

ORIGINAL ARTICLE**MEDICAL STUDENTS' ATTITUDINAL CHANGES TOWARDS
CADAVER DISSECTION: A LONGITUDINAL STUDY****Abay Mulu¹, Desalegn Tegabu²****ABSTRACT**

BACKGROUND: *Recently, not only the medical school curriculum but also medical students' attitude towards cadaver-based learning of anatomy has changed. This investigation is therefore designed to analyse students' attitudes towards human cadaveric dissection before and after exposure to dissection.*

METHODS: *A longitudinal survey was conducted among second year medical students in 2010 at the college of Medicine and Health Sciences, University of Gondar. All second year medical students (n=147) were included in the study where their attitudes were surveyed at three time points (one week prior to dissection session, a week after the initiation of dissection and eight weeks after the second survey). Three standardized and pretested questionnaires prepared in English were used to collect relevant data from the subjects.*

RESULTS: *Out of the 147 students 85.7% were males. The subjects' age ranged between 18 and 23 with a mean and standard deviation of 19.5±1 years. This study has revealed that among majority of the students fear and nausea have decreased while their interest and excitement has increased on subsequent exposure to dissection (P<0.05). About 75% of students considered the dissection room as slightly or highly stressful. Smell of the cadaver and eye irritation as a result of the chemicals in it were the major aspects identified as making the dissecting room stressful. The result also showed that almost all (99%) considered cadaver dissection had very important educational value for anatomy learning.*

CONCLUSION: *In the majority of the students fear and nausea had decreased while interest and excitement had increased on subsequent exposure to dissection. It also showed that chemical odour and eye irritations were the leading factors which create discomfort in the dissection room even though anatomical dissection by itself was not considered as a stressor. Thus, instructors are recommended to adequately prepare students mentally and emotionally before the commencement of the dissection session for an exciting and stress free anatomy learning through dissection.*

KEYWORDS: *Cadaver, dissection, attitude, Ethiopia*

INTRODUCTION

Anatomy, the study of the structures of the human body is one of the first, most basic and important subjects studied by medical students when they begin their medical education career (1). Anatomy teaching in medical schools has been traditionally based around the use of human cadaveric specimens, either taking the whole body specimens for complete dissection or as prosected specimens (2). It has also been recognized as the most universal instrument, which is strongly supported and preferred over other methods, for

professional training and skill development in becoming medical doctors (3–6).

In addition, the practice of cadaveric dissection allows students grasp the three-dimensional anatomy and concept of biological variability (7). Through dissection, students are able to visualize firsthand actual structures of the human body. It has also been called the “sharp end” of medical education (8). Because of current arguments on balancing learning outcomes, problems related to the use of human cadaver, teaching methods and resources, many recent curricula in anatomy have introduced a shift towards greater use of

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alternative modalities of teaching involving cadaveric plastination, non-cadaveric models and computer-based imaging (9,10).

Moreover, the use of cadavers for dissection in anatomy learning has been identified by some scholars as expensive, time consuming and potentially hazardous (11). Although there is no consensus on its effect, working with cadavers, whether through active dissection or by examination of prosected specimens constitute a potential stress (12). In medical schools where cadaveric dissection mainly constitutes preclinical teaching of anatomy, students are exposed to cadavers in the early stages of their training but this exposure induces both positive and unintended negative experiences in these students. The emotional impact of such exposure on students and their ability to cope has been examined in some studies. The effects which have been described include the physical (smell, nausea, conjunctival irritation) and psychological (anxiety, stress, emotional trauma, depression) (12–15) but available evidences suggest that adaptive mechanisms for coping with exposure are triggered soon afterwards in these students. A number of studies conducted in different parts of the world have documented reaction of medical students to human cadaveric dissection by examining experiences retrospectively through structured questionnaires(13,15–17). There has not been a study done in Ethiopian Medical Schools to assess students' attitude towards anatomical dissection either retrospectively through recollection or by recording student's attitudes as they progressed through a dissecting room-based anatomy instruction. This investigation was therefore designed to record students' attitudes to human cadaveric dissection before and after exposure to dissection and compare baseline attitudes and changes followed after repeated experience. It also identifies student's preference towards other compensatory methods for anatomy learning.

MATERIALS AND METHODS

Anatomical dissection remains corner stone of learning anatomy at undergraduate level of second year medical students at the College of Medicine and Health Sciences, University of Gondar. The college has a large dissecting room with necessary

facilities which confirms to the country's standard for safety related to chemical levels. Each year about 150 medical students attend Anatomy course in the college. The practical session of the Anatomy course consists of 3 hours of regional dissection in a week.

