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ASSESSMENT OF THE KNOWLEDGE, ATTITUDE, AND PRACTICE OF MEDICAL STUDENTS TOWARDS THE IMPORTANCE OF CADAVER & ITS HANDLING IN ETHICAL STANDARDS DURING PROCUREMENT, TRANSPORTATION, INJECTION, DISSECTION AND CARING PROCESS IN ETHIOPIA.

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JIMMA, ETHIOPIA

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ABSTRACT

Background: Cadaver dissection involves far more than the acquisition of anatomical knowledge. It has a role in the development of professionalism; is a major shaper of attitudes such as respect, mortality, privilege and the requirement to share knowledge; and helps to shape caring and responsible professionals who are reflective and show the attributes for effective self-assessment. The use of human body for medical and scientific research is a sensitive issue & any-thing involving human body is ethically acceptable.

Objective: To assess the Knowledge, Attitude, and Practice of medical students towards the importance of cadaver & its handling in ethical standards during procurement, transportation, injection, dissection and caring process in Ethiopia.

Methods: Institutional based cross sectional study was conducted from April 01 to April 30, 2018. The data were collected from 279 respondents enrolled PCII at the School of Medical Sciences of the Jimma University, Addis Ababa University, St. Paul University and University of Gondar, selected by simple random sampling technique after allocating the total sample to each Institution proportionally. Descriptive statistics, bivariate analysis and multivariable logistic regression analysis were employed to identify significant variable of cadaver dissection based on ethical standards.

Results: A total of 279 respondents were included in the study out of whom 156 (55.9%) were male and 123(44.1%) were female and most of the respondents were in the age groups of 21-30 years (SD = 0.492 and variance=0.242; range, 20–30 years). The study results indicated that 98.6% of the study participants had cadaver dissection session and cadaver was important to learn gross Anatomy, 235(84.2%) students reported that the smell of formalin is depressing. The study result showed that about 45.5% of the study participants had adequate knowledge, about 48.7% of the study participants had favorable attitude, and about 39.1% of the study participants had good practice about the cadaver dissection based on ethical standards to learn Anatomy, respectively. From the results of the present study, one might confidently infer that cadaver dissection is still considered important and indispensable in the study of human anatomy

Key Words: Cadaver procurement, dissection, Ethical standards, KAP of medical students and medical institution.

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ACRONOMS

WHO-World Health Organization

IFAA -International Federation of Associations of Anatomists

UAGA-Uniform Anatomical Gift Act

CBP- Cadavers and Body Parts Request

SOM-Morgue of the School of Medicine

HGR-Humanity Gifts Registry

OC-Operational Committee

AHA/A-Anatomy Authority Act

HTA -Human Tissues Authority/Act

PMBD-post mortem body donation

KAP- Knowledge, attitude and practice

L-liter, **ml**-milliliter

Kg-kilogram, **g**-gram

BC-Before Christ

DR-Dissection Room

CD-Cadaver Dissection

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CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND

Basic medical sciences education is a foundation for the whole medical education. Anatomy, the study of the structure of the human body is one of the first, most basic and yet one of the most important subjects studied by medical students when they begin their medical career (1)(2). The history of anatomy, and particularly anatomical teaching, has been dominated by dependence upon use of the bodies of the deceased or cadavers (3). But dissection for learning and research took its first history in dead animals because of the taboos regarding the dissection of humans. It was initially conducted by physicians in ancient Greece. The dissection of dead animals gradually leads to “vivisections” (surgery of live animals). Prominent physicians from this period who performed “vivisections” include Alcmaeon of Croton (6th–5th century BC), Aristotle, Diocles, Praxagoras (4th century BC), Erasistratus, and Herophilus (4th–3rd century BC)(4). All of these authors had a great influence on Galen of Pergamon (2nd–3rd century), the prolific Roman physician of Greek ethnicity who developed, to an unprecedented level, the techniques for dissection and vivisection of animals (4). Experience in dissection of dead or living animals was implemented in human cadavers in latter years. The use of human cadavers (a dead human body) as a learning tool has been in practice for over five hundred years. Dissection of human body started in ancient Greece in the 3rd century BC. This practice revived in medieval Italy during 14th century AD and it evolved in Europe and United States of America over centuries. The recorded history showed that the first peoples to dissect human bodies were two Greek physicians Herophilus (335-280BC) and Erasistratus (304-250 BC). Andreas Vesalius (1514-1564) was the first medical student to dissect the cadaver and also continued with it even as a professor (1). Andreas Vesalius), a Flemish-born anatomist, is credited as the father of modern Anatomy for his contribution in dispelling many misconceptions propounded by Galen and held for 1500 years about human body and its functions by dissecting human bodies (5).

It is heartening to know that everyone feels that cadaveric dissection is essential for imparting knowledge in Anatomy and the other teaching aids only supplement it (6). Traditionally, cadaveric

dissection was the pillar for the teaching and study of human anatomy. It is still remains very important in learning anatomy (6).

The act of dissection (from Latin *dissecare* "to cut to pieces"; also called anatomization), essential part of teaching and learning anatomy, is considered fundamental to the understanding and learning of anatomy. It is the true essence of basic subjects which gives the medical student their very first exposure to human body and helps them overcome their inhibitions (7). It is also allows the ability to use tactile and visual senses allows students to get a complete understanding of the three-dimensional relationships so critical to understanding the tissues and structures that become daily targets of their clinical practice (8)(9). The process of dissection also involves far more than the acquisition of anatomical knowledge (10)(8)(11). It has a role in the development of professionalism; is a major shaper of attitudes such as respect, mortality, privilege and the requirement to share knowledge; and helps to shape caring and responsible practitioners who are reflective and show the attributes for effective self-assessment (6)(12). The Anatomy Laboratory shares the functions listed for cadaver dissection as it serves as a site of learning and growth in which to develop and foster empathy, professionalism, teamwork, and a fundamental understanding and appreciation for the human body through cadaveric dissection (13)(14)(7).

Historically cadaver procurement was dependent on bodies of capital punishment sentenced criminals. But due to demand exceeding supply, as their dissections are required for studying the human anatomy in all disciplines of medical science and medical institutions of various specialized disciplines have overgrown, the need for cadavers has also increased proportionately (6)(14), cadavers can be obtained by three ways. The first one is voluntarily donation; the best method of cadaver procurement is Voluntary Body Donation based on altruistic reason, by the person him/herself. The conditions to be taken into account when a person voluntarily donate his/her body includes; person should be an adult of sound mind and He/she should give his informed consent in writing with having absolute freedom for the subject for revoking at any time the given consent but the consent unaltered by moral or physical constraint. The existence of a legalized document (declaration before a public notary, donation contract, will of the deceased) which stipulates that the donation is done with a humanitarian, altruistic goal, without pursuing a material or other type of benefit (15). The second way of donation are based on family consent, the conditions to be taken into account when donations are based on family consent, there should

be: The necessity of written consent from at least one major member of the family or relatives (in the following order: husband, parent, child, brother, sister); The inadmissibility of cadaver donation if during lifetime the deceased person expressed the option against such a donation. The third and the last method of cadaver procurement is unclaimed cadavers and of those without family, which was the mostly practiced method in our country. It is considered to be the least ethical way. That is because the deceased person's consent concerning the use of his/her body for teaching purposes cannot be taken for granted (15)(6).

The foremost intention of procurement of the cadaver is for dissection purpose so as to enable the undergraduate and medical students master the normal anatomy of the human body, training surgeon, postgraduate and for scientific research. Hence some cadavers may not be considered appropriate for the same and may have to be rejected. These are: Forensic cadavers (post mortem and medico-legal cases), Medical grounds e.g. the cadavers which are carriers of contagious diseases like tuberculosis or AIDS or HbSAg (Australia Antigen) (6), Body without skin intact – Bed sores or skin diseases like psoriasis etc, and Decomposed / extremely obese / extremely emaciated body (15).

Transport of cadaver is the physical movement of cadaver from one University to another University and from mortuary to anatomy unit. On cadaver transportation when a body fluid leakage occur while transporting dead bodies, the usual accepted guidelines endorsed by WHO for dealing with spilled body fluids should be followed: Wear disposable gloves and, if available, a plastic apron - If the spillage has occurred on an aircraft, only use cleaning materials suitable for aircraft use. Do not try to clean the body fluids by hosing with water or air. Use material that will absorb the body fluids and scrape the material into a biohazard bag. Wash the area with water/disinfectant after removal of the adsorbent material. Dispose of gloves and apron in a biohazard bag. Wash hands thoroughly with soap and water afterwards (16).

Embalming is injecting certain chemical preservatives into the body to slow the process of decay. A standardized formula for embalming is used to embalm cadavers for dissection. Embalming formula contains a mixture of chemicals like; ethanol, formalin, phenol, glycerin and water. The embalming fluid is injected into the artery (femoral, or carotid, or brachial) under pressure of 1 - 1.5 kilopascal, until the cadaver is filled (\pm 25L for a 60 kg cadaver). The blood flows into the veins and the arteries are therefore empty (17). Other embalming process usually involves cavity,

hypodermic and surface embalming. Cavity embalming refers the suction of the internal fluids of the cadaver and the injection of embalming chemicals into body cavities, using an aspirator and trocar. Hypodermic embalming means the injection of embalming chemicals under the skin as needed. Surface embalming uses as supplements for other methods, especially for visible, injured body parts (17)(18). When a previously embalmed cadaver was being dissected and the tissue was exposed to air, a significant change in volume was noted in the tissue. So, it is absolutely essential for wet specimens to be kept moist. Routinely, we cover these with cloth dipped in suitable wet fluid, after which they are covered with polyethylene bags and stored in a cooled room. When wet specimens are in use and are required to be uncovered for longer periods, they are moistened with fluid using an ordinary domestic spray can. Subsequent to such exposure, these specimens are dipped in suitable specimen wetting fluid (17).

The dissection of an unclaimed body does not necessarily have to be undignified. Nevertheless, it is not safe to assume that the person in question would have approved of dissection of his or her body, which means that, on an individual level, this practice must be seen as a violation of the personal autonomy of the deceased and his or her presumed last wishes. On a community level, use of unclaimed bodies often discriminates against the poor who cannot afford burial and/or do not have the means to care for or protect their dead (19).

Dissection is the act of cutting up and analyzing a tissue or a specimen in detail. The dissection of the human body symbolizes a procedure during which the body is sliced or divided as an aid to discerning the functions and relationships of its components. A cadaver has a fundamental moral-ethical value that necessitates a reverential attitude towards it. Ethical principles suggest that the whole processes in cadaver handling has to be conducted in a very maximum care and respect. In spite of this it is a common place to see violations of recommendations in cadaveric ethical standards in several settings (13). Such ethical violations may be observed during cadaver procurement, transportation, embalming/preservation, storage, dissection disposal etc. The procurement, inventory, use, storage, transfer, transportation, and disposition of cadavers/parts used for education and research purposes must be conducted safely, respectfully, and in compliance with all legal, public health, and ethical standards (20).

We possess a reverential attitude towards the human cadaver because of various reasons for the same: Firstly, the way we handle a cadaver indirectly indicates the way we would treat a live

patient; the only difference between a cadaver and a human is the presence of life, otherwise cell to cell they are the same. Secondly we should always respect the memory of the departed. Disrespecting the cadaver means the deceased person him/herself. Thirdly the near ones of the deceased have endured an agonizing and irremediable loss which should never be overlooked. Lastly every cadaver possesses a religious implication like resurrection or rebirth. So disrespecting the human cadaver would advocate disregarding the entire human existence. In view of the above, dissection of a cadaver should be performed in stringently guarded provisions so as to receive acceptance (15). It is therefore suggested that an element of consensus is added to the concept of consent, a consensus between donors, relatives, anatomists, and the wider community. A consensus can give difficult decisions surrounding body donation and dissection a broader basis and can help bridge the gap between donors and families on the one side and anatomists, researchers and students on the other side (19). Informed consent means an agreement, compliance or permission given voluntarily without any compulsion. It can be defined as “the voluntary and revocable agreement of a competent individual to participate in a therapeutic or research procedure, based on an adequate understanding of its nature, purpose and implications” (21).

Sourcing cadavers around the world shows that; countries (e.g. Muslim dominated countries in Northern Africa and the Middle East and some Caribbean countries) that have failed to obtain cadavers from within its own borders and is an indication of the tenacious resistance against all forms of local sourcing of either unclaimed cadavers or donated cadavers. These represents countries that have opted for the importation of cadavers and have supportive legislation (22). Some Countries depend on unclaimed cadavers are (e.g. Romania; Turkey and most sub-Saharan African countries such as Cote d’Ivoire, Ethiopia, Kenya, Nigeria, Zambia) using ancient legislation solely depend on unclaimed cadavers (22). Also, Countries that are largely using donated cadavers are (e.g. Germany, Portugal, Spain and USA) have turned the tide from largely using unclaimed cadavers to largely using donated cadavers and are a result of active body donation programs (22). Anatomists and other staff of anatomical institutes or body donation programs have to handle the dead body physically to serve intended research and teaching purposes (19). The use of human body for medical and scientific research is a sensitive issue. Researchers should assure themselves that any-thing involving human body is ethically acceptable. It is a central tenet of the ethics of anatomical dissection, an ethical norm, and as such belongs to the realm of deontological ethics. Kant specified dignity as follows: “In the kingdom of ends

everything has either a price or a dignity (19). The concept of human dignity as applied to the human cadaver thus establishes continuity between the living and the dead (19).

It was thus established that living persons should be able to decide about the fate of their “own” cadaver after death(19). This historical development toward body donation can also be interpreted as a transfer of the concept of “informed consent” to anatomical dissection. Informed consent, that means, the written consent of a potential research subject after information about involved risks, is the core ethical value of today’s medical research on living human subjects. It was globally established by the Helsinki Declaration of 1964, Declaration of Helsinki: The World Medical Association drafted the first international agreement recommending ethical standards for clinical/medical research(23).

The central claim is medical research is subject to ethical standards that promote respect for all human beings and protect their health and rights(23). Some research populations are vulnerable and need special protection. The particular needs of the economically and medically disadvantaged must be recognized. Special attention is also required for those who cannot give or refuse consent for themselves, for those who may be subject to giving consent under duress, for those who will not benefit personally from the research and for those for whom the research is combined with care (24), which goes back to the Nuremberg Code of 1947 (19)(23). The first and the central claim of the Nuremberg Code is the voluntary consent of the human subject is absolutely essential (23). This means that the person involved should have legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit, duress, overreaching, or other ulterior form of constraint or coercion; and should have sufficient knowledge and comprehension of the elements of the subject matter involved as to enable him to make an understanding and enlightened decision (23). This latter element requires that before the acceptance of an affirmative decision by the experimental subject there should be made known to him the nature, duration, and purpose of the experiment; the method and means by which it is to be conducted; all inconveniences and hazards reasonably to be expected; and the effects upon his health or person which may possibly come from his participation in the experiment (23).

The duty and responsibility for ascertaining the quality of the consent rests upon each individual who initiates, directs, or engages in the experiment. It is a personal duty and responsibility which

may not be delegated to another with impunity. The degree of risk to be taken should never exceed that determined by the humanitarian importance of the problem to be solved by the experiment. Proper preparations should be made and adequate facilities provided to protect the experimental subject against even remote possibilities of injury, disability or death (23).

In the same vein, body donation implies that a living competent human subject consents in writing that his or her body may be used for anatomical purposes after death (2).

