

Diversity of Body Donations and Willed Donor Applications in a Newly Established Medical Faculty in Sri Lanka

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Abstract

Objective: Body donations to the medical faculties in Sri Lanka play a critical role in medical education and research. The success of body donation programs depends on the diversity of donors. Assessing donor diversity is crucial to meeting the educational needs of students and researchers. Thus, the aim of this study was to examine the demographic profiles and diversity of donors and willed donors registered at a newly established Faculty of Medicine (FOM), Wayamba University of Sri Lanka (WUSL) located in Kuliyaipitiya, Northwestern Province (NWP).

Methods: A retrospective analysis of the body donation registry and willed donor applications received to the Department of Anatomy, FOM, WUSL from the year 2019 to 2024 was conducted.

Results: A total of 35 adult body donations, one foetal body donation, and 183 complete willed donor applications were received. The highest number of body donations (38.88%, n=14) and willed donor applications (n=117, 63.93%) have been received in the year 2023. Based on this study, the typical donor was likely to be a 52-year-old, Sinhalese male lived in NWP. The typical willing donor was likely to be a Sinhalese, female living in the NWP.

Conclusion: Although a good number of body donations and applications have been received, a lack of ethnic diversity in the donations was observed despite the population-based ethnic diversity of the country and the NWP.

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Introduction

Body donations to medical faculties play a crucial role in medical education and research, providing valuable opportunities for students and researchers to study human anatomy in a hands-on manner (1). While some argue that technological advances can provide more sophisticated, comprehensive, and time-saving teaching materials for anatomy, many educators believe that hands-on experience with real human bodies is essential for medical students to truly understand the intricacies of human anatomy. Dissection allows students to generate valuable skills such as manual dexterity, spatial understanding, and critical thinking, which are difficult to replicate through virtual means (2,3). Furthermore, the use of cadavers allows students to develop empathy and respect for the human body, professional development skills that are crucial for their future interactions with patients (4,5). It also provides an opportunity for students to understand the variations and complexity of human anatomy, which is essential for understanding anatomical basis when treating patients in clinical practice (6,7).

Many years ago, cadaver dissection mostly involved unclaimed or executed bodies. Nowadays, the majority of bodies used for this purpose are donated voluntarily. Body donation involves giving one's body after death with no expectations or incentives, solely for medical education and research (8). Several countries have established programs to accept body donations and utilize them for dissection in medical schools as a primary method for teaching human gross anatomy in medical education (9). The countries with a

preponderance of Buddhists, including Thailand, Japan, and Sri Lanka, in which the cadavers received exclusively through body donation for medical education and research confirm the notion that religion has a significant impact on willed cadaver donations (10).

Several researchers have examined the demographic profiles of the cadaver donors (11-15). The majority of these have been conducted among the Western population (11-15) except two being conducted in South Africa and India (13, 16). It has been also shown that the willingness to consider full-body donation is substantially correlated with demographic characteristics (17). Therefore, assessing the demographics of cadaver donors is crucial for improving research and education in the medical field, and increasing cadaver availability through increased donation rates, especially for a newly established medical faculty.

Sri Lanka, despite being a third-world country with a financial crisis and limited resources, has found that cadavers are an affordable and accurate mode of teaching and learning gross anatomy. Exposure to diverse cadavers during medical education and research is crucial as it allows students and researchers to appreciate the vast diversity in human anatomy and understand variations within different populations in a precise manner in comparison to artificial models. This exposure also promotes a more comprehensive understanding of cultural sensitivity and ensures that medical knowledge is applicable and beneficial to a diverse and multicultural population.

Most of the well-established Sri Lankan medical faculties receive dead bodies continuously as there are many more volunteers to donate bodies except the medical schools established in the Eastern province in Sri Lanka. However, the assessment of the diversity of the body donations and the adequacy of donations to newly established medical faculties has not previously been assessed. Therefore, assessing the diversity of cadaver donors and the social demographic profiles of body donations in Sri Lanka is timely and important. Identifying the demographic characteristics of potential donors could assist in determining the specific audience for body donation awareness campaigns to maximize the diverse cadaveric exposure in anatomy education.

Recognizing the importance of engaging with a diverse range of donors in medical education, this study aimed to examine the demographic profiles of registered body donors and willed donors at the Faculty of Medicine, Wayamba University in Sri Lanka, including factors such as age, gender, and ethnicity. Further, by identifying possible geographic areas and communities for potential donations, the faculty can launch awareness programs targeting potential communities in the geographical regions surrounding to faculty to ensure an adequate supply of cadavers in diverse populations to meet the anatomy educational needs in the future.

