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# Opinions of Medical Students about Cadavers and Cadaver Procurement in Medical Education

## Cadavers And Cadaver Procurement in Medical Education

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**ABSTRACT**

**Objective:** Although various learning methods are used in anatomy education, cadavers remain unquestionably important in medical education worldwide. Many medical schools face shortages of cadavers. The aim of this study was to investigate students' awareness of and attitudes toward cadavers and the process of cadaver procurement.
**Materials and Methods:** The survey was distributed to second- and third-year students at the Faculty of Medicine via digital media in 2023. A sixteen-question survey was administered to 140 students who participated in the study at the end of the academic period.
**Results:** Almost all medical students (91%) believed that cadavers should be included in anatomy education. Most students reported that they were not emotionally affected while working with cadavers and did not experience negative emotions such as anxiety or fear. When working with cadavers, women showed significantly more empathy than men ($p<0.05$). Forty-six percent of students knew how to obtain cadavers, while 43% stated that it was important to know how the cadaver they worked with was obtained. In our study, 36% of students found it ethically acceptable to use abandoned bodies in anatomy education, and 67% found it acceptable from an educational perspective. It was concluded that students were not willing to encourage themselves, their family members, or their acquaintances to donate bodies.
**Conclusion:** The results of this survey may provide information that will contribute to further research and the implementation of educational programs aimed at increasing medical students' awareness of cadavers and cadaver procurement.

## Tıp Eğitiminde Kadavra ve Kadavra Temini Hakkında Tıp Öğrencilerinin Görüşleri

### Tıp Eğitiminde Kadavra ve Kadavra Temini

**Makale Bilgisi**

**Makale Geçmişi**
**Geliş Tarihi:** 06/08/2024
**Kabul Tarihi:** 03/10/2024
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**Anahtar Kelimeler:**
Beden bağışı,
Kadavra,
Kadavra temini,
Diseksiyon,
Anatomi eğitimi

**ÖZET**

**Amaç:** Anatomi eğitiminde farklı öğrenme yöntemleri kullanılmasına rağmen, kadavranın dünya genelinde tıp eğitiminde tartışmasız önemli bir yeri bulunmaktadır. Kadavralarla anatomi eğitiminin önemine rağmen, birçok tıp fakültesinde yeterli kadavra bulunmamaktadır. Bu çalışmanın amacı, öğrencilerin kadavra ve kadavra temini konusundaki farkındalıklarını ve tutumlarını araştırmaktır.
**Gereç ve Yöntemler:** Anket, 2023 yılında Tıp Fakültesi Dönem II ve Dönem III öğrencilerine dijital ortam üzerinden ulaştırılmıştır. Çalışmaya katılan 140 öğrenciye eğitim döneminin sonunda on altı sorudan oluşan bir anket uygulanmıştır.
**Bulgular:** Tıp fakültesi öğrencilerinin neredeyse tamamı (%91) anatomi eğitimine kadavranın mutlaka olması gerektiğini düşünmektedir. Öğrencilerin çoğu, kadavralarla çalışırken duygusal olarak etkilenmediklerini, kaygı ve korku gibi olumsuz duygular yaşamadıklarını belirtmiştir. Kadavralarla çalışırken kadınlar erkeklerden anlamlı olarak daha fazla empati kurabilmektedir ($p<0,05$). Öğrencilerin %46'sı kadavra temin yollarını bilmektedir. Öğrencilerin %43'ü çalıştıkları kadavranın hangi şekilde temin edildiğini bilmenin önemli olduğunu belirtmiştir. Çalışmamızda sahipsiz bedenlerin anatomi eğitiminde kullanılmasını etik açıdan doğru bulan %36, eğitim açısından doğru bulan %67 oranından öğrenci bulunmaktadır. Öğrencilerin beden bağışı için kendilerini, aile üyelerini veya çevrelerini teşvik etmeye istekli olmadıkları sonucuna varılmıştır.
**Sonuç:** Bu anketin sonuçları, tıp öğrencilerinin kadavra ve kadavra teminiyle ilgili farkındalıklarını artırmayı amaçlayan eğitim programlarının uygulanmasına katkıda bulunacak bilgiler sağlayabilir.