1.2. Statement of the problem

Knowledge of anatomy is one of the cornerstones of modern medicine. The dissection of cadavers to learn human anatomy has been common practice in many countries in the world for centuries since Vesalius founded modern human anatomy in Padua during the sixteenth century (25). Anatomy is designed to give students a view of the body and help them to understand the subject in detail. Even though the dissection method is emotionally stressful it provides essential knowledge and skills for their future studies (26).

First year medical students normally experience a variety of emotional reactions and mixed feelings, when they encounter human cadavers for the first time (27). There is an area of concern for physiological, emotional reactions and mixed feeling by the first year medical students when they encounter with human cadavers for the first time in dissection room (28). Though initially the dissection might be a challenging with many symptoms associated with it but many of the students adapt the situation quickly (29).

A good anatomical knowledge is fundamental and indispensable to efficient and safe clinical practice and for the understanding of other subject disciplines such as physiology, pathology, and surgery. Moreover, studies have shown that anatomical dissections reinforce respect and compassion among medical students. The high costs, time intensity, the requirement for highly skilled professionals, and the emotionally challenging nature of cadaveric dissection as well as being a cause of significant psychological distress among medical students have been cited as its potential disadvantages (30).

However scarcity of cadavers is felt all over the world. Body donation is the preferred and major source of cadavers worldwide. It is defined as an informed and free act of giving one's whole body after death for medical education and research (31). The study revealed that some study has observed that African -Americans, older age, lower education , lack of insurance, unemployment , co morbid conditions and religion/spirituality were associated with less willingness to donate cadaveric body/organs (31). The use of unclaimed bodies has several criticisms that have encouraged the use of donated cadavers. There exist countless cases of non-ethical use of the human body for anatomical study. The resulting knowledge should not be demonized or censored,

since even under erroneous political pressures, the study of anatomy and the use of the Human “Atlas” is a tribute to those who have died. It should rather be analyzed to become a valuable tool in teaching ethics and history to the future medical practitioner (32). Nowadays, donated cadavers are generally easier to preserve in a better state than unclaimed cadavers who have to undergo a time consuming process of trying to locate their relatives before embalming. The number of unclaimed cadavers obtained is potentially liable to further reduction from relatives claiming back some cadavers due to late identification. Although unclaimed cadavers tend to be younger and may even include pediatric cases, unclaimed cadavers have very low female numbers when compared to donated cadavers and may compromise the learning of female reproductive anatomy and research (31)(22).

The worldwide practice of using unclaimed bodies is simply and sadly based on taking bodies of the “friendless dead”, who “do not like it and cannot resist”, and targeting communities who cannot effectively protest (31)(22). The most potent criticisms against the use of unclaimed cadavers are the negative emotions and ethical issues when compared to using donated cadavers because using unclaimed cadavers allows dissection without the consent of the person-now-dead, depends on the ignorance of the relatives and is “exploitation of those on the margins of society”(22). Across the Atlantic Ocean, a number anatomy schools in USA were once so proud of exclusively using Afro-American as unclaimed cadavers during the time of slavery. The very high proportion of adult male unclaimed cadavers maybe due to more familial isolation in adult males than females (22). The “Prussian Directives” were fully exploited by anatomy departments under the Nazi realm and large numbers of political victims on the wrong side of the Nazi philosophy ended up being used for anatomical teaching (33)(22).

In Nigeria, unclaimed cadavers tend to come from the much poorer northern regions of the country (22). Some Countries likes (e.g. Germany, Portugal, Spain and USA) have turned the tide from largely using unclaimed cadavers to largely using donated cadavers and are a result of active body donation programs. Unclaimed cadavers make up a smaller percentage of cadavers. Countries that are solely depend on unclaimed cadavers, represent countries (e.g. most sub-Saharan African countries such as Cote d’Ivoire, Ethiopia, Kenya, Nigeria, Zambia) using unclaimed cadavers. A mix of ignorance on body donations by the public, the relative ease of obtaining unclaimed cadavers, the reluctance by anatomists to face the anticipated cultural resistance and state

legislations that does not allow body donations are the major impediments among these countries. Some have found that the setting up of body donation administrative structures too difficult, although administrative resources for body donation programs can be pooled together and a centralized anatomy body donation center can be set up (22).

Cadavers are becoming increasingly scarce and their preservation costs have continued to rise. Running a dissection laboratory with appropriately trained full-time staff can be a considerable financial challenge for any educational institution. In addition, the variability of cadaveric material and quality of dissections (dependent on professionals' and student skill level) are among the reasons why necessary of turning from using unclaimed body to donated body for dissection in medical schools (34). The study revealed that the majority of students expressed a negative experience; hence it is necessary to support them before initiation dissection. The proper time, means and methods of communication about cadaver dissection to these students at the early stage of their studies is still a case of arguments and controversy among anatomists. It is pertinent to note that cadaver dissection and its value to anatomy education is a topic of much interest to anatomists and medical students (10)(35).

Some study revealed that there were no formal orientations/lectures offered to most of the students before initial exposure to cadaver dissection. A formal course on KAP of cadaver dissection that will reveal some physical, mental and emotional challenges, benefits of cadaver dissection to their education, avoidable practices and punishment/caution for misconduct should be introduced and made compulsory for all cadaver dissecting professionals and medical students (10)(36). To raise the awareness about body donation, organized efforts are needed to change the mind-set of the society through 'Body donation programme'. Support from medical professionals is imperative to the success of such programs as their opinions and beliefs will play a major role in shaping attitude towards donation and respect of the body. As recommended by Rokade et al, we also suggest that the 'body donation units' should be mandatory for all medical colleges for effective implementation of 'Body donation programme'. Moreover honor and publicity should be given to the religious, political as well as other popular public personalities who have volunteered for body donations. The students should be sensitized for honoring the cadaver at the commencement of medical course session (37).

1.3. Significance of the study

The purpose of this study was to investigate the knowledge, attitudes, practice and DR and Dissection principles of Ethiopian medical school students to the importance cadaver dissection (CD) and its handling based on the ethical standards. The study identifies the ethical gaps and the attitude of institution regarding the scope and utility of understanding the role of human dead body or cadaver in health curriculum and research and transmission of message to the next generation of learners.

Also this study highlights the usefulness of cadaver dissection (CD), enlightening the precise forms in which the body of the deceased person can be procured and used for teaching as well as for research. It is designed at setting some nominal guidelines regarding rules and regulations recommended for sustaining the standard of dissection as well as the dignity of the cadavers. It is designed at setting some standard guidelines regarding procurement and injection recommended for sustaining the standard of dissection as well as the dignity of the cadavers. It will also evaluate sustained and /or predicted risk due to lack of compliance with cadaver handling standards.

CHAPTER TWO

LITRATURE REVIEW

2.1. Cadaveric body donation and its ethical standards

The most ethically acceptable way of obtaining cadavers for dissection is through body donation. Persons donating their body receive no financial compensation; this is truly their ultimate gift. Hence, it is imperative that proper respect be given to the cadavers. Any disrespect for the cadaver will be a disgraceful act as a human being. So the donated cadavers are probably the most preferred ethically, usually has the least amount of social conflict and fill the void left by persistent shortages of unclaimed cadavers (22). Most countries in the world depend on unclaimed cadavers for most of their teaching cadavers. Even the USA and Canada have failed to stop their dependency on unclaimed cadavers and about 20% of their anatomy departments still use unclaimed cadavers (22)

Some Countries depend on donated cadavers are (e.g. Australia, Austria, France, UK, Israel, Japan and New Zealand) exclusively rely on donated cadavers for mainly legal reasons but all have limited success in obtaining enough numbers of cadavers (22)(6). Countries use donated cadavers but not use any unclaimed cadavers are (e.g. The Netherlands and South Korea) are characterized by aggressive, active and successful body donation programs and do not use any unclaimed cadavers (22). Most important reason for ‘nobody donation’ in Indians is lack of awareness. Only 22 % of general population is aware that body can be donated. Another major hindrance in body donation is spirituality and religious beliefs (31). Some study noted that the barriers to cadaveric donations in Libyan population were lack of adequate knowledge, unease about body manipulation and concerns about religious implications. It has also been noted that although anatomists encourage cadaver donation, the attitude of anatomists towards donating their own bodies for dissection is not well known (31). It must be borne in mind that a tiny percentage of donors are required to sustain a body donation program. In Netherlands, a mere 0.1% of the population of 16.5 million enlisting to be body donors was enough to provide adequate numbers of cadavers of 650 per year. Organ donation needs higher numbers and 28% of the population was not enough (22). Presently, only in a few countries ethical and legal considerations for human bodies donation

for dissection and study have reached a consensus in which the donor must have expressed his (her) decision while is alive and anatomy teaching and research is ruled only under the premise of respect for the human cadaver in both inside and outside the anatomy laboratory with principle instilled early in the medical formation act with great care and sensitivity as current anatomic education (32).

Academic discussion of ethical principles governing decisions in this field is vital for those who deal with body donation and use dead bodies for research and teaching. Ethics cannot produce irrevocable truths (19). Questions regarding the ethics of anatomy belong to the domain of applied ethics, or more specifically to bioethics or medical ethics and it is the human body and human tissues that are central to bioethical questions concerning life in both health and disease, in research and clinical practice. Anatomy, as a discipline has a number of ethical dimensions. Bioethics is the study of the typically controversial ethical issues emerging from new situations and possibilities brought about by advances in biology and medicine. Human material with potential for use in biomedical research related to anatomy includes cadaver as a whole, organs and parts of organs, cells and tissue, embryos and fetal Tissue. It is important that the practices of body, organ and tissue donation take into account the cultural, ethical, spiritual and religious views of all concerned. This need to respect different view- points gives added importance to ensuring that each person makes a wise decision on donation. Ethics is that part of philosophy which concerns good behavior. Ethics searches common fundamentals for morality. It applies certain philosophical approaches to human life and behavior. Ethics is challenged by problems related to cultural, legal, religious and market regulations. The practice of bioethics is related to survival as an effective social institution (21).

Body donations are highly important for therapeutic and non-therapeutic purposes. Therapeutic research aims to improve treatment to a class of patients like, Human organs donated are commonly used to help cure patients who are in need of those particular organs, to help them survive and continue living, while non-therapeutic research is to enhance the furtherance of purely scientific knowledge like, whole body donation provides huge benefits and contributions towards the society by providing the purpose of training, research and experimentation for professionals. Moreover, a donated body can be used for a number of possible purposes including: a)"Anatomical examination"- this term describes the teaching of the structure and function of the human body to

students or health care professionals. b) "Research"- this term describes scientific studies which improve the understanding of the human body. c) "Education and training" - these terms describe the training of health care professionals, usually those learning surgical techniques, as opposed to anatomical examination (38).

Use of the cadavers is consistent with donor intent. To assist indetermination of donor intent and ensuring use is consistent with donor intent, you will provide copies of relevant sample cadaver donation forms and any supplemental information provided to donors (e.g., brochures). The donation forms will be evaluated to determine if donors would have had a reasonable expectation that their bodies could be used for activities consistent with the contemplated use. If it is clear that a donor prohibited the contemplated use, then the donor's cadaver will not be used (39). Adequacy of consent by the donor is another issue that definitely needs to be addressed well. It must be ensured that any decisions about the deceased donation must be made on the known wishes of the donor during his/her lifetime. Normally, these donation are made due to the spirit of altruism, as a means to avoid funeral ceremonies, to avoid waste of the bodies and in some rare cases, to evade the expense of a funeral (38). Duty of care and respect of his/her confidentiality must also be preserved under a good and responsible governance system. The concept of trust must really be upheld, to ensure that none of the donated bodies or bodily parts are misused and traded illegally in black markets. Donating Human Bodies for scientific Research and for training has procedures.

Due to the importance of human body donation, countries are recommended to adopt a clear legal framework which regulates the acceptance of donations for medical education and research, which clearly addresses any other related legal issues. In the United Kingdom, whole bodies are donated to medical schools particularly for the purpose of education, training or research. This practice is covered by the Human Tissue Act 2004 and regulated by the Human Tissues Authority (HTA). By virtue of these provisions, donated bodies are still used for teaching purposes in medical schools, also for anatomical and surgical training. However, under the Human Tissue Act 2004, written and witnessed consent must be obtained from the potential body donor prior to his/her death, as the executor of an estate may no longer act based on his/her knowledge of the deceased's wish to donate his/her body (38). Information in this case does not usually include "risks" for the donor, but rather an explanation of the purposes of the donation and of the eventual fate of the remains. From an ethical point of view, this concept of body donation based on "informed consent" was a

major advance as it observes two important norms: human dignity, and individual personal autonomy(19).

The first principle is that of autonomy. According to this, each individual should have autonomous control over the disposition of his or her body after death. Emphasis here is on what an individual decrees should or should not be done with his or her body at death, despite social need or public interest. This is a principle that has been overlooked far more frequently than it has been followed (26). However, to protect the autonomy of the donor, potential donors are given the opportunity, when signing the consent form, to rule out such a veto (counter-veto) beforehand, i.e. to donate their body even against the wishes of their relatives. This appears to be a very formalized approach, and decisions may be difficult if donor and relatives have divergent wishes (19).

Unclaimed bodies are typically, one presumes, the bodies of people who did not consent and whose families have not consented to anatomical use. If the consent of either the deceased or the family or both must be obtained for anatomical use to be justified, it follows that using unclaimed bodies will typically be unjustified (40). The use of unclaimed bodies has been one of the distinguishing features of the anatomy profession since the passing of nineteenth century legislation aimed at solving the problem of grave robbing. Only in more recent years has the use of bequeathed bodies supplanted dependence upon unclaimed bodies in many (but not all) countries. We argue that this dependence has opened the profession to a range of questionable ethical practices. Starting with contraventions of the early Anatomy Acts, we trace the manner in which the legitimacy of using unclaimed bodies has exposed vulnerable groups to dissection without their consent. These groups have included the impoverished, the mentally ill, African Americans, slaves, and stigmatized groups during the Nazi era. Unfortunately, ethical constraints have not been imposed on the use of unclaimed bodies (41).

the wide- spread use of the unclaimed bodies of the mentally incapacitated, since the subjects whose bodies now became available for dissection were not simply poor, but were seriously disadvantaged as a result of their long-term impoverished mental state, and in many cases their lack of competence to consent to dissection. In being (probably) poor and mentally incapacitated, they were doubly disadvantaged on account of circumstances over which they had no control (41)(3). However, the tenuous status of the mentally ill was but one example of this; in North America the African Americans and slaves provided another (11). In which African Americans

and the poor provided a disproportionately large number of bodies for dissection, public disquiet prompted the move to use unclaimed bodies (42). For the most part, society looked the other way with regard to grave-robbing, provided that the bodies continued to be procured mostly from the poor and marginalized segments of society (42). It is salutary to reflect on the comment of a New Yorker at this time: “the only subjects procured for dissection are the productions of Africa...and executed criminals)... and if those characters are the only subjects of dissection, surely no person can object” (quoted in Humphrey, 1973). In other words, the main targets were the urban poor, notably, African Americans, impoverished Irish and German immigrants, and American Indians, along with criminals; those who were unable to protect their dead, and whose death in the eyes of some deserved no protection (11).

