PERCEPTION OF HOUSE OFFICERS IN KANO STATE TOWARDS THE USE OF CADAVER FOR MEDICAL EDUCATION

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BEING A DESSERTATION SUBMITTED TO THE DEPARTMENT OF ANATOMY, BAYERO UNIVERSITY, KANO, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTERS DEGREE IN ANATOMY, BAYERO UNIVERSITY KANO, NIGERIA

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DECLARATION

I hereby declare that this work is the product of my research efforts undertaken under the supervision of Professor. I.M.INUWA and has not been presented anywhere for the award of a degree or certificate. All sources have been duly acknowledged.

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CERTIFICATION

This is to certify that the research work and the subsequent write up of

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DEDICATION

To my teacher, my mentor, my coach, my Mum, Hajia Fatima Ibrahim and to my tutor, my role model, my hero, my Dad, Late AlhajiAliyu Mukhtar.

CONTENTS

LIST OF ABBREVIATIONS

AKTH: Aminu Kano Teaching Hospital

AIDS: Aquired Immunodeficiency Syndrome

CAL: Computer Assisted Learning

CT: Computer Tomography

HIV: Human Immunodeficiency Virus

MAWSH: Mohammad AbdullahiWase Specialist Hospital.

MBBS: Bachelor of Medicine Bachelor of Surgery

MMSH:Murtala Mohammad Specialist Hospital

MRI: Magnetic Resonance Imaging

PBL: Problem Based Learning

UMMS: University of Michigan Medical School

US: Ultrasound

LIST OF TABLES

LIST OF FIGURES

List of Appendices

ABSTRACT

Anatomical knowledge is undoubtedly essential for doctors regardless of their specialty, particularly since they continue to perform physical examinations, make medical decisions, communicate with colleagues, and provide explanations to patients. Furthermore, expert knowledge of anatomy is essential in the present day, particularly for surgeons, because of the development of various surgical techniques and emergence of more sophisticated imaging technologies. The aim of this project was to study the perception of house officers on the use of cadaver for medical education. Data was collated using a self-administered questionnaire to 216 House officers currently undergoing their internship at AKTH, MMSH and MAWSH. The data was analyzed using Minitab 12.21 computer statistical software, associations were tested using chi-square test of significance and Mann-Whitney test.The study response rate was 93.5%. The findings of this study revealed that dissection had a significant input in acquiring knowledge of anatomy, according to most of respondents (80%). Dissection is indispensable in the study of anatomy(78% of the respondents). The study also found dissection to be relevant to clinical practice, improved clinical skills and examination (53% of the respondents). Dissection plays a vital role in teaching gross with 54% of the respondents agreeing that the best method of teaching anatomy was cadaver. The respondents (80%) feel that the use of cadaver improved their ability to understand the theory taught in class and appreciate anatomical variation. Dissection has a very important role in acquiring knowledge of anatomy. It improves clinical practice, with regards to skills acquisition, improving clinical examination, documentation and performing basic procedures.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Anatomy has arguably the longest history as a discipline in formalized health sciences education. Human anatomy is not just the study of structure or morphology but the human anatomist is likened to a geographer of the human body. Anatomy is an integral component of the medical curriculum, a sound knowledge in human anatomy prepares the health sciences undergraduate for his future training in the clinical disciplines (Pond, 2013). Learning anatomy and understanding the structure of the human body as it relates to its functions has been the foundation of medical education and practice for hundreds of years (Anastasios, 2012). Anatomy is the English word derived from the Greek term '*anatome*' that means cutting up. Anatomy is a very important subject in medical education involving three components: gross anatomy, embryology and histology (Flores, 2006). Dissection is globally considered an essential part of medical training involved in teaching students to appreciate gross anatomy. It is designed to give students a hand on view of the body while also creating awareness of the transformational changes that occur after death. Medical education worldwide aims at producing health professionals (Elizondo-omana*et al*., 2005). There was a growing acknowledgement of the fact that a good medical or surgical practice could only be based on adequate and very exact knowledge of human anatomy which was derived from learning and teaching human dissection (Saima*et al.,* 2011).

Discussion of human cadaver dissection has been a subject gaining popular grounds in the academic diaspora even though the knowledge of anatomy and the

advancement in medicine have been tremendously affected by this valuable avenue of exploration. According to a Professor of History and Internal Medicine at the University of Michigan Joel Howell who was quoted "Without the anatomical understanding of the human body that is afforded by dissection, much of modern medicine would simply not exist." (Turney, 2007).

In the 4th century BC, Aristotle and Hippocrates produced an empirically founded system based on animal dissection. The 4th century BC marked the period and break through when the first use of human cadavers for anatomical research occurred when Herophilos and Erasistratus gained permission to perform human dissection on executed criminals in Alexandria. By the 2nd century BC, Galen, a Greek Anatomist, had been prohibited by Roman law to dissect human cadavers, therefore was confined to dissecting pigs, dogs and apes, with the belief that their anatomy was the same as humans. His work was the basis for all anatomical understandings and would remain unchallenged for nearly 1400 years as science entered the Dark Ages (Arraez*et al.*, 2004). In the late 15th century, Leonardo da Vinci began making anatomical drawings secretly using human cadavers. He began using the concept of art where he is very good in to detail the skeletal, muscular and vascular systems of humans. In 1543, Andreas Vesalius, whom is known as the father of modern anatomy, published a series of detailed woodcuts of dissected corpses, finally challenging the accuracy of Galen's work 1400 years earlier (Horst *et al.,* 2008). Although human cadaver dissection was prohibited in England until the 16th century, there was a selected group of physicians and surgeons from the Royal College of Physicians and Company of Barber Surgeons, who were given permission to dissect a very limited number of cadavers (Granger, 2004). The Murder Act of 1752 allowed for the bodies of executed murderers to be dissected for anatomical research and education. The

problem arose by the 19th century that the supply of cadavers could not withstand the demand, which gave birth to a growing black market of body snatchers which lead to The Anatomy Act of 1832 which greatly increased the legal supply of cadavers for medical dissection. In the 20th century and into the 21st, dissection has earned the understanding that has made it a valuable part of medical education. In 1994, Gil Hedley began offering human cadaver dissection workshops to body workers. This has sparked an outgrowth of studies for the alternative therapies practitioners that is growing (Monkhouse, 1992).

The technological advancement has brought about a lot of breakthrough with the advent of new techniques and information technology alternative methods of teaching anatomy came into existence. This has brought about the availability of computer programs and various websites to almost all medical students, an alternative concept of teaching anatomy arose: ‘‘the cadaverless gross anatomy lab” (Winkelmann, 2007). This concept was strengthened by the inherent rampant curriculum changes paying tribute to scientific advances due to the increase in the quantum of knowledge in cellular and molecular biology and genetics which are to be taught to medical students. The medical education community is thus faced with a challenge. The most obvious of which was since teaching gross anatomy in a dissection course for students is costly and medical faculties suffer from financial constraints, a debate has thus began to arose regarding the use of cadaver and the cadaver less concept of teaching anatomy (Aziz *et al*., 2002). The subsequent argumentation is a strong plea for continuation of the cadaver centered dissection course which is an integral and indispensable component of the classical dissection labs for teaching anatomy. Three dimensional medicine is the compassionate art of healing through a detailed understanding of the tissues and structures inside the body, and this is best learnt by

dissection (Vazquez and Carretero, 2005). Although biomedical information and new imaging technologies have improved our understanding of anatomic structural organization, the burning question is still “is cadaver-based learning in the dissecting room relevant or essential for teaching tomorrow’s doctor? There are a lot of arguments arising regarding the use of cadaver in medical education. The common arguments for the dissection course as the core of gross anatomy education include.

1.1.1 The Practical Argument

In current medical education much attention is paid to clinical analysis, fact and knowledge acquisition without any direct bodily contact. Medicine is an art that requires manual skills. Doctors not only analyze fact but they act in one way or the other every day in practice be it as a surgeon or a general practioner. They also use various instruments the principle of use of which depends on the precision and skill acquired. The art to examine patients as performed by physicians is naturally entirely different from everyday contact. In that doctors touching are analytical and instrumental, or part of operations or surgical interventions. The gross anatomy lab offers the unique possibility to learn and practice manual skills required for analytical doctoral touching. Plastinates and ‘body slices’ do not fulfil these requirements, since they do not allow such contact and practical training (Biasutto*et al*., 2006).

The fundamental Hippocratic tradition of touch between physician and patient has always been deemed an essential skill acquired in the dissecting room. Hands on cadaver teaching is the first step towards discovering the three-dimensional structural organization of the body. The three dimensional high resolution software, which appears better at visualizing human anatomy, still produces a simplistic and distorted picture of the human body. Amidst a lot of curricular reforms, students of medicine, and other basic science courses which are also divorcing human touch. They have

been left with no access to dissection, thus changing their future to the whim of technological innovation. This could explain why tomorrow's doctors are often not even equipped to extract blood. Hands on experience is important for developing the touch based skills of palpation, percussion and auscultation which can be superior to the new mechanical gadgets. Hand dexterity, trained in the dissecting room, is part and parcel of all branches of the medical profession (de Bruxelles, 2002)

1.1.2 Hypothetical Seeing and Thinking

According to some authorities like Karl Popper knowledge acquisition occurs via testing and falsification of hypotheses (Popper, 1959). Indeed, the doctor's diagnostic view on his/her patient is not only analytical. Doctors diagnose by putting forward hypotheses and evaluating them. The range of diagnostic and therapeutic tools will depend on this hypothesizing process of observing and thinking. The dissection course can be seen as a preparation to this profoundly medical and scientific view of man and the world. Students when dissecting in the lab they begin to tell themselves if I cut this area I should see a structure expected and in doing so has acquired knowledge. If something unexpected emerges, then you have also learned something. Unlike the living body, a cadaver does not punish errors. In contrast, these errors may even lead to deeper insight. Plastinates or anatomical models, on the other hand, do not allow such a way of thinking and hypothetical deductionism (Horst *et al.,* 2008).

Medicine in less than two decades has witnessed tremendous expansion of databases on the cellular and molecular processes of both healthy and diseased states. Powerful tools such as Computerized Tomography (CT), Magnetic Resonance Imaging (MRI) and ultrasound have been developed to assist diagnosticians and surgeons as well as serving the interests of anatomy. There is even a growing hope that one day anatomy

will be taught via the 'cyber cadaver" (Vishram and Poonam, 2013). However, it is clinical astuteness, owing it strength to hands-on experience that produces highly skilled physicians and surgeons. Dissection of the cadaver should induct one into topography at the beginning of studies, with the new technology serving to consolidate knowledge. A balance between new and old methodologies can be found in some centers where anatomy is taught both by classic dissections and modern imaging technology. The instantaneous access, storage, and retrieval of information on computers has also reduced the importance of learning, while computer-assisted learning is rewarding for finding facts and indeed enhances the integration of basic and clinical sciences. The current over-dependence on information technology has devalued 'humanness' in medical education as machines cannot tell us anything about life or death. The dissected cadaver remains the most powerful means of presenting and learning anatomy as a dynamic basis for solving problems (Mclachlan, 2004). Medicine is a direct dialogue between the patient and physician. It therefore means if students only use models, images, audiovisuals or computers, they will not develop the reasoning that comes from investigative dissection of real tissue to acquire knowledge of the living. Nor will they have the ability in emergency situation to make clinical decisions that entail life or death, litigation or job satisfaction. Cognitive ability sustained via hands-on experience is paramount (Omar, 2009).

1.1.3 The Didactic/Constructive Argument.

Acquisition of knowledge can be passive or active. Passive acquisition of knowledge (reading, hearing, observing) is far less efficient than active acquisition of knowledge (acting, discussing, constructing). Dissection can be viewed as a form of as acting, or even better, as organized acting in groups. Dissecting strategies a form of teaching which is planned in stages organized in groups to aid learning and better

understanding and after dissection, the parts are returned to their anatomical positions. The relatively soft, pliable cadaveric material used in the dissection course is not just dismembered, it is dissected in such a way that it can be put back together again. Indeed, there is nothing more informative and useful than trying to reconstruct the dissected convolutes of the guts and abdominal organs back to their original positions. Plastinates or models, however, are rigid structures that do not or at least only partially permit reconstruction (Horkheimer and Adorno, 1971).

1.1.4 The Educational Psychological Argument

Knowledge acquisition is most efficient when involving as many senses as possible. It is therefore most necessary from an educational psychological point of view to bring in as many sensory impressions as possible into educational processes. The dissection course fulfills this criteria of knowledge, during which students must activate all senses to literally comprehend. In this respect, dissection courses serve as a unique, powerful tool to convey macroscopic knowledge. Presentations and plastinates may serve as short-term form of entertainment but do not engrave the basic concepts of anatomy into the long-term memory of students (Pawlina andLachman, 2004).

1.1.5 The Philosophical/Medical Argument of Distance and Proximity

A physician occupies a very important cadre in practice who is always trying to see what to offer to his objects even though being humans. In a sense, patients should be regarded as the 'object among objects' and the doctor's objective view should result in sound, useful diagnoses and valid therapies (Horst, 2008). Obviously physicians deal with patients, who should be considered not only as objects but also as human beings and hence subjects, whom doctors should respect and understand as such. One

of the most important qualities of a good physician is the way in which he is able to combine both roles, i.e. that of neutral observer and that of compassionate helper (Rizzalo, 2006). The extent to which students are successful in this dual role will be disclosed for the first time in the dissection course (Pawlina,2004). The first step required of students in dissection courses is the cold objectivism of the cadaver, which may still be seen as an individual, sometimes even with a personality. The cadaver, the specimen, should be converted into an 'object'. Being an object among objects in the students' minds, only then can it be dissected. The next step and still more difficult step, is that this object, while gradually losing its original form during the dissection process, should begin to tell the story of the human being to whom it belonged. The fragility of bones may point to the painful process of osteoporosis, the fine-spun muscles to a bedridden history, and the calcified coronary arteries to infarction (Winkelman,2007). At the end of the course, the objects, the specimens, the cadaver, the donors regain their names and the status of being a subject. Any degree of mastering such attitudes, which are indispensable for practicing in the medical profession, is impossible when working with plastinates, which will remain objects among objects and which only serve purely illustrative functions (Mchlachlan, 2004).

1.1.6 The Argument of Stereotypy

Man is considered a 'dividuum' and hence divisible, an opinion that certainly should be true from an anatomical point of view. Every human being is considered divisible but at the same time unique. This uniqueness, which the patient wishes and appreciates to see respected by his/her doctor and quite rightly so also pertains to physical properties. Biological variation is one of the most important concepts in modern medicine. This is due to the fact that no two individuals have identical

anatomy and pathology. As students get exposure to different cadavers, they learn the principles of both anatomical variations and developmental anomalies (Nietzsche, 2005). Thus, the future doctor is likely to acknowledge the complexity and uniqueness of the whole body (Rizzalo, 2006). Each year, teachers and students will experience the very cosmos of diversity based on a universal, common constructional plan. This in the same surprising and unexpected individuality of a patient that is revealed in front of the physician. This feeling of surprise at the identification of such a variation during the dissection course is a highly informative and enriching experience. This is gained by those who can be proud of discovering it, for those who have identified it and for those who try to explain it (Vazquez andCarretero, 2005). The decisive element, just like in real life, lies in the momentary effect of surprise about individuality and the way of dealing with its flexibility when dealing with something that deviates from the rule. These aspects are trained in a gross anatomy course. A series of plastinates, even one showing the most common variations, quickly loses its novel character (Guttman, 2004). Teachers and students share this knowledge they pick up along the dissection process and students quickly know the list of exposed variations by heart. The 'individuum' returns to the status of 'dividuum' a heap of known, exchangeable components. Unfortunately with the upcoming new concept of cadaverless laboratories and anatomy teaching using a computerized and standardized 'visible man', plastic bones, models and computer generated simplified images will compromise future doctors' clinical astuteness. A recipe for misdiagnosis and eventual malpractice. (Aziz, 2002).

1.1.7 The Argument of 'Connective Tissue'

Plastinates or anatomical models are final products that are made of materials like plastics and metals. They miss a vital aspect of the human body composition of fluids and connective tissue. No organ in the human being just appear like that, instead organs need to be laboriously and elaborately uncovered before being removed, excised and cut out of connective tissue envelopes, fasciae and adipose tissue (Pawlina andLachman, 2004). Plastinates do not afford this experience to the observer as all structures are immediately exposed. The difference between production and discovery is denied. Yet it is this connective tissue seen during dissection course, these tough or fragile areas, these clefts and separating walls, in which nerves and blood vessels are contained that form the very essence of a surgeon's skills (Topp, 2004). It is through this connective tissue and not through the organs proper that he/she clears a path to the organ of interest. The connective tissue is the area through which pathological processes invade the organism and it also forms tracts through which the major body pathways run from one region to another. Connective tissue both connects and separates, joins and partitions the organism. The skillful, mechanical and topographical approach to this tissue is a prerequisite to gaining insight into anatomy. To prospective surgeons it is even more essential, because only during the dissection course are the necessary skills developed to deal with this important component of the human body (connective tissue).Once again, plastinates or models conceal this process of dealing with connective tissue. In addition, the totally different consistency of the various tissues is reduced to sheer uniformity. (Winkelman, 2007).