Methods

A retrospective analysis was conducted at the Department of Anatomy, Faculty of Medicine,

Wayamba University of Sri Lanka. The body donation registry has been maintained since November 2019 by the receipt of the first body donation to the department up to date. The willed donor applications with informed written consent to donate the body following death have also been received from November 2019 to date. Data on all body donations and willed donor applications received from the year 2019 to April 2024 were analyzed. The data collected included information on received body donations and willed donor applications. Demographic characteristics of body donors and willed body donors such as gender (male, female), age, and ethnicity (Sinhalese, Sri Lankan Tamil, Moor, etc.) were collected. The distance from donors' residences to the faculty was determined using Google Maps based on their permanent addresses.

Descriptive statistics were used to analyze the data, including percentages and frequencies. For comparison purposes, the data on body donations and willed donor applications were analyzed separately. The analysis also involved identifying the typical donor and willed donor profile based on age, gender, ethnicity, and distance from donors' residence to the faculty. Statistical Package for the Social Sciences (SPSS) version 23 was used in data analysis.

Results

The faculty was established in the year 2018 and the acceptance of donations was started in January 2019, and the first body donation was received in November 2019.

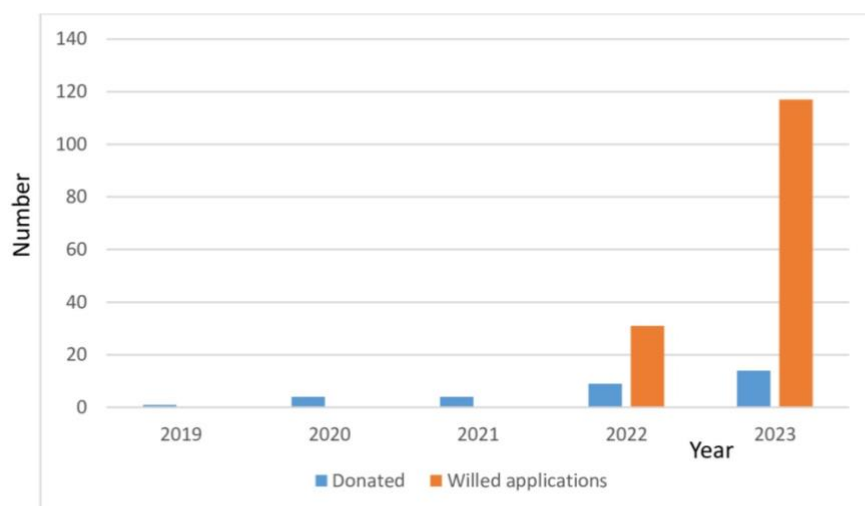


Figure 01 describes the body donations and willed donor applications received in each year at the Faculty of Medicine, Wayamba University of Sri Lanka.

Table 01: Body donations and willed donor applications received by each gender in each year from 2019 to 2024 at the Faculty of Medicine, Wayamba University of Sri Lanka.

Year	Number and percentages of donations(n=36)		Number and percentages of willed donor applications(n=183)	
	Males	Females	Males	Females
2019	01(100%)	00(0%)	00(0%)	00(0%)
2020	02(50%)	02(50%)	00(0%)	00(0%)
2021	04(100%)	00(0%)	00(0%)	00(0%)
2022	05(55.56%)	04(44.44%)	14(45.16%)	17(54.84%)
2023	11(78.57%) *	03(21.43%)	36(30.78%)	81(69.23%)
2024	01(25%)	03(75%)	20(57.14%)	15(42.86%)

Table 01 describes body donations and willed donor applications received by each gender in each year from 2019 to 2024 at the Faculty of Medicine, Wayamba University of Sri Lanka.

*Including the donation of a male foetus.

To date, the faculty has received a total of 35 adult body donations, one foetal body donation, and 183 complete willed donor applications to meet the educational and research demands. The highest number of body donations (n=14,38.88%) as well as the highest number of willed donor applications (n=117,63.93%) has been received in the year 2023 (Figure: 01).

The received body donations show a male preponderance of 63.88% (n=23). In contrast to the received body donations, the willed donor applications show a female preponderance of 61.74%(n=113). In 2019, only one male donation was received, while in 2020, there was an equal distribution between males and females. However, in the following years, the number of male donations was more than female donations, with the highest number recorded in 2023. On the other hand, the number of willed donor applications showed a different trend, with more applications received from females compared to males in most years (year 2022 and 2023) (Table 01).