The use of unclaimed bodies reached its moral nadir in Germany and its occupied territories under the National Socialist regime from 1933 to 1945. The bodies of those sentenced to death and subsequently executed were made available to anatomy departments and those ready to utilize them found them accepting a far greater number of bodies than previous years from a much wider variety of sources. Indeed, the German Ministry of Education issued a decree that from 1939 all bodies of those executed after court verdicts should be delivered to the closest Anatomical Institute for scientific use. Ultimately, besides bodies coming from legal proceedings in civilian and military courts, bodies were also supplied from concentration camps, prisons and psychiatric institutions (41). Until the 18th century in Europe and the United States, the use of executed criminals’ bodies for dissection fulfilled the needs of both the court system and the anatomists (42). The use of unclaimed bodies has become so much an integral part of the anatomical ethos that the ethical dimensions provided by the autonomy principle have been generally ignored (26). Even while efforts were being made to improve societal attitudes toward dissection and donation, the Uniform Anatomical Gift Act (UAGA) established in 1968.

The UAGA officially made body donation a right, morally based on free choice and volunteerism (42). The UAGA clarified ambiguous laws regarding donation and tried to standardize laws among states. Perhaps even more significantly, the UAGA established the human body as property, a new privilege that allowed for a donor’s wishes to be honored in court even if his or her next of kin objected to the donation after death (42). Anatomical dissection and body donation also need clear regulations. The International Federation of Associations of Anatomists, 2012 (IFAA

recommendations) should be seen as the gold standard for these matters and should be adopted by national associations of anatomists(19). The first and central claim of the recommendations is to require a formalized informed consent from donors who are entirely free in their decision. This respects the personal autonomy of the deceased and the dignity of his/her mortal remains and acknowledges a continuity between the living person and the dead body (19). Informed consent means an agreement, compliance or permission given voluntarily without any compulsion. It can be defined as “the voluntary and revocable agreement of a competent individual to participate in a therapeutic or research procedure, based on an adequate understanding of its nature, purpose and implications”(21). We should respect the dead because of ethical obligation. For these reason, dead bodies are absolutely different from furniture. Others base an obligation on the feelings of the living, whether living family members who would feel distress at the abuse of bodies or members of cultures with norms of respectful treatment and always base the ethical obligation on the interests that people have while alive in what happens to their bodies after they die. This is the ‘posthumous interests’ view. It is widely discussed and quite widely accepted in philosophy. The posthumous interests view is not the only potential foundation of an obligation to respect the dead. Perhaps we should respect the dead as part of an inter-generationally advantageous scheme; if we living people respect the wishes of the dead now later living people will respect our wishes after we die. Perhaps we should be concerned with the interests of families who would suffer if their relatives’ bodies were treated disrespectfully. For some people, respect for the dead is more than just following their wishes. That is a view held by some of those who think public display remains unethical even when people had wanted to be displayed (40).

Moreover, the main ethical concern of cadaver dissection lies in respect to human life. cadaver dissection or working with human cadaver requires respect and sensitivity (43). Some rules and regulations have been recommended for maintaining the highest standard of a dissection as well as the dignity of the cadavers. Anatomical dissection is a time honoured part of medical education. Hence, it is imperative that proper respect be paid to the cadaver at all times. An unjustified mutilation of the cadaver during dissection or a manipulation that in- fringes the accepted moral standards is ethically blamable or even judiciary punishable (21). Any disrespect for the cadaver will be shameful and a disgraceful act as a human being. The teachers and the students should observe professional conduct while in the dissection hall and outside of the hall (41)(26).

2.2. Cadaver embalming processes, its ethical standards and potential health hazards of embalming chemicals

Embalming is a chemical process that aims the preservation and sanitization of the human body indefinitely. The technique of embalming is an important tool in teaching and research in anatomy enabling the preservation of cadaveric material in good conditions (lessening any significant structural changes and maintaining the natural appearance). The desired properties required for successful embalming of cadavers for gross anatomy teaching include a good long-term structural preservation of organs and tissues with minimal distortion, prevention of over-hardening or appearance alteration, while maintaining flexibility of internal organs, prevention of desiccation and fungal or bacterial growth and spread within a specific cadaver and to other cadavers in the dissection room (44)(18).

The preparation of the cadavers for injection/embalming- need knowledge and curiosity. It is started by washing the corpses, the lab attendants with mask, gloves and safety coats entered the room and started washing the corpses and then shaving hairy region and finished up with water cleaning. Then take the cadavers to the embalming table and embalm the cadaver according to the instruction. Then embalming solution or a mixture of 40% Formalin (fixes the cadaver tissue and kills microorganisms by cross- linking proteins), Phenol (carbolic acid) (is used as a mold inhibitor), Alcohol (is used as a germicidal agent and to fix the tissue by drying), glycerin (is a polysaccharide used to help keep the joints of the cadaver flexible) and water was kept in a jar 4 meter above the ground to facilitate the passage of the fluid due to gravity during infusion. Then cotton pads were inserted in the nose, ears and mouths of the cadavers to avoid any leakage.

After the cadaver was stretched to its full extension, an incision was made in the area of femoral triangle. Femoral artery was identified, a trocar a long, pointed, metal tube was inserted and embalming fluid was infused. With the help of syringe, the embalming fluid was injected in the abdomen, thorax, limbs, muscular part and all the other body cavities. Embalming fluid was infused through the superior orbital fissure to preserve the brain matters (45)(18). After spending more than two hours, these bodies were sent to the embalming tank containing 10% formalin to make them ready to be used in the teaching and learning of Human Anatomy in the dissection room after 10 days of storage (18).

The actual embalming process usually involves four parts: Arterial embalming involves the injection of embalming chemicals into the blood vessels, usually via the right common carotid artery. Blood is drained from the right jugular vein. The embalming solution is injected using an embalming machine and the embalmer massages the cadaver to ensure a proper distribution of the embalming fluid. In case of poor circulation, other injection points are used. Cavity embalming refers to the suction of the internal fluids of the cadaver and the injection of embalming chemicals into body cavities, using an aspirator and trocar. Hypodermic embalming means the injection of embalming chemicals under the skin as needed whereas surface embalming uses as the supplement of the other methods, especially for visible, injured body parts(18).

Purpose of embalming is either to temporarily preserve human remains to forestall decomposition and make it suitable for display at a funeral or for long term preservation, not presentation. Embalming for anatomical research and study a need different process is used when a cadaver is embalmed for dissection by medical students. The first priority is for long term preservation, not presentation. In short, the procedure consists of a pre- embalming treatment with blood clot disperser, removal of blood clots, drainage of blood, and arterial embalming with an embalming machine via both carotid and femoral triangles of the body (18)(17). The cadavers are always very well fixed so that they can be used for not only anatomical dissection but also research for the vascular system by vasography, kinematics of the joint and other histologic examinations. The desired properties required for successful embalming of cadavers for gross anatomy teaching include: good long-term structural preservation of organs and tissues with minimal shrinkage or distortion; prevention of over-hardening while maintaining flexibility and suppleness of internal organs; prevention of desiccation; prevention of fungal or bacterial growth and spread within a specific cadaver and to other cadavers in the dissection room; reduction of potential biohazards (spread of infection to dissection personnel and students); reduction of environmental chemical hazards (especially from formaldehyde and phenol) in order to comply with increasingly severe health and safety regulations and a new awareness of possible dangers of these chemicals in the work place; and retention of color of tissues and organs while minimizing oxidation effects that result in 'browning'(18).

2.3. Cadaver transporting bioethics, cadaver dissecting and its standards

To transport the cadavers/parts to the approved location needs; all cadavers/parts must be properly packaged and labeled prior to transport. The transporter is responsible for obtaining adequate training. Specific information about acceptable packaging may be obtained from the Morgue of the School of Medicine (SOM Morgue). All transport must be consistent with information contained in the Cadavers and Body Parts Request (CBP Request). Any proposed change related to transport requires submission of an amended CBP request and written approval by the Operational Committee (OC) prior to initiating the transport (46)(20).

Upon receipt by the department, the Anatomical Specimens Coordinator (if appointed) or Project Leader shall enter the cadavers/parts new location and any other changes in information into the Anatomical Materials Database. The SOM Morgue must acknowledge receipt of the cadavers/parts in and update the Anatomical Materials Database, and make arrangements for the disposal of cadavers/parts in a manner consistent with all legal requirements(46).

The SOM Morgue is responsible for the following; Serves as the sole point of contact for acquisition, receipt and final disposition of all cadavers/parts procured through the Humanity Gifts Registry (HGR) or from an Approved Supplier for educational or research activities at the University. Tracks the location of all cadavers/parts and maintains appropriate supporting documentation. Initially records and subsequently monitors the location, movement, and use of cadavers/parts from the time of their arrival at the University until the time of their final disposition by the University, including internal transfer among investigators and oversees the movement of cadavers/parts between non-contiguous university locations for continued use.

Conducts at least annual site inspections of all University schools and centers that receive, use and store cadavers/parts and Maintains official records of cadaver/parts for all Approved Projects (46)(20).

As the dissection in an invasive procedures there is ethics related to it to ensure safe medical practices (47). The following are the ethical points related to the cadaveric dissection. All students as well as teachers should maintain the dignity of cadavers as the cadavers have great role in their

life for teaching and learning process (47). The institutes should implement the “Cadaveric oath” before the beginning of dissection which will improve the mindset of students towards cadavers (47)(13). During dissection and after dissection the students must respect the cadavers and treat them with sensitivity. The teachers should maintain the professional conduct during the dissection and maintain the secrecy related to the cadavers. The mutilation of body parts of the cadaver is strictly prohibited and should not happen at any cost, as it is an act of disrespect towards the cadaver. The body parts in the museum should be preserved with proper care. Cadavers should be disposed properly under direct observation by professionals related to dealing with it and should be disposed of within the fence of the institution with proper care and procedure. During this the spiritual and religious aspects or social beliefs of the society should be kept in mind (47)(13).

Ethics concerned with the rules and safety, are as follows, the first one is Care of Cadavers: The cadaver has to be kept moist at all times by covering with towels moistened with embalming fluid and during dissection the medical students and other trainer should only uncover the area they are studying. The second is Laboratory Access: The dissection hall should have got a limited access and needs to be locked when not in use. Only students enrolled in the course are allowed in the dissection hall. The third is Laboratory Safety: Cadavers are embalmed with a fluid containing glycerin, ethyl alcohol, formalin and phenol. Physical contact of one’s skin and clothing with the cadaver should be avoided (43)(26)(13). The medical students and other trainer are required to wear disposable gloves at all times while working in the dissection hall. Non-latex/powder-less gloves should be available for dissection. A long-sleeved white coat/apron should be worn while working with the cadaver. Lab coats may not be worn outside of the lab. Dirty coats are a health hazard and are offensive. No open-toed shoes or sandals are allowed (43)(26).

All backpacks or other personal items should be left at a corner. Food and drinks are not allowed in the dissection hall. Proper use and handling of the dissection instruments should be carefully maintained. The ventilation system in the hall is designed to remove air at the level of the cadaver and to reduce exposure to the embalming chemicals and odours. The ventilation system should remain on at all times. There is a negative air flow to keep odours from leaving the hall. The door to the hall should be closed at all times. Preservation of the tissues and organs: All tissues removed from the cadaver must be collected and placed in the designated containers or tray (43)(26)(13). No body parts, tissue, etc. should be removed from the dissection hall. The excess liquid that has

accumulated on the dissection table should be drained into the bucket located under the table (41)(26).

The dissection hall is an ideal place to introduce concepts of humanistic care. The dissection hall evokes the students' memories, speculations, and fears about serious illness in themselves, their families, and loved ones (26)(43). The attitude of the teaching institution in administering to the medical students' and the other trainer needs as they undertake the emotionally charged task of dissection can provide a model for how the medical students will respond, in turn, to the hopes and fears of their patients and to their own reactions to dying. This approach will allow students to implement and practice humanistic values immediately, laying a foundation for their clinical training (26).

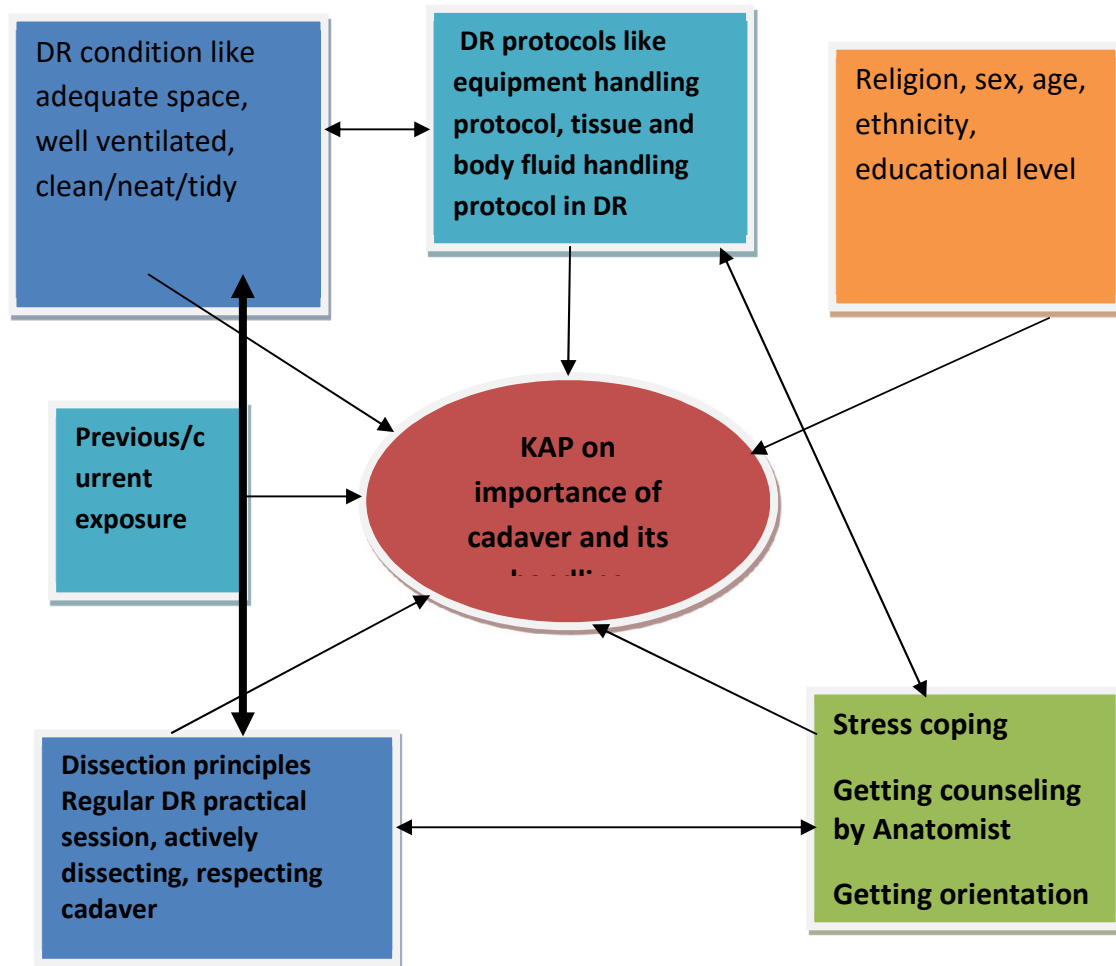
Knowledge, attitude and practice (KAP) studies are highly focused evaluations that measure changes in human knowledge, attitudes and practices in response to a specific intervention, usually outreach, demonstration or education. In human anatomy, dissection could be regarded as the procedure of exposing structures in such a way that their locations, shapes, sizes, thickness, consistency and distribution can be determined (10)(8). Experience over the years has shown that many students had little or no formal knowledge about cadaver dissections before entry into the dissecting room (10). Even before entering the anatomy laboratory, a student, at some level, knows that the first patient that he/she will care for is a dead one and experience considerable anxiety and stress(48). Students rapidly develop a coping mechanism which enables them to view cadaver dissection as an occupation quite divorced from living human beings (10)(49). Students should be advised to prepare mentally and emotionally before entering the dissection room so that they are emotionally involved and stimulated. The majority of students expressed a negative experience; hence it is necessary to support them before initiation dissection (35)(36). The study conducted in Italian medical school showed that about 80% respondents were less likely to be in favor of post mortem body donation (PMBD). Interestingly, a study conducted in Turkey, on the attitude of medical students towards the idea of donating their own body discovered that the majority of the respondents were themselves not in favour of body donation. This was particularly caused by the feeling of unwillingness to be dissected by their own fellow colleagues, family rejection, psychological reasons anxiety of disrespectful behaviour to cadavers and lastly, religious belief. This shows that serious campaigns must be done, to convince the public, especially these medical

