

Research Article – Education in Anatomy and Embryology

Inspiring Tanzanian medical students into the profession: appraisal of cadaveric dissection stress and coping strategies

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Abstract

Learning experiences and environments greatly influence mastery of competencies during training and in future career. From its nature, cadaveric dissection early in the medical training has the potential to daunt the student's interest in the medical profession during training and in the future clinical practice. This study aimed at appraising the Tanzanian first year medical students at Muhimbili University of Health and Allied Sciences on emotional and physical stress during practice in cadaver dissection room, coping strategies and attitude on dissection. 169 students completed a self administered questionnaire that assessed emotional and physical symptoms encountered during cadaver dissection. The questionnaire also asked for the coping strategies. The frequency distributions were used to summarize demographic variables, reaction and coping strategies. The commonest symptoms were disgust, fear and nausea. Curiosity, prior mental preparedness, pressure and help from the staff were the major coping strategies. About four in five students were fearful and anxious at the beginning, but the figure dropped towards the end of the dissection course. Females reported significantly higher rates of symptoms than males. Prior exposure to a dead body significantly lowered the levels of stress. Close to 95% positively favored dissection over other methods. About 90% would go through the dissection course given another chance. Almost all students would recommend the medical profession to their younger relatives. Anatomy staff and mentors should devise appropriate coping strategies including gradual introduction to dissection room, proper cadaver preparations, proper counselling and complementing dissection with videos and radiographic pictures.

Key words

Medical students, cadaveric dissection, stress, coping.

Introduction

Learning experiences largely influence mastery of the intended competency acquisition and later career prospects (Pekrun, 1992; Pekrun et al., 2002; Afkalides and Volet, 2005). From its nature the dissection of the human dead body (cadaver) during teaching anatomy early in the medical training - as it is largely practiced - has the potential to dissuade medical students against the medical profession during their

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training and also in their future career. In the UK, close to 8% of young doctors leave the medical profession either temporarily or permanently for several reasons including factors tethered to unfavorable experiences during learning and poor preparation (Beedham, 1996; Paice, 1997).

Dissection has been a cornerstone of teaching anatomy for centuries. Despite its traditional standing as a model of teaching anatomy, studies have shown that cadaveric dissection may cause physical and psychological trauma of variable scale (Arráz-Aybar et al., 2008) to overt psychiatric conditions (Finkelstein and Mathers, 1990). Although dissection is still the fundamental method of teaching and learning anatomy in the majority of African medical schools, little efforts have been done to appraise and improve this important teaching method while data and educational scholarship in this area are notably scant (Kramer et al., 2008; Kinfu, 2008; Mulu and Tegabu, 2012; Ongeti, 2012). As the pedagogical value of dissection remains debatable among anatomists globally, African medical schools, and indeed developing countries, need to empirically investigate and improve knowledge on anatomical education through cadaver dissection.

Muhimbili University of Health and Allied Sciences (MUHAS) has traditionally been the only medical school in Tanzania and one of the few medical schools in East Africa and therefore attract students from varied cultural and religious backgrounds at both national and regional level. Cultural diversity and religious beliefs among students may strongly influence their interaction with dissection (Notzer et al., 2006; Naz et al., 2011). Age and sex are other important elements that may affect students' learning in the subject of anatomy. This study aimed at appraising the Tanzanian first year medical students at MUHAS on emotional and physical stress during cadaver dissection and coping strategies. We also investigated the students' experiences and attitudes towards dissection as a cornerstone method of teaching anatomy at MUHAS.

Material and methods

Data set and sampling

First year medical students in their anatomy course were requested to complete a self-administered questionnaire. The questionnaire bore no identity and respondents were assured of the voluntariness of participation and confidentiality of the information. The faculty/assessor was available to answer any queries from students during the filling in of the questionnaires. The questionnaire was administered after the course had run since four months - a period that could not affect student's recollection of facts required in the questionnaire. The questionnaire primarily assessed emotional and physical symptoms encountered during the cadaver dissection sessions. The questionnaire also asked for the coping strategies employed by the student. Frequency distributions were used to summarize demographic variables, symptoms and coping strategies. A p -value of ≤ 0.05 was considered significant.

