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Original Research Article

ANALYSIS OF CADAVER POPULATION: A RETROSPECTIVE STUDY IN A MEDICAL TEACHING INSTITUTION IN WEST BENGAL

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ABSTRACT

Introduction: The use of cadavers is an essential part of education and research in Anatomy. Besides Anatomy, dissections on cadavers are done for practicing surgical skills and also for development of new surgical techniques. As shortage of cadaver supply may adversely affect the quality of medical training, there exists an urgent need to overcome the scarcity of cadavers in our country.

Aims: In the present study, an attempt was made to create a database of cadaveric population in the Department of Anatomy of a medical teaching institution in West Bengal during last six years.

Materials and Methods: A retrospective review of cadavers received in the Department of Anatomy, Calcutta National Medical College, Kolkata through voluntary donation were studied during the period between 2010 to 2015, based on documents available in the same department at the time of body donation by the relatives of the deceased.

Results: Total numbers of voluntarily donated cadavers studied were 152. The pattern of body donation was variable from year to year. Highest numbers of cadavers were donated in the year 2010 and lowest in the year 2014. Most of the cadavers received were male as a result of institutional deaths and belonged to urban setting. Oldest and youngest cadavers were also of male ones. The average age of cadaver was 77.5 years and most (90.8%) of them were of 61-90 year age-group.

Conclusion: The Department of Anatomy of the present institution is well equipped with infrastructure and facilities to receive cadavers as there is a growing demand for steady supply of cadavers to maintain the quality of both undergraduate and postgraduate training and research. Shortage of cadavers also resulted insufficiency in supply of bones and viscera's. Moreover, female cadavers were found less in number and no paediatric cadaver was observed. To promote public education for the importance of body donation, joint efforts from various sections of people particularly religious leaders, popular public personalities should be emphasized. This activity might be augmented by setting up of help-desks in the medical teaching institutions to disburse information regarding donation process. Role of medical students cannot be ignored in raising awareness among general population towards the generous act of body donation to overcome the scarcity of cadavers in our country.

KEY WORDS: Anatomy, Voluntary body donation, Database, Public education.

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INTRODUCTION

Body donation is considered as an informed and free act of giving one's whole body after death for medical education and research. The use of cadavers for medical education and training started in 500 B.C. Shankaracharya firmly believed "Iddham Sharirum paropkarum" with true meaning that the body is for the use of others in which death is not the end; it is the beginning [1]. In ancient days, Sushruta dissected a number of human bodies. Andreas Vesalius (1514-1564) was the first medical student to dissect the cadaver and also continued with it even as a professor [2]. In late 18th and 19th century, when demand of cadavers exceeded supply in United States, anatomists would even dissect their own family members. William Harvey, who was famous for discovering 'circulatory system' dissected even the body of his own father and sister [3]. In India, the Anatomy Act was passed in 1948 to provide unclaimed bodies of deceased persons for the purpose of anatomical examination and research. The Anatomy Act was further amended in 2000 to allow donation before death of one's body or any part thereof, after death by a person to a hospital and medical teaching institution for therapeutic purpose, medical education and research. Thus, factors like age, sex, caste, religion, socioeconomic status etc. cannot stand as objection before body donation act [4].

Cadaveric dissection has been labeled as "royal road" and the cadaver as the "first teacher/patient". Teaching and research in Anatomy is wholeheartedly based on cadaver dissection and body donation is the major and preferred source of cadavers worldwide. It not only helps a medical student to learn topographic localization of various organs of body but also helps in developing a spatial and tactile appreciation for the fabric of human body that can't be achieved by prosection or computer assisted methods of learning alone [2,5]. With recent advancements in technology, many assisted models have been developed in the form of mannequins and simulations but none of them can be a true replacement to a real cadaver [3].

The student-cadaver-patient encounter is of paramount importance in medical education where dissection has been described as 'a precious experience', not to be missed as dissection has several learning outcomes other than anatomy learning like fostering teamwork and respect for human body and can enhance students' skill of thinking in a logical manner [5]. Besides Anatomy, cadavers are often used for practicing surgical skills and also to develop newer surgical technique before applying the same therapeutically with confidence over patients. With the increase in number of medical teaching institutions in our country, a steady supply of cadavers is becoming very essential to meet the requirement [4, 6-7].

Medical Council of India strictly regulates medical education in India and accordingly, first year medical undergraduate education programme include allocation of about 650 hours for teaching Anatomy as compared to less hours for other subjects [8].