students first, so that they can further promote the public to follow their footsteps. This is not surprising as in a study conducted upon South Asians in the UK regarding their attitude towards body donation, a huge majority of the respondents totally rejected the notion either by claiming they were unsure of it or clearly unwilling to become one. Thus the public understands and trust towards this type of donation is Challenges crucial to be increased, to ensure that more are willing to register as potential body donors and supply is sufficient (38). The research conducted in a Nigerian Medical School regarding attitudes towards cadaver dissection showed that 87% agreed that dissection provided the best method for learning anatomy as 78% agreed that cadaver dissection is ethically acceptable. Majority of the students (90%+) considered cadaver dissection as important and indispensable in the study of human anatomy and 95% reported that they prefer dissection with assistance from their teacher (34)(1)(12). Also another research conducted on the Perception to cadaver dissection Kenya Methodist University, the result showed that the majority (85.3%) found their first visit to the dissection room exciting. Most consider dissection the best method of learning anatomy, and do not support the view that it should be replaced by computer aided programs or plastic models (30). Despite most students indicating that they like anatomy, and find it exciting, very few are willing to take up careers as anatomists. More emphasis needs to be placed on pre-dissection training and counseling to make the experience better for students (50). There is need to mentor students on taking up anatomy as a career, in view of the great need for anatomists in the region (51).

The human anatomist is actually a geographer of the human body (52). It is inescapable that the extent we experience hands-on and personal or emotional aspects of this educational journey directly affects not only how we teach the geography of the human body but also how and what our students learn. This also affects the knowledge they take with them into clinical practice as physicians (27)(49). There is a link between dissection in the gross anatomy laboratory and the acquisition of clinical skills, as well as the development of professionalism and professional attitudes for medicine (52). Even though the dissection method is emotionally stressful it provides essential knowledge and skills for their future studies (29)(27). There is an area of concern for physiological, emotional reactions and mixed feeling by the first year medical students when they encounter with human cadavers for the first time in dissection room (28). Though initially the dissection might be a challenging with many symptoms associated with it but many of the students adapt the situation quickly. The exposure to the cadavers has both the physical like smell, nausea,

conjunctival irritation and psychological like anxiety, stress, emotional trauma depression impact on the students (29). The use and increase of students learning through cadaver dissection emphasis the need to ensure the alignment of students' understanding of concepts, their structural relations and its relevance to clinical practice (35)(53). They stress the acquisition of essential anatomical skills including the power of observation, identification and interpretational abilities, which are essential for effective and safe clinical practice (54). Managing a cadaver lab is costly and time consuming(55). Specialized equipment must be purchased and properly used to maximize the cadaver's practical life span. Once a cadaver is dissected it must be rigorously maintained with hazardous embalming chemicals and regularly monitored by trained professionals (25).

2.4. Conceptual frame work



CHAPTER THREE

OBJECTIVES

3.1. GENERAL OBJECTIVE

- ❖ Assessment of the Knowledge, Attitude, and Practice of medical students towards the importance of cadaver & its handling in ethical standards during procurement, transportation, injection, dissection and caring process in Ethiopia.

3.2. SPECIFIC OBJECTIVES

- ❖ To determine Knowledge, Attitude, and Practice of medical students towards the importance of cadaver and its ethics during handling.
- ❖ To evaluate the existence of standardized cadaver procurement, transportation, embalming, and care in Ethiopia medical school.

CHAPTER FOUR METHODS AND PARTICIPANTS

4.1. Study area and period

Study was conducted in selected Medical School of Ethiopia, from April 01 to April 30, 2018.

4.2. Study design

Institutional based Cross-sectional study was conducted.

4.3. Source population

The source population of this study was all the medical students/all the enrolled pc-II students, in Ethiopia Medical Schools.

4.4. Study population

The study population was randomly selected medical students, from four Universities, who have direct contact with the use of cadaver for surgical skills, learning and scientific research.

4.4.1. Inclusion criteria

- All cadaver procuring and preparing/supplying University
- All the enrolled PC-II students in selected University

4.4.2. Exclusion criteria

- All the cadaver receiving University
- All the other medical students
- Those who were out of the study area for several days due to different reasons, during the study period were not included in the study.

4.5. Sampling technique: -Four Universities were selected based on the cadaver procurement and preparation for themselves and for supplying to sister Universities. Finally, the required sample size from each University was selected by using SRS (lottery method) after preparing sampling frame for each of the selected areas. These selected participants who were enrolled to the University were addressed by data collectors.

4.6. Sample size determination: - single population proportion was calculated with 95% C.I, 5% marginal error, in considering $p = 0.5$, $d=0.05$ and for 95% C.I. and

$$n = Z(\alpha/2)^2 pq/d^2$$

$$n = (Z \alpha /2)^2 P (1 - P)/d^2$$

= $(1.96)^2 (0.5) (0.5) / (0.05)^2 = 384$, since, the source population ($N=848$), is less than 10,000,

correction is needed as follow

$$nf = \frac{n}{1 + \frac{n}{N}} = \frac{384}{1 + \frac{384}{848}} = \frac{384 * 848}{1232} = 264$$

When a 10% non-response rate was considered, the total sample size was 290. The study participants were selected based on the inclusion and exclusion criteria by using simple random sampling method.

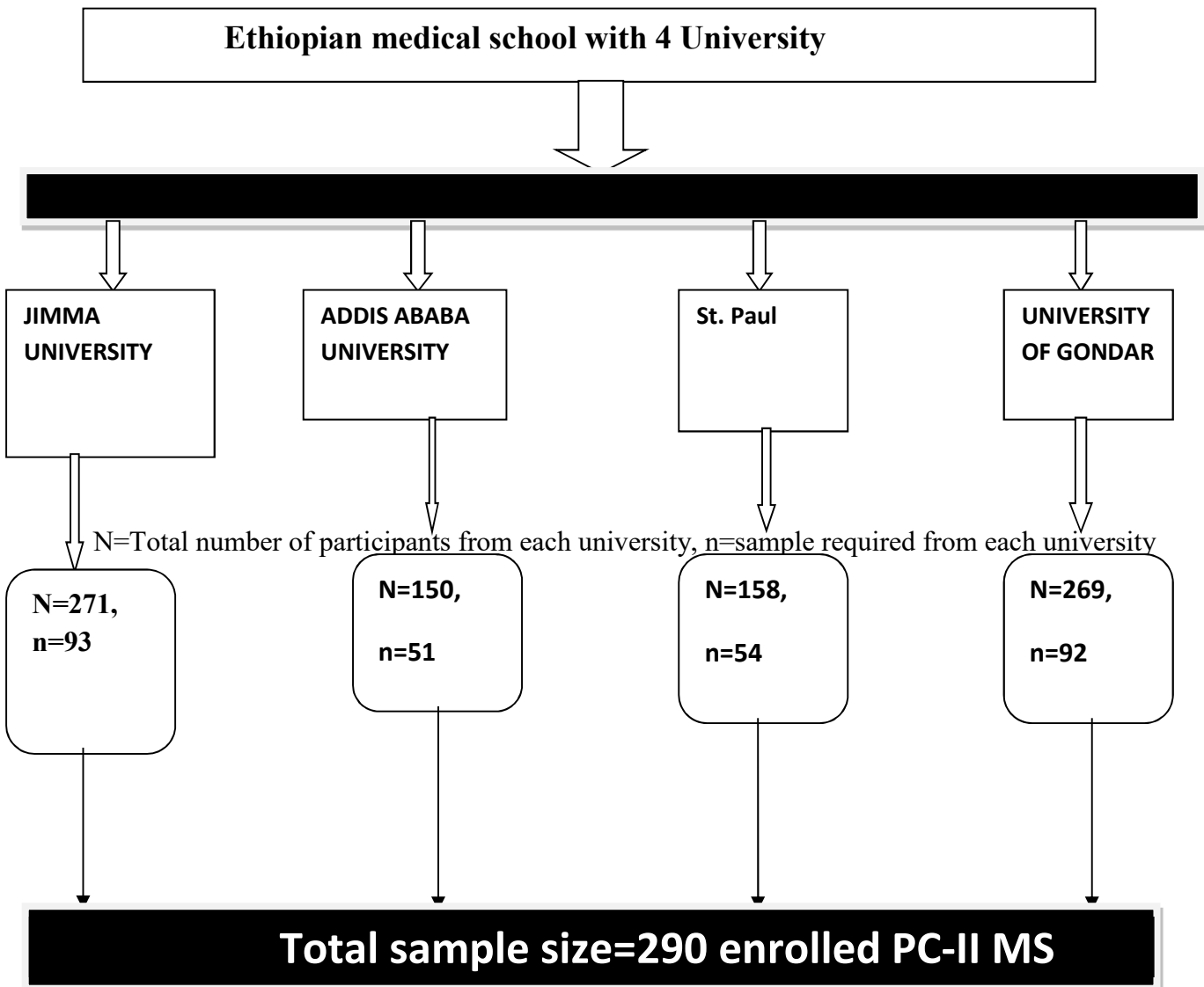
N =total population (AAU=150, JU=280, St. Paul=158, Gondar=260 ($N=848$))

n = minimum sample size,

$Z \alpha/2$ = level of significance

N = Total population from selected medical school=848

4.7. Sampling frame



Sampling technique of how study participants were selected from Universities, Ethiopia, in 2018G.C


N=total number of participants from each university, n=sample required from each University

4.8. Data collection procedure

An interviewer's based questionnaire which includes the socio-demographic characteristics, knowledge and practices, attitude; and ethical standards towards the importance of cadaver and its handling by using tools was used as data collection instrument. During data collection the completeness of the data was checked by data collectors and also immediately after data collection by the supervisor and principal investigator

4.9. Variables

4.9.1. Dependent Variable

 KAP on importance of cadaver and its handling based on standards

4.9.2. Independent variables

Socio demographic characteristics and other factors:

- Age
- sex
- Ethnicity, Educational level
- DR condition, Duration in the lab per/day
- Actively dissecting the cadaver
- Respecting the dissecting body
- Attending DR session regularly
- Counseling by anatomist
- Exposure of cadaver handling

4.10. Statistical analysis

After data collection, each questionnaire was checked for completeness and code was given during data collection. Collected data were edited, coded and entered to Epi data version 4.1 and then exported to SPSS version 21 for analysis. Descriptive statistics like frequency tables, graphs and descriptive summaries were used to describe the study variables.

Bivariate analysis, binary logistic regression test was performed to see the existence of association between dependent and independent variables. First all factors was analyzed by bivariate analysis. Then variables with P-value ≤ 0.25 in the bivariate analysis were entered into multivariable logistic regression analysis. 95% CI and p- value less than 0.05 was used as cut of point to see presence of statistical significance.

To control the effect of confounding variables and to identify determinants of outcome variable, multivariable logistic regression analysis were used. Different models were fitted for the different groups of explanatory variables. While fitting the different groups of variables in different models, variables which show significant association with the outcome variable was reported at every step, model one to the final model. Finally all groups of explanatory variables was fitted to a single model. Variables with p-value < 0.05 was reported in this single model as determinants using both p-values and adjusted odds ratios (AORs). Interaction between variables will be tested and reported if significant.

4.11. Data quality control

Training was provided to selected data collectors for three days about the objective, purposes of the study and process of data collection. Vague points and other problems encountered about the questionnaire were explained and clarified. Closer supervision was undertaken during data collection. Every questionnaire was crosschecked daily by the supervisors and the principal investigator. Problems faced were discussed over night with data collectors and the supervisors and pre-testing was done in Wachamo University, in order to prevent information contamination.

4.12. Operational definitions

Practice: ever practices practiced of cadaver towards the standards. This was categorized as: Good or Poor Practices. Those who correctly responded from provided items above median were categorized under good practice while the others as poor practices.

Adequate knowledge: Those who correctly responded above median from provided items to assess knowledge of cadaver importance and its handling towards the standards.

In adequate knowledge: Those who responded below median from provided items to assess knowledge of cadaver importance and its handling towards the standards.

Attitude: psychological; mental, physical and social readiness to cadaver dissection according ethical standards. This is categorized as:

Favorable attitude: those who correctly responded above median from provided items to assess attitude on importance of cadaver and its handling towards the standards.

Unfavorable attitude: those who responded below median from provided items to assess attitude on importance of cadaver and its handling towards the standards.

Standards: any action on cadaver dissection surrounded by ethical reservations, or any use of cadaver based on legal ground.

4.13. Ethical considerations

The study was obtained ethical clearance from ethical committee of Jimma University, Institutional Review Board (IRB). Permission paper was obtained from University president to each of the selected medical institution and Anatomy department. Similarly after clear discussion about the actual study or explaining of purpose of the study, verbal informed consent was obtained from each study participants while the study subjects right to refuse was respected.

CHAPTER FIVE

RESULTS OF THE STUDY

5.1. Socio-Demographic Characteristics

The interviewer based questionnaire was collected from preclinical two medical students. A total of 279 (156(55.9%) male and 123(44.1%) female) participants completed the questionnaire. The participants were preclinical two (PCII) medical students enrolled at the School of Medical Sciences of the Jimma University, Addis Ababa University, St. Paul University and University of Gondar. The response rate of the distributed questionnaires was 96%. The study result showed that most 166(59.5%) of the respondents were in the age groups of 21-30 years (SD = 0.492 and variance=0.242; range, 20–30 years).

The religion of the majority of participants was Orthodox (34.4%) while 31.9%, 24.7% and 9% of the study participants were Muslim, Protestant and others, respectively. The ethnic identity of participants by proportion was 96(34.4%) 85(30.5%), 23(8.2%) and 75(26.9%) Amhara, Oromo, Tigre and Others(South Nations, Gambela, Hareri, etc.), respectively.

The marital status of study participants showed that all of 279(100%) were single. The age profile of students involved in the study showed that 113(40.5%) were in the age groups of ≤ 20 years. The socio-demographic characteristics of the study participants are summarized in Table 1

Table 1, Socio-demographic characteristics of the study participants response.