Data screening and analysis

One hundred and eighty-eight students completed the questionnaire whereas 19 questionnaires were not properly filled and contained either ambiguous or contra-

Table 1 – Participants demographics.

| Variable | N(%) |
|--|-------------|
| Gender | |
| Male | 131 (77.5%) |
| Female | 38 (22.5%) |
| Age | |
| 18-21 | 96 (56.8%) |
| >21 | 72 (42.6%) |
| Unidentified | 1 (0.6%) |
| Ever seen a dead body before? | |
| Yes | 89 (52.7%) |
| No | 80 (47.3%) |
| Fear or Anxiety before entering dissection room | |
| No fear at all | 32 (18.9%) |
| A bit anxious and afraid | 99 (58.6%) |
| A lot anxious and afraid-Horror | 34 (20.1%) |
| Other | 4 (2.4%) |

dicting information which were excluded from the study. 169 questionnaires met the final criteria for inclusion and analysis. Descriptive statistics using frequency distributions were used to summarize demographic variables. Reported experienced symptoms, challenges (degree of disturbance) and coping strategies were also summarized using frequency distributions. Moreover, the degree of fear and anxiety before dissection was compared with that after dissection using McNemar's test. Association between reported demographic variables, symptomatic challenges and coping strategies were assessed using the chi-square test or Fisher's exact test (when cell counts fell below 5). A p-value ≤ 0.05 was considered statistically significant. All analyses were accomplished using IBM-SPSS (version 20).

Results

A total of 169 students successfully filled in the questionnaire that met criteria for analysis. The majority of students were males (77.5%) and most students were in the 18-21 years age group (56.8%). Nearly half of the students (52.7%) had seen a dead body prior to entering the dissection room. Only about 1 in 5 students did not report any fear or anxiety (18.9%), before entering the dissection room while slightly higher percentage reported a high level of fear and anxiety or horror (20.1%). The most common symptoms, reported by more than a quarter of students surveyed, were disgust, fear, nausea, loss of appetite and sweating as shown in Table 2. To a lesser extent, participants reported experiencing anxiety (21.3%) and insomnia (15.4%). Only 8 (4.7%) students reported faintness. Unlike the male students, females significantly reported higher rates of experiencing disgust (54.3% vs 32.4%, $p=0.021$), nausea (55.3% vs 24.0%, $p<0.01$), palpitations (40.0% vs 20.5%, $p=0.019$), insomnia (35.3% vs 12.5% $p=0.002$) and faintness (16.2% vs 1.6%, $p=0.002$). Unlike the older group,

Table 2 – Symptom reactions to the dissection room.

| Variable (Symptoms due to dissection of human body)* | Proportion of students expressing the symptom (%) | Proportion of male students expressing the symptom (%)** | Proportion of female students expressing the symptoms (%)** | p-value |
|--|---|--|---|----------|
| Disgust | 53 (31.4%) | 34/105 (32.4%) | 19/35 (54.3%) | 0.021*** |
| Fear | 52 (30.8%) | 36/109 (33.0%) | 16/33(48.5%) | 0.106 |
| Nausea | 52 (30.8%) | 31/129 (24.0%) | 21/38 (55.3%) | <0.01*** |
| Loss of appetite | 47 (27.8%) | 32/118 (27.1%) | 15/37 (40.5%) | 0.121 |
| Sweating | 44 (26.0%) | 35/122 (28.7%) | 9/33 (27.3%) | 0.873 |
| Palpitation | 39 (23.1%) | 25/122 (20.5%) | 14/35 (40.0%) | 0.019*** |
| Anxiety | 36 (21.3%) | 24/108 (22.2%) | 12/35 (34.3%) | 0.153 |
| Insomnia | 26 (15.4%) | 14/112 (12.5%) | 12/34 (35.3%) | 0.002*** |
| Faintness | 8 (4.7%) | 2/125 (1.6%) | 6/37 (16.2%) | 0.002*** |

* Percentages do not add up to 100 since participants can have multiple answers.