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## Introduction

In anatomy, cadaver dissection is an age-old but powerful learning tool for medical students. The regular use of the human body in medical education began in Europe during the Late Middle Ages and became widespread in the 18th and 19th centuries (1). From then to the present, dissection has maintained its value in the medical curriculum as a method of learning human anatomy (2). This learning approach provides students with a true three-dimensional view of human anatomy and reinforces the knowledge gained in lessons. Examining cadavers in anatomy education allows students to discover variations in real human material compared to textbooks and models (3). It also improves the manual dexterity required in almost every field of medical expertise (4).

Cadaveric dissection is a traditional method used in anatomy education. In addition to cadaver anatomy education, the development of technology has introduced new learning methods, such as computer-based programs and three-dimensional models, in anatomy courses (5). While it is relatively easy to provide training using technological advances, these materials are not real (6). Observing the human body in the dissection laboratory and seeing the organs and tissues in their actual locations underscores the importance of cadavers in anatomy education, despite technological advancements (7). Combining traditional methods with emerging technologies can enhance the understanding and retention of information. Therefore, courses that incorporate dissection, three-dimensional models, and imaging methods together may be more effective. A multimodal education approach to anatomy is considered one of the best methods (8).

The cadaver impacts students not only by providing information about the human body but also in terms of shaping their attitudes and thoughts toward life and death. Confronting the cadaver allows students to face the concept of death and may provoke deep reflection on the subject (9, 10). A medical student's first encounter with a cadaver can be a period of intense emotions, such as anxiety and stress. Understanding the complex emotions students experience in dissection laboratories is essential for the development of their professional skills (9, 11). It is believed that prospective physicians form their first attitudes toward patients in their professional lives based on their experiences in dissection laboratories (11).

Despite the importance of cadaver anatomy education, many medical schools face challenges in providing an adequate cadaver supply due to factors such as financial and transportation difficulties, religious reasons, and sociocultural considerations. There are several options for procuring cadavers, including body donation programs, imported cadavers, bodies of criminals sentenced to death, or unclaimed bodies (12, 13). Additionally, practices vary greatly between developed and developing countries. In many developed countries, cadavers are sourced through body donation programs (14, 15). In developing countries such as Iran, South Africa, and Nigeria, unclaimed bodies or those of criminals sentenced to death are used as cadaver sources (13, 16). In Turkey, many

faculties rely primarily on unclaimed bodies, with additional sources including voluntary body donations or imports (17).

Despite the importance of cadaver procurement, there are relatively few survey studies in the literature on this topic compared to other surveys related to cadavers. The aim of our study is to examine the opinions of medical faculty students on cadavers and cadaver procurement, which serve as the primary educational resource in anatomy courses.

## Materials and Methods

The study was conducted with a total of 140 medical students (74 female, 66 male) who volunteered to participate in the survey from Term II (second year) and Term III (third year) students registered at Izmir Kâtip Celebi University Faculty of Medicine in Turkey. Approval for the study was granted by the Izmir Kâtip Çelebi University Noninvasive Clinical Research Ethics Committee (decision number 2023/180).

The survey was composed of two parts: demographic characteristics of the participants and their opinions about cadavers and cadaver procurement. Three answer options were provided: Yes, No, and Undecided. Participants were informed about the purpose of the survey, and their consent was obtained. The survey, consisting of sixteen questions, was administered to students at the end of their anatomy education period. Additionally, the researchers assured the students of the confidentiality of their identity information before they participated in the survey. Survey data were collected digitally using the "Google Forms" application (Google, Inc., Mountain View, CA, USA).

The data were analyzed using IBM SPSS Statistics 25.0 (IBM Corp, Armonk, New York, USA). The number of units and percentage values were presented as descriptive statistics. For categorical variables, the exact method of the Chi-Square test was used for comparisons between groups. A p-value of $<0.05$ was considered statistically significant.

## Results

The demographic data of the students who participated in the survey are presented in Table 1. A total of 140 students, 74 female and 66 male, answered the survey (Table 1).