Serial No_	Characteristics	Frequency	Percent (%)	Remark
1.	Sex distribution			
	Male	156	55.9	
	Female	123	44.1	
2.	Marital status			
	Single	279	100	
	Married	0	0	
3.	Age distribution			
	≤20	113	40.5	
	21-30	166	59.5	
4.	Ethnicity of respondents			
	Oromo	85	30.5	
	Amhara	96	34.4	
	Tigre	23	8.2	
	Others	75	26.9	
5.	Religion of respondents			
	Orthodox	96	34.4	
	Muslim	89	31.9	
	Protestant	69	24.7	
	Others	25	9	
6.	Educational status			

	University	279	100	
	other			
7.	Occupational status			
	Medical students	279	100	
	other			
8.	Duration in the cadaver lab per day			
	>2.5 hours	154	55.1	
	≤2 hours	126	44.9	
Total				

The study results indicated that 98.6% (54% male and 44.6% female) of the study participants had cadaver dissection session in their gross Anatomy course while 1.4% did not. Counseling or orientation before entering dissection room (DR) about possible emotional reaction to cadaver observation or handling was offered to 48.4% (27.1% male and 21.3% female) of the participants but 51.6% (30.4% male and 21.2% female), did not receive any counseling. More than half, of the participants reported that they did not advised to follow universal precautions at all times and they did not wear nitrile or latex gloves, safety glasses or goggles and long pants, shirt and no open-toed shoes 63.1% (37.9% male and 25.2% female), while 36.9% (18.1% male and 18.8% female) were advised and wore disposable glove. About 2/3rd, 69.9% (41.3% male and 28.6% female), of the participants indicate that there was no first aid services and responsible person in case of injury were available.

This study showed that from the total participants 87.5% (47.2% male and 40.3% female) did not know about the cause of death of the dissecting cadaver while 12.5% did. More than 2/3rd, 81%, of participants reported that they were not found cadaver identification tag while 19% were found cadaver identification tag. Majority of the participants 74.9% (42.6% male and 32.3% female) didn't report the development of mold on the body while 25.1% did so. From the total, 88.5% (49.8% male and 38.7% female) of the participants reported that they neither have any knowledge about cadaver memorial services offered in the church/mosque, school or lab nor had participation on such occasions. However about 12% (11.5%) of the participants reported so. Our study indicated that 161(57.7%) participants consider the body they dissect or use in the DR as their first patient while 118(42.3%) did not consider those bodies as first patient .The same study showed that 194(69.5%) of the study subjects consider the cadavers or their remains used in their DR as their first teacher while 85(30.5%) did not consider it so. This study further shows that most of the students 166(59.5%) had apprehension on initial exposure to cadaver dissection but their apprehension decreases gradually as the dissection session prolonged.

Table 2. The distribution of the experience and behaviors of the study participants related to cadaver dissection.

Dissection related items to measure the need of cadaver dissection?	Yes/No	Response		
		Frequency	Percent (%)	Remark
1. Do you have cadaver dissection session in your gross Anatomy course?	Yes	275	98.6	
	No	4	1.4	
2. Do you receive counseling before you enter in dissection room (DR) about possible emotional reaction to cadaver observation or handling?	Yes	135	48.4	
	No	144	51.6	
3. If yes, who provide you the counseling activity	Anatomist	197	70.6	
	Head of department	68	24.4	
	College dean	14	5	
	psychiatrist			
4. Are you given an opportunity to dissect by yourself?	Yes	197	70.6	
	No	82	29.4	
5. Are you advised to follow universal precautions at all times and wear nitrile or latex gloves, safety glasses or goggles and long pants, shirt and no open-toed shoes?	Yes	103	36.9	
	No	176	63.1	
6. Do you get enough information about the availability of first aid services and responsible persons in case of injury in the lab?	Yes	84	30.1	
	No	195	69.9	
7. Do you get enough information from gross Anatomy lab staff about the cause of death of the body before you?	Yes	35	12.5	
	No	193	69.2	
	I don't ask	51	18.3	
8. Do you find cadaver identification tag on the body in front of you and keep it always there on the body?	Yes	53	19	
	No	226	81	
9. Do you report the development of mold on the body to the appropriate person?	Yes	70	25.1	
	No	209	74.9	
10. Do you understand that the body is on the dissection table for the furtherance of science and medicine and it is an utmost gift for you?	Yes	200	71.7	
	No	79	28.3	
11. Do you offer utmost respect to the body in front of you and its family?	Yes	192	68.8	

The study result showed that, most of the students 171(61.3%) knew the dissection hall is clean when they entered into DR for dissection, while 108(38.7%) did not and 216(77.6%) believed that DR cleanliness can directly affect health while the remaining proportion 63(22.4%) had no knowledge about its effect. In addition to this more than half 154(55.2%) of the respondents knew that cadaver handling has high potential for infectious risk. Contrary to this, large number of participants 125(44.8%) did not know about cadaver handling risk. Majority 203(72.8%) of the respondents did not had first aid kit in their lab while 76(27.2%) did. Most of 225(80.6%) of the respondents did not get introduced about how to use the first aid kit when the injury occurred while 54(19.4%) did do so. From the total participants the majority 174(62.4%) of the students did not had protocol for handling dissection equipment in their DR (DR) while 105(37.6%) did. More than half 164(58.8%) of the respondents did not had protocol for handling tissue and body fluid in their DR while 115(41.2%) did. Regarding DR session injury exposure 37(13.3%) of the students were encountered injury in the DR and they did not received treatment while 242(86.7%) did not. The dissection room condition and related characteristics distribution of the study participants were summarized in Table 3.

Table 3: The dissection room (DR) condition distribution of participant's response

Items to measure the participants understanding of dissection room safety	Participants response			
	Yes/No	Frequency	Percent %	Remark
1. Do you think that the dissection hall is clean when you enter into it for dissection?	Yes	171	61.3	
	No	108	38.7	
1. Do you think that DR cleanliness is related to health?	Yes	216	77.4	
	No	63	22.6	
3. Do you think that the smell of formalin is depressing?	Yes	235	84.2	
	No	44	15.8	
4. Do you think that repeated exposure to above permissible level of embalming fluid chemical vapor is toxic?	Yes	215	77.1	
	No	64	22.9	
5 .If yes, do you take appropriate protective care (do you use personal safety precautions)?	Yes	119	42.7	
	No	160	57.3	
1. Do you think cadaver handling has high potential for infectious risk?	Yes	164	58.8	
	No	115	41.2	
7. If yes, do you use personal safety devices and precautions?	Yes	110	39.4	
	No	169	60.6	
8. Do you have first aid kit in your lab?	Yes	76	27.2	
	No	203	72.8	
9. If yes, have you ever been introduced how to use it?	Yes	54	19.4	
	No	225	80.6	
	Yes	105	37.6	

10. Do you have protocol for handling dissection equipment in your DR?	No	174	62.4	
11. Do you have protocol for handling tissue and body fluid in your DR?	Yes	108	38.7	
	No	171	61.3	
12. Is there any injury you encountered in DR due to any reason and treatment you received?	Yes	37	13.3	
	No	242	86.7	
Total		279	100	

The knowledge of cadaver dissection based on ethical standards was analyzed from summing up all relevant 12 knowledge items. A correct answer for each item scored as “1” and incorrect answer was scored as “0”. Then items were summed up and converted to 100 %. Accordingly, the median score was 7, mode 10 and the mean was 8.17 (SD=4.929, variance=24.299).

According to this analysis about 152[54.5% (77(27.6%) male and 75(26.9%)] female) of the respondents scored below the median value, therefore they had inadequate or poor knowledge about the cadaver dissection based on ethical standards during Anatomy lesson. The remaining percentage 127[(44.5%) (79(28.3%) male and 48(17.2%) female)] of students in this study scored above the median value, therefore they had adequate or good knowledge about cadaver dissection and its handling based on ethical standards to learn Anatomy.

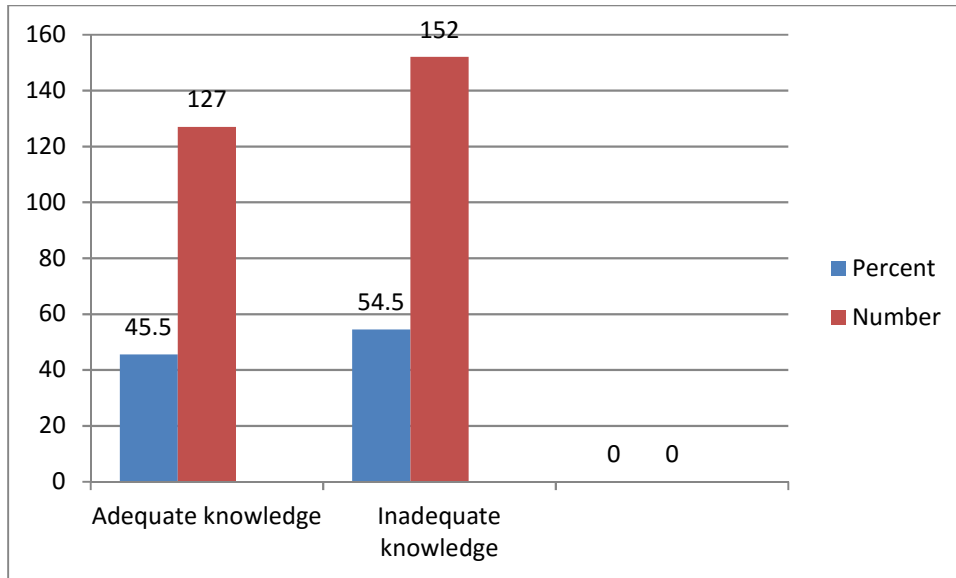


Figure 1. The proportion of respondents concerning knowledge cadaver use

Among inadequate knowledge study participant students 83(29.7%) and 69(24.7%) were in the age groups of >20-30 and 10-20 years, respectively while adequate knowledgeable 83(29.7%) and 44(15.8%) were in the age groups of >20-30 and 10-20 years, for the importance of cadaver dissection and its handling based on ethical standards, respectively.

From descriptive statistics of the socio-demographic characteristics and cadaver dissection items predictor variables those were found to show statistically significant association with knowledge were reported in Table 4. On bivariate logistic regression analysis, sex, age, getting counseling, respecting the dissecting body, attending DR regularly, and actively dissecting the body were shown had significant association with knowledge.

Table4.Variables found to show significant association with knowledge on bivariate logistic analysis.

value	Adequate Knowledge	inadequate knowledge	CODR	P-
Sex(1)				
Male	79(28.3%)	77(27.6%)	1	
Female	48(17.2%)	75(26.9%)	0.624(.993:2.589)	
.054				
Age(1)				
10-20years	44(15.8%)	69(24.9%)	1	
>20- 30years	83(29.7%)	83(29.6%)	1.568(.965:2.548)	
.069				
Get counseling activity(1)				
Anatomist	98(35.1%)	99(35.5%)	1	
Others	29(10.4%)	53(19%)	0.593(0.325:0.941)	
.029				
Respecting the dissecting as first patient(1)				
No	78(28.0%)	80(28.7%)	1	
Yes	49(17.5%)	72(25.8%)	0.698(0.888:2.312)	
.141				
Respect body dissecting as first teacher(1)				
No	37(13.2%)	69(24.7%)	1	
Yes	90(32.3%)	83(29.8%)	2.022(1.228:3.329)	
.006				
Attending DR session regularly(1)				
Yes	91(32.6%)	88(31.5%)	1	
No	36(12.9%)	64(23.0%)	0.544(0.329:0.899)	
.018				
Actively dissecting(1)				
Yes	77(27.6%)	70(25.1%)	1	
No	50(17.9%)	82(29.4%)	0.554(0.344:0.894)	.016
Cadaver dissection promotes feature professional work(1)				
Yes	88(31.5%)	88(31.6%)	1	
No	39(14.0%)	64(22.9%)	0.609(0.371:1.00)	
0.050				
Cadaver dissection enhances skills for clinical work(1)				
Yes	91(32.6%)	90(32.3%)	1	
No	36(12.9%)	62(22.2%)	0.574(0.347:0.950)	
0.031				
Attitude category(1)				
Positive Attitude	73(26.2%)	63(22.6%)	1	
Negative Attitude	54(19.3%)	89(31.9%)	0.524(0.325:0.844)	.008
Practice category(1)				
Good Practice	58(20.8%)	51(18.3%)	1	

.039	Poor Practice	69(24.7%)	101(36.2%)	0.601(0.370:0.976)
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Variables with a p -value < 0.25 on bivariate logistic regression analysis were considered to have significant association with knowledge. Those selected variables were entered in to the model for analysis multivariate logistic regression analysis (*Table 5*). This analysis showed that variables like Sex, Age, Getting counseling activity, Respecting the dissecting body, Attending DR session regularly and Actively dissecting body and Attitude & Practice category (p -values: 0.054, 0.069, 0.029, 0.294, 0.018, and 0.016, and 0.008, and 0.039, respectively) had significant association with knowledge.

Table5.Multivariate analysis of the association of knowledge with Sex, Age, Getting counseling activity, Respecting the dissecting body, Attending DR session regularly and Actively dissecting body and Attitude & Practice category,

value		Adequate knowledge	Inadequate knowledge	AODR	P-
	Sex(1)				
	Male	79(28.3%)	77(27.6%)	1	
	Female	48(17.2%)	75(26.9%)	0.609(.367:1.010)	
0.0484					
	Getting counseling activity(1)				
	Anatomist	98(35.1%)	99(35.5%)	1	
	Others	29(10.4%)	53(19%)	0.527(.302:0.920)	
0.024					
	Respecting the dissecting body as your first teacher(1)				
	No	37(13.2%)	69(24.7%)	1	
	Yes	90(32.3%)	83(29.8%)	2.098(1.245:3.535)	
0.005					
	Attending DR session regularly(1)				
	Yes	91(32.6%)	88(31.5%)	1	
	No	36(12.9%)	64(23.0%)	0.572(0.338:0.968)	
0.022					
	Cadaver dissection enhances skills for clinical work(1)				
	Yes	91(32.6%)	90(32.3%)	1	
	No	36(12.9%)	62(22.2%)	0.574(0.347:0.950)	
0.031					
	Attitude category(1)				
	Positive Attitude	73(26.2%)	63(22.6%)	1	
	Negative Attitude	54(19.3%)	89(31.9%)	0.581(.353:.956)	
0.24					

AOR: Adjusted odds ratios, CI: confidence interval; p -value

From the multivariable logistic regression analysis specifically, participants who did get counseling activity from Anatomist were about 53% (odds ratio, OR = 0.530) more likely to be knowledgeable than those getting counseling from others (likes senior students, college dean and head of the departments). The likelihood of being knowledgeable among participants who answered “yes” to questions Attending DR session regularly was 57.2% (OR: 0.572). Similarly, the likelihood of “male” participants to answer yes was 61.0% (OR: 0.609) than those who answered “no” and “female” participants. In other way, the probability of being knowledgeable among participants who answered “no” to questions Attending DR session regularly and “female” participants was about 42.8% and 38.2% percentage lower than among those who answered “yes” and “male” participants (OR: 0.572 and 0.609), respectively.

Among participants who answered “yes” to questions respecting the dissecting body as first teacher were 2.1times more likely knowledgeable than among those who answered “no”, (ORs :2.098).

Among participants who answered “no” to questions Cadaver dissection enhances skills for clinical work were about 42.6% percentage lower knowledge than among those who answered “yes”, (ORs: 0.574).

Finally, participants who had unfavorable Attitude about cadaver dissection and its handling were about 41.9% percentage lower to have adequate knowledge than those who had favorable Attitude, (ORs: 0.581).

