

“Body Worlds” Exhibitions: Opinions of the Students of Bursa Uludağ University Faculty of Medicine

Bursa Uludağ Üniversitesi Tıp Fakültesi Öğrencilerinin Gözünden “Body Worlds” Sergileri

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ABSTRACT Cadaver, which has an important place in medical education, has a very important place in terms of human dignity, respect, autonomy and life / death values especially in terms of medical ethics. The difficulty in obtaining the cadaver has led to the development of techniques for the storage of bodies in different ways. Although plastination is a solution to the cadaver supply problem, it has the feature of being ethically controversial with its exhibitions consisting of bodies with different positions. The aim of this study is to evaluate the views of Bursa Uludağ University Faculty of Medicine grade 1, 2 and 3 students about “Body Worlds” exhibitions in terms of ethics (medicine and art). For this purpose, a questionnaire consisting of two open-ended questions and two stages “before” / “after” has been prepared. After the first survey (before), a 20-minute presentation has been made using images from the “Body Worlds” exhibitions, followed by a second survey (after). A total of 381 students participated in the study. According to the questions before and after the presentation, it was determined that the students found the “Body Worlds” exhibitions neither ethically appropriate nor considered as a work of art. It has also emerged that the exhibitions should not be open to the public but open to those who study in the field of health. As expected, the ethical training received in the first 3 years is thought to be effective in ethical sensitivity towards the subject. In conclusion, regardless of whether the plastination technique is an important and new method to stabilize dead bodies, this level of anatomical “transparency” should be used for only science and education and not as a paid exhibition in public places.

Keywords: Education; ethics; medical ethics; students

ÖZET Tıp eğitiminde önemli bir yere sahip olan kadavra insan onuru, saygınlığı, özerkliği ve yaşam/ölüm değerleri özelinde tıp etiği açısından da oldukça önemli bir yere sahiptir. Kadavra temininin zor olması, bedenlerin farklı şekilde saklanmaları konusundaki tekniklerin de gelişmesine neden olmuştur. Bu tekniklerden biri olan plastinasyon, ölü dokuların daha dayanıklı kalmalarını sağlamanın yanı sıra farklı pozisyonlar verilmiş bedenlerden oluşan sergileri ile etik açıdan tartışma konusu olma özelliği taşımaktadır. Bu çalışma ile Bursa Uludağ Üniversitesi Tıp Fakültesi dönem 1, 2 ve 3 öğrencilerinin “Body Worlds” sergileri ile ilgili görüşlerinin etik (tıp ve sanat) açısından değerlendirmek amaçlanmıştır. Bu amaç doğrultusunda iki açık uçlu soru içeren ve “önce” / “sonra” olmak üzere iki aşamadan oluşan bir anket hazırlanmıştır. İlk anket uygulandıktan sonra “Body Worlds” sergilerindeki görüntüler kullanılarak hazırlanan 20 dakikalık bir sunum yapılmış ve arkasında ikinci anket uygulanmıştır. Anketlere toplam 381 öğrenci katılmıştır. Sunum öncesi ve sonrası sorularına göre öğrencilerin, “Body Worlds” sergilerini ne etik açıdan uygun buldukları ne de bir “sanat eseri” olarak değerlendirdikleri saptanmıştır. Ayrıca sergilerin halka açık değil, sağlık alanında eğitim alanlara açık olması gerektiği şeklinde görüş ortaya çıkmıştır. Beklendiği üzere ilk 3 yıl içinde alınan etik eğitiminin konuya yönelik etik duyarlılık konusunda etkili olduğu düşünülmektedir. Sonuç olarak, plastinasyon tekniğinin ölü bedenleri stabilize etmek için önemli ve yeni bir yöntem olup olmadığına bakılmaksızın, “anatomik şeffaflığın”, halka açık yerlerde ücretli bir sergi olarak değil, sadece bilim ve eğitim için kullanılması gerektiği görülmektedir.