1.1.8 The Argument against the Plastinate Authenticity.

Eighty percent of the human body is comprised of water and fat (Granger, 2004). The dissection course reveals this facts. The plastinates which are made up of synthetic material replace this composition of the human body however, these 80% are replaced by synthetic material. Leading to the loss of authenticity. Equally unreal are the misleading colours of plastinates, which indeed are painted vividly. Authentic colours and the state of the organ surfaces are not exposed by this technique or that method. Body surfaces (fibrous or sparkling) are visualized far better by means of conservation methods that do not mask fat or water (Garrison and Hast, 2003).

1.1.9 The Argument of the Life of Knowledge.

Admittedly, gross anatomy is no longer about new discoveries, but rather about reproduction of knowledge gained over centuries. Nevertheless, the following premise holds true for anatomists due to the fact that collected knowledge is not equal to reproducible knowledge and skills (Horst, 2008). Knowledge does not live in books, it lives in the mind. It does not only survive by production but also and mainly by reproduction. Whatever is known and written down somewhere, but is no longer practiced, is useless. Dissections courses gives the ability to produce and reproduce knowledge. This will help to conserve and save practiced knowledge, and therefore be beneficial also for future generations of trained medical professionals (Guttman*et al.,* 2004).

The principles of anatomy thought in the dissection room introduces students to the reality of death. It also introduces a very important concept of biological variation and demonstrates common pathologic changes (Boon *et al*., 2001). Anatomy also introduces a form of new vocabulary that teaches the basic language of medicine.

Anatomy dissection nurtures the group spirit thus assisting in social bonding and communication. The art and science of medicine is to define disease with concision and precision in order to take the right decision towards interventions. Adequate skills and knowledge of anatomy are therefore indispensable and should be imparted from the onset of medical education. The most appropriate method is to show the inner workings of tissues and structures of the human body through dissection while training health professionals (Walter, 2004). The technological advancement with computerization and biomedical informatics have reduced the need for excessive memorization and actual dissection. With all these a lot of criticisms are being levelled at anatomy teaching with overcrowded curricula. Packed with clinically unconnected facts, excessive memorization, didactic lectures, passive learning and lack of communication with patients. Some medical schools no longer featured cadaver based anatomy in the curriculum regardless of its vocational importance to future health care professionals (Omar, 2009).

The present fashion of learning anatomy involves the use of various medical imaging modalities to help conceptualize anatomical structures. This has transformed the teaching of anatomy to an entirely different entity. The new trend is further facilitated with technologies like ultrasound, three dimensional visualization, multiaxial computerized image reconstruction, multiplanar magnetic resonance imaging andplastinatedprosections (Ellis, 1994).

With all this advancements some centers are now reverting to the classical method of dissection (Biasutto, 2006). To the medical students, some argue that the cadaver is the first patient. This creates the awareness where students have to face the reality of life, morbidity and mortality and the awesome responsibility of a physician in caring

for the patient. Beginning with a lifeless cadaver also reduces complexity, giving a good understanding of gross anatomy integrated to structure and function which can then be extrapolated to the living. In the dissection room, the students learn skills by vicarious means (Heylings, 2002). Even though they experience anxiety and stress from a psychological point of view as a defense mechanism and coping strategy but not through detachment or indifference. Good medical education involves development of observation, conceptualization and the formulation of hypotheses in order to produce critical thinking in tomorrow's doctors (Hanna, 2002). Curricula that demean the importance of dissection are likely to reduce the ability to approach diagnosis and intervention scientifically. This goes against the claims that current reforms are in line with evidence-based medicine (Walter, 2004).

Although the new information age that is fuelled by fast computers has reduced 'routine learning'. Cognitive skills in anatomical concepts have direct relevance to clinical skills. The ability to call on these skills is essential for emergency medicine where, at the spur of the moment, one is required to make a clinical decision that entails life or death, litigation or job satisfaction. Group activity is often an inherent feature of the traditional dissection room. In psychological parlance, people working for a common good are likely to benefit from group cohesion and the team-spirit of colleagues (Older, 2004).

With Changes in undergraduate medical education this have partly influenced new trends in postgraduate surgical training. This can be seen with a clear view in a surgical fellowship which was taken to mean a broad-based examination taken early

while in training with high standards in basic sciences. The principle prerequisite was a proficiency in the art and science of anatomy (Calman, 1993).

1.2 STATEMENT OF THE PROBLEM

Dissection has been a part of medical education in all parts of the world. Most of the people recognize dissection as the most universal and universally recognizable step in becoming a doctor. All the medical schools have their own dissection rooms in the Department of Anatomy. Today, increasing use of computers, access to the web and abundance of subject material on the web-sites have developed the concept that the cadavers in the dissection room can be replaced by a well-equipped computer room and multimedia projection (John and Debra, 2006)

These modern teaching tools are durable, clean, odorless, and aesthetical and hassle free in the sense that the students are not required to undergo training, unlike a traditional dissection session. These advances in technology have procured many supporters in the medical education community. In the current educational scenario, the anatomists have polarized into two belief systems, the modernists who regard the cadaver dissection as obsolete and dispensable and the traditionalists who think that dissection is the keystone of anatomy education. This transformation in the perceptions of educationalists is an issue that needs to be analyzed in a greater view because it deals with the process of educating and training our future health professionals, who will one day encounter living patients. Some educationalists believe that the shift from a descriptive "cadaver oriented anatomy" to a "clinically trimmed, computer oriented anatomy" may not be good in the assimilation and sustenance of core knowledge. However many educationalists hold the view that lessons learnt from the actual feel of human flesh are incomparable. Computers, however advanced they may be, will remain an artificial synthetic medium. Computer

simulation and technology can never equate with the complex and miraculous reality of a human body.

1.3 STUDY HYPOTHESIS

H_oa: -There is no statistically significant association between exposure to a lot of dissection and significance of dissection to anatomical knowledge.

H_ia: - There is statistically significant association between exposure to a lot of dissection and significance of dissection to anatomical knowledge.

H_ob: - There is no statistically significant association between significance of dissection to anatomy and relevance of dissection to clinical practice.

H_ib: - There is statistically significant association between significance of dissection to anatomy and relevance of dissection to clinical practice.

H_oc: - There is no statistically significant association between significance of dissection to housemanship and relevance of dissection to clinical Examination and documentation.

H_ic: - There is statistically significant association between significance of dissection to housemanship and relevance of dissection to clinical examination and documentation.

H_od: - There is no statistically significant association between relevance of dissection to housemanship and dissection improved clinical skills.

H_id: - There is statistically significant association between relevance of dissection to housemanship and dissection improved clinical skills.

H_oe: - There is no statistically significant association between relevance of dissection to housemanship and dissection improved basic clinical procedures.

H_ie: - There is statistically significant association between relevance of dissection to housemanship and dissection improved basic clinical procedures.

1.4 JUSTIFICATION

Gross anatomy is the cornerstone of medical education. Anatomical knowledge is undoubtedly essential for doctors regardless of their specialty, particularly since they continue to perform physical examinations, make medical decisions, communicate with colleagues, and provide explanations to patients. Furthermore, expert knowledge of anatomy is essential in the present day, particularly for surgeons, because of the development of various surgical techniques and emergence of more sophisticated imaging technologies. A lot of studies have been carried out on student's perception on the use of cadaver for medical education. Other studies have been done on the attitude of students towards cadaver dissection, with a lot of discussion weather to replace cadaver dissection with other alternatives. All these studies captured mostly second year and third year medical students with few cohort studies done on residents. There is the need for a study to capture early graduating doctors in the first year of their practice. This is due to the fact that they are fresh, they have gone through posting to various departments during their clinical years. The house officers are doctors in their first year of practice under supervision. They will give a good representation of medical professionals who will undergo a rotation in four departments. A lot of studies have been carried out on students especially the third and fourth year medical students worldwide, studying perceptions and attitudes towards the use of Cadaver for teaching anatomy. There has been insufficient data that has captured the House officers' perception.

1.5 AIM AND OBJECTIVES

1.5.1 General Aim

To study the perception of house officers on the use of cadaver for medical education.

1.5.2 Specific objectives

1. To determine the opinion of the fact that cadaver dissection imparted anatomical knowledge.
2. To determine the opinion whether the use of cadaver during medical training has added any value to their practice.
3. To determine opinion whether the use of cadaver as compared to other methods of teaching Anatomy is the best.
4. To determine whether dissection enhances the skills and attitude as a future clinician.

CHAPTER TWO

LITERATURE REVIEW

2.1METHODS OF TEACHING GROSS ANATOMY

Anatomy has always been a cornerstone in medical education (Sugand, 2010). It is an undisputed fact that the comprehensive knowledge of anatomy plays a vital role in proper understanding of any other branch of Medicine. It plays an important role in the process of training medical professionals and thereby ensuring safe medical practices. Lecture is defined as an oral discourse on a given subject before an audience for purpose of instruction and leaning (Kizlik, 2012).

Recent technologies like 3-dimensional audio visuals, digital radiological imaging, and web-based study materials etc. have been introduced to make anatomy more interesting and easier among the students and the people who teach them these things. Supporters claim that power point improves learning, invokes audience interest and aids explanations of complex illustrations. Detractors charge that power point inhibits presenter–audience interaction. Teachers can now present the subject to their students with more 3-D images, sequence of images and videos and thus improve the educational value. In the regular course of teaching, teachers use traditional chalk and board as the main tool of teaching apart from the dissection. Plastinates are able to convey far more than man-made, three-dimensional models, simply because they have

come into being via the natural, individual growth of human bodies. Models on the other hand have at some point had to be consciously designed. Ultrasound (USS) or ultrasonic imaging is now a mature technology having a well-established place in clinical practice and accounting for about one in four of all imaging procedures worldwide (Susskind,2005). Dissection has become synonymous with traditional courses and has come to be regarded as the antithesis of problem-based learning. Availability of other resources, overhead projectors, specimens, models and power point presentations were also used (Older, 2004)

2.1.1 Traditional Method

The traditional and the most frequent method used for teaching anatomy is the chalk and board method (Veronica and Mauro, 2013). While taking lecture, the important keywords and sentences are noted down on the blackboard and necessary diagrams are also drawn using chalk on the blackboard. This traditional method of teaching is only followed during the lecture (Lowry, 1999). Nowadays, power point presentation is also categorized under the traditional method. These power point presentations attract the listeners than the chalk and board method and make them more active in listening. The diagrams in the PowerPoint can be clearly seen than the chalk method. Colour of the PowerPoint is more important because it only make to listen attentively (Szabo and Hastings, 2000).

2.1.2 Dissection Method.

Dissection method provides more clearance about the organs to the students and this helps them while doing surgeries and they are able to remember the points very easily and the corresponding nerve and blood supply can be remembered only by the dissection method (Aversi-ferriera*et al.*, 2008). Dissection allows the development of

a three dimensional mind map of the different anatomical regions of the body. Full body dissection gives a comprehensive whole of body view of anatomical regions. Supervising surgeons and demonstrators were invaluable for teaching. This is also followed in all colleges as one of the teaching method for anatomy (Rizzolo, 2002).

2.1.3 Ultrasound Imaging Method (US):

More recently, Ultrasound has become the latest non-invasive method of morphological study to aid or supplement the teaching of gross human anatomy in some medical school curricula (Rao *et al*, 2008). Ultrasound anatomy is based on its ability to reflect an image of the structures under view which, like any other skill, requires both practice and content-specific knowledge. As the ultrasound waves penetrate body tissues of different acoustic impedances along the path of transmission, some are reflected back to the transducer (echo signals) while others penetrate deeper. Thus, an ultrasound transducer works both as a speaker (generating sound waves) and a microphone (receiving sound waves)(Ethnildo and Joanna, 2005)

2.1.4 Teaching of Anatomy

Traditionally, learning anatomy has been dissection-based. Dissection has become synonymous with traditional courses and has come to be regarded as the antithesis of problem-based learning (PBL). However, dissection would appear to be ideally suited to self-directed learning. Students explore a subject for themselves at their own pace, in a practical way and according to their own personal interests (Snelling *et al*, 2003). The technology has been proved to be a boon for anatomists because transmission of visual information has a remarkable role in education of gross anatomy. Similarly,

dissection can provide an opportunity for self-directed learning (Warner andRizzalo, 2006).

2.2 ROLE OF CADAVER IN TEACHING GROSS ANATOMY

Anatomy as a subject has been overly didactic, traditional and archaic. It has failed to evolve and adapt with changing times, so it is an obvious target for novel curricula changes. Modern educationalists consider it to be dogmatic and full of superfluous, clinically irrelevant details. The cadaver dissection used to be revered as the very "essence of anatomy" (Bergman, 2008). With the vast advances in technology, information and imaging tools, the resources for teaching anatomy have made giant leaps in the education system. There are a large number of methods and instruments available, ranging from computers, to live body scans, virtual three dimensional images, plastic models, prosections and synthetic simulators which seem as good as a real human part. These modern teaching tools are durable, clean, odorless, aesthetical and hassle free in the sense that the students are not required to undergo training, unlike a traditional dissection session. These advances in technology have procured many supporters in the medical education community (Darda, 2010).

In the current educational scenario, the anatomists have polarized into two belief systems, the modernists who regard the cadaver dissection as obsolete and dispensable and the traditionalists who think that dissection is the keystone of anatomy education. This transformation in the perceptions of educationalists is an issue that needs to be analyzed in a greater light because it deals with the process of educating and training our future health professionals who will one day encounter living patients (Tabind*et al.* 2010).

Dissecting cadavers is a vital part of educating health professionals. Unlike a book or computer program, learning with cadavers exposes students to the three-dimensionality of the human body. The uniqueness students observe in each cadaver is representative of the diversity they will encounter in their patients. While the benefits of cadaver dissections are well known and well documented (Dempster*et al*., 2006).This experience may prove to be one that evokes emotional reflection (Robbins *et al.,* 2008). In 2005 Lempp conducted a survey with British medical students that assessed their views and feelings on cadaver dissection. He found that many of the students were apprehensive about their work with the cadavers. Some raised concerns about coming in contact with certain diseases, such as AIDS/HIV, and bacterial or other viral infections. However, the majority of the students felt that their work with cadavers was an essential part of medical school, which aided them in their learning experience (Lemp, 2005). Furthermore, the students felt that their training with the cadavers prepared them for their education in the years following medical school. Through cadaver dissection, students understand the relationships, textures, shapes, and structures of the organs (Natalie and Mary, 2011).

Dissection is globally considered an essential part of medical training. It is designed to give students a hand on view of the body while also accustoming them to the transformation processes that the body undergoes after death. With time, there was a growing acknowledgement of the fact that a good medical or surgical practice could only be based on adequate and very exact knowledge of human anatomy, which was derived from learning and teaching human dissection. The dissection training has remained an important part of curricula for decades uniformly across the medical

schools all over the world. Lately, however, this trend has been changing. With literal mushrooming of private medical colleges, supporting varied degree of medical facilities, debate regarding significance of cadavers in the teaching of gross anatomy has heated up. Numbers of medical schools around the world have either removed the practical, hands-on aspect of dissection in the medical undergraduate curriculum or are seriously considering such a measure, on financial and human resource grounds (Saima*et al*, 2011).

2.3 PERCEPTION OF STUDENTS ON THE USE OF CADAVER FOR MEDICAL EDUCATION

Traditionally, learning anatomy has been dissection-based. Dissection has become synonymous with traditional courses and has come to be regarded as the antithesis of problem-based learning. Dissection gives opportunity of students exploring a subject for themselves at their own pace, in a practical way and according to their own personal interests. Surgeons advocate experience with dissection not only to help to learn anatomical detail but to help students familiarize with the variation in anatomy and to obtain an appreciation of fully exposed structures that cannot be seen through the window of an operation but that might be damaged inadvertently. Perhaps most significantly, students have a high regard for dissection as a learning resource in the anatomy course and many other learning outcomes have been identified by students. Dissection gives room for appreciation of 3-dimentional anatomy unlike any other teaching facility. However, dissection as a learning modality has been marginalized from medical curricula to the despair of some academic (Turney, 2007).