Attitude of cadaver dissection based on ethical standards was analyzed from summing up all relevant 11 Attitude items. A correct answer for each item scored as “1” and incorrect answer was scored as “0”. Then the items were summed up and converted to 100 %. Accordingly, the median score was 44, mode 55 and the mean was 39.97 (SD=12.405, variance=153.895).

About 51.3% of the respondents scored below the median value, therefore they had unfavorable attitude towards cadaver dissection based on ethical standards to learn Anatomy and the remaining proportion had scored above the median value, i.e, they had favorable attitude to cadaver dissection and its handling based on ethical standards to learn Anatomy.

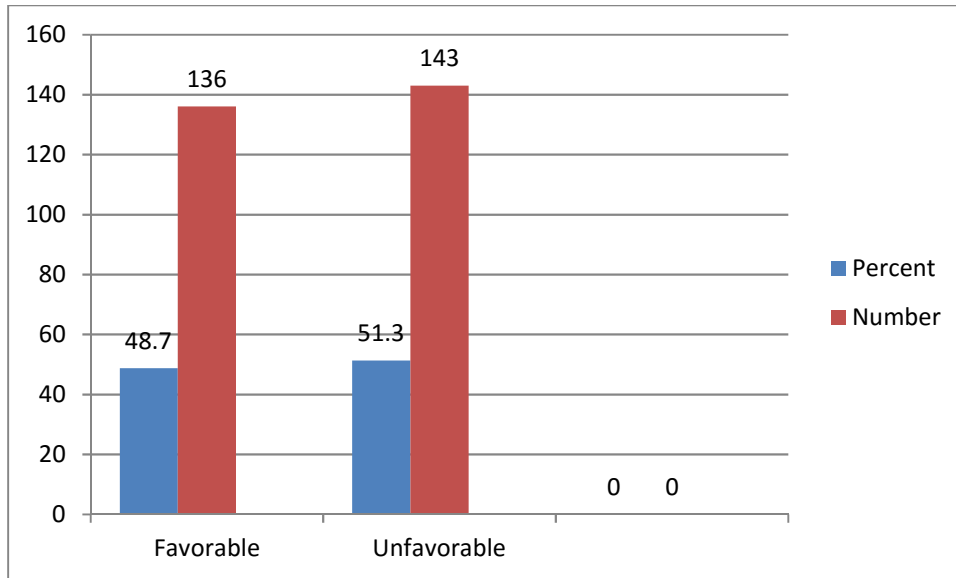


Figure 2: the proportion of the respondents concerning Attitude towards cadaver use

The study showed that above half 143(51.3%) of the respondents had unfavorable attitude. Concerning the issue of cadaver dissection and its handling while 136(48.7%) were favorable attitude. From the total participants 74(26.5%) and 69(24.6%) were male and female were unfavorable, respectively and 82(29.3%) and 54(19.4%) were male and female were favorable, respectively. Considering the age groups 79(28.4%) and 64(22.9%) of >20-30years and 10-20years were unfavorable, respectively and 87(31.1%) and 49(17.6%) of >20-30years and 10-20years were favorable, respectively.

The descriptive statistics of the socio-demographic characteristics and cadaver dissection based items those showed significant association with Attitude were reported in Table 6. Variables found to show significant association with attitude on bivariate analysis were: sex, age, duration in the cadaver lab per day, attending DR session regularly, and actively dissecting the body were showed significant from underlying items.

Table6. Predictor variables which had significant association with the outcome variable

	Favorable Attitude	Unfavorable Attitude	CODR	P-value
Sex(1)				
Male	82(29.4%)	74(26.5%)	1	
Female	54(19.3%)	69(24.8%)	0.706(0.881:2.277)	0.151
Age(1)				
10-20years	53(18.8%)	64(23.0%)	1	
>20-30years	80(29.9%)	79(29.3%)	1.438(0.889:2.326)	0.138
Duration in cadaver				
Lab per day (1) <=2Hrs	59(21.1%)	75(26.9%)	1	
>2.1Hrs	77(27.6%)	68(24.4%)	1.439(0.898:2.308)	0.130
Receiving counseling before enter in DR(1)				
Yes	92(33.0%)	82(29.4%)	1	
No	44(15.7%)	61(21.9%)	0.643(0.394:1.048)	0.076
Offering utmost respect to cadaver(1)				
Yes	97(34.7%)	93(33.3%)	1	
No	39(14.0%)	50(18.0%)	0.748(0.451:1.241)	0.081
Attending DR session Regularly (1)				
Yes	97(34.8%)	82(29.4%)	1	
No	61(13.9%)	61(21.9%)	0.540(0.328:0.889)	0.015
Actively dissecting(1)				
Yes	85(30.5%)	62(22.1%)	1	
No	51(18.2%)	81(29%)	0.459(0.284:0.742)	0.001
Motivation to touch and investigate specimen and cadaver(1)				
Yes	86(30.8%)	82(29.4%)	1	
No	50(17.9%)	61(21.9%)	0.782(0.483:1.264)	0.135
Any apprehension to cadaver dissection(1)				
Yes	85(30.5%)	81(29.0%)	1	
No	51(18.2%)	62(22.1%)	0.784(0.485:1.266)	0.230
Knowledge category(1)				
Not Knowledgeable	63(22.5%)	89(31.9%)	1	
knowledgeable	73(26.2%)	54(19.4%)	1.910(0.325:0.844)	0.008
Practice category(1)				
poor practice	70(25.0%)	100(35.8%)	1	
Good practice	66(23.7%)	43(15.5%)	1.793(0.279:0.745)	0.002

(knowledge of cadaver importance) results on simple bivariate logistic regression analysis

Variables with a *p*-value of < 0.25 on bivariate logistic regression analysis were considered candidate variable for entrance into multivariable logistic regression analysis (table 7), which showed variables with statistically significant association with Attitude regarding cadaver dissection and its handling: sex, age, duration in the cadaver lab per day, attending DR session regularly, actively dissecting, receiving counseling, offering utmost respect and etc (*p*-values: 0.151, 0.138, 0.130, 0.015, 0.001, 0.008 and 0.002, respectively).

Table7. Multivariable logistic regression analysis of the association of predictors variables and attitude of cadaver use (Outcome variable). OR: odds ratios with; CI: confidence interval; *p*-value.

	+ve Attitude	-ve Attitude	AODR	P-value
Receiving counseling before enter in DR(1)				
Yes	92(33.0%)	82(29.4%)	1	
No	44(15.7%)	61(21.9%)	0.670(0.418:1.146)	0.043
Offering utmost respecting to dissecting body(1)				
Yes	97(34.7%)	93(33.3%)	1	
No	39(14.0%)	50(18.0%)	0.720(0.431:1.238)	0.038
Attending DR session regularly				
yes	97(34.8%)	82(29.4%)	1	
no	61(13.9%)	61(21.9%)	0.540(0.328:0.889)	0.015
Actively dissecting				
Yes	85(30.5%)	62(22.3%)	1	
No	51(18.2%)	81(29%)	0.459(0.284:0.742)	0.001
Knowledge category				
Not Knowledgeable	63(22.5%)	89(31.9%)	1	
Knowledgeable	73(26.2%)	54(19.4%)	1.781(1.096:2.896)	0.020
Practice category				
Poor practice	70(25.0%)	100(35.8%)	1	
Good practice	66(23.7%)	43(15.5%)	2.069(1.259:3.402)	0.004

Specifically, participants who had adequate knowledge were about 1.8 (odds ratio, OR = 1.781) times more likely to be in favor of cadaver dissection and its handling than inadequate knowledge participants. The likelihood of being favorable among participants who answered “yes” to

attending DR session regularly and actively dissecting was about 54% and 45.9% percentages higher in favor for cadaver dissection and its handling than among those who answered “no”(OR: 0.540 and 0.459).

Among participants who answered “no” to question Receiving counseling before enter in DR and Offering utmost respecting to dissecting body was about 33% and 28% percentages lower in favor for cadaver dissection and its handling than among those who answered “yes” (OR: 0.670 and 0.720), respectively. Finally, the participants who had good practice were about 2.1 times higher to have positive attitude than those who had poor practice (ORs: 2.069).

The practice of cadaver dissection based on ethical standards was analysed from summing up all relevant 11 practice items. A correct answer for each item was scored as “1” and incorrect answer was scored as “0”. Then items were summed up and converted to 100 %. Accordingly, the median score was 6, mode 6 and the mean was 5.38 (SD=3.147, variance=9.906).

About 60.9% of the respondents scored below the median value, therefore they had poor practice about cadaver dissection based on ethical standards to learn Anatomy and the remaining proportion of the participants scored above the median value, and therefore they had good practice.

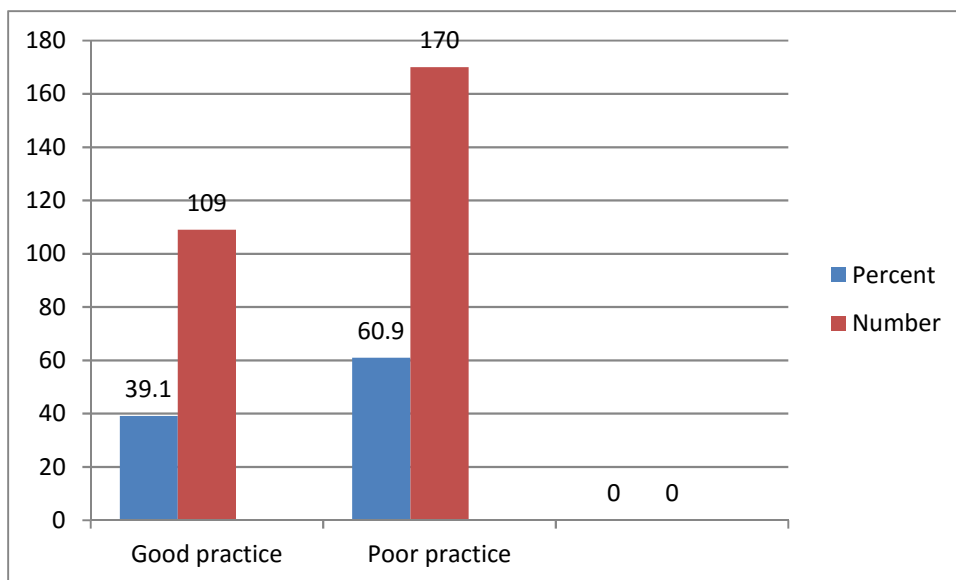


Figure 3: The proportion of respondents concerning standard way of cadaver handling practice

From the total respondents, majority 170(60.9%) had poor practice, from these 92(32.9%), 78(28%), male, female and 97(34.8%) and 73(26.1%), >20-30years, 10-20years had poor practice, respectively, while 109(39.1%) had good practice, from these 64(22.9%), 45(16.2%), male, female and 71(25.4%), 38(13.7%), >20-30years, 10-20years of respondents had good practice, respectively, for cadaver use and it handling based on ethical standards of cadaver dissection.

The assessment of the descriptive statistics of the duration in the cadaver lab per day and cadaver dissection based constructs/items that displayed a candidate of significant association with practice was reported in Table 8. On bivariate logistic regression analysis, the following variables show significant association with good practice of ethical cadaver dissection and handling: getting counseling activity, cadaver dissection positively impact clinical work, cadaver dissection enhances feature professional work, duration in the cadaver lab per day, hands on dissection in DR practical session , and actively dissecting the body.

Table8.Predictor variables which were identified to have significant association with outcome variable (ethical cadaver handling practice) as assessed by simple bivariate logistic regression analysis

value		Good practice	Poor practice	CODR	P-
Duration in the cadaver Per day(1)	<=2Hrs	40(14.4%)	94(33.7%)	1	2.134(1.303:3.493)
	>2.1Hrs	69(24.7%)	76(27.2%)		
0.003					
Get counseling activity(1)	Anatomist	72(25.8%)	125(44.8%)	1	1.427(0.846:2.408)
	Others	37(13.3%)	45(16.1%)		
0.012					
Hands on dissection in DR practical session (1)	Yes	101(36.2%)	78(28%)	1	0.067(0.031:0.147)
	No	8(2.9%)	92(32.9%)		
0.002					
Actively dissecting (1)	Yes	98(35.2%)	49(17.5%)	1	0.045(0.022:0.092)
	No	11(3.9%)	121(43.4%)		
0.001					
Dissection positively impact clinical knowledge(1)	Yes	81(29.0%)	112(40.1%)	1	

0.138	No	28(10.1%)	58(20.8%)	0.668(0.391:1.139)
0.023	Any apprehension to cadaver dissection(1)	Yes 35(12.5%)	78(28.0%)	1
		No 74(26.6%)	92(32.9%)	1.793(0.337:0.922)
0.002	Orientation from anatomist reduces possible emotional reaction(1)	Yes 86(30.8%)	103(36.9%)	1
		No 23(8.3%)	67(24%)	0.411(0.236:0.715)
0.039	Knowledge category(1)	Knowledgeable 58(20.8%)	69(24.7%)	1
		Not knowledgeable 51(18.3%)	101(36.2%)	0.601(0.370:0.976)
0.002	Attitude category(1)	Positive Attitude 66(23.7%)	70(25.1%)	1
		Negative Attitude 43(15.4%)	100(35.8%)	0.456(0.279:0.745)

The association of the predictor variables and outcome variables were assessed by using simple logistic analysis and those variables with a p -value < 0.25 were considered candidate variables for inclusion in the multivariable logistic analysis (*Table 9*). This table showed that a statistically significant association exist between practice and duration in the cadaver lab per day, cadaver dissection positively impact clinical knowledge, cadaver dissection enhances feature professional work, hands on dissection in DR session and Actively dissecting body and Attitude& knowledge category(p -values: 0.003, 0.000, 0.000, 0.000, 0.000, 0.039, and 0.002, respectively).

Table9. Multivariable analysis of the association of practice and predictor variables: duration in the cadaver lab per day, cadaver dissection positively impact clinical knowledge, cadaver dissection enhances feature professional work, hands on dissection in DR session and actively dissecting.

value	Good practice	Poor practice	AODR	P-
0.047	Duration in the cadaver lab per day(1)	<=2Hrs 40(14.4%)	94(33.7%)	1
		>2.1Hrs 69(24.7%)	76(27.2%)	2.224(0.947:5.228)
	Get counseling activity(1)	Anatomist 72(25.8%)	125(44.8%)	1

0.032	Others	37(13.3%)	45(16.1%)	1.657(0.946:2.408)
0.001	Hands on dissection in DR practical session (1)			
	Yes	101(36.2%)	78(28%)	1
	No	8(2.9%)	92(32.9%)	0.065(0.022:0.192)
0.000	Actively dissecting(1)			
	Yes	98(35.2%)	49(17.5%)	1
	No	11(3.9%)	121(43.4%)	0.038(0.014:0.102)
0.038	Dissection positively impact Clinical knowledge(1)			
	Yes	81(29.0%)	112(40.1%)	1
	No	28(10.1%)	58(20.8%)	0.482(0.691:1.139)
0.034	Any apprehension to Cadaver dissection(1)			
	Yes	35(12.5%)	78(28.0%)	1
	No	74(26.6%)	92(32.9%)	1.658(0.537:0.962)

OR: Odds ratios; CI: Confidence Interval; *p*-value

From the multivariate analysis, participants who stayed in the cadaver lab during practical session for more than 2.1 hours were about 2.2 times more likely to have good practice than those who stayed for less than or equal to 2 hours in the cadaver dissection lab during practical session (odds ratio, OR = 2.224). The probability of being good practice among participants who answered “no” to question cadaver Dissection positively impact Clinical knowledge was about 51.8% percentage lower than those answered “no” to the question, (ORs:0.482). The probability of being good practice among participants who answered “no” to question any apprehension to Cadaver dissection was 1.7 times more likely to have good practice than among those who answered “no” , (ORs: 1.658). Finally, respondents who answered “no” to questions hands on dissection in DR practical session and actively dissecting the cadaver were about 93.5% and 95.2% less likely to have a good practice than those who answered “yes”, (ORs: 0.065 and 0.038), respectively, and participants who did get counseling activity from Anatomist were about 1.7 times more likely to have good practice than those getting counseling from others (likes senior students, college dean and head of the departments), (odds ratio, OR = 1.657).