Anahtar Kelimeler: Eğitim; etik; tıp etiği; öğrenciler

Anatomy, as the science that studies the structure of human beings, animals and plants, is one of

the most important components of medical education. Knowledge of body structure and functioning is the

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basis of clinical sciences for students to understand the disease, determine its cause and plan the treatment. The aim of anatomy and dissection in medical education is not just to learn about the inanimate body; to acquire information about the symptoms of disease that have emerged or will occur in the living body and find solutions for them. Therefore, it is unthinkable for a physician not to know anatomy.^{1,2}

The human body has always been a topic of interest and curiosity throughout history. Due to this interest and curiosity, “temporary anatomy theatres” have been established. The first one has been arranged by Mondino de Liuzzi (Mundinus) in 1306 in Bologna, and dissections have been carried out once a year. Following this theatre, theatres have been established in 1557 in London, in Pisa in 1569, in Ferrara in 1588, and in Basel in 1589. The first permanent theatres have been set up in Padua in 1584 and 1594 (by Alexander Benedetti) and have been followed in Leiden University in 1596 and Bologna Palazzo dell’Archiginnasio in 1639.³ In these theatres (except for the one in London) dissections have been performed and have been open to the public with a certain entrance fee. These dissections have also affected the development of anatomy knowledge and medical advances. Anatomical studies have been conducted in these theatres in January, February, and March because of body putrefaction. These theatres, which have a great influence on the education of anatomy, have functioned as a museum in the summer. Various human and animal skeletons / skin, frozen animals, etc. have been exhibited in these museums. As education centres, they have also been a cultural / artistic function for painters and sculptors who have come to learn about the human body and its internal structures and functions to transfer this knowledge to their work as stated in a master thesis titled “Surgeons on the tip of the brush: Surgeons’ guilds paintings in 17th and 18th century Netherlands” by Fikriye Tülay Yunusoğlu.

Experience obtained with models and samples is the most effective step after experience obtained directly from learning. The materials in the anatomy education show diversity to give exact information about the human body and its functioning to stu-

dents. The materials used in anatomy education are effective for attracting students, stimulating learning, enhancing motivation, reinforcing and providing permanent learning and creating a multi-learning environment. During education, the materials used with the aim of supporting education, such as anatomical sheets, cadavers, plastinated specimens, 3D holographic images of the human body, roentgenography, cyber-anatomy, 3D applications, and plastic patterns, are very important to establish an effective and efficient learning environment.⁴⁻⁶ The most important of all these materials is the cadaver, but it is very difficult to supply. Therefore, depending on technological developments, materials that have been prepared with new techniques have also begun to be used. Plastination, as one of these techniques, has been developed by Dr. Gunther von Hagens from Heidelberg University in 1977 for the preservation of biodegradable specimens and has been applied for long-term body storage. It provides a valuable education tool that is used in many centres around the world. In addition to medical science and dentistry faculties, it is possible to use plastination in every branch of science that uses living organisms, such as botany and zoology.⁷⁻¹¹ The main purpose of using plastination is making the human body, the essential material of anatomy education, available to more students in better conditions than cadavers. Thus, cadaveric insufficiency may be overcome. In Turkey, the plastination technique has started to develop in the 1980’s; courses have been organized in time, and some medical faculties have begun to use plastinated bodies/organs for anatomy lessons.

Plastinated specimens have advantages such as;¹²

- They are nontoxic and do not exude fumes,
- They demonstrate the relationship between tissues and organs better than alternative materials,
- They display natural tissue colours,
- They are easy to protect against insects and pests,
- They provide long-term storage,
- They do not require special techniques or fields for preservation, and

- They provide easy transfer.

Despite these advantages, plastination also has some limitations:^{12,13}

- The preparation process takes approximately 15 weeks,
- It costs approximately 1,500-20,000 dollars,
- It requires more equipment than conventional laboratory methods,
- It has limitations in terms of the tactile and emotional experiences provided by wet cadavers,
- Due to the trial and error method, specimen wastage or consumption is questionable, and
- There is no opportunity for further dissection.