A longitudinal survey was conducted among second year medical students in 2010 at the College of Medicine and Health Sciences, University of Gondar where all Second Year Medical Students (147) were surveyed at three different time points (a week prior to dissection session, a week after initiation of dissection and eight weeks after the second survey). Repeaters and re-admitted students were excluded from the survey for they have had prior exposure to cadaver dissection. Data were collected at three different times using three standardized questionnaires prepared in English. The questionnaires were designed to collect socio-demographic data (age, sex, religion, ethnicity and residence) and their experience about Cadaver (attitude, exposure and feeling).

The first questionnaire was administered immediately before the first class of dissection session and it dealt with basic demographics and prior attitudes towards the dissecting room. The second questionnaire was administered a week after the first dissecting room session and it contained additional items on stress in the dissecting room and its triggers, coping strategies used by students, general stressors in students' life and their opinion on the role of dissection in Anatomy learning. The third questionnaire which was almost similar with the second one was administered on the ninth week of the session.

Adequate explanation was given to the students about the objective and relevance of the study before they filled out the questionnaires. The questionnaires were administered and collected in one session in the class room at three different times by the principal investigator to maintain confidentiality and avoid peer bias of the collected data. Before the students filled out the questionnaires, the purpose of the study was explained for them and verbal consent was obtained and the subjects' name was not recorded to keep anonymity.

Data obtained from questionnaires were captured and analyzed using SPSS version 16

(SPSS INC, Chicago). $P < 0.05$ was considered statistically significant.

RESULTS

All second year medical students (147) of the College of Medicine and Health Sciences were included in this study. The majority (85.7%) were males. According to the subjects' socio-

demographic characteristic displayed in Table one, the majority 129(87.8%) were Christians; 85(57.8%) came from urban areas and 110(74.8%) were Amhara by ethnicity. The subjects' age ranged between 18-23 years with mean and standard deviation of 19.5 ± 1 years. The mean age of male and female students was 19.6 ± 0.9 and 18.7 ± 0.7 years respectively with a statistically significant difference ($p < 0.05$).

Table-1: Socio-demographic characteristics of study subjects, Gondar, 2010.

Variables	No(%)
Age(years)	
≤18	22(15.0)
19-20	107(72.8)
>20	18(12.2)
Sex	
Male	126(85.7)
Female	21(14.3)
Religion	
Christian	129(87.8)
Muslim	18(12.5)
Ethnicity	
Amhara	110(74.8)
Oromo	14(9.5)
Gurage	11(7.5)
Tigre	4(2.7)
Other	8(5.4)
Residence	
Urban	85(57.8)
Rural	62(42.2)

The reaction of students towards cadaver varies as the duration of the contact increases. Fear has decreased from 58.5% to 2.7% and nausea from 6.1% to 2% with statistically significant difference ($p < 0.05$). On the other hand interest has increased

from 70.7% to 95.2% and excitement from 42.9% to 57.8% on subsequent exposure to dissection (statistically significant difference was seen at $p < 0.05$) (Table 2).

Table-2: Responses of students for the three questionnaires on attitudes towards dissection, Gondar, 2010.

	Questionnaire-1 No(%)	Questionnaire-2 No(%)	Questionnaire-3 No(%)
Feeling			
Fear*	86(58.5)	18(12.2)	4(2.7)
Nausea [†]	9(6.1)	1(0.7)	3(2.0)
Neutral*	55(37.4)	87(59.2)	78(53.1)
Interest [‡]	104(70.7)	135(91.8)	140(95.2)
Excitement [®]	63(42.9)	79(53.7)	85(57.8)

* $X^2 = 142$, $p < 0.001$, [†] $X^2 = 8.2$, $p < 0.01$, * $X^2 = 14.8$, $p < 0.001$, [‡] $X^2 = 42.8$, $p < 0.001$, [®] $X^2 = 7$, $p < 0.03$.

As described in Table-3, among the symptoms experienced by the respondents, sweating was the most prevalent and had decreased from 36.1% on first exposure to 21.1% on the second exposure to cadaver with a statistically significant difference ($p < 0.05$). The number of study subjects with none

of the symptoms had also significantly increased from 57.8% to 74.8% after frequent exposure to cadaver dissection ($p < 0.02$). Symptoms like nausea, feeling faint, trembling and desire to leave dissection room were reported but with no significant difference.

Table-3: Symptoms listed by respondents after initial exposure followed by subsequent experience with dissection, Gondar, 2010.