The answers given by the students to the survey questions regarding cadavers and cadaver procurement are shown in Table 2. Almost all of the students (91.4%) thought that cadavers should be included in anatomy education. Although most of the students had never seen a dead body before (73.6%), they were not emotionally affected (75%) and had no anxiety/fear (81.4%) while working with cadavers. Nearly half of the students knew how to obtain cadavers (46.4%) and thought that this knowledge was important (43.6%). Working with donated cadavers positively affected the majority of students (70.7%). While 67% of the students found it correct to use abandoned bodies as cadavers for educational purposes, only 36% found it

ethically correct. Most students thought that knowing that the cadaver donor was alive could emotionally affect them (80%), and a small proportion wanted to encourage people around them to donate (22.9%). While 39% of the students' experience in the anatomy laboratory increased their likelihood of becoming a cadaver donor, 34% answered negatively. Only 17% felt ready to become a cadaver donor.

A comparison of the answers given by the students according to gender is presented in Table 3. Compared with male students, female students showed more empathy when working with cadavers ($p<0.05$). Thirty-two percent of male students and 19% of female students found it ethically correct to use unclaimed bodies in medical education (Figure 1).

A comparison of the answers from students according to class is shown in Table 4. Compared to Term II students, Term III students did not feel emotionally affected while working with cadavers and stated that they did not empathize as much while working with cadavers ($p<0.05$).

## Discussion

The use of cadavers is the main method and an indispensable part of learning anatomy in many medical schools. It holds an important place in the beginning and continuation of medical students' education (18, 19). In fact, cadavers can be considered the first patients students encounter in their professional lives. Although cadavers are a necessary and effective tool, there are many difficulties in their procurement, and the number of cadavers is insufficient in faculties. One of the underlying factors contributing to these difficulties is the lack of necessary information and awareness about issues related to cadaver procurement and body donation (20, 21). The aim of this study was to investigate students' knowledge and attitudes about cadavers. Therefore, we believe that this study can increase students' awareness of cadaver procurement.

In the current literature, medical students consider cadavers and cadaver dissection to be among the most effective methods for learning anatomy (22, 23). In one study, 91% of the students and 95% after dissection training stated that cadavers were necessary for anatomy education (24). In another study, almost all of the students (99%) stated that cadaver dissection has important educational value for anatomy (25). Similar findings have been reported in the literature (24, 25). In our study, 91% of the students stated that cadavers should be included in anatomy education. These findings suggest that, although cadaveric use is a traditional method, it still maintains its importance.

One of the difficulties students experience in anatomy laboratories is their first encounter with a cadaver. Previous studies have reported that students have negative reactions to dissection, such as anxiety, stress, and fear, and that these reactions improve over time (26-28). Bahsi et al. (7) determined that women felt more negative emotions, such as anxiety, excitement, and fear, than men during their first encounter with a cadaver, and that these negative

emotions decreased significantly after the fifth encounter. Chang et al. (9) observed that as the time spent in the dissection laboratory increased, students' stress and anxiety levels decreased. In our study, most of the students stated that they were not emotionally affected and had no anxiety/fear while working with cadavers. Negative feelings toward cadavers reported in the literature were not observed during dissection in our study, possibly because the survey was administered at the end of the training period, all at once. In addition, our study revealed that women were more empathetic than men when working with cadavers. We believe that this result is due to women's development of empathy skills.

In our study, 46.4% of the students knew how to procure cadavers, and 43.6% thought that it was important to know how to procure cadavers when working with cadavers. Although there is not enough knowledge about cadaver procurement, most students stated that working with donor cadavers had a positive impact on them. This may indicate that students have a positive attitude toward body donation. In the literature, there are different data regarding students' knowledge and awareness about how to procure cadavers (23, 29). Ciliberti et al. (23) stated that students have incomplete information about body donation programs. Mwachaka et al. (30) reported that only 13.9% of medical school students had heard of body donation programs. In contrast, Ganapaty et al. (29) reported that 87% of medical students were aware of voluntary body donation. The reason for the different results in the literature may be the existence of information and awareness programs about body donation throughout medical education, and the variability of their contents between countries.

Although donation programs are recommended as a source of cadavers in anatomy education, abandoned bodies are mostly used in countries facing supply shortages. The use of abandoned bodies has led to ethical debates (31). In our study, although 36% of the students responded "yes," 31% answered "no," and 32% answered "undecided" to the question, "Do you think it is ethically correct to use unclaimed/unidentified bodies in medical education?", the answer to the question "Do you think the use of unclaimed/unidentified bodies in medical education is correct in terms of education?" was 67% in agreement. The majority of students may have thought that cadavers played an important role in anatomy education and found it appropriate to use abandoned bodies for educational purposes. Additionally, investigating students' thoughts on ethical issues related to cadaver procurement can contribute to ongoing ethical discussions in the literature, particularly in terms of student evaluations.