With these advantages and disadvantages, plastination is being preferred over other materials used in anatomy education because;^{12,13}

- Plastic models do not show real variations and may have some mistakes,
- Computer simulations provide short-term experiences,
- Other computer-based materials do not reflect the actual bio-structure of structural components and do not show structural variations and
- Cadavers are quite difficult to be obtained and preserved.

The specimens prepared by Hagens' plastination technique have first been presented at a "Body Worlds" exhibition in Japan in 1995. After the first exhibition, almost 30 million people from over 60 countries in Europe, Asia and North America have visited these exhibitions.¹⁴ Hagens describes the term "Body Worlds" as "aesthetic-instructive presentation of bodily interiors" that he developed to avoid misunderstandings and purify discourse from individuality.^{12,15,16} Considering anatomy theatres, it may be considered that Hagens has the same aim with the thought of satisfying public's curiosity, trying to make them conscious about their bodies and having them differentiate between healthy-diseased bodies by displaying the plastinated bodies "Body Worlds" has first been exhibited in Istanbul in 2010 (as part of "European Centre of Culture" events), and afterwards in Ankara in 2012 and in Izmir in 2013. There is usually no age limit for these exhibitions; however, when there is, a minimum age

limit of 6 has been set. Furthermore, an entrance fee has been collected (also for children), and group discounts have also been made available. In addition, there have been no restrictions on where the exhibitions have been presented, as they have been displayed in areas such as malls and yards.

The aim of the research was to evaluate the opinions of students of Uludağ University Faculty of Medicine on "Body Worlds" exhibitions in terms of ethics and art.

MATERIAL AND METHODS

THE SAMPLE OF THE STUDY

The sample of the cross-sectional and descriptive study has been consisted of grade 1 (N=426), 2 (N=377) and 3 (N=391) students from Bursa Uludağ University Faculty of Medicine. Grades 1, 2 and 3 students, who have taken anatomy lessons, trained with cadavers and learned to respect individuals and cadavers in anatomy and medical ethics courses have been included in the study. Since they have started clinical education and have gone away from anatomy education grades 4, 5 and 6 have not been included in the study.

DATA COLLECTION TOOL

The study has been conducted by using a 2-staged questionnaire to evaluate the students' opinions on "Body Worlds" exhibitions. First, a survey has been given to the students who agreed to participate in the study to learn about students' knowledge and opinions on "Body Worlds" exhibitions (before presentation). After the survey, a presentation has been made in the "Body Worlds" exhibition, consisting of 20 slides containing photographs of the bodies and lasted for about 20 minutes. The presentation is not intended to direct students or give them detailed information, but to show what plastic bodies are actually. After the presentation, a second survey has been given to evaluate whether students' views have changed about "Body Worlds" exhibitions (after presentation). Survey forms that left blank, missing or incorrectly filled out have not been evaluated. The study has been lasted in 25-30 minutes and been carried out at times other than the course and practice of the students.

ANALYSIS OF THE DATA

Statistical analyses were performed with IBM SPSS ver.23.0 (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.). The data was examined by the Shapiro Wilk test whether or not it presents normal distribution. Paired data were analysed using Wilcoxon signed rank test when data were not normally distributed. McNemar-Bowker Test was used for categorical dependent variables. Statistically significance level was accepted as $\alpha=0.05$.

ETHICS COMMITTEE APPROVAL

The study was approved by the Research Ethics Committee of Bursa Uludağ University Faculty of Medicine with the date December 27th, 2016.