** The total for each line represents the answers given to the specific question.

*** Significant difference at the 5% level.

Table 3 – Challenges in the dissection room.

| Challenge | N (%) |
|-----------------------------|------------|
| Sight of the Cadaver | |
| None | 96 (56.8%) |
| Slight | 62 (36.7%) |
| High | 7 (4.1%) |
| No answer | 4 (2.4%) |
| Touching the Cadaver | |
| None | 93 (55.0%) |
| Slight | 66 (39.1%) |
| High | 7 (4.1%) |
| No answer | 3 (1.2%) |
| Cutting the Cadaver | |
| None | 75 (44.4%) |
| Slight | 76 (45.0%) |
| High | 15 (8.9%) |
| No answer | 3 (1.8%) |

students in the younger age category reported significantly higher rates of anxiety (34.6% vs 13.1%, p=0.004) and disgust (50.0% vs. 21.7% p=0.001). Students who had seen a dead body prior to the dissection reported significantly lower rates of insomnia (11.8% vs. 24.3% p=0.50), fear (22.2% vs. 51.4% p<0.001) and disgust (29.6% vs. 46.4% p=0.40).

As for the challenges in the dissection room, less than 10% of students reported being highly upset. “Cutting of the Cadaver” was rated as highly challenging by more students (8.9%) than those rating that way “Touching” (4.1%) or “Seeing”

Table 4 – Coping Strategies.

| Coping Strategy | N (%)* |
|-------------------------------------|-------------|
| Curiosity | 127 (75.1%) |
| Prior Mental Preparedness | 119 (70.4%) |
| Help/pressure from Anatomy Staff | 115 (68.0%) |
| Help/pressure from peers | 89 (52.7%) |
| Rationalization | 75 (44.4%) |
| Help from senior students | 65 (38.5%) |
| Philosophy or Religious convictions | 40 (23.7%) |
| Detachment | 13 (7.7%) |
| Previous Experience | 13 (7.7%) |

*Percentages do not add up to 100 since participants might give multiple answers.

(4.1%). The majority of students were not affected by seeing (56.8%) or touching (55.0%) the cadaver while the figure dropped to only 44.4% in regard to cutting the cadaver. A substantial proportion of respondents reported being slightly upset by seeing (36.6%), touching (39.1%) or cutting (45.0%) the cadaver. None of the variables were associated with age, gender or previously seeing a dead body before. However, younger students reported that cutting the cadaver was highly challenging more frequently than older students (64.5% vs. 43.1%, $p=0.006$). About 1 in 10 students reported that dissecting a human body interfered with their religious beliefs (10.1%).

There was a significant decrease in anxiety ($p \leq 0.01$) and fear ($p \leq 0.01$) after the students had started dissection than before. Curiosity, prior mental preparedness, and pressure or help from anatomy staff were the most common reported coping strategies (75.1%, 70.4% and 68.0% respectively). One in four students reported philosophy or religious convictions as coping strategies. There was no association between any of the coping strategies and gender. Unlike the younger age group who relied more on curiosity and support from others, participants in the older age category significantly reported prior mental preparedness (83.3% vs. 60.4% $p=0.001$) and previous experience with the dead body (15.3% vs. 2.1% $p=0.002$) as the major coping strategies. Other major coping strategies employed by a wide proportion of students were rationalization (44.4%) and help from senior students (38.5%). Worth to note is the 7.7% of respondents who reported emotional detachment as their coping strategy.

Close to 95% of respondents positively favoured dissection versus other methods. About 90% would go through the dissection course given another chance. Almost all students would recommend the medical profession to their younger relatives even if dissection continues to be the main means of learning anatomy.

Discussion

In the present study, about a quarter to one-third of students reported dissection related stress reactions - a proportion which favourably compares with previous findings (Horne et al., 1990; Nnodim, 1996; Abu-Hijel et al., 1997; Bataineh et al., 2006) but apparently higher than that reported elsewhere (Dinsmore et al.,

2001; Cahill and Ettarh, 2009). These variability of results might largely be due to differences in the methods of study or the extent of student preparation for dissection before beginning sessions. In the present study, a majority of students reported mild emotional reactions with dislike-related symptoms such as disgust, anxiety, nausea and loss of appetite. While these dislike-related reactions could be due to mental processes elicited by fear of death due to cadaver dissection, it is possible that the volatile substances emanating from poorly prepared cadavers and the dissection room microenvironment could be the main culprit for these reactions. Previous reports have shown that most students are actually stressed with the smell, sight and fear of infection (Snelling et al., 2003; Bataineh et al., 2006) or formaldehyde fumes and toxic chemicals (Naz et al., 2006), factors that can be significantly mitigated by better cadaver preparation. Other reports have in fact shown that the workload of the usually much-loaded anatomy course and the examinations stress students more than dissecting the cadaver per se (Evans and Fitzgibbon, 1992; Dinsmore et al., 2001; McGarvey et al., 2001; Snelling et al., 2003; Cahill and Ettarh, 2009). One study (Evans and Fitzgibbon, 1992) went further and found that dissecting ranked only 12th among 14 major stressors of medical students.

