existing gaps in knowledge and attitudes towards body donation among different groups, emphasising the need for comprehensive awareness campaigns and educational initiatives. Addressing the concerns of the medical community, religious considerations, and societal attitudes is essential for fostering a positive environment for body donation. Efforts to promote the sanctity of the act and ensure the respectful treatment of donors’ bodies, coupled with streamlined procedures and inter-institutional cooperation, are crucial for encouraging voluntary body donation and facilitating medical education and research.

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ANNEXURE
1. Age (years):
2. Sex: Male Female
4. Educational Qualification: A) Secondary/Higher Secondary B) Graduate C) Post Graduate D) Other (specify):
KNOWLEDGE/OPINION REGARDING BODY DONATION
5. Have you heard the term Body Donation:
   A) Yes B) No
6. What is your opinion about Body Donation:
   A) For purpose of dissection by medical students B) For organ donation/transplantation C) Both D) No idea
7. Are you willing to donate your body after death:
   A) Yes, for dissection purpose only B) Yes, for organ donation/transplantation C) For both purpose D) Not willing to donate
8. What is your opinion regarding positive attitude of Body Donation:
   A) To save someone's life B) To avoid environmental pollution C) To avoid unnecessary wastage of body D) A and C both by cremation E) To facilitate medical teaching F) All of the above
9. Reason for unwillingness to donate body:
   A) Don't want body to cut into pieces B) Body/organ can be mishandled/abused C) Prevented by Family Members D) Religious barrier E) Any other reason:
FOR PERSONS WILLING TO DONATE
10. From where you came to know about Body Donation:
    A) Self-motivated B) Medical teacher/Doctor C) Voluntary/Religious Organisation D) Media (TV, Newspaper, social media, etc.) E) Family Members
11. Do you know the procedure to donate the body:
    A) Yes B) No
12. Do you know the correct time to donate the body:
    A) Within 4 h B) Within 24 h C) As early as possible D) No idea
13. Have you filled the pledge form already:
    A) Yes B) No
14. Reason behind willingness to donate but have not filled the pledge form yet:
    A) Not decided B) Will do later C) Religious barrier D) Family not ready E) No benefit F) No idea about pledge form G) Need more information on this H) Any other reason:
15. Would you like to promote and spread awareness in the Society for body donation?
    A) Yes B) No C) Not sure D) Not answered