Feeling	Questionnaire-2 No(%)	Questionnaire-3 No(%)
Nausea	1(0.7)	3(2.0)
Feeling faint	3(2.0)	1(0.7)
Trembling	8(5.4)	2(1.4)
Sweating*	53(36.1)	31(21.1)
Desire to leave DR	16(10.9)	8(5.4)
None of the above**	85(57.8)	110(74.8)

* $X^2=8$, $df=1$, $p < 0.005$, ** $X^2=9.5$, $df=1$, $p < 0.002$ (grouped)

The level of stress encountered and the source of stress mentioned by the study participants in the second and third questionnaire is shown on Table-4. Only four percent of the subjects found the dissection room to be highly stressful and 70 % said it was mildly stressful while 25% of them said it was not at all stressful. The chemical odour from the cadaver (52.4% on the second

questionnaire and 59.2% on the third questionnaire) and the eye irritation caused by it (27.2% and 20.4% on the second and third questionnaire respectively) were found to be factors that make the dissection room stressful but a statistical significance has not been observed between the second and third survey.

Table-4: Dissecting room stress on respondents on first and repeated encounters, Gondar, 2010.

Response to questions	Questionnaire-2 No(%)	Questionnaire-3 No(%)
How much is dissecting room stress?		
Not at all	38(25.9)	36(24.5)
Slightly stressful	103(70.1)	104(70.7)
Highly stressful	6(4.1)	7(4.8)
What aspect of dissecting room is stressful?		
Chemical odour	77(52.4)	87(59.2)
Darkness	2(1.4)	1(0.7)
Recurrent dreams	5(3.4)	3(2.0)
Dissection	8(5.4)	6(4.1)
Irritation of the eye	40(27.2)	30(20.4)
Group interactions	12(8.2)	20(13.6)
Others	19(12.9)	24(16.3)

As compared to other stressors in the university, only one student found anatomical dissection as stressor (table -5). However, the most important stressor on both surveys was found to be study

load (70.7%, 64.6% in the second and third questionnaire, respectively). Yet, the distribution of stressors had not been statistically significant between the two surveys.

Table-5: Students rating of common stressors in their second year career, Gondar, 2010.

Stressors	Questionnaire-2	Questionnaire-3
	No(%)	No(%)
Anatomical dissection	1(0.7)	0
Progressive assessment	11(7.5)	17(11.6)
Study load	104(70.7)	95(64.6)
Social change	17(11.6)	19(12.9)
Others	14(9.5)	16(10.9)

The educational value of cadaver in anatomy learning is shown in Table 6. About 99% of the subjects considered cadaver dissection as important for anatomy learning. Ninety percent of them prefer dissection than prosection for

Anatomy learning and 79% oppose the replacement of Cadaver dissection by other instructional methods. However, no statistical difference had been observed between the two surveys.

Table-6: Response of students on educational value of dissection for anatomy learning, Gondar, 2010.

	Questionnaire-2	Questionnaire-3
	No(%)	No(%)
Importance of dissection for anatomy learning		
Extremely important	113(76.9)	115(78.2)
Important	33(22.4)	32(21.8)
No opinion	1(0.7)	0
Which method you prefer for anatomy learning?		
Dissection	133(90.5)	136(92.5)
Prosection	14(9.5)	11(7.5)
Feeling if cadaver is replaced by instructional videos and models?		
Strongly disagree	64(43.5)	68(46.3)
Disagree	52(35.4)	54(36.7)
No opinion	13(8.8)	7(4.8)
Agree	10(6.8)	13(8.8)
Strongly agree	8(5.4)	5(3.4)

DISCUSSION

In recent years, relevance and value of dissection has been under discussion at different universities. Because of high cost of cadavers and shortage of time, some medical schools in Europe and US have abandoned dissection and moved to cadaverless anatomy. However, some persist on cadaver-oriented anatomy to teach basic constructional principles of human body through dissection (3). This study tried to assess students' attitudes to human cadaveric dissection before and after exposure to dissection so as to see changes after repeated exposure. It also determined main

stressors encountered by dissection-based anatomy learning at University of Gondar.

The present study showed students attitudes to human cadaveric dissection longitudinally using three surveys. The results revealed that fear and nausea had decreased significantly along the three surveys 64.6%, 12.9%, and 4.7%, respectively. This result is inline with a study done on medical students in UK which found out that 5% of students distressed by dissection after repeated exposure (18). Similarly, a study by Mc Garvey et al (14) on students of Royal College of Surgeons in Ireland on their initial visit and on the tenth

week visit of anatomy room showed a significant decrease of nausea, dizziness and fainting.