RESULTS

Questionnaires were collected from a total of 381 students: 121 (N=426) from grade 1, 130 (N=377) from the grade 2 and 130 (N=391) from grade 3. Of the 381 students, 164 (43%) were male and 217 (57%) were female. Regarding the professions of the students' parents; 7.9% (30) had mothers working in the health field and 89.5% (341) had mothers in other professions; 7.1% (27) had fathers working in the health field, and 347 (91.1%) had fathers in other professions. The average student age at the time of the study was 20.65 years, with a range of 17 to 29 years.

The students were asked whether they visited "Body Worlds" exhibitions. According to the responses, 12 (10%) grade 1 students (n=121), 19 (14.6%) grade 2 students (n = 130) and 15 (11.5%) (n=130) grade 3 students had visited the exhibition.

The students were asked, "What would be your reaction to "Body Worlds" exhibitions?" The responses were fear, excitement, curiosity, loathing, happiness and anger. According to the responses before and after the presentation, the most common feelings were fear and curiosity. When examined in detail (McNemar's Test), it was seen that the feeling of fear did not change (4.7% before, 7.6% after, $p = 0.090$), whereas the feelings of excitement (26% before, 36% after, $p < 0.001$), curiosity (55.1% before, 67.5% after, $p < 0.001$), loathing (5.2% before, 23.6%

after, $p < 0.001$) and anger (1% before, 16% after, $p < 0.001$) increased, and these increases were statistically significant. Although an increase was seen in happiness (6.6% before, 8.1% after), it was not statistically significant ($p = 0.263$). When examined by years, the most common emotional state was "curiosity" (57% before, 63.6% after in grade 1, $p = 0.268$; 53.8% before 65.4% after in grade 2, $p = 0.024$; 54.6% before, 73.1% after in grade 3, $p = 0.001$), and the increase of curiosity in grade 3 was statistically significant. The second most common emotional state was "excitement" (27.3% before, 30.6% in grade 1, $p = 0.503$; 21.5% before, 36.2% after in grade 2, $p = 0.001$; 29.2% before, 41.5% after in grade 3, $p = 0.002$), and the increases in excitement in grade 2 and 3 students were statistically significant.

According to the questions before and after the presentation, it is evident that the answers to the first item [Plastinated bodies should only be seen by those who have / are receiving an education in the health field.] has changed from "I agree" to "Undecided". This change is statistically significant ($p < 0.001$). Although not statistically significant, there was a change in the responses to item 2 ["Body Worlds" exhibitions are considered ethical.]. The students who responded as "Undecided" before the presentation changed to "I do not agree" after the presentation. Although not statistically significant, there was a change in the responses to item 3 ["Body Worlds" exhibitions are beneficial exhibitions for humanity.]. The students' responses as "I agree" before the presentation changed to "Undecided" after the presentation. The responses to item 4 ["Body Worlds" exhibitions are effective at helping young people choose medical faculties.] remained unchanged as "Undecided". The responses to item 5 [I would like myself or a member of my family to be plastinated.] have changed from "I disagree" to "Strongly disagree". Finally, the responses to item 6 [I would like myself or a member of my family to be presented in an exhibition after being plastinated.] have changed from "Strongly disagree" to "I disagree". This change was statistically significant ($p < 0.001$) (Table 1).

In the surveys, there were 2 open-ended questions. The first one was "Is it art?". The number of

TABLE 1: Comparative analysis before and after the presentation.

QUESTIONS+	n	BEFORE		AFTER		p
		Median (Min-Max)	n	Median (Min-Max)	n	
1) Plastinated bodies should only be seen by those who have / are receiving an education in the health field.	380	2 (0 - 5)	381	3 (0 - 5)		< 0.001
2) "Body Worlds" exhibitions are considered ethical.	381	3 (0 - 5)	381	2 (0 - 5)		p = 0.731
3) "Body Worlds" exhibitions are beneficial exhibitions for humanity.	378	4 (0 - 5)	381	3 (0 - 5)		p = 0.633
4) "Body Worlds" exhibitions are effective at helping young people . choose medical faculties	377	3 (0 - 5)	380	3 (0 - 5)		p = 0.021*
5) I would like myself or a member of my family to be plastinated.	379	2 (0-5)	378	1 (0-5)		p < 0.001
6) I would like myself or a member of my family to be presented in an exhibition after being plastinated.	380	1 (0-5)	379	1 (0-5)		p < 0.001**

* Mean and standard deviation of question for before and after were given respectively (Before 2,49±1,77; after 2,73±1,25). (Because of the median (min-max) statistics were the same, mean and standard deviation statistics were given.)