The study conducted to determine the attitudes of first year preclinical students to cadaver dissection in human anatomy at Ambrose Ali University Ekpoma, Nigeria.Findings showed that 59% of the students found theirs first visit to the dissection room exciting, and 33% were upset at the beginning of the dissection while 64% were not. It was also observed that 57% did not show any anxiety and stress immediately before and during dissection, while 36% did (Izunya*et al*., 2010). It was seen that 54% were found to be mentally prepared for dissection and 76% agreed that dissection enhanced their thinking skills. Dissection provided the best method for learning anatomy according to 87% of the respondents and 78% agreed that cadaver dissection is ethically acceptable. Majority of the students 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 (Izunya*et al*., 2010). A study done in Sokoto, Nigeria revealed that only 7% of the respondents agree that they understand anatomy without dissection (Zagga*et al.,* 2010).

A study titled the perception to cadaver dissection and views on anatomy as a subject between two pioneer cohorts in a Kenyan school, revealed that most student (85.3%) found their first visit to the dissection interesting. They also considered dissection to be the best method of learning anatomy, and do not support the view that it should be replaced by any teaching method available. This include computer assisted learning and models.Most students indicated that they like anatomy, and considered it exciting, though very few are willing to take up careers as anatomists (Paul *et al.,* 2014).

Another study done on Perceptions of first year medical students to cadaver dissection at Stellenbosch University South Africa, the study revealed obvious fears of

dissecting the face, possible collapse or vomiting and feelings of sadness were observed before dissection. These are emotional changes at initial dissection which seemed to disappear with time. Many students felt that the cadaver since it was once a living human being should be respected. After one month it was observed that most students felt that they achieved this respect successfully. The most cited advantage of dissection in both questionnaires was three dimensional visualization of structures and organs. The most obvious disadvantage of dissection observed in this study was fixation which cause inaccurate anatomical appearance as well as smell of fixative (kotze*et al.,* 2010). A Pakistani based study on the perception of cadaveric dissection in teaching anatomy in five medical schools was done amongst their medical students. The study revealed that around 43% students have actually performed dissections in some form, whereas around 57% students had never been involved in dissection. Out of these 57% of the students, further analysis of the results revealed that 45% avoided dissection due to the bad odor of formaldehyde they perceive during the dissection session, 37% avoided dissection due to moral/ethical grounds. It was also found that 22% avoided dissection due to low motivation for the course and respect of human body, 19.4% avoided dissection due to anxiety they experience during the dissection course, some of the respondents (18.6%) were influenced by religious believe to avoid the dissection class, 16% avoided dissection due to emotional aspects and fear of asthmatic attacks, 9.4% said to avoid dissection due to fear of exposure to toxic chemicals while dissecting, while 8.6% due to laziness and 7% due to fear of nightmares (Saima*et al.,* 2011).

Another study surveyed students' perceptions of anatomy education with respect to time and hands-on cadaver dissection, at Seoul National University College of

Medicine. These are students who had completed the anatomy module as freshmen as well as their clinical clerkship. According to the survey responses, the students generally considered these durations given to anatomy to be adequate for achieving their educational goals. Amongst the various modalities of teaching anatomy, almost all the students regarded the dissection laboratory as an essential and most helpful modality of understanding anatomy (Min and Young-il, 2013). The perception of students regarding computer assisted teaching and learning of anatomy in a scenario where cadavers are lacking was also studied. This study revealed that almost all students agreed that it does not provide the real human touch as in cadaver dissections. However, the majority of students (52%) indicated their interest in the need for computer rooms to aid histology teaching to a large extent, even though 48% of the students regarded the use of the computer room as very beneficial in the study of anatomy. Most students (62%) still considered these teaching resources to be of great importance for studying anatomy when combined with dissection. The result also reveal that 40% students did indicate that they did not prefer it to cadaveric material. It is interesting to note that a considerable percentage of students showed a strong preference for computer assisted learning of the subject (20%). The vast majority of students were not of the idea that replacing cadavers by a computer room was an ideal method of teaching anatomy. Majority of students agreed that three dimensional relationship of the various structures can be studied through the use of cross sectional anatomy from CT and MRI scans. Majority of students also agreed that computer assisted learning provides the opportunity to use multiple resources i.e. books, atlas, cadavers material and plastic models etc. Even in the presence of cadavers, because students willing to have clear perception of concepts would try to access these. Quite a number of students (42%) considered that computer assisted

learning of anatomy is useful in learning the subject outside the class room, such as the review of anatomical material, dissection steps, video etc. The difference in the pattern of answers from the study regarding the replacement of cadavers with other current modalities like computers and models, with regards to the student's gender reveal that majority of female students prefers computer assisted learning and teaching of anatomy. The finding is reflecting gender difference in attitudes to the handling of cadavers during dissection (Fazal*et al.,* 2012).Various teaching modalities of anatomy were also surveyed with respect to student's perception on anatomy teaching methodologies.

An opinion regarding curriculum, teaching methodology and assessment techniques in anatomy was taken from the First MBBS students at Medical college Baroda, Gujarat India. The study revealed that most students considered the teaching on dissection table as best method of understanding and teaching anatomy. The conventional lecture method of teaching was not preferred by most of the students. Amongst the students 56.12% feel that the time allocated to teaching in the dissection hall is more than enough, though most of the students (66.91%) do not follow dissection manuals in the dissection lab. It was also noted that 79.71% of the students believe that some series of lectures given before the dissection session are important guide to learning anatomy, with 54.68% of the students felt that the structures mentioned in lecture hall are not always found during dissection. The above study revealed the opinion of the student regarding the duration of curriculum seems to be divided with 38.41 % of students believing that previous scheme of one and half year was better, another 21.41% of students believing that the present duration of one year is not enough and 37.68% are in favor of present one year curriculum. Regarding the material in the

audio-visual room, 53.03% of the respondents agreed that it is accessible to the students, with 48.46% of students considering it to be of average, while 28.46% of the students consider it to be of good quality. Majority (79.86%) of the students are of the opinion of short revision of a region. Majority of students (70.80%) think that the integrated teaching programs are useful to them and welcome such attempts. In this study 46.72% students are aware of internet as a tool to learning and accessed it as an effective source of self-directed learning. A study titled Teaching anatomy cadaver versus multimedia, the better tool, It was revealed that 80% of the undergraduate students found that teaching by cadaver dissection was more beneficial to them as compared to teaching through multimedia slides (Nagar *et al* ., 2012). The students participating were of the opinion that despite advantages of multimedia and computer aided teaching, these tools only complement cadaver teaching and cannot replace it in shaping the knowledge of physicians and surgeons. Even though computerized improvements have developed a new area giving students a lot of elements to facilitate their approach to imaging structures, the possibility of direct contact with tissues and anatomical elements cannot yet be replaced when dissecting (Snellin*et al.,* 2003).

In another survey titled:is dissection a must for better knowledge among future doctors?Second year medical students whom were enrolled in a traditional curriculum based human anatomy course of SGM Medical College of India were surveyed. The investigators provided various teaching methods, with students choice of the following dissection, computer assisted learning, prosections (readily available pre-dissected parts), plastinated specimens (body parts impregnated with synthetic polymers to increase durability), radiologic anatomy, didactic lectures and books

(Tabinda*et al*., 2011). Their responses defined by the perceptions was surveyed. Most students preferred dissection (34.84%) than other methods which included Computer Assisted Learning (15.83%), Prosections (14.93%), and Didactic lectures (10.85%), Books (10.85%), Plastinated specimens (7.23%), Radiological anatomy (5.42 %) (Tabinda*et al.,* 2011). In a study titled Teaching Anatomy,Cadavers versus computers, done at the national university of Cordoba, Argentina which was aimed to show if cadaver dissections are still important in the anatomy course for medical students or whether computerized modalities could replace them. This study surveyed three groups which were followed, one of them proceeded through the Anatomy Course in a traditional way, meaning that the cadaver was used to observe all the regions and structures of the body to teach gross anatomy, the second group used many technological resources but not cadaver dissections, and the third group followed the course, recently with the same program but with both practical resources. Theoretical contents were developed in the same way and by the same tutor (Biasutto et al., 2006). After evaluation of the examination in the three groups the traditional teaching group obtained better results than the technologically supported group, due to the number of students that passed their exams. The third group results were better than the others, with regard to passed exams and marks. Even when computerized improvements have developed a new area giving students a lot of elements to facilitate their approach to imaging structures, the possibility of direct contact with tissues and anatomical elements cannot yet be replaced (Tabind*et al.,* 2011).

A study done in British medical school which showed apart from learning to cope with the overt emotional confrontation with the cadavers which assists anatomical learning, seven additional covert learning outcomes were identified by the

respondents of this study. These includes, respect for the body, familiarization of the body, application of practical skills, integration of theory and practice, preparation for clinical work, and appreciation of the status of dissection within the history of medicine (Lempp, 2005). A study done in Melbourne, Australia amongst first year and second year medical students at the university, revealed that first year students perceived dissection to be important for deep understanding of anatomy compared to second year ($P < 0.001$), making learning interesting ($P < 0.001$) and introducing them to emergency procedures ($P < 0.001$). Further, they preferred dissection over any other approach ($P < 0.001$). First-year students ranked dissection (44%), textbooks (23%), computer-aided learning (CAL), multimedia (10%), self-directed learning (6%) and lectures (5%) as the most valuable resources for learning anatomy(Azer andEizenberg, 2007). Second year students found textbooks (38%), dissection (18%), pre- dissected specimens (11%), self-directed learning (9%), lectures (7%) and CAL programs (7%) as most useful. Neither of the groups showed a significant preference for pre-dissected specimens, CAL multimedia or lectures over dissection. Both first and second year students, regardless of their gender, academic background, or citizenship felt that the time devoted to dissection classes were not adequate. Students agreed that dissection deepened their understanding of anatomical structures, provided them with a three dimensional perspective of structures and helped them recall what they learnt. Although their perception about the importance of dissection changed as they progressed in the course, good anatomy textbooks were perceived as an excellent resource for learning anatomy. Interestingly, innovations used in teaching anatomy, such as interactive multimedia resources, have not replaced students' perceptions about the importance of dissection (Azer andEizenberg, 2007).

A similar study was done to ascertain the attitudes of anatomists in Europe towards the methods of teaching best fitting a series of learning outcomes for anatomy. Most anatomists (69%) favored the use of dissection above other teaching methods when considering the whole series of learning comes, this method seeming to achieve a range of different course aims and objective. The use of human cadaveric dissection gained more approval when the skills-base was considered rather than just the content, i.e. knowledge base of an anatomical course (Susana *et al.,* 2006). According to a study, 82% of Anatomists in Iran use lecture for teaching and only 3% of them use interactive media. Even though it was found out in the study that 83.5% of them believed dissection is the best method for teaching Anatomy. This finding confirms the idea "although we are living in 21st century, our classes are like the 19th century class. Nevertheless, from modern medical point of view, dissection is necessary but not enough and should be accompanied by other methods such as anatomical models, educational videos, interactive media and plastination, this idea is also confirmed by some studies in other countries (Gholamreza*et al.,* 2012).

The Attitudes of medical and dental students to dissection was studied in Guy's, King's, and St. Thomas's School of Medicine United Kingdom. There were also significant differences between medical and dental students, males and females, and students of differing ethnic backgrounds, which persisted over 12 weeks. Both medical and dental students found tutorials and textbooks of most value in learning anatomy. Dental students found prosection more useful than medical students though neither group demonstrated a significant preference for prosection over dissection. Of concern, 7% reported recurring images of cadavers and 2% insomnia after commencing dissection. Interest in the subject matter and discussion were the

commonest methods used to combat stress. This study contributes to the ongoing debate about the value of the dissecting room in the medical school curriculum (Patel andBajem, 2008). The medical student is under considerable stress as he is facing a professional course that needs total dedication and total attention. At the commencement of the programme, students go through the anatomy curriculum, which involves interaction with cadavers and cadaveric material. A study titled medical students react to cadaveric dissection. The reactions of students on their first exposure to the human cadaver was studied. Viewpoints regarding the need for pre-education sessions were also elicited. The positive feelings included a curiosity and interest to learn about the structure of human body. Few experienced fear, some were put off by the formalin fumes and few expressed eagerness to dissect the cadaver. Students also felt a sense of gratefulness to the people who donated their bodies for dissection. It was reported by some that negative feelings influenced their routine activities. Students felt the need to seek help from faculty in overcoming their anxiety. They felt that a pre-education session should be conducted before the formal dissection teaching begins which could instill a sense of respect into the minds of the students and eliminate the feeling of anxiety. A better teacher student interaction will go a long way in improving the attitude of students towards cadaveric dissection. This will offer a state of mental status for the fresh medical students to handle higher levels of stress in their clinical careers, thereby reducing the dropout rates. Only 20% students mentioned that they would prefer computer assisted learning over cadaveric dissection (Ambica, 2012).

In another study titled reactions of first year Indian medical students to dissection hall experience majority of respondents (83.66%) agreed that actual hands on training on

cadaver dissection gave better results than demonstration of prosected specimen and also enhanced learning and confidence in the subject matter (Gaurav andMandep, 2010). A study done in the United States showed that 79% of the respondents have acquired skills and performed skills more quickly after training and 72% of the respondents showed improved performance after training with the use of cadaver (Levine *et al.,* 2006).

Changes in the teaching of gross anatomy have often involved decreasing student contact time with cadaver alongside the use of new methods for teaching anatomy. However, still remains controversy, over teaching methods and about whether cadaveric dissection by students should remain the preferred method. Furthermore, decisions concerning changes in curricula are more likely to be taken by choosing a method of teaching rather than by proper evaluation of what are the desired learning outcomes for a course in anatomy. A cross-sectional multicenter study, was conducted in Karachi at various hospitals and medical colleges. The findings were for the first visit to dissection hall, 71.8% were exited and 26.6% were not excited 1.6% did not remember their experience of attending cadaver dissection, it was depressing for 38.7%, not depressing for 54.8% and 6.5% didn't remember, 46.8% lost their appetite, 46.8% had normal appetite and 6.5% don't remembered, the depression and loss of appetite got eliminated with further interactions of cadavers. About 25% experienced fainting by themselves or either by their class mates at the first site of cadaver, 67.7% did not felt fainting and 7.3% don't remember (Asma*et al.,* 2013). The basic purpose of dissection is to learn the gross structures for functional correlation (Rath and Garg, 2006)

Therefore cadaver dissection forms one of the most important components of anatomy, as it helps the students to remember and recollect what they have seen. In a study done in India majority of participants 91.2% believed that learning anatomy by dissection is essential to become a doctor, also the best method of learning human body is by doing dissection. It gives better understanding of the region and helps to recollect a large amount of information. On the other hand, a small group of participants, 6.8% felt that dissection is not essential to become a doctor. They believed that it helps only those opting to become a surgeon. On the importance of dissection in medical education 1.9% did not responded to the question (Amar*et al.,* 2014)

It is undisputed that anatomy still has a role in the process of training doctors and supporting modern medical practice. All medical schools, new and old, still maintain anatomy as a core subject in their curricula. Over the last 20–30 years, all anatomy curricula have been reduced to lessen the factual burden on students and make time for teaching other skills. This reduction will have an effect on the training of future surgeons (and some other specialists) but perhaps it is the specialists, or anatomists, responsibility to provide the necessary training at a later, more appropriate, time in training. Unfortunately, the evidence suggests that the curricula and teaching have diminished too much, to an extent where safety and clinical practice might be compromised. If this is the case, it can be attributed to reduction in resources and the resultant effects on teaching methodology in the modern medical curriculum. Anatomy has traditionally been delivered at the beginning of medical education to provide a basis for clinical training and practice. A dogmatic support amongst traditionalists for detailed anatomy courses may have been detrimental to the evolution of anatomy as a subject. Reformers regard these teaching methods to be

'old-fashioned' and incompatible with modern learning practices possibly without appreciating the many benefits of the traditional approaches. For further progress to be made, the traditionalists have to concede that learning large quantities of detailed anatomy is unnecessary for the majority of medical careers, even though a core of knowledge must be covered and assimilated by all students. Some progress has been made in defining core knowledge. If a core of knowledge is agreed, then its assimilation must be assessed not only in the first year of medical school but with ongoing assessments throughout clinical school curricula and beyond. Acceptance of the concept of core knowledge also requires recognition that this will be inadequate for specialist training. Students entering medical careers which require a more detailed knowledge of anatomy will need access to specialized anatomy training at later stages in their careers (Turney, 2007).

A sustainable solution is for anatomy departments is to forge educational and financial links with hospital departments and some medical schools are beginning exploring this option. This would allow vertical integration of anatomy into the medical school curriculum from the first year of medical school, through clinical school and into specialist training, reinforcing the core anatomy by appreciation of its clinical relevance. Involvement of clinical specialists would give them the opportunity to shape the anatomy syllabus according to good clinical practice and advancing techniques, maintain their own knowledge, and help to address the staff shortages in anatomy teaching. The criticisms of senior specialists about their juniors' lack of anatomical knowledge would be addressed directly and it should produce safer, more competent practitioners, less likely to make mistakes and incur litigation in the future (Turney, 2007).