The analysis of the ethnicity shows that the body donations received by the Faculty of Medicine, Wayamba University of Sri Lanka, exclusively from the Sinhalese ethnic group (n=36*Including the donation of a male foetus). In 2019, there was only one donation from a Sinhalese individual, but this number increased in the following years with 04 and 09 donations in years 2021 and 2022 respectively. Interestingly, in 2023, there was a significant increase in donations, with 14 coming from the Sinhalese group. In the year 2024, 04 donations were received within two months

showing a potential trend of increased receipt of body donations. Received willed donor applications were also exclusively from Sinhala people till the year 2023. However, Sinhala preponderance of 98.91%, (n=181) was noted after receipt of 1.09% (n=02) willed donor applications from Sri Lankan Tamils in the year 2024. Neither cadavers nor willed donor applications were received from any other ethnic groups living in the country.

Following the analysis of distance, the study found that the mean distance from the residence of the donor to the faculty reported was 36.76km. The minimum distance recorded was 1.1km, while the maximum distance was 102km. This indicates that there is a wide range in the distance between a donor's residence and the faculty. The majority of both the donors (61.11%, n = 22) and willed donors (95.81%, n = 175) were from NWP.

In the analysis of ages, Grubbs' test was used to identify outliers in the two data sets. When the age of foetal body donation was included the G-value against the critical value at the significance level of 0.05 was greater than the critical value. Since the age of the foetal donation is significantly different from the rest of the data, it was considered to be an outlier and removed from the analysis. Therefore, the age of adult body donors ranged from 31 to 87 years and showed normal distribution. The mean age of donors was 52.09 years with a standard deviation (SD) of 13.45 years. The mean age of females was (53.3±14.56 years) which was slightly higher than that of males (51.9±11.45 years) (figure 02). A typical body donor of the Faculty of Medicine, Wayamba University of Sri Lanka is a 52-year-old

Sinhalese (100%) male (63.88%, n = 23) lived in NWP (61.11%, n = 22).

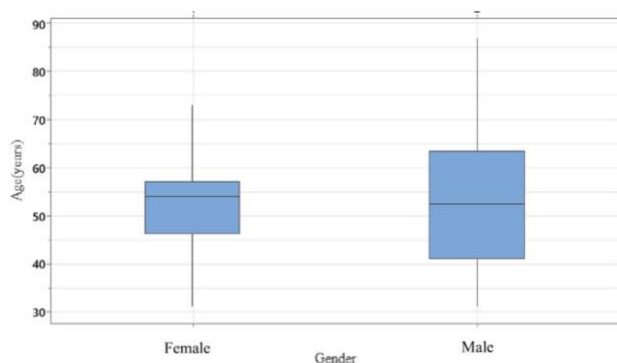


Figure 02: Box plot of the age distribution of body donations by gender

The willed donors' age ranged from 20 to 93 years. In contrast to the ages of the body donors the ages of willed donors showed a negatively skewed distribution. The median age of females was 62 years, while the median age of males was 64 years (figure 03). A typical willing donor is a Sinhalese (98.95%, n = 181), female (56.54%, n = 113) of 64 years, living in the NWP (95.81%, n = 175).

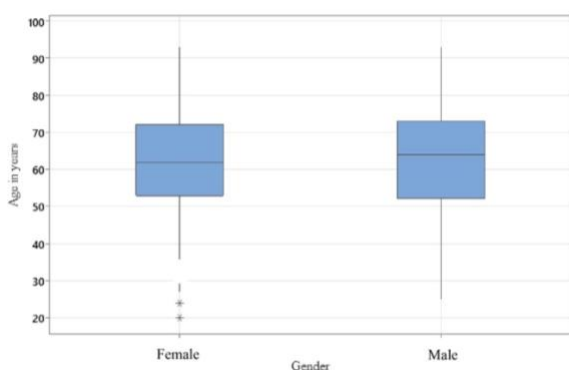


Figure 03: Box plot of the age distribution of willed donors by gender

Discussion

The medical faculties in Sri Lanka regularly receive a significant amount of body donations

for educational and research use, except for the faculty located in the Eastern province of the country. The teaching of practical gross anatomy in Sri Lankan medical faculties is mainly based on the donated whole bodies and prosected specimens prepared from donated bodies. Previous studies on the demographic profiles of cadaver donors and donor diversity have mainly been conducted among populations in Western countries (11,12,14,15) and limited attention has been received to exploring the donor diversity of cadavers in Sri Lanka.