In our institution, 2 hours of each working day are exclusively designed for dissection. Dissection is practiced for five days a week over a period of approximately 8-9 months in each academic session. Our institute with a recent annual intake of 200 students per year (150 till 2015-2016) for undergraduate (MBBS) and 2 students per year for postgraduate (MD/MS) course, thus requires a continued supply of cadavers to facilitate training and research in Anatomy as per MCI norms.

The donated cadavers who have pledged themselves when alive without any objection from their near relatives and provided they should have natural death and are free from contagious disease are accepted in this department. Taking into consideration of upsurge and renewed interest for body donation in recent past, data on this topic is meager on West Bengal population especially in this medical institution. Therefore, the present study was attempted to assess the adequacy, profile and trend of cadaver donation during the last 6 year in the Department of Anatomy.

MATERIALS AND METHODS

A retrospective review of individuals who donated their bodies in the department of Anatomy of the present institution during the period from 2010 to 2015 was conducted based

upon available data in this aspect. The relatives of voluntary donors who came to the present institution for body donation were required to fill a proforma regarding their willingness to donate bodies and then after donation, certificates were issued to relatives to express gratitude for their generous act. In this aspect, the death certificates issued by registered medical practitioner were collected by the authority and the proforma used in the study were filled based on those information maintained in the department from the above documents. Detailed information of cadavers mentioning their name, age, sex, religion, residence, date of death, place of death, cause of death etc. were recorded in tabular form and entered accordingly after manual inspection of body donation register maintained in the department of Anatomy. The cohort of donors in the present study included donors whose bodies were dissected for undergraduate and postgraduate studies as well as for research and workshops and also bodies which were in storage set-up waiting for dissection/workshop. Descriptive statistics and relative percentage where appropriate were calculated to characterize donors' information.

RESULTS

Findings of the present study are presented in brief in Table 1.

The following observations were made: Total number of cadavers received in the department of Anatomy during the study period between 2010 to 2015 were 152, highest number of cadavers received in the year 2010 which was 36, lowest number of cadavers received in the year 2014 which was only 13, males were found more inclined towards body donation (102, 67.11%) as compared to females (50, 32.89%), oldest and youngest cadavers were of male ones, youngest and oldest age at donation were 37 and 99 years respectively, among female cadavers, lowest and highest age of cadaver donation were 48 and 95 years respectively, average age of cadaver was found as 77.5 years, most (138, 90.8%) of the cadavers were of 61-90 year age-group and received as a result of institutional deaths, most (121, 79.6%) of the cadavers were donated from urban settings and all (100%) cadavers belonged to Hindu as found on overall area and religion-based analysis, total number of cadavers remained in storage for future use were 7 (4.6%).

Table 1: Analysis of cadavers in the year 2010-2015.

Year	Total number of cadavers received	Highest age of cadaver (in years)	Lowest age of cadaver (in years)	Average age of cadaver (in years)
2010	36 (Male: 24, Female: 12)	Male: 89; Female: 92	Male: 37; Female: 48	75.1(Male:74.1, Female: 77)
2011	27 (Male: 16, Female: 11)	Male: 94; Female: 87	Male: 61; Female: 61	80.0(Male:78.7,Female: 81.8)
2012	25 (Male: 17, Female: 08)	Male: 96; Female: 89	Male: 49; Female: 62	79.0(Male:79.9,Female: 77.1)
2013	34 (Male: 21, Female: 13)	Male: 99; Female: 95	Male: 56; Female: 60	77.0(Male:77.3,Female: 76.5)
2014	13 (Male: 09, Female: 04)	Male: 93; Female: 86	Male: 64; Female: 80	77.5(Male:75.3,Female: 82.5)
2015	17 (Male: 15, Female: 02)	Male: 92; Female: 78	Male: 68; Female: 73	77.7(Male:77.7,Female: 75.5)
Total	152 (Male:102, Female: 50)	Male: 99; Female: 95	Male: 37; Female: 48	77.5(Male:77.1;Female: 78.3)

DISCUSSION

Cadaveric dissection has long been considered as an essential teaching tool for sound understanding of human anatomy particularly its three-dimensional aspects towards medical undergraduates for better training in the clinical disciplines [9-11]. Human body is though very complex but conforms to a general pattern. What is described as normal anatomy in textbooks is found less than half the time. These are known as variants which are present in many individuals. Each cadaver is therefore like a new source of knowledge as such anatomical variants are of considerable importance in disseminating messages to different sections of medical personnel like surgeons, radiologists, orthopaedicians etc. Moreover, as paediatric anatomy deviates considerably from adult anatomy, dissection on younger child should be emphasized to build up more knowledge on anatomy of paediatric population [1].