2.4 PERCEPTION OF RESIDENT DOCTORS ON THE USE OF CADAVER FOR MEDICAL EDUCATION

The trend of dissection training is at the verge of extinction all around the world (Omar, 2009). With literal mushrooming of private medical colleges, supporting varied degree of medical facilities. In the past, anatomical skills and knowledge were gained through didactic lectures and complete dissection of the body via personal tuition. This approach has been modernized by the addition of special study modules, problem-based workshops, computers, plastic models and other teaching tools. Evidence suggests that, in some centers, dissected cadaver-based anatomy is no longer a priority. The present trend is likely to undermine the vital role of cadaver dissection in anatomy. (Omar, 2009).

The human anatomist is actually a geographer of the human body. 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. 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 (Guttmann *et al.,* 2004).

Benefits of meticulous dissection fall into three domains;

• Knowledge acquisition and integration

• Skills

• Attitudes

• The cadaver was considered as the “First patient”.

It is believed that cadaver dissection plays an important role in developing professional endeavors, and the hand on experience of dissection helps in developing surgical skills of clinicians as well as the development of professionalism and professional attitudes for medicine. (Asma*et al.,* 2014)

Anatomical sciences appear to be taking a diminishing role in undergraduate medical education. Some believe that although the academic community has become desensitized to the concerned voices of senior anatomists and surgeons arguing for the preservation of anatomy education, perhaps concerns raised by medical students those with first-hand experience of the current system may be harder to ignore (Gogalniceanu*et al.,* 2010). Surveys from the last decade on medical student opinion of their anatomy education indicate that the majority of medical students and professors feel further cuts in gross anatomy and cadaver dissection should be avoided (Patel andMoxham, 2008). These studies show that both students and faculty believe cadaver dissection is the centerpiece of gross anatomy study and that the anatomy they are learning is clinically relevant. Also, students feel that the quantity of material they are expected to learn is appropriate, with some believing the material is excessive and others believing it is insufficient. Of course, it is difficult to know whether student opinion is an accurate predictor of how well a student will be prepared for clinical practice, the main concern being that students do not yet know what the demands of clinical practice are.

In a study done in University of Michigan Medical School (UMMS) who are currently in their postgraduate training. Respondents felt their anatomy education prepared them well for residency, that a more robust anatomy curriculum would be helpful. The study revealed that dissection was important to their residency preparation. A 4th year anatomy elective was effective in expanding their anatomy education and preparing them for residency. The surgical specialty group felt dissection was more important to their residency preparation than the non-surgical group and that a more robust anatomy curriculum would have better prepared them for residency. Thirty percent of surgical specialty respondents who did not take a 4th year elective commented that they wish they had (Michael and Thomas, 2011).

In a study on importance of cadaveric dissection in learning gross anatomy done in Karachi, Graduate and postgraduate doctors from basic and clinical sciences perception on the use of cadaver were surveyed. The dissection sessions were avoided by 25%, and 71.8% attended all sessions while 3.2% had mix sessions sometimes attending and sometimes missing them. There were multiple reasons for not attending the sessions. These included, 31.5% had palpitations, 61.3% did not have palpitation and 6.5% did not remember. About 18.5% had allergy to formaldehyde, 75.8% did not have allergy to formaldehyde and 12.1% were scared of the dead body, 83.9% had no scare from the cadaver and 4% were not sure whether they were scared or not. The Cadaver dissection helped, in understanding of regional anatomy in 71.8% of doctors, in 25.8% Cadaver dissection did not help in clearing the concepts of gross anatomy and 2.4% were not sure of it. For 58.1% cadaver dissection was helpful in learning and understanding the minor details of gross anatomy regarding small structures and their relationship to each other. In 33.1%, it did not add any value in clearing detailed

concepts of gross anatomy and 8.9% do not remember the experience of learning, beside learning and understanding the gross anatomy, 54.8% developed interest in anatomy, because of cadaver dissection, in 41.9% cadaver dissection played no role in building their interest in anatomy and 8.9% don't remember it (Asma*et al.,* 2014).

The doctors who participated in the study are in practice at present either in basic sciences or in the clinical sciences, so their view point in developing their professional skills and endeavors was important in relation to Cadaver dissection. Hands-on experience helped in developing professional endeavors in 49.2%, in 40.3% cadaver dissection did not played any role in developing professional skills and 10.5% did not remember. About 29% doctors were inspired by cadaver dissection to the extent of becoming surgeons in their professional life, 63.7% have no such inspiration and 7.3% don't remember the experience (Asma*et al.,* 2014).

In light of the many changes that have been made in medical gross anatomy instruction, an attempt was made to determine the adequacy of medical student preparation in gross anatomy upon arrival at a postgraduate residency program and whether the adequacy of preparation had changed in the last 10 years. To address these questions, a survey was mailed to all of the programs in four postgraduate residencies in the United States. This survey requested information about the importance of gross anatomy to the discipline, the adequacy of resident preparation, how today's residents compare to those of 10 years ago, and in what areas they are deficient. Another survey was mailed to all medical school anatomy departments to follow changes in curriculum, teaching methods, curriculum hours, and staffing in gross anatomy. A majority of the residency programs report that gross anatomy is either extremely important or very important to mastery of their discipline and rank it

as the most important basic science. Overall, 57% of the residency program directors felt that residents need a refresher in gross anatomy upon arrival, 29% felt that they were adequately prepared, whereas 14% felt they were seriously lacking. Fifty-six percent of the residency programs indicated that the residents are as prepared as those of 10 years ago, 41% indicated that they are less prepared, and only 4% said that they were better prepared. There were significant differences in the responses between the different residency programs. The residency programs indicated that residents need to arrive more proficient in clinical applications, general knowledge, and cross-sectional applications. Anatomy departments continue to modify their curriculum and teaching methods, decrease the curriculum hours and faculty devoted to gross anatomy, and foresee problems obtaining qualified gross anatomy teachers in the future (Cottam, 1999).

A study done on residents undergoing laparoscopic training did not have sufficient power to demonstrate that a single laparoscopic cadaveric dissection improves cognitive measures of anatomic perception, but suggested that it improves spatial perception of anatomy and is perceived by residents to be a valuable educational approach (Cundiff*et al.,* 2001).

In a study done in India on the impact of dissection on undergraduate and postgraduate Medical colleges, it was noticed that 70% of the postgraduate students agreed that dissection was of help to them. In the study 75% agreed that models and specimen cannot be an alternative to the dissection. However, 30% said that text books, models and specimens can be used as tool for teaching. It was observed that 85% undergraduate students found dissection helpful in understanding anatomy. The

study also showed that 20% thought that books and models can be replacement for dissection, while 20% thought that books and models can be a replacement for dissection. The results also showed that 85% undergraduate students found dissection helpful in understanding anatomy. The students who are regular in dissection they can memorize the structure and their relationship with the neighboring viscera than those who are not doing the same regularly. Past studies have emphasized dissection as an important tool for learning anatomy. Many authors have emphasized the importance of dissection for undergraduates and have shown it as a major tool for enhancing their memory regarding the body parts and their relationship (Rath and Garg, 2006). The introduction of a problem-based learning system (PBL) has resulted in reduction in the number of lectures and limited the use of dissection in teaching anatomy. In the new curriculum, students learn the anatomy by using models and dissected specimen. But the same students are not learning the anatomy as effectively as the students who are doing dissection regularly as evident from the present study (Veronica and Mauro, 2013). Some authors have discussed the effect of the availability of step-by-step dissection videos on student practical examination scores and have reported that video resource availability did not enhance student performance in anatomy and radiology. It has stressed that learning anatomy is most efficient and highest retention is observed when learning is combined with the dissection experience. Anatomy is taught by using textbooks, plastic models, and multimedia illustrations, but human cadavers are the primary tool for human anatomy education. Dissection would enhance students' understanding of anatomy. This concept again is proved by the present study where it has been seen that students understand better anatomy by dissection methods only (Sarma and Islam, 2015).

Anatomy is essential for all branches of medicine. As the methods of education are undergoing a metamorphosis, anatomy curriculum seems to have changed. Thus, anatomical errors in general surgery with accidental damage to associated structures have found to be increased. The shift from "cadaver oriented anatomy" to a "clinically trimmed, computer oriented anatomy" may not be good in acquiring and nourishment of core knowledge. Many educationalists hold the view that lessons learnt from the actual feel of human flesh are incomparable. Computers, though advanced, will remain an artificial synthetic medium. It can never equate with the complex and miraculous reality of a human body. A cadaver dissection laboratory allows aspiring future physicians the first visual and tactile experience of "human body and life". Dissection prepares the medical students to face the picture of death confidently which is important in treating life. The cadaver provides an appreciation of human life through an understanding of death and dying. Dissection helps a student to paint the whole picture in his mind. A model is like the picture in a book. It is suggested that dissection should be done in under graduate years so that a 3 dimensional model of human body is printed on their mind. Students agreed that dissection enhanced their understanding of anatomical structures, provided them with a 3 dimensional perspective of structures and helped them recall what they had learnt. Thus it is clear that dissection performed at undergraduate level is of help not only at that level but in future it helps them at postgraduate level to understand anatomy. Dissection allows specialists in safe practice and also helps in progress of clinical developments (Sarma and Islam, 2015).

2.5 PERCEPTION OF HOUSEOFFICER TOWARDS THE USE OF CADAVER FOR MEDICAL EDUCATION

The perception of clinical significance of cadaveric dissection was studied amongst final year medical students and interns of College of Medicine and of King Khalid University Hospital, King Saud University. About 80% of their final year students and 82% of interns found that sufficient time was spent for the dissection of different regions in anatomy, and a considerable number of students would have liked even more details. The vast majority expressed a wish to repeat topographical anatomy during their clinical teaching. In this study 84.3% of final year students and 87.6% of interns showed interest in a series of short specialized dissection courses during the clinical posting. A total of 74.6% of the respondents agreed that the study of gross anatomy was essential for the understanding of other clinical courses. However, 51.5% of the students indicated that the teaching of anatomy and the knowledge acquired were irrelevant to clinical practice. Furthermore, 60.4% of the students said that the study of gross anatomy did not develop their ability to perform common clinical procedures, such as lumbar puncture, catheterization, intravenous lines, etc. Fifty-two percent of the students agreed that lectures and presentations in anatomy were helpful in the acquisition of knowledge, whereas 53% agreed that dissection sessions improved their understanding of the subject and developed their practical skills (Mohammad, 2012).

Michael and Thomas, (2011) found out that the respondents felt that use of cadaver for medical education prepared them very well for internship. It was also reported as a whole that the robustness of their anatomy course was appropriate, with only a slight bias toward feeling that a more robust anatomy course would have better prepared. The manual skills learnt in the dissecting room are essential in almost every branch of the medical profession in this study (62%) agreed that dissection sessions should be

included in the clinical curriculum while (14%) disagreed. Also 54% of the respondents in this study agreed that a more robust dissection course in anatomy in medical school would have better prepared them for internship. The usefulness of cadaver dissection to anatomy education has long been debated. While some authors argue that the dissection laboratory is indispensable for anatomy education, others note possible disadvantages of dissection compared to other tools such as models, computer assisted techniques etc. Some observers argue in favor of complete cadaver-less anatomy education. In this study 72 (35%) agreed that gross anatomy can be taught without cadaver while 98 (48%) disagreed. Decisions concerning changes to curricula are more likely to be taken by choosing a method of teaching rather than by proper evaluation of what are the desired learning outcomes for a course in anatomy.

CHAPTER THREE

MATERIALS AND METHODS

3.1 STUDY AREA

The study was conducted in the three institutions were training of house officers is done in Kano state these include;

1. Aminu Kano Teaching Hospital.
2. Murtala Muhammad Specialist Hospital.
3. Muhammad AbdullahiWase Specialist Hospital.

Kano state is located on latitude $12^{o}02^{1}$N, longitude $08^{o}30^{1}$E in the north-western region of Nigeria (Ki – Zerbo, 1998). Kano is the most populous state in Nigeria with a state population of over 9 million, a metropolis of 137 km^2 area and consisting of 6 local government areas with a population of over 2 million (NPC, 2006). Kano state is considered the commercial and political capital of northern Nigeria (Encyclopedia, 2009). The principal inhabitants of Kano are of Hausa/Fulani ethnic origin with minority representing virtually all tribes in Nigeria and a minute fraction of non-citizens (Danasabe, 2000).

3.2 STUDY SITE

The research was conducted at Aminukano teaching hospital (AKTH), Murtala Muhammad Specialist Hospital (MMSH) and Muhammad AbdullahiWase specialist hospital (MAWSH). Aminu Kano Teaching Hospital was established in August 1988 as the teaching hospital for Bayero University Kano Medical School. The hospital is situated in Tarauni Local Government Area of Kano state. It was established to serve as a fully functional 500 bed Teaching Hospital with state of the art facilities for provision of service, teaching and research to cater for the needs of the local and wider community. Training covers medical students, Resident Doctors, House officers, intern medical laboratory scientist, pharmacists, physiotherapist, imaging scientists, optometrists and Dentists. The hospital also trains community health officers as well as health information management officers.

The hospital currently has sixteen (16) clinical department offering services, conducting training and research, and more than 10 support services departments including a diagnostic Centre. The hospital has staff strength of about two thousand one hundred and twenty (2120) professional and non-professional staff. The hospital

provides various services to the community in the field of health and social services through its clinical and services departments. The hospital is equipped with some of the latest and best medical equipment available in Nigeria today (Human resource, 2015).

Murtala Muhammad specialist hospital is situated in Kano municipal Local Government Area of Kano state and Muhammad AbdullahiWase specialist hospital is situated in Nassarawa Local Government Area of Kano state. They are staffed and equipped by the state government under the hospitals management board. Both hospitals are secondary health care centers with some degree of specialization involved in health care delivery, training as well as a referral center for primary health care facilities in Kano state (Planning Office, 2015).

3.3 STUDY POPULATION

The study comprised of house officers working in Kano state, which comprised of two hundred and sixteen houseofficers in Kano state, one hundred and forty-four were males and fifty-eight were females**.**

3.4 SELECTION CRITERIA

3.4.1 Inclusion criteria.

1. The population of study involved House officers practicing in Kano state.
2. Senior house officers (house officers undergoing extension of their housemanship training)

3.4.2 Exclusion criteria

Medical officers, residents and consultants working in these hospitals.

3.5 SAMPLE SIZE DETERMINATION

The sample size was calculated using the Fisher formula for estimating minimum sample size for descriptive studies i.e.

$n=Z^2Pq/d^2$ (Oyejide, 1991)

Where,

n= minimum sample size

Z= standard normal deviate corresponding to 95% confidence interval on the normal distribution curve i.e. 1.96

P= prevalence from previous similar study which is 29.6% (from a study on the perception to cadaver dissection and views on anatomy as a subject between two pioneer cohorts in a Kenyan medical school), therefore P=0.296proportion in the target population 85.3% (P=0.835)

q= complementary probability

q =1-p

=1- 0.853

=0.147

d= degree of precision of 5% i.e. 0.05

Thus by substituting these above values into the formula for n above:

$$n = Z^2pq/d^2$$

$$N = \frac{(1.96)^2 \times 0.835 \times 0.147}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.835 \times 0.147}{}$$

$$\frac{}{0.0025}$$

$$n = \frac{0.47153}{0.0025}$$

$$n = 188.6$$

Based on the above, the minimum sample size was 189. However this was inflated to take care of refusal or non-response and increase the precision.

3.6 SAMPLING TECHNIQUE

The research was a cross sectional descriptive study. Which involved the total population of house officers in Kano. There were a total of 216 house officer in Kano state at the time of the study, distributed as follows

Aminu Kano Teaching Hospital = 20

Murtala Muhammad Specialist Hospital = 102

Muhammad AbdullahiWase Specialist Hospital= 94

3.7 ETHICAL CONSIDERATION

Ethical approval and clearance was obtained from the ethical committee of Aminu Kano teaching hospital and Kano state health management board through the management of Murtala Muhammad Specialist Hospital and Muhammad AbdullahiWase specialist hospital Kano. The aims and objectives of the study was explained to the participants and a written consent was obtained.

3.8 INSTRUMENTS

This was a questionnaire based study**.** The questionnaire was semi-structured, self-administered. The questionnaire consisted of 6 sections lettered A-D. Section A of the questionnaire assessed the socio demographic characteristics of the respondents. Section B assessed the respondent's perception of dissections input of anatomical knowledge, section C perception of dissection significance to clinical practice. Section D assessed perception of dissection as compared to other methods of teaching anatomy.

3.9 LIMITATIONS

- The number of house officers in the tertiary institution was small due to the industrial action by the national association of resident doctors during the period of the study.
- There are few female house officers due to the industrial action.
- The number of female doctors compared to male doctors cannot be regulated from the graduates of MBBS.