CHAPTER SIX

DISCUSSION

6.1. DISCUSSION

Anatomical knowledge is very crucial to the practice of medicine; thus its acquisition through cadaver dissection was the core aspects to study human Anatomy. The present study is to investigate student knowledge, attitude, and practice towards dissection and handling of cadavers as per ethical standards and importance of cadavers in medical education in medical school of Ethiopia.

The study results indicated that 98.6% of the study participants had cadaver dissection session and cadaver was important to learn gross Anatomy. Our findings indicated that cadaver dissection (CD) was the most fundamental method of learning gross Anatomy, which is suitable for grasping major Anatomical concepts, that means cadaveric dissections encourage deeper learning experience by providing a significant opportunity for students to study the exact nature of human tissues and their clinical relevance. This is higher than the findings in a study by Dissabandara et al.,(28) where only 36% of their respondents said they prefer dissection to other forms of learning. The finding of the present study is, however, similar to the work of Izunya et al.,(1) in which they found that about above 90% of Nigerian medical students prefer cadaveric dissection as important and indispensable in the study of human anatomy and Ali A et al.,(34), in UK, more than 90% of the students believed that anatomy is an essential part of the medical curriculum and should be taught to all medical students, and Kumar V et al.,(49), in India, more than 90% of medical students believe that dissection is relevant and the most important for gross anatomy learning and more than 92% of the respondents preferred dissection than other method of learning Anatomy.

The present study showed that 144(51.6%) did not received counseling before they enter in dissection room (DR) about possible physical and emotional reaction to cadaver observation or handling, 166(59.5%) had apprehension on initial exposure to cadaver dissection but their apprehension decreases gradually as the dissection session prolonged. As they achieved psychological awareness as a part of coping strategy and emotional neutralization as a part of reducing apprehension and adaptation of DR condition through by getting orientation from Anatomist, or by adjustment of cognitive, emotional and physical reaction by means of adaptation,

or by receiving stress coping counseling from senior students, or having previous exposure to dead body or cadaver. This is in agreement with study conducted by Dr. Shilpa et al., 2017, Izunya et al., 2010, and Ghosh SK, et al., 2018.

The present study showed that 176(63.1%) did not advised to follow universal precautions at all times and wear nitrile or latex gloves, safety glasses or goggles and long pants, shirt and no open-toed shoes, The same study showed that 164(69.9%) did not get enough information about the availability of first aid services and responsible persons in case of injury in the lab, large proportion of participants, 244(87.5%) reported that they did not get enough information from gross Anatomy lab staff about the cause of death of the body before them, The assessment of cadaver marker (identification tag) and its maintenance showed that 226(81%) did not found cadaver identification tag on the body in front of them and keep it always there on the body, the care that cadavers in the DR get seems good as 209(74.9%) of participants did not reported the development of mold on the body to the appropriate person. However, 247(88.5%) of participants indicated that they do not have information about the availability of cadaver memorial service in the church, mosque, school or lab and they did not ever involved on it. These findings are inconsistent with study done by Dinesh kumar et al.,(48) in India, as reported, eastern countries like Thailand, honour the cadavers with the special status of “teacher” and conduct two different ceremonies 1) the dedication ceremony some days before the course session and 2) the cremation ceremony at the end of the course. This indicates that the institution didn’t introduce about the nature of DR and cadaver dissection and general rules and regulation about dissection. This gap is particularly critical in view of the medical students and the type of education that should be provided on this important topic throughout the curriculum. Our findings are somewhat different from study conducted on medical students in India, Shaikh ST, 2015,(26), and Dr. Shilpa et al., 2017(29), in Colombia, Rueda Roberto & Hernández Juanit, 2012,(48), and with international Safety Guidelines and Rules of the Cadaver Lab,(55), they was reported that majority of the students got the information about the school labs, textbooks, care of cadaver, cadaver memorial ceremony, cadaver handling manual and protocols etc and the students had knowledge about personal safety measures like wearing gloves, cutting nails, using disinfectant soap after dissection and wearing mask, while handling the cadaver/dissected specimens.

The current study revealed that 235(84.2%) students reported that the smell of formalin is depressing. Out of this figure 215(77.1%) of students reported that repeated exposure to permissible level of embalming fluid chemical/formalin vapor is toxic. This problem may be attributed to a better ventilation system and safety measures applied in these medical schools. This is in agreement with previous studies in Africa, Europe, Asia [Izunya et al., 2010, Ghosh SK, et al., 2018, Sharma S & Gupta V. 2017] (1)(35)(27), they reported that one of the major disadvantages associated with cadaveric dissection is the smell of the formalin.

This study further showed that 164(58.8%) of students believed cadaver handling has high potential for infection risk. In addition we showed that 203(72.8%) of students did not have first aid kit in their lab. Our findings are slightly similar from study conducted in Arab, Abu-Hijel et al., 2010,(12) as reported “Fear of contracting diseases or infection” (total 62%) was a prominent experience in the DR and believed that cadaveric material may involve risk, particularly with inappropriate handling.

Our study revealed that more than half of our study participants 174(62.4%) did not have protocol for handling dissection equipment in their DR. Similarly, 171(61.3%) of students did not have protocol for handling tissue and body fluid in their DR. This indicates that students had scant knowledge of this issue. This study showed that the respective medical institutions did not set guidelines about DR condition and dissection principles.

The present study showed that less than half, 127(45.5%) of students had adequate knowledge about the importance of cadaveric dissections and its usefulness in the teaching and learning of anatomy. Even though, the rate seems low (less than half), this confirm a general view that dissection helps students to recall what they have learned and gives them lasting knowledge.

This study indicate that our study participants strongly believe that learning anatomy by using visual and tactile stimuli through the use of the human cadaver promote understanding anatomical concepts and future clinical skills i.e. the process of anatomical dissection aided their orientation and three dimensional mental picture of the human body, which presumably helped them to learn and retain the information. Our findings are similar from study conducted on medical students, in Australia, as reported Michelle Machado, 2017,(53) “inadequate retention of anatomical detail may adversely affect efficiency and effectiveness of clinical practice”. Given this view, it is not

surprising that the overall effect of undervaluing anatomy in the medical curriculum has led to an outcry in the medical community, with clinicians complaining about the low levels of anatomical knowledge among medical students and new medical graduates, but somewhat different from study on medical students in Italia, as reported Ghosh SK et al.,(35) 70.4% of medical students had knowledge, Sharma S & Gupta V,(27) in India, have reported more than 90% of the students found themselves to be privileged to have such an intimate knowledge of the human body that is unknown to others. and Winkelmann et al.,(19) have reported that it is well known that the experience gained from cadaver dissection by individual students is very wide, but the educational value of cadaver dissection encompasses much more than learning anatomy. This difference is due to the variability in the Institution /organization and Anatomy education delivery. This study also revealed that “female” participants were about 38.2% percentage lower than “male” participants. These findings are consistent with the findings of Abu-Hijel et al., 2010, as reported female students felt more distressed and experienced stronger physical and emotional reactions to most stimuli in the DR. Also, they used certain coping methods more frequently than their male counterparts. Historically, women may experience greater difficulties in being accepted into medicine

The analysis of the attitude of our study subjects revealed that 136(48.7% (less than half) of the students had positive attitude about the importance of cadaveric dissections and its usefulness in the teaching and learning of anatomy. This favorable attitude expressed by the students in this study is similar to those expressed in a study by Alhassan A., (30) in Ghana and lower from the work of Dissabandara et al.,(28) in Australia, which they found that the majority of respondents held positive perceptions about the usefulness of cadaveric dissections as an effective approach to studying anatomy and as reported Michelle Machado, 2017,(53) both clinicians and students are in favour of instituting a core curriculum that involves more clinically relevant anatomy teaching, more involvement of clinical skills in anatomy teaching and more vertical integration of anatomy across the undergraduate medical curriculum.

Slightly more than half, 51.3% of the students had unfavorable attitude towards cadaver dissection and handling due to negative reactions and feelings they faced as difficult experiences. This implies that large proportion of students believed that their anatomical knowledge is insufficient for their future professional accomplishment. This inherent challenge of dissection is likely to

facilitate critical thinking and further development of both, physical and mental skills to help overcome obstacles and solving problems. Such issues can be alleviated by preparing students adequately before the dissection sessions by using other modes of learning such as introductory lectures, pro- section and model-based sessions prior to the dissection activities and by providing adequate guidance during the sessions. This result is consistent with previous studies by Abu-Hijel et al., (12) in Arab, almost all students reported variable degrees of physical and behavioral reactions toward certain stimuli in the DR, those with the most fear also had significantly higher levels of physical reactions and disturbances. Ali et al.,(34) in UK reported that the result of perceived inadequacy of students' anatomical knowledge could therefore have been an accurate reflection of their competency and Bernard et al., in Nigeria reported that the majority of students expressed a negative experience; hence it is necessary to support them before initiation dissection .

The present study showed that most, 60.9% of students had poor practice while far less than half, 39.1% of the students had good practice. It is believed that cadaver dissection plays an important role in developing professional endeavors and hand-on experience of dissection helps in developing surgical skills of clinicians. Our findings are quite different from Study conducted by khan AN et al.,(52) in Pakistan, reported that cadaver dissection provides good hands-on experience in 90%, which also provides improvement of practical skills to work on patients in future and in UK, Ali et al.,(34) have reported that the mismatch between practically orientated assessments and the dwindling practices of teaching by gross dissection could lead to poor student achievement, but good hands on dissection opportunity leads to good practice of medicine and in Australia, Michelle Machado, 2017,(53) the lack of dissection opportunities provided to students affects their ability to develop key critical thinking skills required during emergency circumstances but having access to a cadaver or a good surgical examination procedures with extended time practice and skills enables students to practice procedures in the presence of a trained clinician to improve their technique, skills and confidence on the treatment of patients. However, this is not substantiated by previous research as medical students are a highly motivated group and are likely to compensate for such discrepancies. It is possible that this difference is due to a higher proportion of unwillingness of students in our study and the discrepancy may also be due to the variability in the institution and course delivery mode.

Limitation of the study

We are awarded that our study was planned, analyzed and organized well. However, still we admit its limitations. First of all the research was conducted in four geographically far settings (Universities). The principal researcher tried to cover all the sites however it was difficult to collect all the data by him. This can affect to some extent the consistency of the collected data. To mitigate this problem and maintain the validity of the data we deployed trained technical as data collectors. It would be better if all the data were collected by principal investigator.

Secondly our data collection tool was designed to collect knowledge, attitude and practice of medical students towards ethically standard ways of dissecting and handling cadaver. It also asses the value students give to the importance of cadaver use in medical education. The students from different ethnic, religious and norms backgrounds could have responded differently to the question items. The study was conducted in a country where many things are considered as taboo. Including seeing dead body let alone dissecting and using it for research in DR. Even such studies were not conducted so far in the country and citing the articles that concord or discord with our study were scarce. Therefore students who come from highly conservative could have low level of KAP towards cadaver and its importance. To capture the true view of students about cadaver importance in medical school curriculum and KAP of dissecting and handling cadaver and its specimens as per the international ethical standards universities shall adopt international ethical cadaver handling guidelines and communicate those guidelines to at least medical students.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATION

7.1. CONCLUSOIN

In conclusion the KAP of the majority of our study participants towards ethical way of cadaver handling and dissection in the DR was rated as low. i.e. medical students have poor compliance and knowledge towards international principles of cadaver handling and useful anatomical acts. It is inevitable that low KAP affect the quality and quantity of respect, care and enthusiasm the students can offer to the cadaver they use for their anatomy education and enthusiasm they can have for patients in their future carrier. On contrary most of our study participants strongly believe that cadaver dissection is highly important for understanding anatomical concepts and to have good understanding of the concepts health problems that arise from problems in anatomical structures.

Our study also showed that most of the students participated in this study faced significant emotional, mental and physical challenges when they encounter human cadavers in the DR. These challenges mainly ensue from the failure to provide medical students with adequate education about DR condition and cadaver dissection based on ethical standards and DR rules & regulation about cadaver dissection, safety measures and protocols, which suggests a lack of a scientific and academic strategy for making DR a common and shared practice.

7.2. RECOMMENDATION

Anatomist and Biomedical department had steered the emphasis on promoting information about nature of DR and the principles of dissection. The Anatomical Society has drawn up an anatomy syllabus by including about DR manner and Dissection principles, specifically for under- graduate medical courses to guide anatomy teaching. It emerged that a high number of students had scant Knowledge, Attitude and Practice of DR and dissection principles, such lack of clarity in the Anatomist expectations may account for the broad variability in anatomical knowledge of students across the Ethiopian medical school. This leads to the notion that serious measure must be taken, to convince the policy maker to include in the curriculum and the Anatomist to provide training on this important topic throughout the course. The lack of student confidence in their anatomical knowledge is concerning. This is the time of increasing patient expectations and rising complaints,

it is important to produce confident doctors with anatomical knowledge and practical skills that is adequate and consistent across all Ethiopian medical schools. This is an area that needs further guidance from the Anatomist and further research is recommended on the importance of anatomy for medical students.

A formal course on KAP of cadaver dissection that will reveal some physical, mental and emotional challenges, benefits of cadaver dissection to their education, promote good practices, positive attitude & encourage good knowledge and punishment/caution for misconduct should be introduced and made compulsory for all medical students. Besides, behavioral and educational programs, a short introductory course may help to “desensitize” students to various aspects of human dissection and the DR. Also it is necessary to prepare students mentally and emotionally to the DR experience.

I believe that orientating the medical student towards this practice is of high moral and medical value.

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ANNEXES

JIMMA UNIVERSITY, INSTITUTE OF HEALTH, DEPARTMENTS OF BIOMEDICAL SCIENCES, AND DEPARTEMENT OF CLINICAL ANATOMY

Annex ONE: Participant information sheet and informed consent form

Hello, my name is _____, I am here to collect data for the research purpose which is conducted to complete a thesis for Master's Degree of clinical Anatomy. The purpose of this study is to assess the ethical standards of cadaver uses and its handling among selected participants in medical schools.

You are selected to be one of the participants in the study. I would like to ask you to fill this questionnaire that takes 30 to 45 minutes of your time. No harm is imposed to you except the time you commit for filling the question. In addition, there is no payment for participation even though the result of the study may benefit as a health professionals.

The questionnaire Participation in this study is voluntary, you have the right to refuse or with draw from the study at any time for any reason without penalty. However, your honest answers to these questions are important since it provide relevant information to design an intervention that aims to improve the use of cadaver and further to strengthen the program by model health professionals like you. The information you provide is confidential and it will be used only for study purpose and it will not be disclosed to anyone. A code number will be used to identify the participant therefore, writing your name is not needed.