A study conducted in Iran reported that most students were reluctant to encourage their family members and friends to donate bodies. In that study, a contradiction was found between the desire to donate one's own body and the desire to encourage others (13). Similarly, in our study, it was determined that students were not willing to donate. Only 23% of the students answered "yes" to the question, "Would you like your family to be a body donor?" In our study, unlike Abbasi et

al.'s results, there was also reluctance among students to encourage people around them, whether they knew them or not. We believe that the reluctance to encourage body donation may be due to the inadequacy of donation programs and activities. When such activities increase, students may be more willing to promote awareness of and a sense of responsibility for cadaver donation in society.

There are studies reporting that participants' support for the idea of donating their bodies decreased significantly after the anatomy dissection laboratory (32, 33). Gebert et al. (34) reported that the percentage of students willing to volunteer for body donation decreased by 25% after cadaver dissection. After dissection, the thought of dissecting one's body may cause discomfort and anxiety. In this study, the number of students who said that their chances of donating their bodies increased as a result of their experiences in the anatomy laboratory was 39%. Agnihotri et al. (10) reported that mental and emotional preparation of students before entering the dissection laboratory reduced the anxiety that might occur after dissection. If the negative emotions that students experience after dissection are reduced by providing preliminary information before entering the dissection laboratory, their support for body donation can increase.

Although cadavers have an unquestionably important place in medical education, there is great difficulty in procuring cadavers, and there is general reluctance to voluntary body donation. Singh et al. (35) reported that only 33% of medical and nursing students were willing to donate their bodies. Boduç et al. (36) reported that while the majority of students wanted to donate their organs, very few were willing to donate their bodies. In our study, only 17% of the students felt ready for cadaver donation. The reason for the reluctance to donate cadavers, which was observed in our study as well as in other studies, may be psychological obstacles arising from the idea of deteriorating the integrity of the person's body. We believe that these obstacles can be overcome by showing respect for cadavers in dissection laboratories through medical education, explaining the benefits of cadavers in education, and emphasizing the importance of body donation.

**Conclusion**

Cadavers and cadaver dissections are among the most valuable tools and methods used in anatomy education. Although their educational value is widely accepted, there are significant challenges in their supply, and ethical debates continue in situations of limited availability. In our study, although medical school students did not have sufficient knowledge about how to procure cadavers, they demonstrated a positive attitude toward donor cadavers. However, both students and their families are reluctant to donate or encourage body donation. Students' knowledge and awareness can be enhanced by including more programs focused on cadaver use and cadaver donation in medical education. Future doctors can play an important role in increasing public awareness of cadavers and cadaver donation, particularly in terms of medical education and research.

## Limitations

The limitations of our study include the small sample size and the fact that only a single institution was evaluated. Additionally, since our survey was administered only at the end of the semester, we were unable to make a comparison regarding the students' situation before receiving anatomy education.

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**Table 1.** Demographic characteristics of medical students.

| Demographic parameters | Total, *n* (%) |
|---|---|
| Gender | |
| Female | 74 (52.9) |
| Male | 66 (47.1) |
| Year | |
| Second-year students | 109 (77.9) |
| Third-year students | 31 (22.1) |