4.0 STATISTICAL METHODS

Data was analyzed using software Minitab (version 12.21) statistical software. Microsoft Word and Microsoft Excel (2007) was used for creating tables, charts, and graphs. Absolute numbers and simple percentages was used to describe categorical variables. Quantitative variables were described using measures of central tendency (mean, median) and measures of dispersion (standard deviation) as appropriate. The Chi-square test was used in assessing the significance of associations between categorical groups, and a *p*-value of 0.01 or less was considered statistically significant.

CHAPTER FOUR

RESULTS AND DISCUSSION

Two hundred and two questionnaires were retrieved out of the two hundred and sixteen administered, giving a response rate of 93.5%.

4.1 SOCIODEMOGRAPHIC CHARACTERISTICS

4.1.1 Age Distribution

The age of the respondents is between 24years and 37 years, with a mean age of 28years.

Table 4.1. Showing sex distribution of respondents

SN	Sex	Frequency	Percentage
1	Male	144	71%
2	Female	58	29%

The respondents comprised of one hundred and forty four males (71.29%) and fifty eight females (28.71%).

Table 4.2: Showing the religion of respondent

SN	Religion	Frequency	Percentage
1	Muslims	113	56
2	Christians	89	44

113 of the respondents are Muslims (55.94%) while 89 are Christians (44.06%).

4.1.2 Dissection and Knowledge of Anatomy

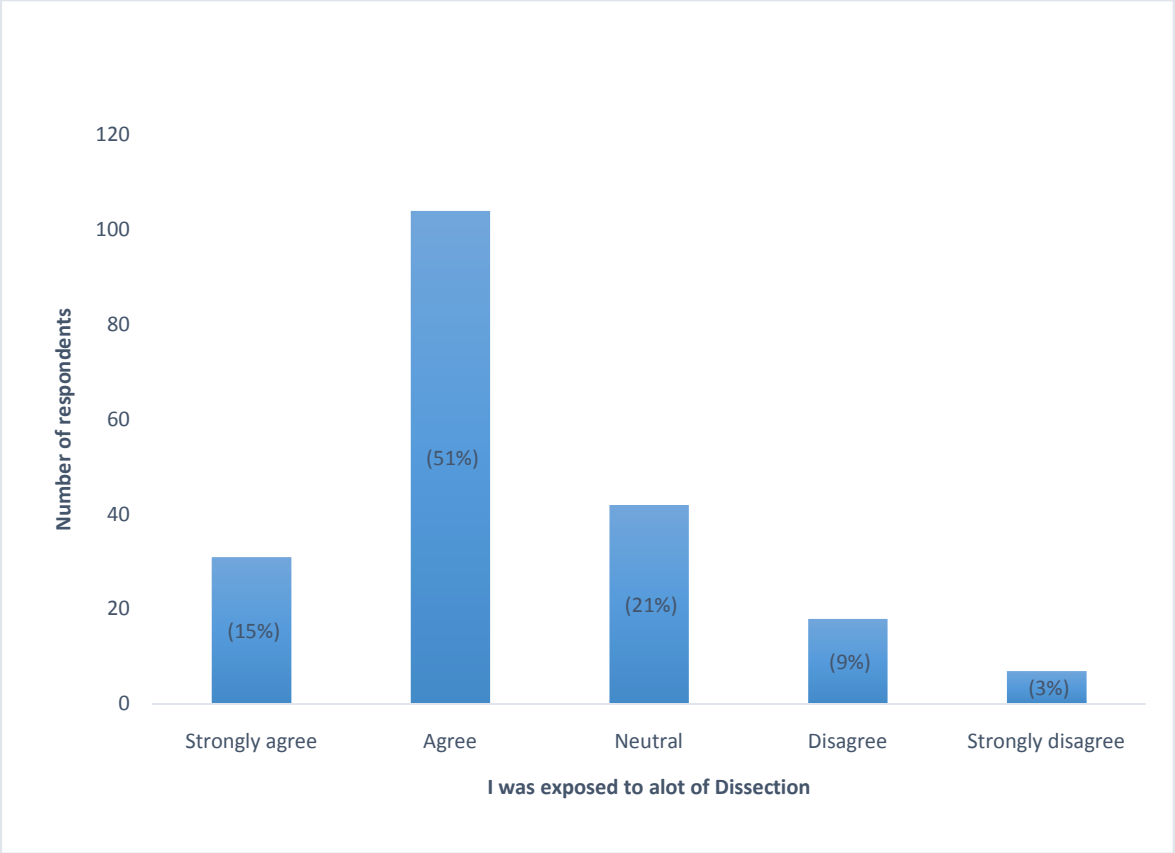

Figure 4.1: Perception on “Exposure to Dissection at Medical School"

135 (66%) of the respondents agreed that they have performed a lot of dissections while at medical school however 25 (12%) disagreed.

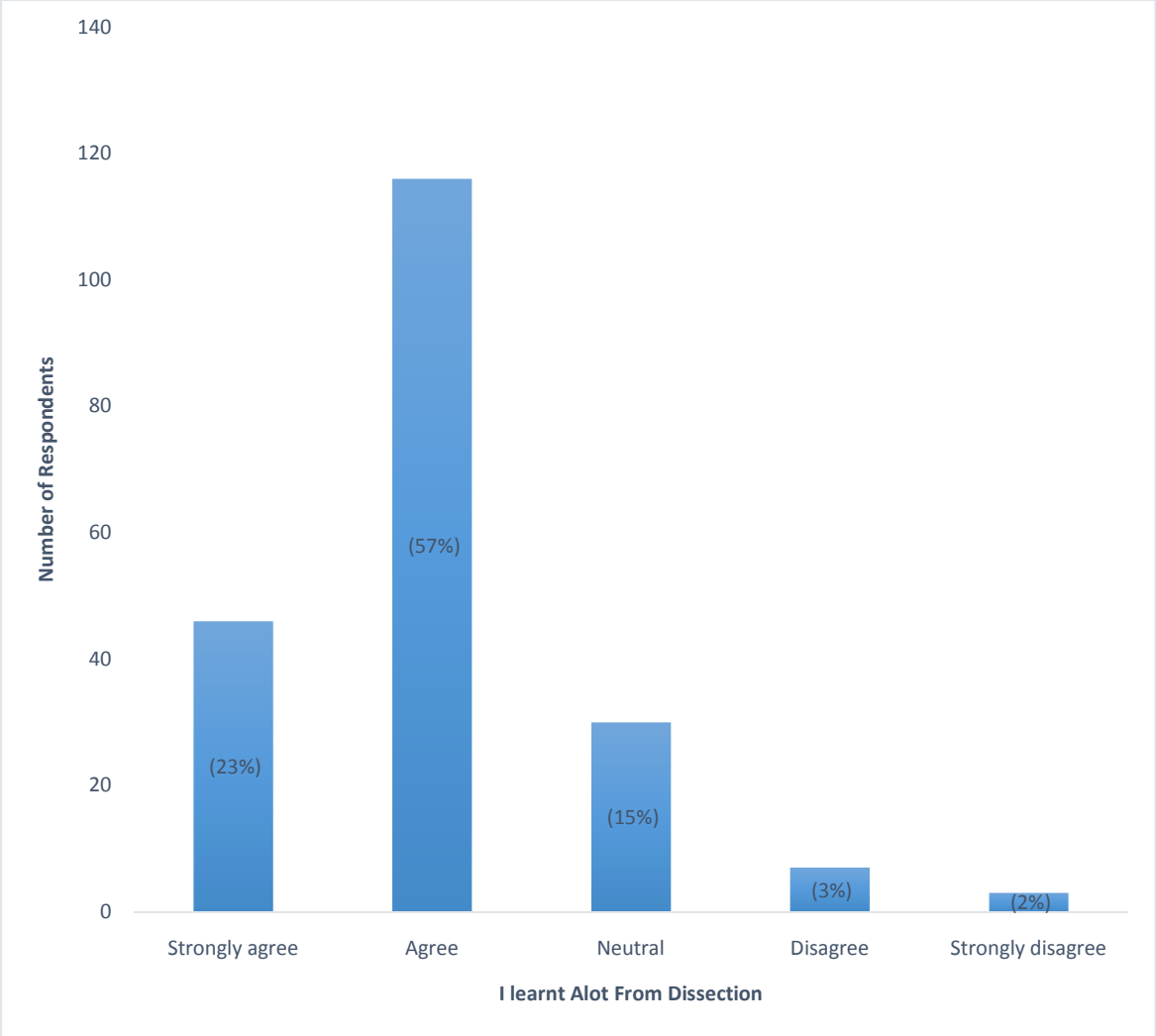

Figure 4.2: Perceptions on "I Learnt a lot From Dissection"

162 (80%) of the respondents agreed that they learnt a lot from dissection, however 10 (5%) of the respondents disagreed.

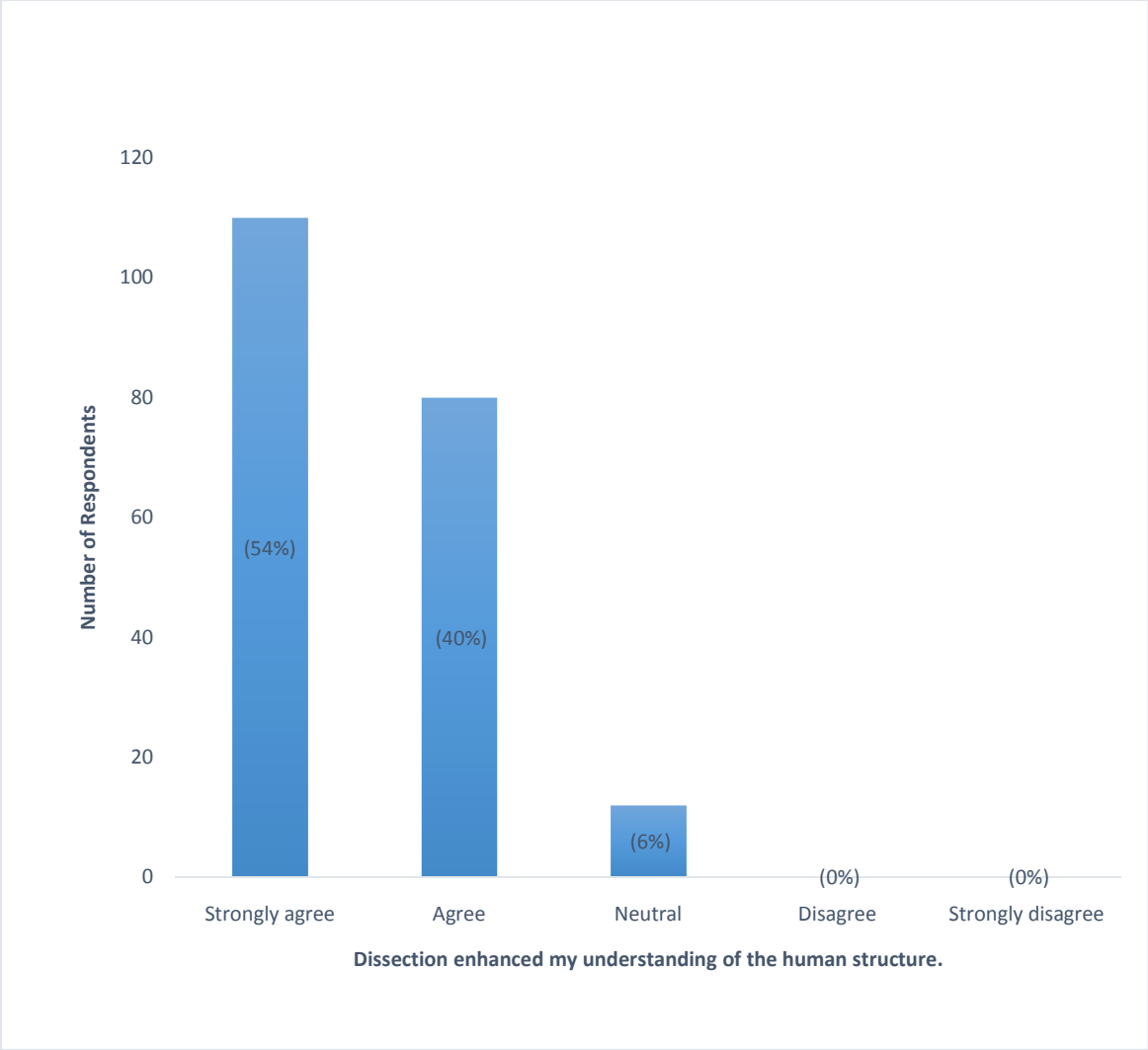

Figure 4.3: Perception of "Does Dissection help to Understand the Human Structure".

Most respondents 190 (94%) agreed that the use of cadaver for medical education enhanced their understanding of the human structure, none of the respondents disagreed.

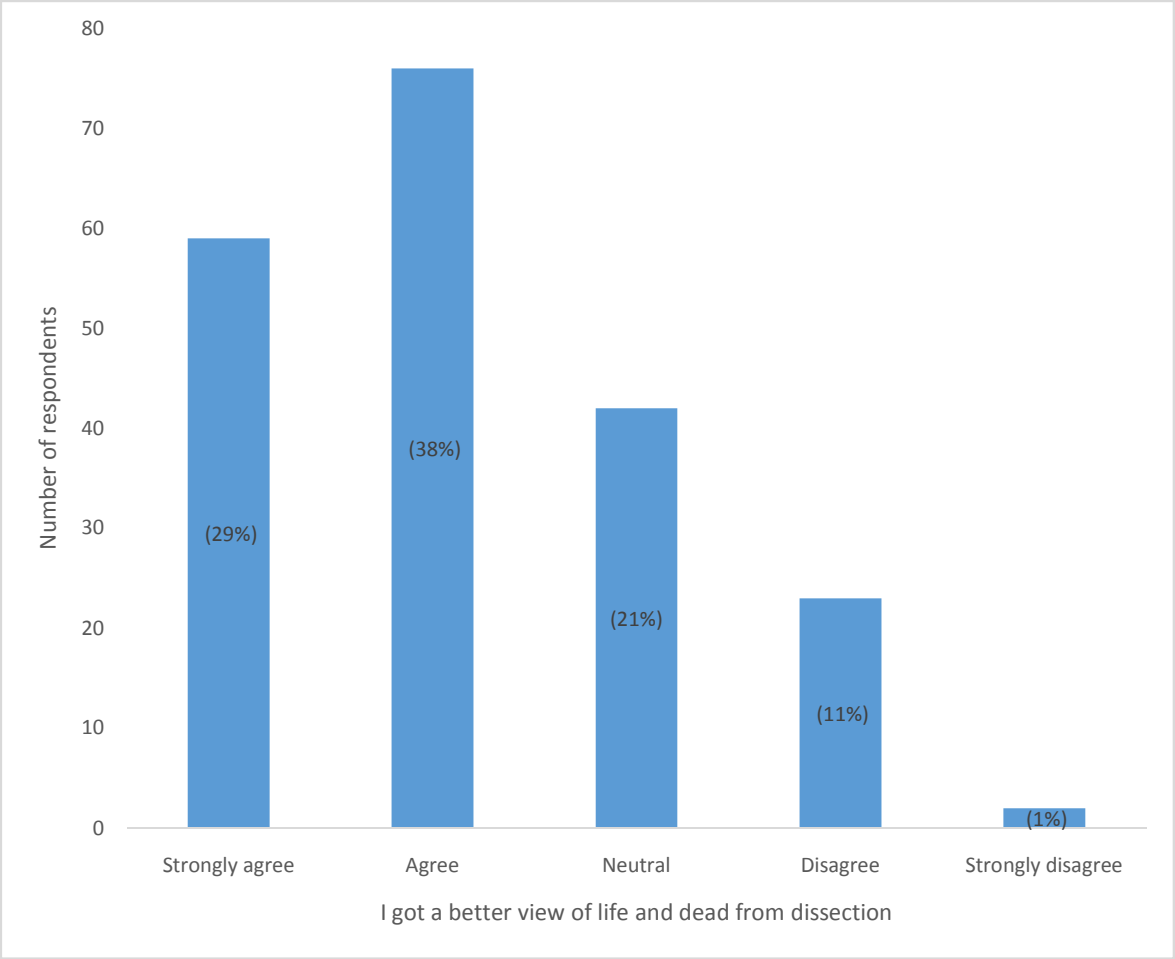

Figure 4.4: Perception on" Dissection Gives a Better View of Life and Death"

135 (67%) of the respondents agreed that dissection gives a better view of life and death even though 25 (12%) of the respondents disagreed.