A considerable proportion of students reported even more worrisome physical symptoms including palpitations, insomnia and faintness, which matched with previous findings (Arráez- Horne et al., 1990; Nnodim, 1996; Abu-Hijelh et al., 1997; Bataineh et al., 2006; Aybar et al., 2008), but were generally less intense than those reported from other studies (Finkelstein and Mathers, 1990). Apart from being deterrent factors against learning and future career achievements, these reported symptoms do pose serious health concerns to students. The departments and schools, therefore, should build and ensure the capacity for handling the dissecting room challenges including availability and readiness of first aid and emergency medical services, academic and psychological counselling. For example, studies have shown that repeated or gradual exposure including detailed verbal information on the situation, visits to dissecting room when no cadaver is present and showing of video pictures of human dissections before carrying out the first dissection considerably reduced the students' anxiety response (Horne et al., 1990; Tuohimaa et al., 1993; Tschernig et al., 2000; Arráez-Aybar et al., 2004; Khan and Mirza, 2013). Further, flexibility should be provided for students who consistently express similar or any other severe symptoms to have a right to opt for, and be guided to other academic disciplines of their choice.

As for the coping strategies, most students pointed out that curiosity and mental preparedness helped them cope with the dissection room stress. These are student self motivated and non-coercive factors do positively promote learning. A sizeable proportion of students reported compressive coping strategies such as pressure from staff and peers, a scenario that may create a negative attitude towards the subject and hence affect the future career achievements (Pekrun, 1992; Pekrun et al., 2002; Afkaldes and Volet, 2005). More than a third of the participants coped by the help from senior students indicating that socialization and interaction with the (senior) students peers can be an invaluable approach to defusing the dissection anxiety. In agreement with previous studies, students reported fewer symptoms eight weeks after the first dissection session indicating that apprehension faded with time (McGarvey et al., 200; Cahill and Ettarh, 2009).

It is interesting that the students overwhelmingly favoured dissection as the cornerstone of learning anatomy, a finding in line with the few African studies (Izunya et al., 2010; Bekele et al., 2011; Mulu and Tegabu, 2012; Ongeti, 2012) and with several others from elsewhere (O'Carroll et al., 2002; Rajkmari et al., 2008; Khan and Mirza, 2013). Female students significantly expressed disgust, fear and anxiety more often than their male peers in agreement with many other reports (Sharlton et al., 1994; Dickinson et al., 1997; Nnodim, 1996; Abu-Hijelh et al., 1997; Bataineh et al., 2006; Plaisant et al., 2011). This seemingly gender associated trend could probably be due to culturally engraved gender differences in many parts of the world which is an important factor to offset if gender equality is to be achieved in rare professions such as medicine. In the present study, students in the older group and those who had seen a dead human body before tended to cope well with the dissection room challenges in agreement with previous studies (Rajkmari et al., 2008), but in contrast with other studies which did not see this effect (Horne et al., 1990). As we aim at combating the severe shortage of doctors particularly in Africa, including internal brain drain (those who choose to abandon the medical profession due to poor career interest etc.), we need to begin right at the grassroots during enrolment including the selection criteria for students joining the medical schools. In Tanzania, for instance, the sole criterion to join the medical school is the student's academic performance in science subjects at high school. Other attributes such as age, career interest, attitude and previous exposures need to be considered in order to increase the number of medical graduates with interest and readiness to practice in clinical setups.

Conclusions and recommendation

We have showed that there are variable levels of stress and means of coping among medical students going through the dissection course in Tanzania. This is the first empirical study in the country to appraise the cadaveric dissection among medical students. As many health professions training institutions flourish in Tanzania, our findings will be useful in guiding the training in the subject of anatomy which invariably use cadaveric dissection. More studies are needed to assess, evaluate and improve the delivery of the anatomy course.

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Conflict of interest

The authors have no conflict of interest to declare.

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