In this study, interest and excitement of the students towards dissection showed statistically significant increment along time in the three surveys (70.7%, 91.8%, 95.2% and 42.9%, 53.7%, 57.8%, respectively). This accord's well with the study done by Cahill and Ettarh (2) in Ireland, where 95% of Irish medical school students were interested with cadaver dissection. Thus, for the majority of the students, dissection does not appear to be unpleasant experience. Another study done in India also showed that interest and excitement had increased while fear and nausea had decreased along the three surveys (19).

In this study, nausea, feeling faint, trembling and desire to leave dissection room did not show significant difference with continued exposure. It would be reasonable to expect that the association between the dissecting room environment and unpleasant symptoms would cause some students to change their initial attitude to dissection; this however, did not happen. This finding contrasts with a study of 425 Spanish medical and health science students attending dissections, which showed attitudes and emotional reactions progressively diminish with continuing exposure to dissection (20).

Several studies reported that incidence of emotional, mental as well as and a psychological effect among medical students is between 20% and 47% (21). In agreement with Mc Garvey et al. (14), this study found that majority of students experienced mild or no stress. Almost the same proportions of students (<5%) in both studies reported high levels of stress. However, the levels of high stress among students in this study did not change significantly with increasing experience of dissection over the 9-week period of the investigation. This could be due to inadequate orientation of students or something inherent among those who manifest it.

The leading factors which make the dissecting room stressful were the chemical odour (52.4% and 59.2%) and eye irritations (27.2% & 20.4%) on the first and repeated encounters, respectively and this result is in line with the study done by Bataineh et al. (15) where 58.5% of medical students showed a variable degree of disturbance due to the chemical odour. High percentage of students in this study were disturbed

by the smell compared to (8%) (22) and (3.65%) (9) in Western countries. These differences may be attributed to a better ventilation system and safety measures applied in these medical schools.

In this study among the common stressors, study load was the most stressor in their second year career (70.7% in the second and 64.6% in the third survey) but anatomical dissection by itself was found to be the least stressor on both surveys and this result is supported by Mc Garvey and his colleagues' study (14). Although medical school environment is stressful, findings from previous studies showed, majority of students do not find the experience of dissection stressful and for a small percentage of students there still remains a need to explore ways of helping them to adapt to the experience of dissection (12,18).

In this survey, 99% of students considered dissection as important and this finding supports a study done by Izunya et al (23), which showed 90% of respondents considered cadaver dissection as important and indispensable in the study of human anatomy. The manual skills learnt in the dissection room are essential in almost every branch of medical profession (24). Moreover, dissection has been considered as essential requirement in learning three-dimensional aspect of human anatomy (25) and has remained universally recognizable step in becoming a doctor (3), which puts undergraduates at the sharp end of medical education.

A study done by Patel and Moxham (26), showed 98% of professional anatomists believe that dissection is important for gross anatomy learning. Another study done by Mulu and his colleagues also showed that 98% of second year medical students responded dissection is relevant for anatomy learning (27).

This study revealed that majority (90.5%) of the respondents preferred dissection than prosection. This finding is in line with the study of Izunya and his colleagues (23) that most of the students (71%) agreed that actual hands on practical sessions of cadaver dissection gave better results than demonstration of prosected specimens for better understanding. A similar study in India also showed 96.3% of students preferred dissection than prosection (28). Similar findings were also reported elsewhere by Jonson (29), Rajkumari & Singh (1), Parker (30) and Mclachian et al. (3).

In this study, majority of the students (78.9%) on the first survey and (83%) on the second survey disagreed with the replacement of dissection-based learning of anatomy by other methods. This accord's with a cross-sectional study done by Mulu and his colleagues at the same University (27) which reported 81% of medical students opposed replacement of dissection by other methods.

In conclusion, the present study had shown that in the majority of the students fear and nausea had decreased while interest and excitement had increased on subsequent exposure to dissection. It also showed that chemical odour and eye irritations were the leading factors which create discomfort in the dissection room even though anatomical dissection by itself was not considered as a stressor compared with other stressors in the university. Thus, instructors are recommended to adequately prepare students mentally and emotionally before the commencement of the dissection session for an exciting and stress free anatomy learning though dissection.

Majority of the students preferred cadaver dissection than prosection and opposed its replacement by other methods of learning. Therefore, medical curriculum developers and policy makers should pay attention to the relevance of dissection for anatomy learning. Similar, study by other medical schools in Ethiopia is also recommended to identify whether factors affecting attitude are uniformly distributed throughout the country.

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