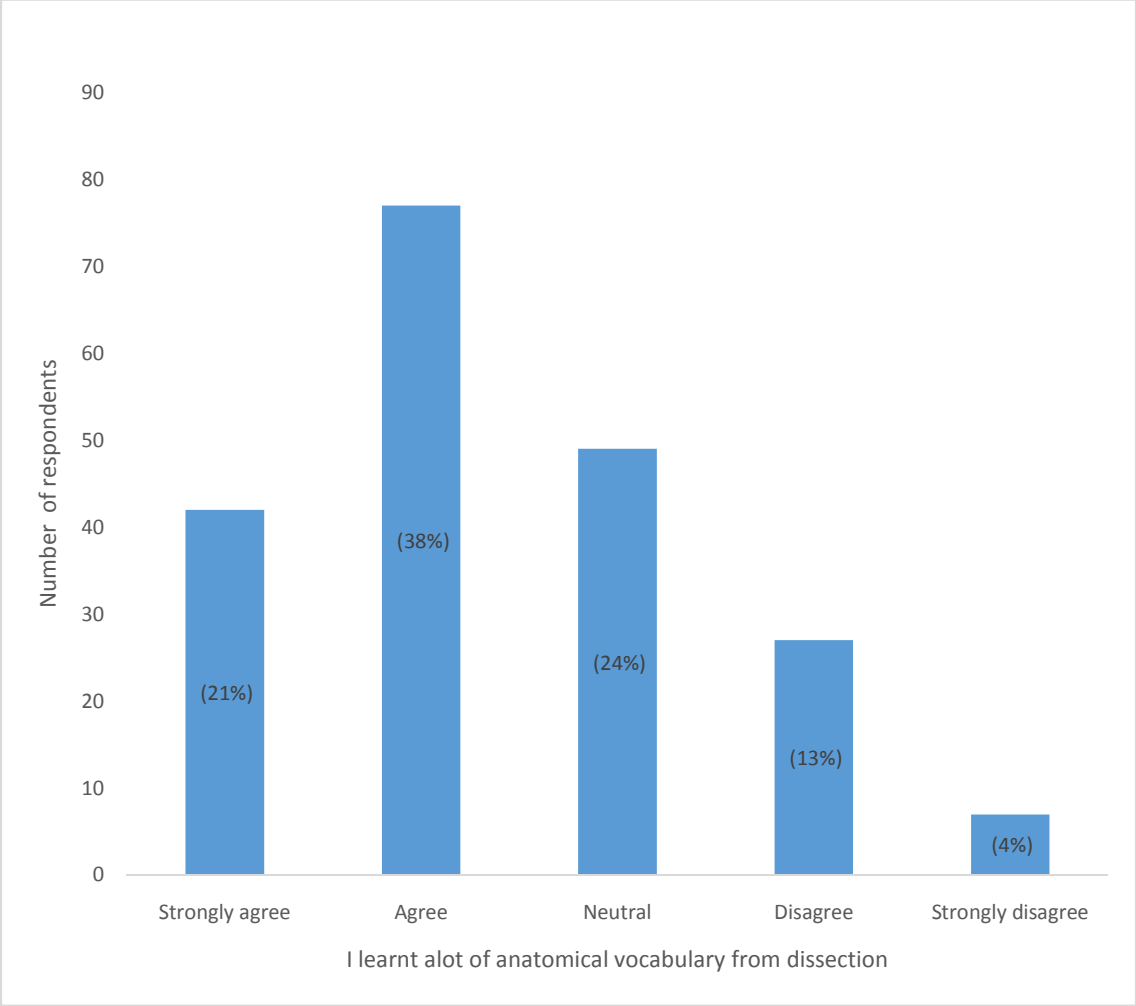

Figure 4.5: Perception on "Dissection Improved my Anatomical Vocabulary"

119 (59%) of the respondents agreed that dissection improved their anatomical vocabulary while 34 (17%) disagreed.

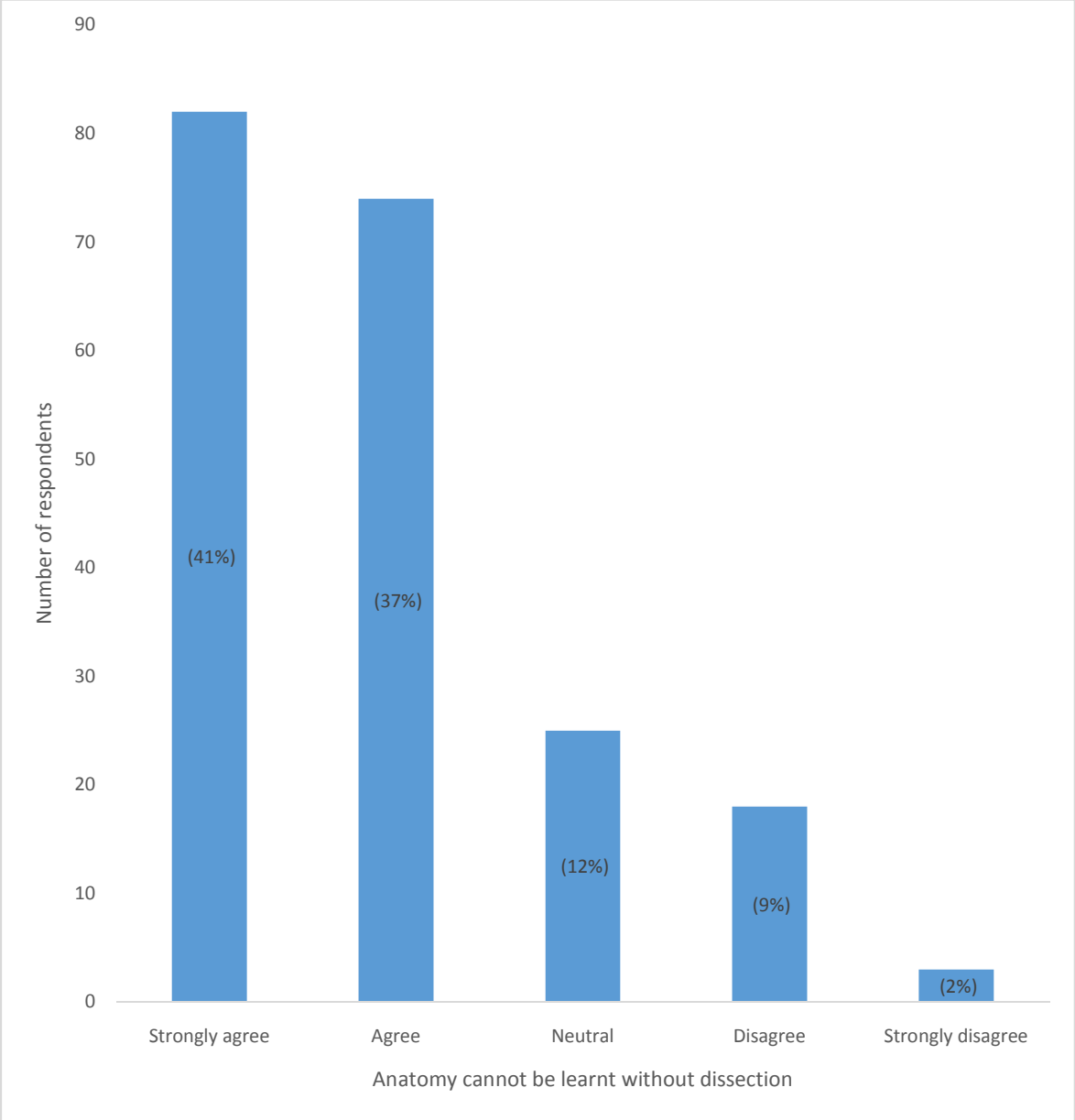

Figure 4.6: Perception on "The use of Cadaver is Indispensable in the Study of Anatomy"

159 (78%) agreed that the use of cadaver is indispensable in the study of anatomy while 21 (11%) disagreed.

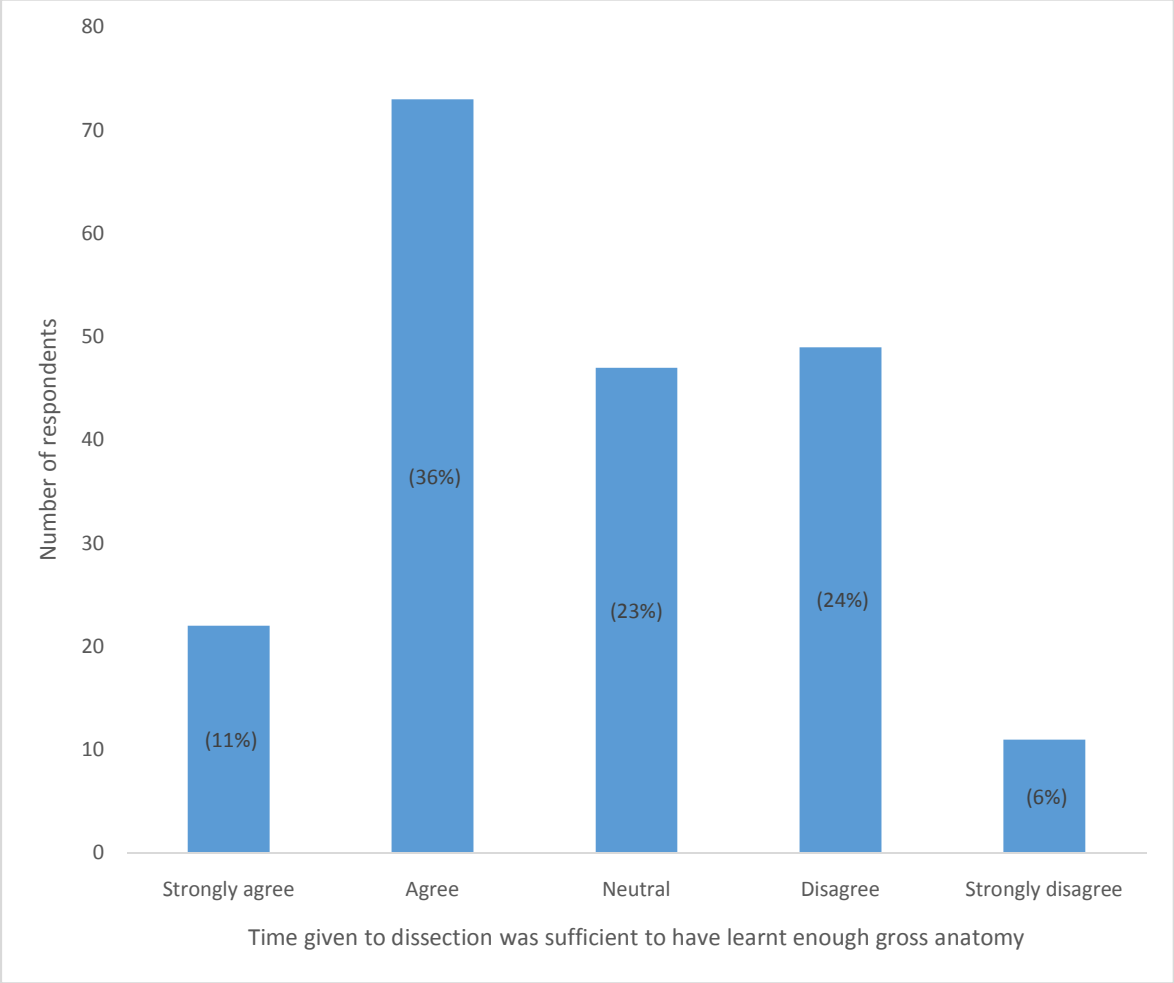

Figure 4.7: Perception on "Time given to Dissection was Sufficient to Have Learnt Enough Gross Anatomy.

95 (47%) of the respondents agreed that the time allotted to dissection is sufficient to have imparted knowledge of gross anatomy while 60 (30%) disagreed.

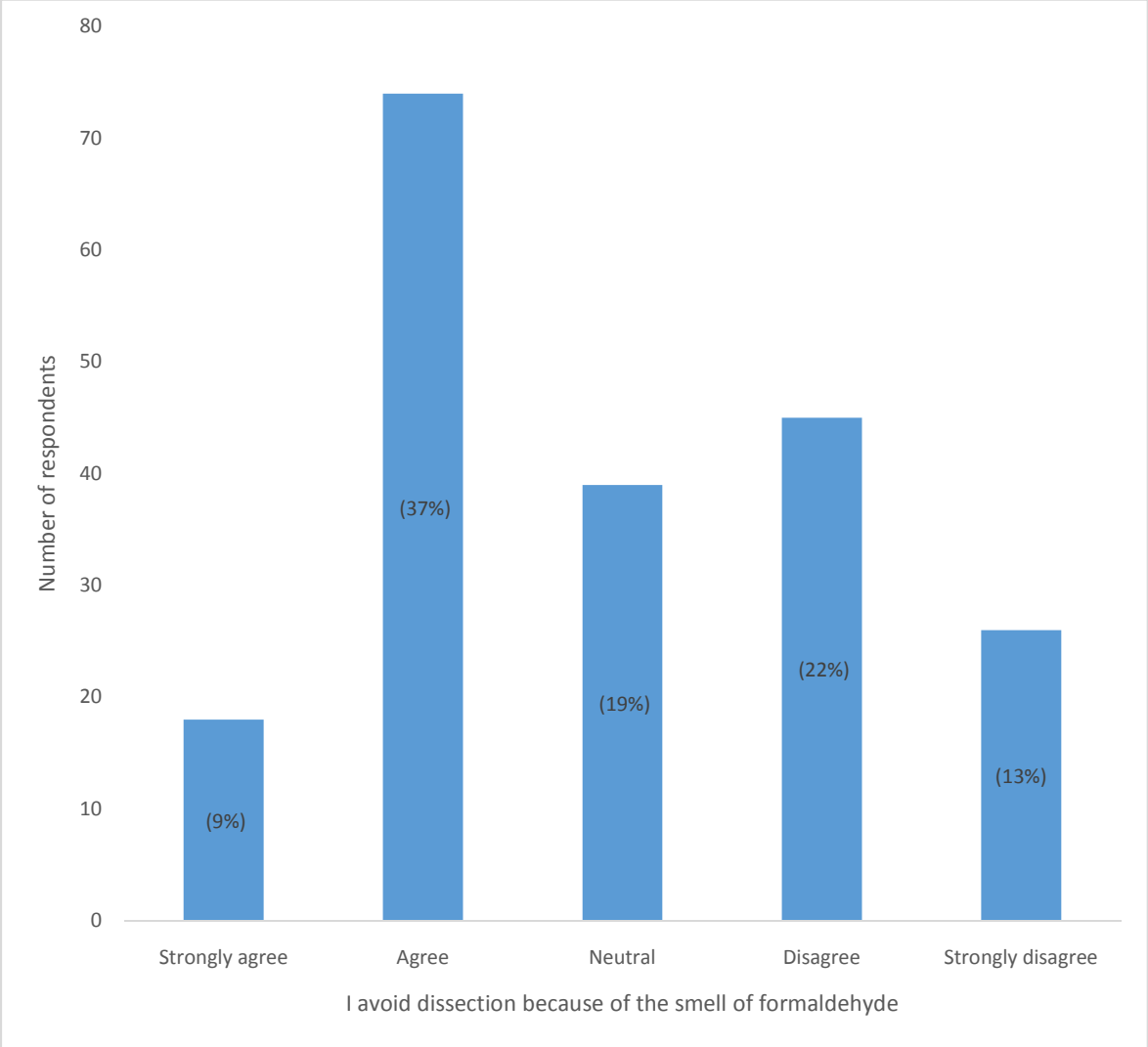

Figure 4.8: Perception on "The Smell of Formaldehyde Makes me Avoid Dissection"

92 (46%) agreed that they avoided dissection because of the smell of formaldehyde" while 71 (35%) disagreed.