**Table 2.** Distribution of answers to survey questions

| Questions | Yes<br>*n* (%) | No<br>*n* (%) | I'm not sure<br>*n* (%) | Total<br>*n* (%) |
|---|---|---|---|---|
| **Q1.** Is it necessary to have education with cadavers? | 128 (91.4) | 1 (0.7) | 11 (7.9) | 140 (100) |
| **Q2.** Have you ever seen a dead body before seeing a cadaver? | 37 (26.4) | 103 (73.6) | 0 (0) | 140 (100) |
| **Q3.** Do you feel emotionally affected when working with cadavers? | 25 (17.9) | 105 (75) | 10 (7.1) | 140 (100) |
| **Q4.** Did you empathize while working with cadavers? | 63 (45) | 61 (43.6) | 16 (11.4) | 140 (100) |
| **Q5.** Do you experience any anxiety or fear when working with cadavers? | 22 (15.7) | 114 (81.4) | 4 (2.9) | 140 (100) |
| **Q6.** Do you have information about ways to supply cadavers? | 65 (46.4) | 41 (29.3) | 34 (24.3) | 140 (100) |
| **Q7.** Is it important for you to know how the cadaver you are working with was supplied? | 61 (43.6) | 49 (35) | 30 (21.4) | 140 (100) |
| **Q8.** Does working with a cadaver that you know is a donor affect you positively? | 99 (70.7) | 24 (17.1) | 17 (12.1) | 140 (100) |
| **Q9.** Do you think the use of unclaimed/unidentified bodies in medical education is correct in terms of education? | 94 (67.1) | 18 (12.9) | 28 (20) | 140 (100) |
| **Q10.** Do you think it is ethically correct to use unclaimed/unidentified bodies in medical education? | 51 (36.4) | 44 (31.4) | 45 (32.1) | 140 (100) |
| **Q11.** Does knowing the body donor while he/she is alive affect you emotionally? | 112 (80) | 13 (9.3) | 15 (10.7) | 140 (100) |
| **Q12.** Would you like your family to be a body donor? | 33 (23.6) | 58 (41.4) | 49 (35) | 140 (100) |
| **Q13.** Would your family approve of you becoming a cadaver donor? | 15 (10.7) | 74 (52.9) | 51 (36.4) | 140 (100) |
| **Q14.** Would you encourage people you know or do not know to become cadaver donors? | 32 (22.9) | 45 (32.1) | 63 (45) | 140 (100) |
| **Q15.** Did your experience in the anatomy lab increase your willingness to donate your body? | 55 (39.3) | 48 (34.3) | 37 (26.4) | 140 (100) |
| **Q16.** Do you feel ready for a cadaver donation? | 25 (17.9) | 76 (54.3) | 39 (27.9) | 140 (100) |

**Table 3.** Distribution of parameters based on sex of the participants.

| | *p** |
|---|---|
| **Q1** | 0.441 |
| **Q2** | 0.007*** |
| **Q3** | 0.340 |
| **Q4** | 0.019*** |
| **Q5** | 0.307 |
| **Q6** | 0.409 |
| **Q7** | 0.035*** |
| **Q8** | 0.100 |
| **Q9** | 0.211 |
| **Q10** | 0.020*** |
| **Q11** | 0.113 |
| **Q12** | 0.191 |
| **Q13** | 0.199 |
| **Q14** | 0.791 |
| **Q15** | 0.886 |
| **Q16** | 0.054 |

*:comparison by gender, Pearson's chi-squared test. ***=significant result (p<0.05).

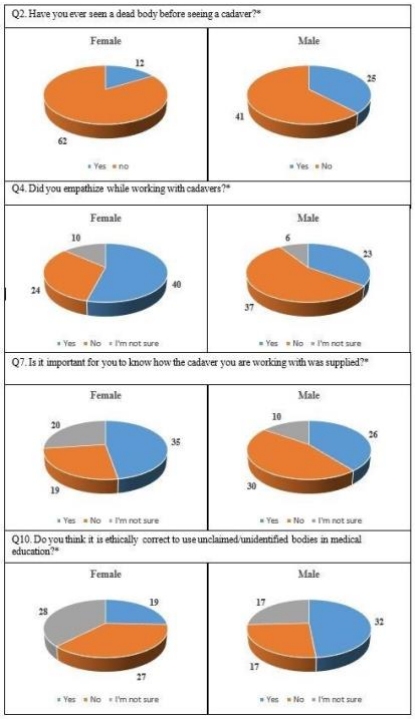


**Figure 1.** Comparison of answers to questions 2, 4, 7, 10 by gender

**Table 4.** Distribution of parameters based on the class of the participants.

| Questions | *p** |
|---|---|
| **Q1** | 0.426 |
| **Q2** | 0.889 |
| **Q3** | 0.024*** |
| **Q4** | 0.020*** |
| **Q5** | 0.051 |
| **Q6** | 0.760 |
| **Q7** | 0.187 |
| **Q8** | 0.129 |
| **Q9** | 0.063 |
| **Q10** | 0.482 |
| **Q11** | 0.072 |
| **Q12** | 0.719 |
| **Q13** | 0.620 |
| **Q14** | 0.642 |
| **Q15** | 0.658 |
| **Q16** | 0.941 |

*:comparison by gender, Pearson's chi-squared test. ***=significant result ($p<0.05$).