** Mean and standard deviation of question for before and after were given respectively (Before 1,55±1,14; after 1,95±0,67). (Because of the median (min-max) statistics were the same, mean and standard deviation statistics were given.)

+ The comparison questions are 5-point Likert scale questions. These questions are rated "5-0" as "strongly agree-I don't know".

the students who said "I don't know" was 51 (17.2%) before the presentation and 8 (2.7%) after the presentation. The number of the students who said "It is art" was 135 (45.6%) before the presentation and 152 (51.4%) after the presentation. The number of the students who said "It is not art" was 110 (37.2%) before the presentation, but this number increased to 136 (45.9%) after the presentation. There was a relation-

ship between the students' responses before and after the presentation ($p < 0.001$). A detailed analysis according to grades 1, 2 and 3 can be seen in Table 2.

The other question was "Is it ethical?". The number of the students who said "I don't know" was 98 (33.1%) before the presentation and 56 (18.9%) after the presentation. The number of the students who said "It is ethical" was 129 (43.6%) before the presenta-

TABLE 2: Opinions on art before and after the presentation vs grades cross-tabulation.

Years	Art-Before Presentation		Art-After Presentation			Total n (%)	p*
			I don't know	It is art	It is not art		
Grade 1	Art-Before Presentation	I don't know	3	8	5	16(17.4%)	0.012
		It is art	0	31	11	42(45.7%)	
		It is not art	1	9	24	34 (37.0%)	
	Total n (%)	4 (4.3%)	48 (52.2%)	40 (43.5%)	92		
Grade 2	Art-Before Presentation	I don't know	3	10	5	18(18.0%)	0.002
		It is art	0	36	7	43(43.0%)	
		It is not art	0	8	31	39(39.0%)	
	Total n (%)	3(3.0%)	54(54.0%)	43(43.0%)	100		
Grade 3	Art-Before Presentation	I don't know	0	6	11	17(16.3%)	0.001
		It is art	0	38	12	50(48.1%)	
		It is not art	1	6	30	37(35.6%)	
	Total n (%)	1 (1.0%)	50 (48.1%)	53 (51.0%)	104		
Total	Art-Before	I don't know	6	24	21	51(17.2%)	<0.001
		It is art	0	105	30	135(45.6%)	
		It is not art	2	23	85	110(37.2%)	
	Total n (%)	8 (2.7%)	152 (51.4%)	136 (45.9%)	296		

tion and 46 (15.5%) after the presentation. The number of the students who said “It is not ethical” was 69 (23.3%) before the presentation, but this number increased to 194 (65.5%) after the presentation. There was a relationship between students’ answers to the questions before and after the presentation ($p < 0.001$). A detailed analysis according to grades 1, 2 and 3 can be seen in [Table 3](#).

The explanation to the open-ended questions are evaluated in 2 topics:

1. The explanation of the students who changed their opinions after the presentation ([Table 4](#)).
2. The explanation of the students who did not change their opinions after the presentation ([Table 5](#)).

The results were given by the answers of 3 students (1 in each grade) with randomized selection. No statistical analysis was made for these explanations.

DISCUSSION

Several studies have been carried out on “Body Worlds” exhibitions with different interdisciplinary methods / approaches. Many of the works have been intended to learn the ideas of exhibitors. How-

ever, very few studies are on the opinions of students. For this reason, the findings of this study have been discussed with similar questions used in other studies.