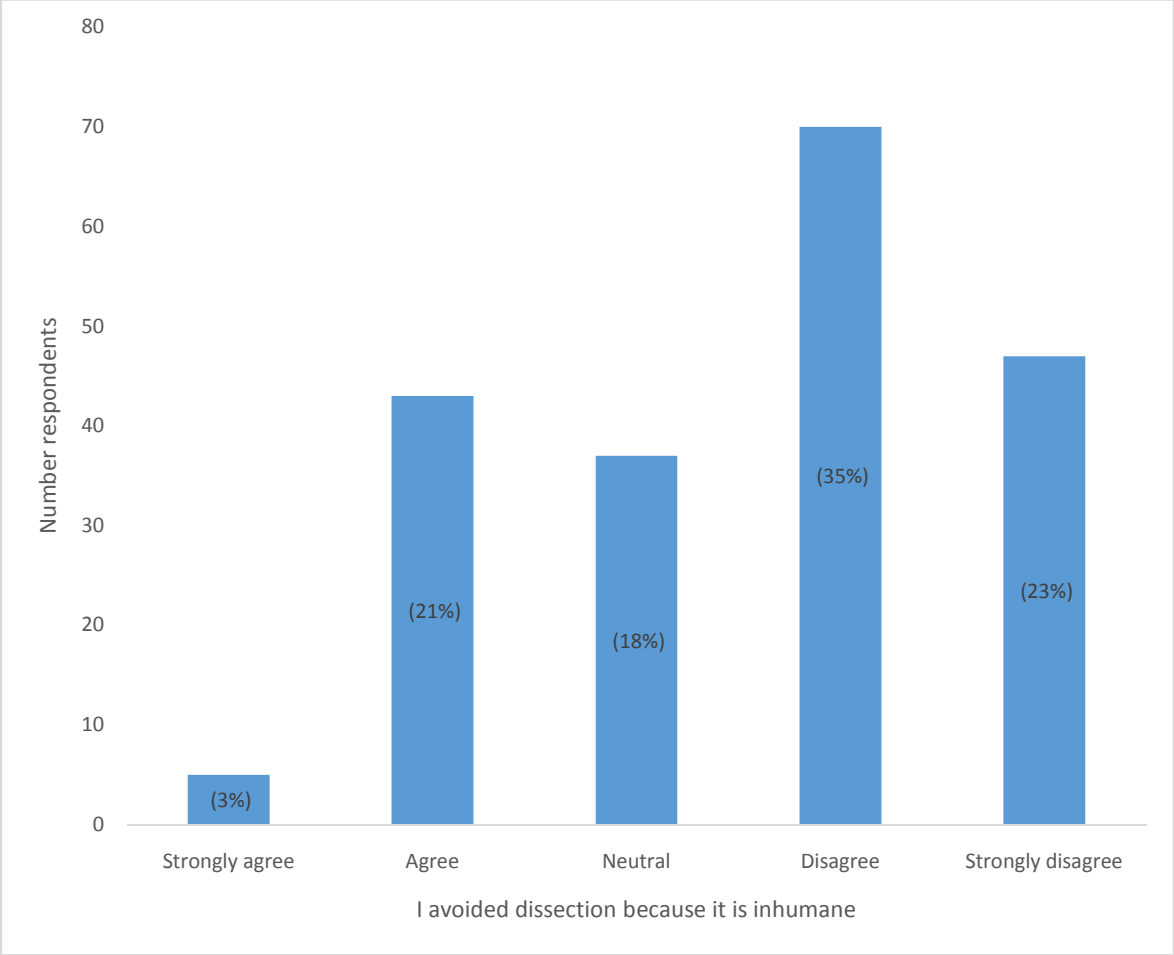

Figure 4.9: Perception on "I Avoided Dissection because it is Inhumane"

48 (24%) of the respondents agreed that they avoid dissection is inhumane while 103 (58%) disagreed.

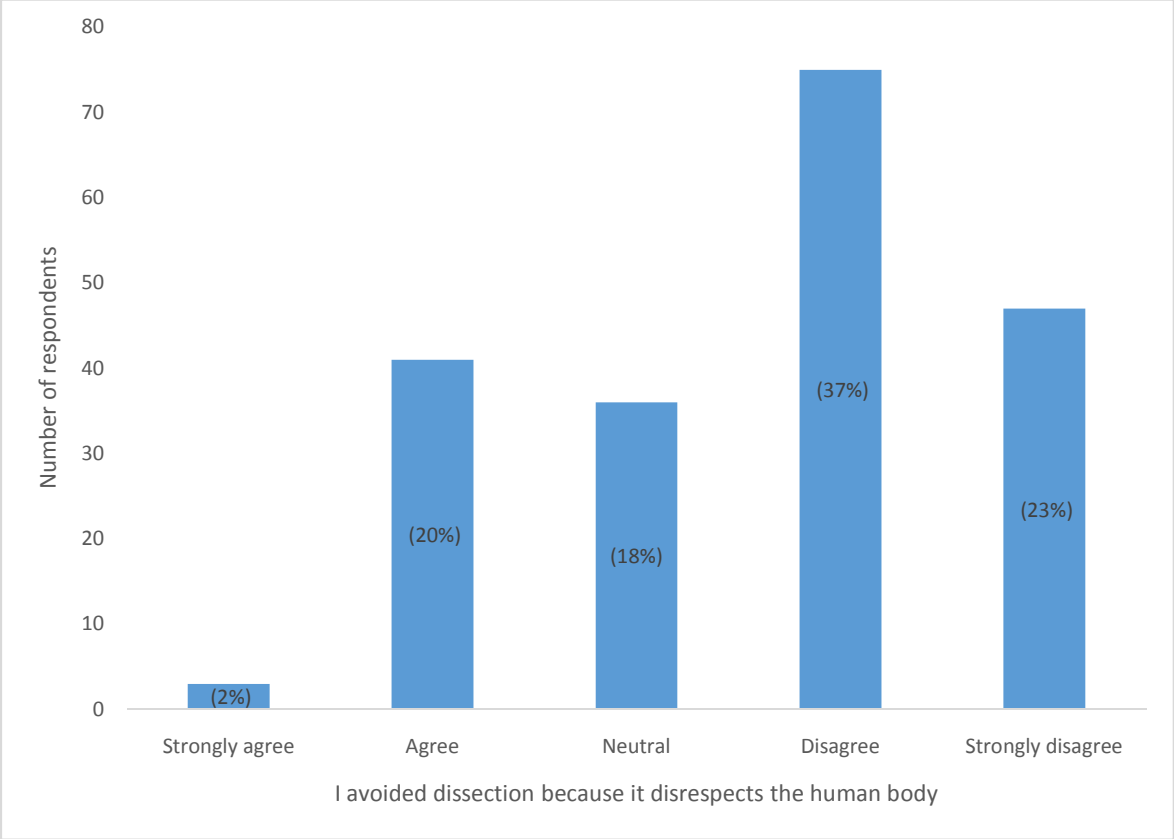

Figure 4.10: Perception on "Dissection is Disrespectful to Human Body"

44 (22%) of the respondents agreed that dissection is disrespectful to the human body while 122 (60%) disagreed.

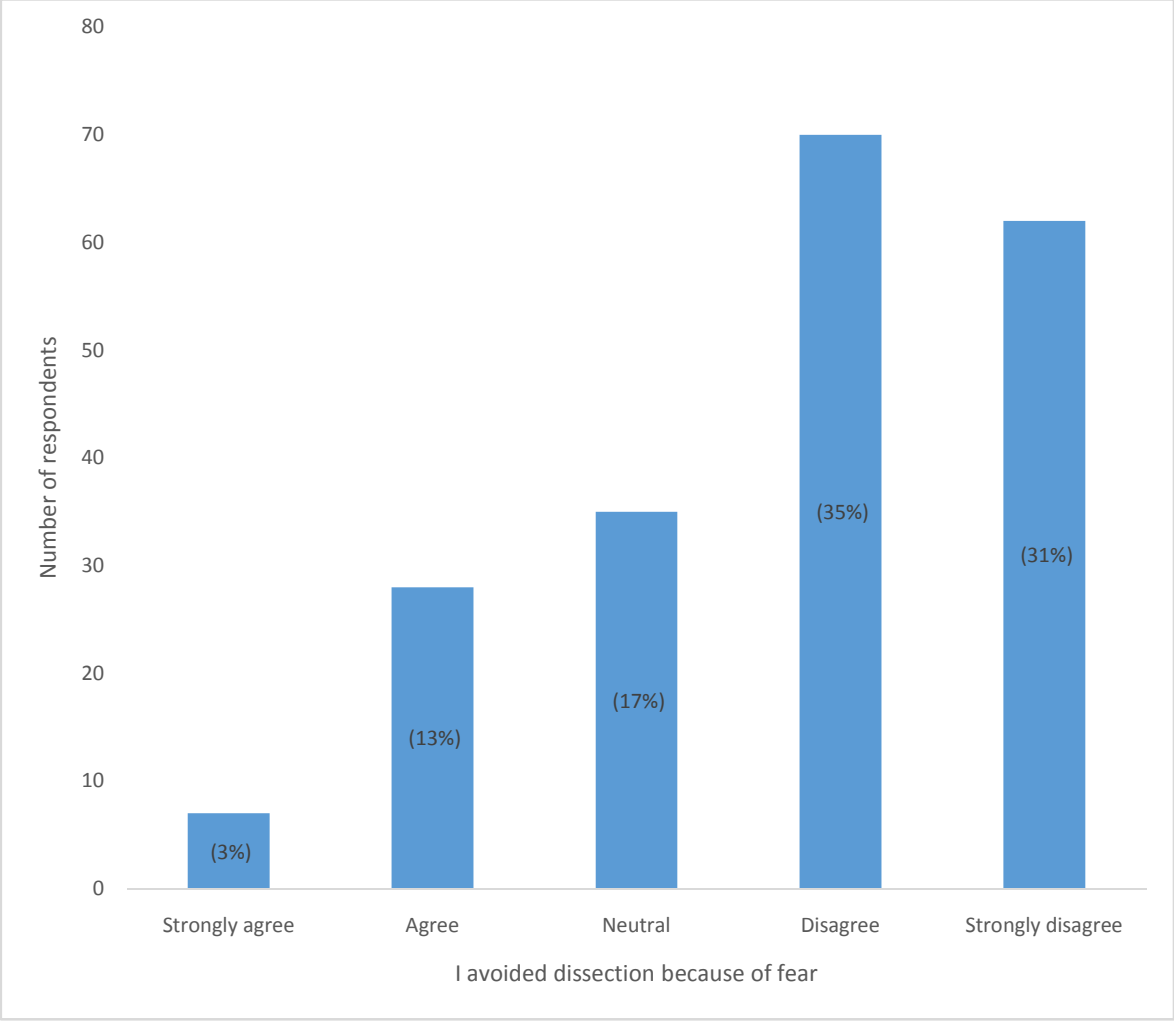

Figure 4.11: Perception on" I Avoided Dissection because of Fear of the Dead"

35 (16%) of the respondents agreed that they hated dissection because of fear the dead while 132 (66%) of respondents disagreed.

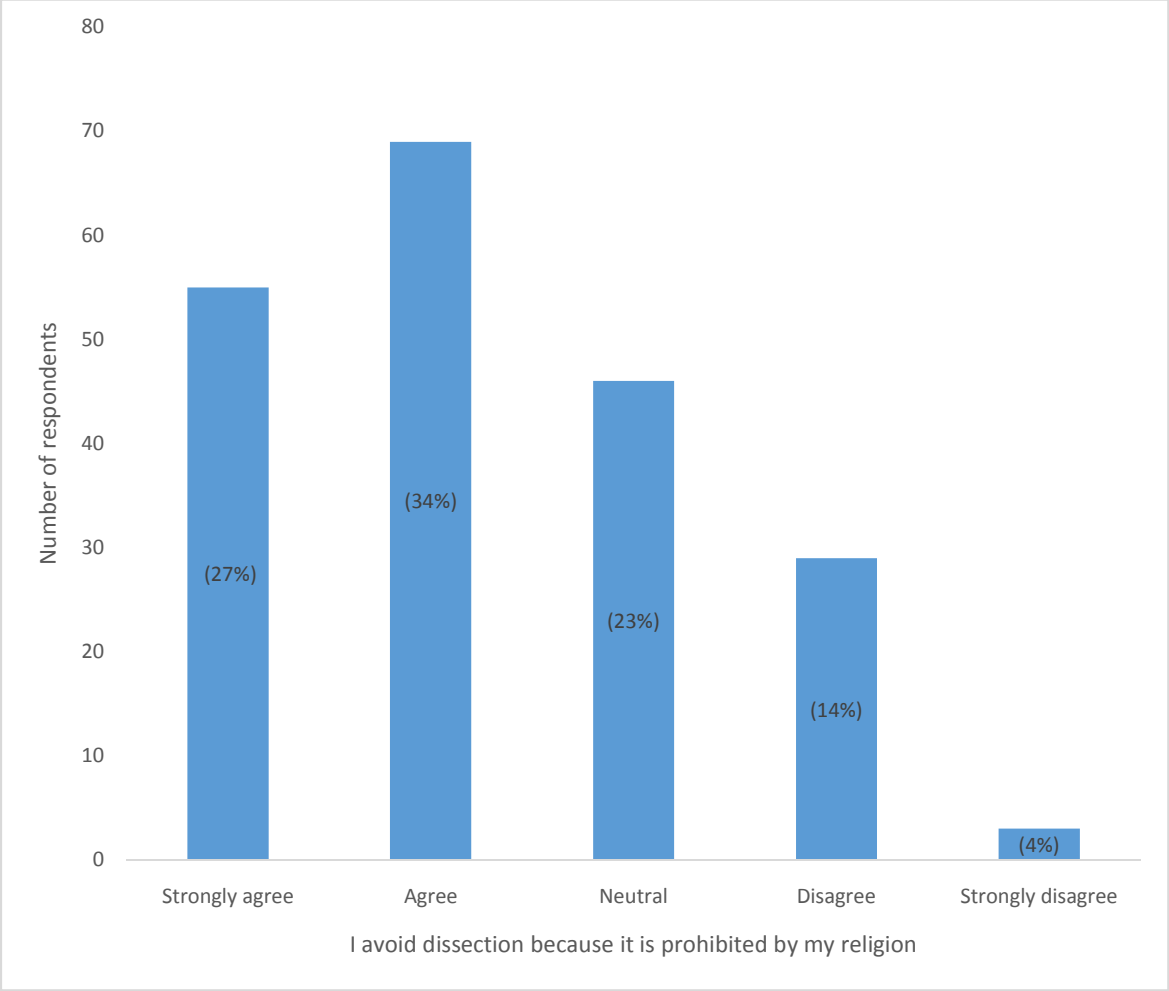

Figure 4.12: Perception on “Dissection is Prohibited by my Religion".

32 (16%) agreed that dissection of the human body is prohibited by their religion, while 121 (61%) of the respondents disagreed.

4.1.3 Relevance of Cadaver Dissection to Practice

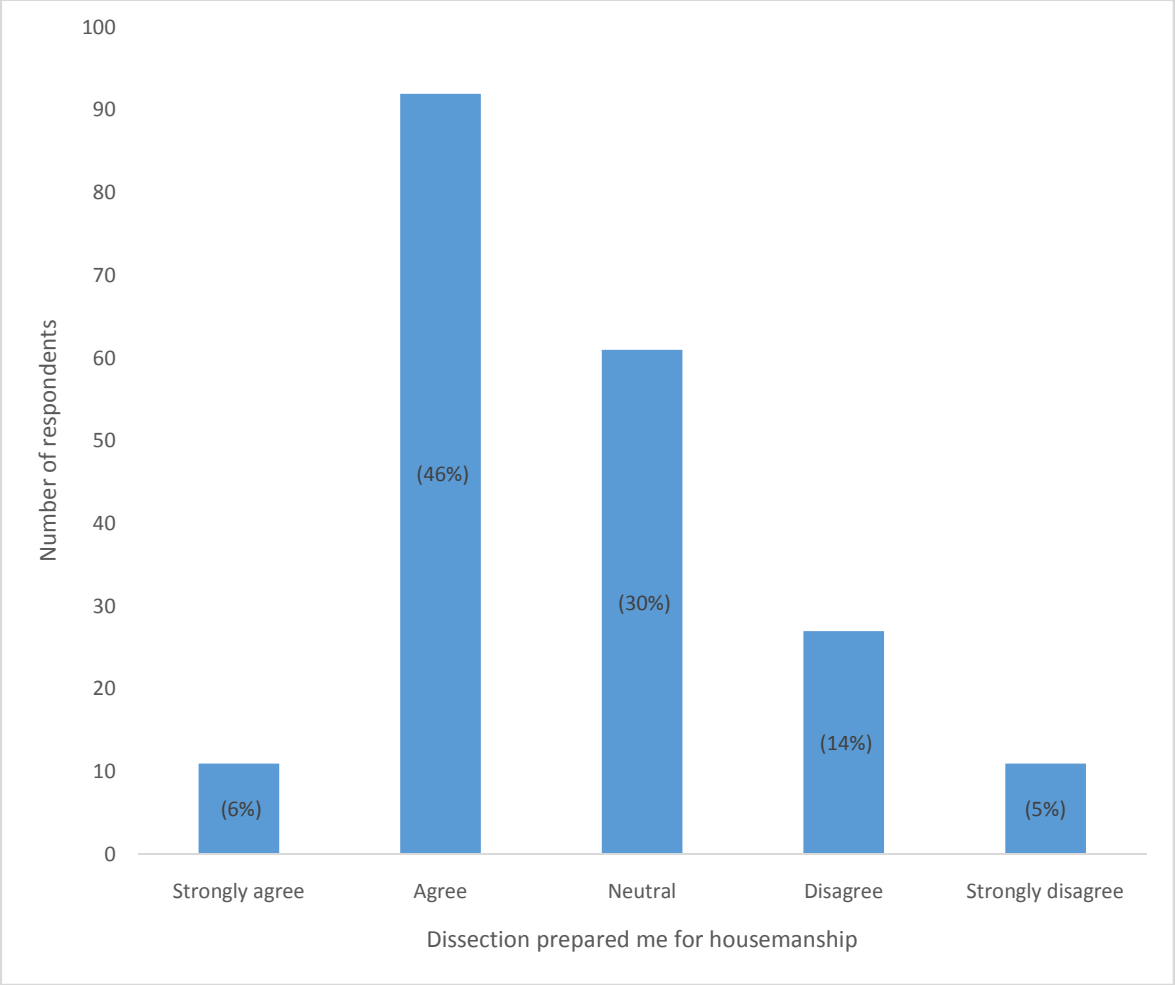

Figure 4.13: Perception" Dissection Prepared me for Housemanship"

112 (52%) of the respondents agreed that dissection prepared them for housemanship however 38 (19%) of the respondents disagreed.