With the rising number of medical colleges, most of the medical colleges in India suffer from gross insufficiency of donated cadavers that might

affect the quality of medical teaching and training in near future [2]. Several reasons have been documented for such shortage like spirituality, religious beliefs, lack of awareness among donors or their families towards body donation etc. Unnecessary loss of cadavers due to lack of proper co-ordination between centers reflects other cause of relative insufficiency of cadavers. There is a dilemma among the people that body may not be treated with dignity and respect. People also fear their bodies may not be used for the right purpose [12].

The Department of Anatomy of the present institution is well equipped with infrastructure and facilities to receive cadavers for both undergraduate and postgraduate training and research. The department receives cadavers through voluntary cadaver donation from a wide area covering the metropolitan city of Kolkata and its suburbs.

During the past six year retrospective analysis, the number of cadavers received has remained relatively low. The pattern of body donation was found to be variable from year to year. It was observed that additional donation of multiple cadavers from outside the state resulted in increased cadaver population in the year 2013. Cadavers received in any year might be used in other year. Most of them were used in medical training & research purpose for both undergraduate and postgraduate students and surgical training & workshops. But data regarding exact usage pattern were lacking. We found only 7 bodies were present in stock in this institution for future use. Armstrong reported that there was a higher willingness to donate in younger age group than older ones in Australia [13]. Other investigators found that older age was negatively associated with body donation [14-15].

In the present study, average age of donation is 77.5 years. Most previously done Indian studies have reported that commonest age-group of donated cadavers as of 61-90 years [1, 16-17]. The higher age-group of the cadavers might be due to the facts that they have higher mortality rate resulting from natural cause. The need of positive response from young age-group is there in the present institution as youngest age at donation was found as 37 years. In the present study, predominantly male donors were found similar to other studies [15, 17, 18-19]. Such sex related difference in the attitude towards body donation could be explained by the fact that women in our country feel more cultural bondage due to low level of literacy and male dominated society might discourage to raise awareness among women. On socio-demographic exploration of whole body donors, different investigators reported that literacy favored body donation among educated section of people [20-21], but in our study we could not see the related trend due to lack of data regarding socio-economic status of donated bodies. Moreover, most of the cadavers were donated from urban settings indicating rural and semi-urban people in our state are less aware and feel more cultural bondage about body donation.

Almost all religions in the world support and encourage the act of donation. However, the decision is left to personal conscience [2]. In the present study, all cadavers belonged to only Hindus. This indicates that there is less or no awareness among other religions about body donation. Therefore, proper counseling and guidance to all religions are very much essential.

Supply of bones from the cadavers were found in shortfall to meet the requirement of the department as cadavers were embalmed within a few hours of donation rendering them unfit for bone extraction. In order to alleviate such problem, attempts could be made to embalm the cadavers in selective way. Gross insufficiency of cadavers also aggravated shortage of viscera pool in the department.

It is also worth noting that increased number of cadavers should be used to maintain quality of medical research and training in Anatomy and also to serve the growing requirement of different surgery based workshops and training programmes in the present institution.

Limitation:

In the present study, lack of information about expected donation (through scrutiny of pledge forms) and usage pattern of cadavers might affect the quality of medical teaching and training. Attempts should be made to maintain record through incorporation of proper information regarding the above mentioned issues as such inclusions are quite justifiable. Moreover,

such efforts could minimize unnecessary loss due to poor preservation as results of either prolonged transportation or late notification. Therefore, various reasons cited above should be taken care of while designing future awareness campaign programme.

CONCLUSION

The present study is an attempt to provide baseline data pertaining to both past and present profile of cadaveric population in a medical teaching institution in West Bengal. Keeping in mind that lack of cadavers might create a serious threat for future medical education, well organized co-ordinated efforts from different social organizations should be emphasized to make appropriate counseling of donors and their close relatives to remove various reasons cited for 'no body donation'. This activity might be augmented through participation of various sections of people particularly religious leaders, popular public personalities of the society to cast positive attitude among potential donors to turn them into actual donors.

To promote public education for the importance of body donation, undergraduate medical students admitted in the institution may take crucial role to initiate awareness among their families and friends. In the interest of whole medical fraternity, teaching medical institution can promote whole body donation by establishment of help desks to facilitate donation process by disbursing information as lack of proper guidance often leads donation process cumbersome and discourage people from contributing them to the noble cause of advancement of medical science. Thus, the present study can definitely play important role in raising awareness in the society towards the generous act of body donation to overcome the scarcity of bodies in our country.

Conflicts of Interests: **None**

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