In the current study, it may be assumed that the change in the responses to item 1 is due to the information about what the plastinated bodies are during the presentation ([Table 1](#)). In a study conducted in 2011 by Prof. Dr. Nesrin Çobanoğlu on Facebook to learn about the thoughts of students of Gazi University Faculty of Medicine regarding “Body Worlds” exhibitions, the students stated that it would be appropriate for people who have received an education in the health field to visit the exhibition. Likewise, in Tokaç’s article which stated the thoughts and opinions of the students of faculty of medicine and dentistry, the students’ opinions are that the exhibitions should be open to the people in the field of health but not to the public.¹⁷ On the other hand, as the exhibition consultant from İstanbul University, Dr. Mehmet Üzel had his anatomy class to 90 students of grade 3 in the exhibition in İstanbul in 2010 and both him and the students stated that the exhibition is useful to all of the people to understand the health and the value of their bodies.

TABLE 3: Opinions on ethics before and after the presentation vs grades cross-tabulation.

Years			Ethical-After Presentation			Total n (%)	p*
			I don't know	It is ethical	It is not ethical		
Grade 1	Ethical-Before Presentation	I don't know	9	3	19	31(32,3%)	<0.001
		It is ethical	6	10	25	41(42,7%)	
		It is not ethical	2	0	22	24(25,0%)	
		Total n (%)	17 (17,7%)	13 (13,5%)	66 (68,8%)	96	
Grade 2	Ethical-Before Presentation	I don't know	17	1	18	36(37,5%)	<0.001
		It is ethical	3	18	18	39(40,6%)	
		It is not ethical	0	0	21	21(21,9%)	
		Total n (%)	20(20,8%)	19(19,8%)	57(59,4%)	96	
Grade 3	Ethical-Before Presentation	I don't know	12	1	18	31(29,8%)	<0.001
		It is ethical	7	13	29	49(47,1%)	
		It is not ethical	0	0	24	24 (23,1)	
		Total n (%)	19(18,3%)	14(13,5%)	71(68,3%)	104(100,0%)	
Total	Ethical-Before Presentation	I don't know	38	5	55	98(33,1%)	<0.001
		It is ethical	16	41	72	129(43,6%)	
		It is not ethical	2	0	67	69(23,3%)	
		Total n (%)	56(18,9%)	46(15,5%)	194(65,5%)	296	

TABLE 4: Responses to open-ended questions with a change in opinion.

Question: Is it art?		
Year	Before presentation	After presentation
1	It is art because it focuses on the “man”, the artwork itself. (Grade 1)	It is not art, there is not an authority to hold accountable for how the cadavers are displayed. It is not known whether they should allow them to present their bodies in that way, so it is not art. (Grade 1)
2	It is art because it is a talent and a new material creation. However, according to the purpose, it is also possible to depart from art. (Grade 2)	It is not art, it’s made for a commercial purpose. (Grade 2)
3	I don’t know. (Grade 3)	It is not art, the material used is imaginary. Because the material is human, I think it prevents art. (Grade 3)
Question: Is it ethical?		
Year	Before presentation	After presentation
1	It is ethical if that person has allowed his body to be used in the name of science and art, there is no problem. (Grade 1)	It is not ethical, the human body is a valuable asset and should be respected even after it is dead. It is only suitable to be used for science and medical student education with respect. (Grade 1)
2	It is ethical, I do not think it will be contrary to ethics if consent is given for the plastinated body. (Grade 2)	It is not ethical; it has been exhibited openly without paying any attention to any moral motives of the persons. (Grade 2)
3	I don’t know. (Grade 3)	I do not think it is ethical. As humanity and respect for human existence are not protected, I think it violates the protection of privacy and personal rights, which is a priority for a physician. (Grade 3)