A multicenter, prospective study conducted in New Zealand, Ireland, and South Africa revealed variations in donor age among different populations (13). Race or ethnicity has been identified as one of the main factors influencing willingness to donate bodies (17). Our research indicates that our donor pool is predominantly made up of Sinhalese individuals, likely due to the strong influence of the Sinhala Buddhist culture that promotes the act of donation. There is a male predominance among body donors in our study as shown in India and England (16,14), but in contrast to the findings from Brazil which shows a higher proportion of female donors (15).

The average age of donors varies across countries, with Brazil seeing donors at around 60 years (15) old, India with donors typically in their 70s (16), and the USA and England seeing donors with an average age of around 70 and 82 years (18,14), respectively. Our findings also indicate that the typical donor as well as a typical-willed donor are above 50 years and fall within the age range of the

elderly population supporting the notion that body donors are typically of advanced age.

An interesting finding of the study is that some donors have been from more than 100 km away from the faculty even without providing any transport facility or expenses for the transport. This finding can be attributed to the fact that developed public awareness beyond the near vicinity of the faculty through the medical students from various districts may be encouraging donors to consider a donation to the newly established faculty to fulfill their educational and research demands. Additionally, there are no restrictions or cut-off distance in acceptance of the donations.

The key finding of this study was that the newly established medical faculty, FOM, WUSL is lacking a diverse collection of donors despite the receipt of a good number of donations received within a short period. When considering the population statistics of the country, it is important to note that 74.9% of the population is Sinhalese, 11.2% are Sri Lankan Tamils, and 9.3% are Moor. In the NWP, the population diversity is slightly different, with 85.7% Sinhalese, 2.8 % Sri Lankan Tamils, and 11% Moor (19). However, it is concerning to observe that the diversity in the received body donations and willed donor applications does not reflect any of the diversities seen in the country or the NWP. Research done in Western populations has also shown a similar lack of donor diversity, with white elderly individuals being the typical donors (11,14,15,20,21). A study in India too noted a significant predominance of Hindu donors, which does not align with the racial

diversity present in census data and statistics (16).

Although a newly established faculty, the Faculty of Medicine Wayamba University of Sri Lanka has received an acceptable number of 36 cadavers to meet the educational and research demands within a short period. The time gap of ten months between the initiation of the acceptance of body donation in January 2019, and to receipt of the first donation in November 2019 may be attributed to the time required to raise awareness about the faculty and its body donation program among the public. When considering the receipt of only one donation in the year 2019, limited facilities and technical training to preserve bodies have limited the receipt of bodies in this initial year. The number of cadaver donations was also limited in 2020 and 2021, possibly due to COVID-19 restrictions on physical contact. During the COVID-19 pandemic, the complete discontinuation of accepting body donations in Spain and India (18,22) as well as the limitation on accepting body donations in the USA (20) has been reported. However, the well-established faculties in the USA seem to have maintained sustainability as utilization has also been decreasing during that period proportional decrease in body donations and body donor requests (20). Our findings further indicate a significant increase in body donations and an increase in willed donor applications following the COVID-19 pandemic since the year 2023. A similar tendency was observed even in the USA (21), attributed to the easing of physical contact restrictions in the subsequent years, allowing for more opportunities for charitable giving.

In conclusion, while there has been a receipt of a considerable number of body donations and willed donor applications to the newly established medical faculty even within a short period, there is a lack of diversity in terms of ethnicity. This is concerning given the overall ethnic diversity of the population in the NWP and the country as a whole. It might be challenging to increase body donation among minorities in the NWP of Sri Lanka due to religious and cultural beliefs and concerns. Further, research on the island-wide analysis of socio-demographic characteristics of donated cadavers, and socio-cultural beliefs would be useful to get an overall idea of the diversity of the donations in the country and to identify target groups to implement necessary interventions to enhance the diversity of body donations in Sri Lanka. Identifying the demographic characteristics of potential donors could assist in determining the specific audience for body donation awareness campaigns to maximize the diverse cadaveric exposure in anatomy education and research.

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Conflicts of interests: None

Author contributions

EAAMW was involved in conceptualization, planning, literature review, data analysis, manuscript writing, review, and editing. PADS was involved in Data analysis, and KMC was involved in review, proofreading, and editing.

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