If you have something that is not clear about the study please contact the investigator, Madebo Ergano (Mobile 0915619547,madebo2009@gmail.com) at any time. Are you willing to participate in this study? **1. Yes** **2. No**

Questionnaire code _____

Data collection facilitators

Signature _____ **Date** _____

Thank you!!!

ANNEX TWO; RESEACH QUETIONNAIRE

Instructions: Respond to the following questions by encircling or writing on the blank space

Part I: Socio-Demographic characteristics

Table 1.1: the distribution of socio-demographic characteristics of study participants

Serial No	Characteristics	Frequency	Percent (%)	Remark
1.	Sex distribution			
	Male			
	Female			
2.	Marital status			
	Single			
	Married			
3.	Age distribution			
	≤20			
	21-30			
4.	Ethnicity of respondents			
	Oromo			
	Amhara			
	Tigre			
	Others			
5.	Religion of respondents			
	Orthodox			
	Muslim			
	Protestant			
	Others			
6.	Educational status			
	University			
	College diploma			
7.	Occupational status			
	Medical students			
	Technical assistants			
8.	Duration in the cadaver lab per day			
	3 hours			
	>3 hours			
	2.5 hours			
	2 hours			
	Others			
Total				

Table 1.2 the dissection related characteristics of respondents

Dissection related items to measure the need of cadaver dissection?	Yes/No	Response		
		Frequency	Percent (%)	Remark
1. Do you have cadaver dissection session in your gross Anatomy course?	Yes			
	No			
2. Do you receive counseling before you enter in dissection room (DR) about possible emotional reaction to cadaver observation or handling?	Yes			
	No			
3. If yes, who provide you the counseling activity	Anatomist			
	Head of department			
	College dean			
	psychiatrist			
4. Are you given an opportunity to dissect by yourself?	Yes			
	No			
5. Are you advised to follow universal precautions at all times and wear nitrile or latex gloves, safety glasses or goggles and long pants, shirt and no open-toed shoes?	Yes			
	No			
6. Do you get enough information about the availability of first aid services and responsible persons in case of injury in the lab?	Yes			
	No			
7. Do you get enough information from gross Anatomy lab staff about the cause of death of the body before you?	Yes			
	No			
	I don't ask			
8. Do you find cadaver identification tag on the body in front of you and keep it always there on the body?	Yes			
	No			
9. Do you report the development of mold on the body to the appropriate person?	Yes			
	No			
10. Do you understand that the body is on the dissection table for the furtherance of science and medicine and it is an utmost gift for you?	Yes			
	No			

11. Do you offer utmost respect to the body in front of you and its family?	Yes			
	No			
12. Do you understand that disclosing the identity of your cadaver outside dissection room (DR), photographic and videotaping the cadaver, take its piece outside DR and nick naming it is de dignifying your body and its relatives?	Yes			
	No			
13. Do you consider the body you are given to dissect as your first patient?	Yes			
	No			
14. Do you consider the body you are given to dissect as your first teacher?	Yes			
	No			
15. Is there cadaver memorial service in the church /mosque, school or lab and have been involved on it?	Yes			
	No			

Table 1.3: knowledge of the importance of cadaver dissection response distribution

Items to measure the knowledge of the participants on the importance of cadaver	Yes/No/Not sure	Response		
		Frequency	Percent (%)	Remark
1. Do you think that coming well prepared (psychological, mental, emotional and physical) for cadaver dissection improves your Anatomy learning?	Yes			
	No			
	Not sure			
2. Do you think that attending gross Anatomy practical session (lab session) facilitates learning Anatomical structure (texture, color, shape, location, course and relationships) and improve understanding Anatomical concepts?	Yes			
	No			
	Not sure			
3. Do you think that hands on dissection improve your learning out come in Anatomy than demonstration or prosection?	Yes			
	No			
	Not sure			
4. Do you think that cadaver dissection enhances combination of theory and practice of Anatomy education?	Yes			
	No			
	Not sure			
5. Do you think that cadaver dissection is still considered important and indispensable for learning Anatomy?	Yes			
	No			
	Not sure			
6. Do you think that cadaver dissection promotes team work and practical skills?	Yes			
	No			
	Not sure			
7. Do you think that dissection based /mediated Anatomy lesson positively impact your clinical knowledge and practical achievements?	Yes			
	No			
	Not sure			

8. Do you think that the dissecting cadaver help you in informing and confirming or reforming your own 3-D ideas and images of the development and structure of the human body at all levels of organization?	Yes			
	No			
	Not sure			
9. Do you think that dissection help to understand the interdependence of structure and function in health and disease?	Yes			
	No			
	Not sure			
10. Do you think that good knowledge and skill in dissection is important for your clinical practice?	Yes			
	No			
	Not sure			
11. Do you think that cadaver dissection based Anatomy lesson will impact your ability to take an effective history, perform physical examination and perform diagnostic and therapeutic procedures with minimal risk and maximal benefit to patients?	Yes			
	No			
	Not sure			
12. Do you think that cadaver dissection promotes preparation for work practice?	Yes			
	No			
	Not sure			

Table 1.4: Attitude of the importance of cadaver dissection participant's response

Items to measure the Attitude about the importance of cadaver dissection	Participants response			
	Likert scale	Frequency	Percent (%)	Remark
1. Dissection enhances the skill of logical thinking and team work sprit	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			
2. Cadaver dissection provides true picture of human body structure	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			
3. Dissection enhances manual/surgical skill to understand course	Strongly disagree			
	Disagree			
	Neutral			
	Agree			

	Strongly agree			
4. Cadaver dissection promotes knowledge that increases the respect of the body	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			

5. Cadaver dissection promotes the knowledge of your future profession	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			
6. Cadaver dissection has the potential to widen the spectrum of learning outcomes, which are essential for learning and understanding the course	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			
7. Guidance/orientation from Anatomy staff before entering the dissection hall would encourage learning from cadaver dissection	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			
8. Dissection promotes the development of psychomotor skills in preparation for clinical work	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			
9. Cadaver dissection enhances combination of theory and practice	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			
10. Cadaver dissection promotes familiarity with human body which helps to deal with the patients	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			
11. Cadaver dissection promotes preparation for work practice and knowledge that increase the respect of the body	Strongly disagree			
	Disagree			
	Neutral			
	Agree			
	Strongly agree			

Table 1.5: Practice towards the importance of cadaver distribution among respondents

Items to measure the practice of cadaver dissection	Response of participants			
		Frequency	Percent %	Remark
2. Do you attend DR session regularly?	Yes			
	No			
2. Do you have real specimen and cadaver in DR?	Yes			
	No			
3. Do you have motivation to touch and investigate specimen and cadaver by yourself?	Yes			
	No			
4. Do you narrate dissection procedures?	Yes			
	No			
5. Do you assist dissection other than narrating, by providing materials/passing equipment?	Yes			
	No			
6. Do you actively dissect?	Yes			
	No			
7. How often you actively dissect by your own?	Always			
	Sometimes			
	Not at all			
8. How often you assist dissection?	Always			
	Sometimes			
	Not at all			
9. How often you narrate dissection?	Always			
	Sometimes			
	Not at all			
10. Do you think that cadaver dissection promotes preparation for work practice?	Yes			
	No			
	Not sure			
11. Do you think that dissection enhances the development of psychomotor skills in preparation for clinical work?	Yes			
	No			
	Not sure			

Table 1.6: stress coping in cadaver dissection distribution

Items to measure the stress coping on cadaver dissection	Response of the participants			
	Yes/No	Frequency	Percent %	Remark
2. Do you have gross Anatomy practical/lab session?	Yes			
	No			
3. If yes, did you get orientation from Anatomy staff members on your first day of DR visit on possible emotional reactions towards cadaver dissection ?	Yes			
	No			
4. If yes, does this helped in any way?	Yes			
	No			
5. Do you have any apprehension to cadaver dissection on your initial exposure to cadaver?	Yes			
	No			
6. If yes, do you have the apprehension as your first day?	Yes			
	No			
6 .If yes, do you managed your long dissection session?	Yes			
	No			
7. If No for question4, what had helped you to avoid/overcome exposure to dead body?	Previous exposure to dead body			
	Orientation from Anatomy staff			
	Cognitive, emotional, physical adaptation			
	Received stress coping counseling other than Anatomy staff			

Table 1.7: knowledge of dissection room (DR) safety participant’s response

Items to measure the participants knowledge of dissection room safety	Participants response			
	Yes/No	Frequency	Percent %	Remark
2. Do you think that the dissection hall is clean when you enter into it for dissection?	Yes			
	No			
3. Do you think that DR cleanliness is related to health?	Yes			
	No			
4. Do you think that the smell of formalin is depressing?	Yes			
	No			
4. Do you think that repeated exposure to above permissible level of embalming fluid chemical vapor is toxic?	Yes			
	No			
5. If yes, do you take appropriate protective care (do you use personal safety precautions)?	Yes			
	No			
7. Do you think cadaver handling has high potential for infectious risk?	Yes			
	No			
10. If yes, do you use personal safety devices and precautions?	Yes			
	No			
11. Do you have first aid kit in your lab?	Yes			
	No			
12. If yes, have you ever been introduced how to use it?	Yes			
	No			
10. Do you have protocol for handling dissection equipment in your DR?	Yes			
	No			
11. Do you have protocol for handling tissue and body fluid in your DR?	Yes			
	No			
12. Is there any injury you encountered in DR due to any reason and treatment you received?	Yes			
	No			

ANNEXES 3:

The standards per protocols

The first way of cadaver procurement voluntarily body donation, when a person voluntarily of his own accord and free will decides to donate his body during his lifetime, for furtherance of medical education and scientific progress, it is evidently the best accepted cadaver source. The conditions to be taken into account are:

1) Person should be an adult of sound mind. 2) He should give his informed consent in writing. 3) The possibility of revoking at any time the given consent. d) The consent unaltered by moral or physical constraints. e) The existence of a legalized document (declaration before a public notary, donation contract, will of the deceased) which stipulates that the donation is done with a humanitarian, altruistic goal, without pursuing a material or other type of benefit

A second way of cadaver procurement comes into existence when the deceased did not express, during lifetime, the wish to donate his/her body. Such a donation is made by the family/legal representative on

behalf of the deceased person. When donations are based on family consent, there should be:

1) The necessity of written consent from at least one major member of the family or relatives (in the following order: husband, parent, child, brother, sister);
2) The inadmissibility of cadaver donation if during lifetime the deceased person expressed the option against such a donation.

The third and the last method of cadaver procurement is unclaimed cadavers and of those without family. It is considered to be the least ethical way. That is because the deceased person's consent concerning the use of his/her body for teaching purposes cannot be taken for granted.

Unsuitability for donation

The foremost intention of procurement of the cadaver is for dissection purpose so as to enable the undergraduate medical students master the normal anatomy of the human body. Hence some cadavers may not be considered appropriate for the same and may have to be rejected.

Some of the donated bodies may not be suitable for usage and **hence liable for rejection**. Some frequent reasons for rejection of the body are-

1. Body of a medico legal case (e.g. Suicide, homicide, accidental death etc.).
2. Postmortem bodies.
3. Body of a person having contagious / communicable disease g. HIV, AIDS, Tuberculosis, Hepatitis B & C, Gangrene etc.
4. Decomposed body.
5. Extreme obese / emaciated body.
6. Body with organs removed (except eyes).
7. Body of a person with skin diseases like psoriasis, bedsores etc.

A cadaver has a fundamental moral- ethical value that necessitates a reverential attitude towards it. The ethical predicament emerges when an invasive manipulation of the cadaver is to be carried out

Firstly, the way we handle a cadaver indirectly indicates the way we would treat a live patient; the only difference between a cadaver and a human is the presence of life, otherwise cell to cell they are the same.

Secondly we should always respect the memory of the departed. Disrespecting the cadaver means the deceased person him/herself.

Thirdly the near ones of the deceased have endured an agonizing and irremediable loss which should never be overlooked.

Lastly every cadaver possesses a religious implication like resurrection or rebirth, disrespecting the human cadaver would advocate disregarding the entire human existence.

Anatomy Lab Safety Plan

Anatomy Lab Safety Policy

Work in anatomy labs, while illuminating and worthwhile, does pose some health and safety risks that need to be considered and addressed. Below is a list of work practices that **MUST** be followed during

all lab sessions and prep work.

1. Only parts of uncovered cadavers may be exposed during any lab session. The ventilation system can be opened to accommodate lab room highly ventilated .
2. Check to make sure ventilation hoods are “ON” before starting work. Do NOT unzip or open cadaver or specimen bags for a dissection if you don’t think the hoods are working.
3. Keep cadavers covered in zipped body bags when they are not being studied.
4. Do not eat, drink, apply lip balm, or touch your face while in the Anatomy Lab.
5. Wear examination gloves when handling specimens, cadavers, or waste material.
6. Change gloves when damaged and periodically as needed.
7. Wear eye protection when working with cadavers and preserved specimens.
8. Wear a lab coat or scrubs when doing dissections to protect your clothes. For significant splash hazards, wear an apron over the lab coat.
9. Dispose of all scalpel blades and other sharps in red “SHARPS” containers.
10. Wash hands and any exposed skin immediately on contact with embalming fluid and before leaving the dissection area.
11. All waste containers must be kept closed when not actively being filled. Do not overfill.
12. Report injuries or problems to the laboratory supervisor as soon as possible.

Cadaver Care

All human anatomy students and professionals are responsible for the proper care of our human cadavers. When work is not actually being conducted, zip up the body bag to both avoid excessive odors and to prevent the cadaver from drying out.

DO NOT...remove the identification tag on the cadaver

DO NOT dissect or remove body parts without permission from the instructor.

Keep the body bag closed when cadaver is not being used.

Do not open more than two cadaver bags at a time

Laboratory Hygiene Practices

A. Required Personal Protective Equipment (PPE)

Lab Coat _ Always, when working

Rubber/Plastic Apron - Significant splash hazard

Latex or Nitrile Gloves - Always, when working

Heavy Rubber Gloves - Extended contact/immersion

Safety Glasses - Always, when working

Face shield - Significant splash hazard

Potential Hazards and Preventive Measures

Working in an Anatomy Lab is a valuable educational experience, but is not without risk.

Fortunately, good work practices and common sense can minimize the risk of injury and exposure to embalming fluid and biohazards. Examples include keeping containers closed when not directly working with specimens, not being sloppy, and consistently wearing latex or nitrile gloves when handling cadavers or specimens.

Embalming Fluid

The liquid used to preserve animal and human tissue contains chemicals that can be hazardous if mishandled.

Preservatives such as ethanol, phenol, and formaldehyde are flammable so avoid open flames and ignition sources

Phenol and formaldehyde are toxic even in small quantities so proper handling of waste fluids and functioning ventilation are essential to avoid overexposure

Inhalation of vapors, injection through cuts/punctures, or ingestion by eating or licking contaminated lip balm can cause unwanted exposure. Keep food, drinks, gum and cosmetics out of the anatomy lab and make sure fluid collection containers are closed.

The formulation of embalming fluid has changed over the years. New formulations are using smaller concentrations of formaldehyde and other toxic chemicals.

The formulation of the embalming fluid used:

(61% Water +5%Commercial Formalin +20% Ethanol +3% Lysol +10% Glycerin 1% Phenol

Note that the formula is subject to change.