The change in responses to item 2 (Table 1) is also compatible with the answers to the open-ended question of “Is it ethical?”. In general, after the presentation it was observed that the opinion that the exhibitions cannot be considered as ethical increased (Table 5). In two studies conducted by Ogenler and Kadioğlu and Erbay et al., students emphasized that the human body is valuable and for this reason, the human body must also be respected after his/her death.^{18,19}

The change in responses to item 3 (Table 1) can also be explained with the responses to item 1 and 2. The answers to open-ended questions also support this change in the statements of the students. It can be assumed that the students are indecisive about whether the exhibitions are ethical, based on the answers to the open-ended questions. They have mentioned that the exhibitions are especially important for science and medicine, but not for the “public”, as in Çobanoğlu and Tokaç’s studies.¹⁷ A second issue that probably affects this response is that there is no age limit for participating in the exhibitions. In Ogenler and Kadioğlu’s study, where the opinions of health vocational students were investigated on dead human bodies, the students answered an item “It is a re-

spectable activity to perform chemical and physical interventions on the dead human body to make it an educational tool and work of art (plastination).²⁰” with a result of 4.54 (from 0 to 10). Another item in this study is also relevant to our second implication that “Children should be prevented from seeing a dead human body.” The students answered with a response of 7.11 (from 0 to 10).²⁰ It can be seen in both studies that students are aware of training materials and their use. In addition, they also believe that the children do not need to see dead human bodies as an entertainment or exhibition material.

The changing responses to item 4 (Table 1) can be considered that this preference is based on university admission exams rather than visiting the exhibitions.

The changing responses to item 5 (Table 1) can be considered because of the positions of the plastinated bodies in the presentation and the people’s viewpoints on these bodies may be related to the expression of such a precise judgement.

The changing responses to item 6 can be considered that the reason for this response to the idea of “being exhibited” involves a disappearance of the

TABLE 5: Responses to open-ended questions without a change in opinion.

Question: Is it art?		
Year	Before presentation	After presentation
1	It is art, only an artist can succeed to show the finest details of the human body. (Grade 1)	It is art because the human body is a microcosm. Human body is a small o microcosm, and it is art to show it in detail. Just as a famous painter draws a naked human body and studies it with interest, this exhibition should also be studied. (Grade 1)
2	It is art because it presents the human body with aesthetic concern in a form that we cannot see. More scientific, but art. (Grade 2)	It is art because it uses dead bodies to present new ways of looking at the human body as well as show us various forms of daily life activities. (Grade 2)
3	It is art, it is a skill to display the human body close to reality in that delicacy. I think it is art after seeing the heart coronaries at the exhibition. (Grade 3)	It is art because I think it is a skill to dissect it finely and to make it hold on for a long time. (Grade 3)
Question: Is it ethical?		
Year	Before presentation	After presentation
1	It is ethical because it is a great way for people and medical faculty students who are interested in and researching the human body. There is no ethical problem if consent is obtained from persons whose bodies are plastinated. (Grade 1)	It is ethical, because it is the best assistant for medical faculty students in learning. (Grade 1)
2	It is ethical because I do not think it will be ethically problematic because it is an exhibition made with donated bodies. (Grade 2)	It is ethical; the display of plastinated bodies, such as the use of cadavers, to people does not cause ethical problems. (Grade 2)
3	It is ethical, anyone who wants to go can go. (Grade 3)	It is ethical, it is absurd to think of ethics in those who are dead and are no longer recognized. (Grade 3).

concept of privacy. In Ogenler and Kadioğlu's study, where the opinions of health vocational students were investigated towards dead human bodies, the students answered the item "Dead human bodies can be exhibited in the museums due to special environmental conditions or periodic anti-decay procedures.²⁰" with a result of 4.81 (from 0 to 10). This result is compatible with the current study.

The most emotional state of the students towards the "Body Worlds" exhibitions was "curiosity", the second most common feeling was "excitement". In Ogenler and Kadioğlu's study, the emotional state of the participants against dead bodies was also measured in a similar way as "sadness" in year 1 and "curiosity" in year 2, which are similar to the results of our study.¹⁸ This result can be interpreted as a medical faculty student with curiosity about the "plastinated body" and that a study / learning mentality are necessity for the medical profession.

In the current study, there were open-ended questions on ethics and art to ensure that students could write their own thoughts about the exhibitions. The increased change of the students' thoughts on "It's not ethical" can be a reason that the opinions of the students who did not visit or were not aware of "Body Worlds" exhibitions changed after watching the presentation.

The increase of the students' thoughts on "it's not art" may be considered that the idea of "creativity" can be the reason for this response (Table 2 and Table 5). In Ogenler and Kadioğlu's study, where the opinions of health vocational students were investigated on dead human bodies, the students answered an item "It is a respectable activity to perform chemical and physical interventions on a dead human body to make it an educational tool and work of art (plastination).¹⁸" with a result of 4.54 (from 0 to 10). Although not definite, this result is similar to our results.

It is understood from the results of our study that students regard art as displaying and appealing.

As a result of open-ended questions, the students suggested that physicians, health professionals and students who are receiving an education in the health field should visit the exhibit on plastinated bodies. We can deduce that this is a dominant result because these students are trained in the field of health and have an approach that prioritizes the field of medicine / health. The human values of these bodies must not be ignored in order to be regarded as works of art. Since it is not appropriate for these bodies to be exhibited in public spaces without specific boundaries, it would be more useful to use these plastinated bodies as educational material for use by only those people in the health field.

CONCLUSION

The plastination of bodies, as an example of the milestones in the history of anatomy (anatomy theatres, anatomical illustrations, etc.) developed by Gunter von Hagens, has received positive and negative criticisms in terms of medical ethics and ethics of art. The criticized points in terms of medical ethics of the exhibitions are primarily about the concept of confidentiality, respect for autonomy, privacy and whether informed consent has been given by the persons whose bodies are exhibited.^{20,21} The controversies in terms of art are about whether the actions applied in the works are in accordance with ethics. These actions, starting from the process of formation of the designed work, are determined by various evaluations, such as whether this work will add new things to people or protect human values. Art provides freedom for a desire to uncover it, but while adhering to the freedom offered, the mentioned ethical elements should be considered. Freedom does not give the artist the right to use, display and present whatever he/she wants.²²

In conclusion, “human body” is important and a necessity for medical education. But the exhibition of “human body” must be taken into consideration in terms of privacy, autonomy, etc in other words ethics.

Although there are articles on whether the perspectives of those who visit the “Body Worlds” exhibitions have changed on the concepts of body and health/disease, there are not enough studies in our country other than student presentations at the medical humanities congresses. Likewise, research in which the ethical dimension of the subject is discussed with students/staff is not sufficient. The study, mainly planned on the attitudes of medical students, has tried to establish a platform on ethics approaches towards “Body Worlds” exhibitions and raise awareness on the usage of human body in terms of ethics. Further research on the human body and its use in different fields is important in terms of raising awareness of the issue and emphasizing the importance of ethical values.

“Wandering among the visible bodies while walking through Dr. Gunther von Hagens’s ‘Body Worlds’ exhibits of corpses of real human bodies is nothing but a further increase in the effect of ignorance of death.²³”

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No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Serap Yılmaz, Serdar Babacan; **Design:** Serap Yılmaz, Serdar Babacan, Sezer Erer Kafa; **Control/Supervision:** Serap Yılmaz, Serdar Babacan, Sezer Erer Kafa; **Data Collection and/or Processing:** erap Yılmaz, Serdar Babacan; **Analysis and/or Interpretation:** Serap Yılmaz, Serdar Babacan, Sezer Erer Kafa; **Literature Review:** Serap Yılmaz, Serdar Babacan, Sezer Erer Kafa; **Writing the Article:** Serap Yılmaz, Serdar Babacan, Sezer Erer Kafa; **Critical Review:** Sezer Erer Kafa.

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