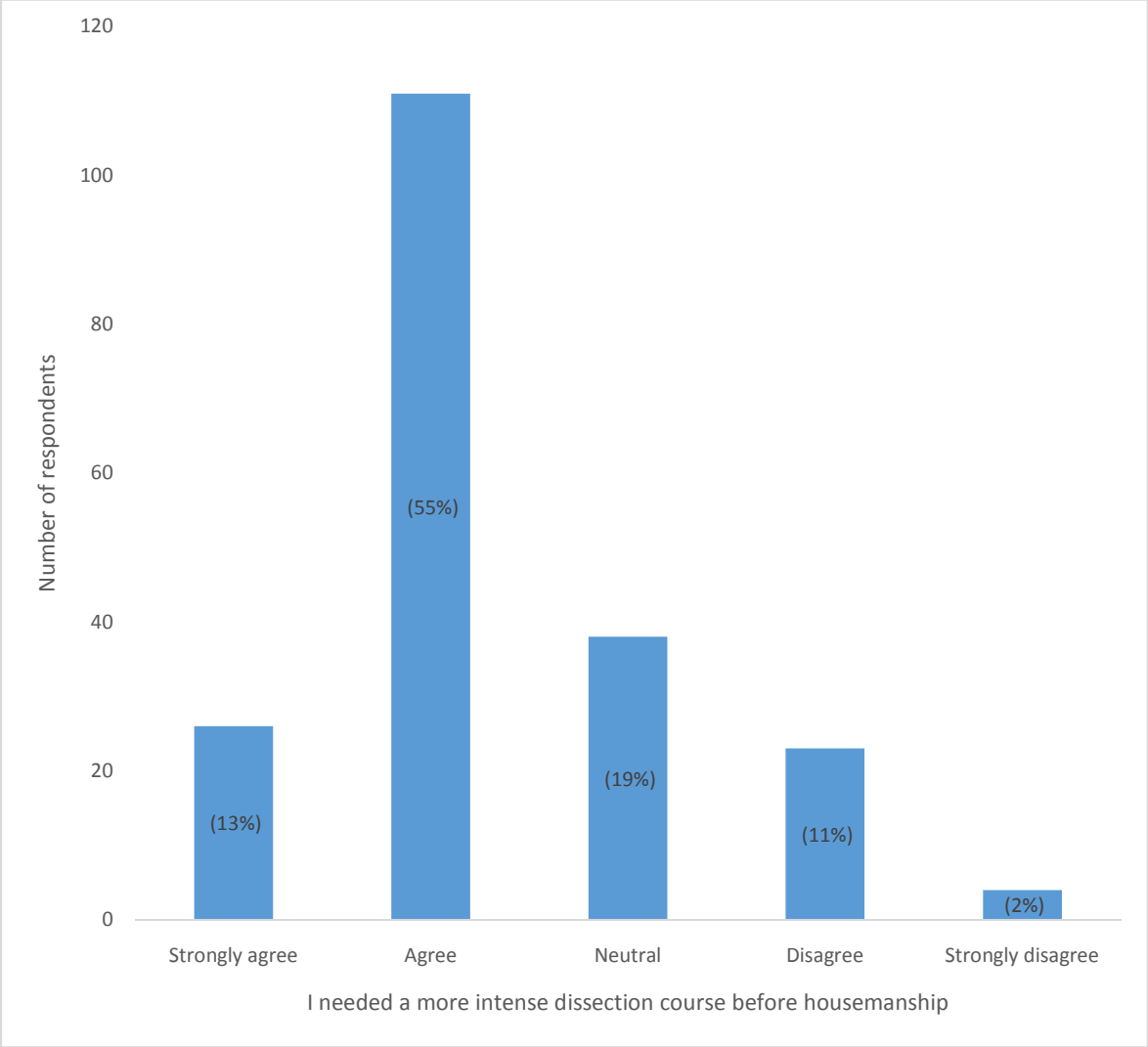

Figure 4.14: Perception "A More Intense Course of Dissection would have betterPrepared me for Housemanship".

137 (68%) agreed that a more intense dissection course would have better prepared them for housemanship however 27 (13%) disagreed.

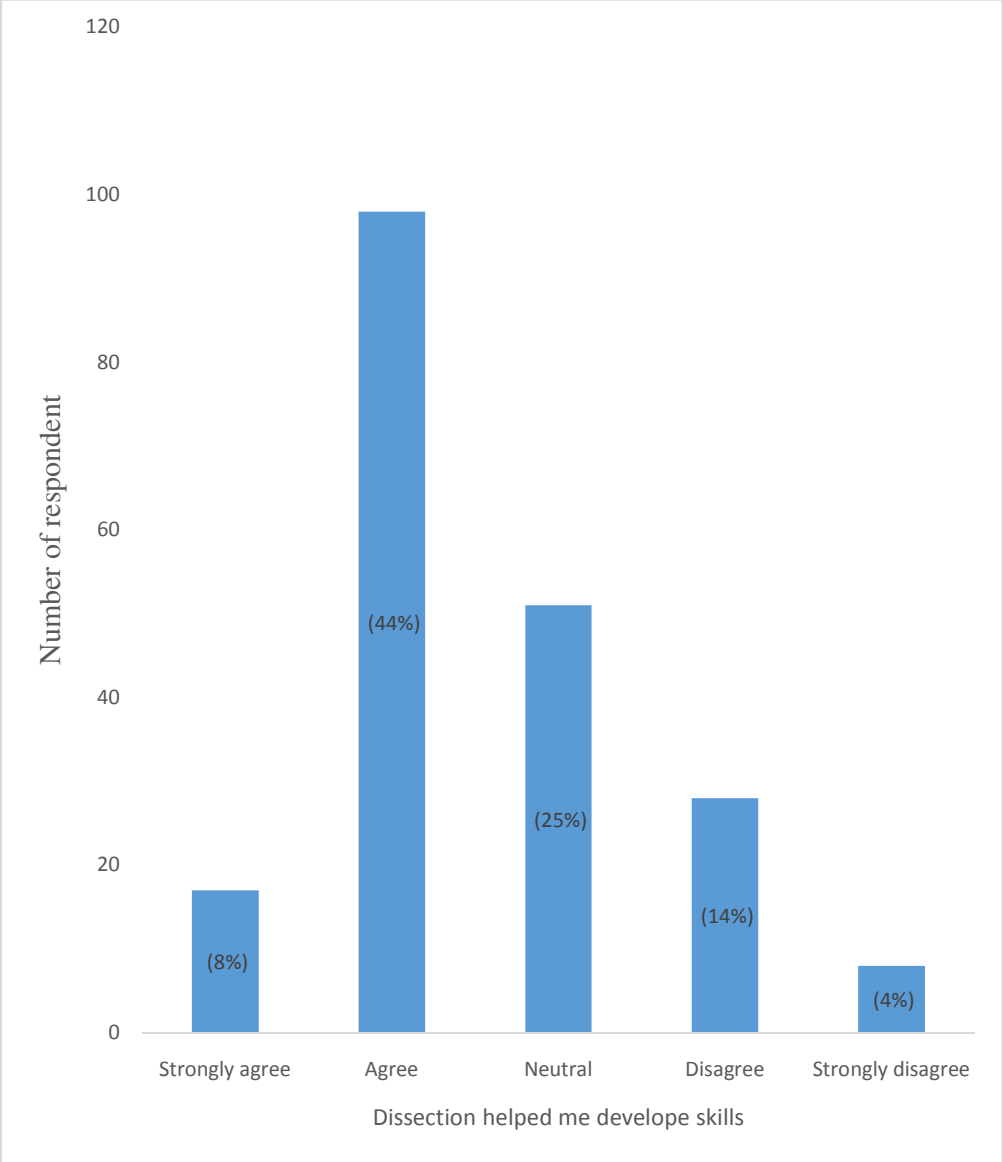

Figure 4.15: Perception on "Dissection Helped Develop Skills".

115 (52%) agreed that dissection helped develop skills, while 36 (18%) disagreed.

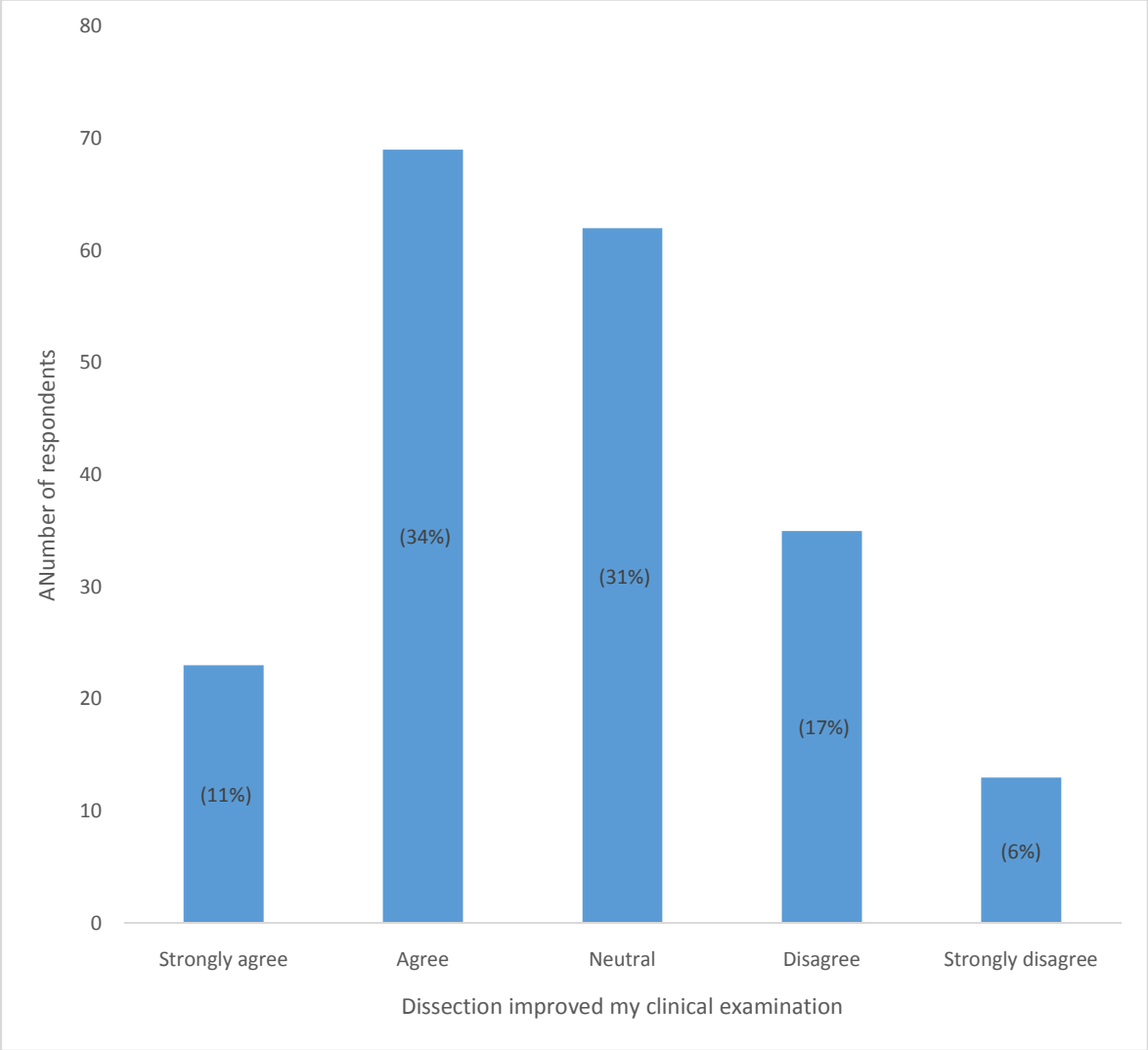

Figure 4.16: Perception on "Dissection Improved my Clinical Examination"

92 (45%) agreed that dissection improved their clinical examination and documentation, however 48 (23%) disagreed.

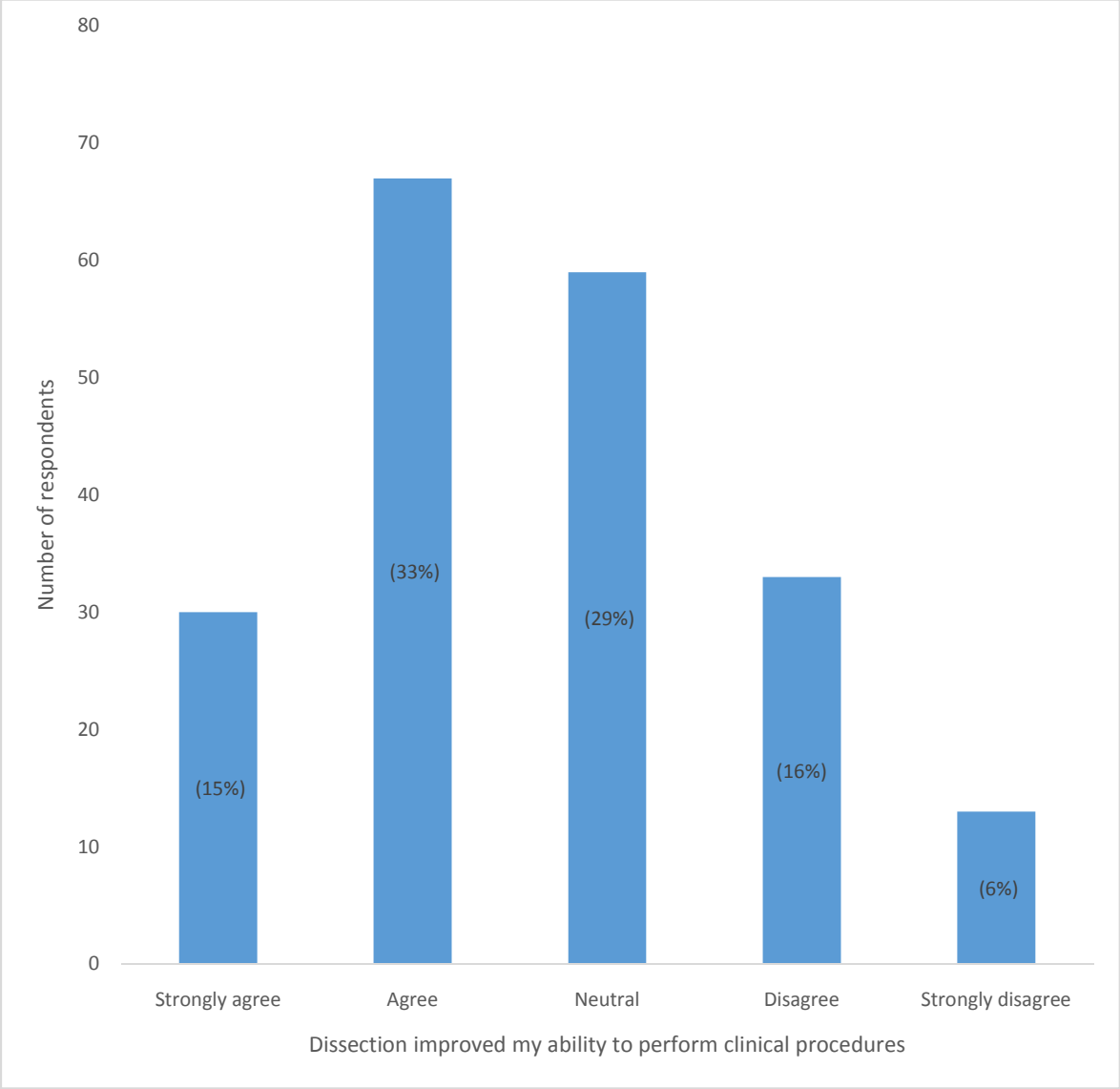

Figure 4.17: Perception on "Dissection Improved my Ability to Perform Clinical Procedures".

97 (48%) agreed that dissection improved their ability to perform basic clinical procedures e.g. NG tube insertion, catheterization, cannulation etc. 46 (22%) disagreed.

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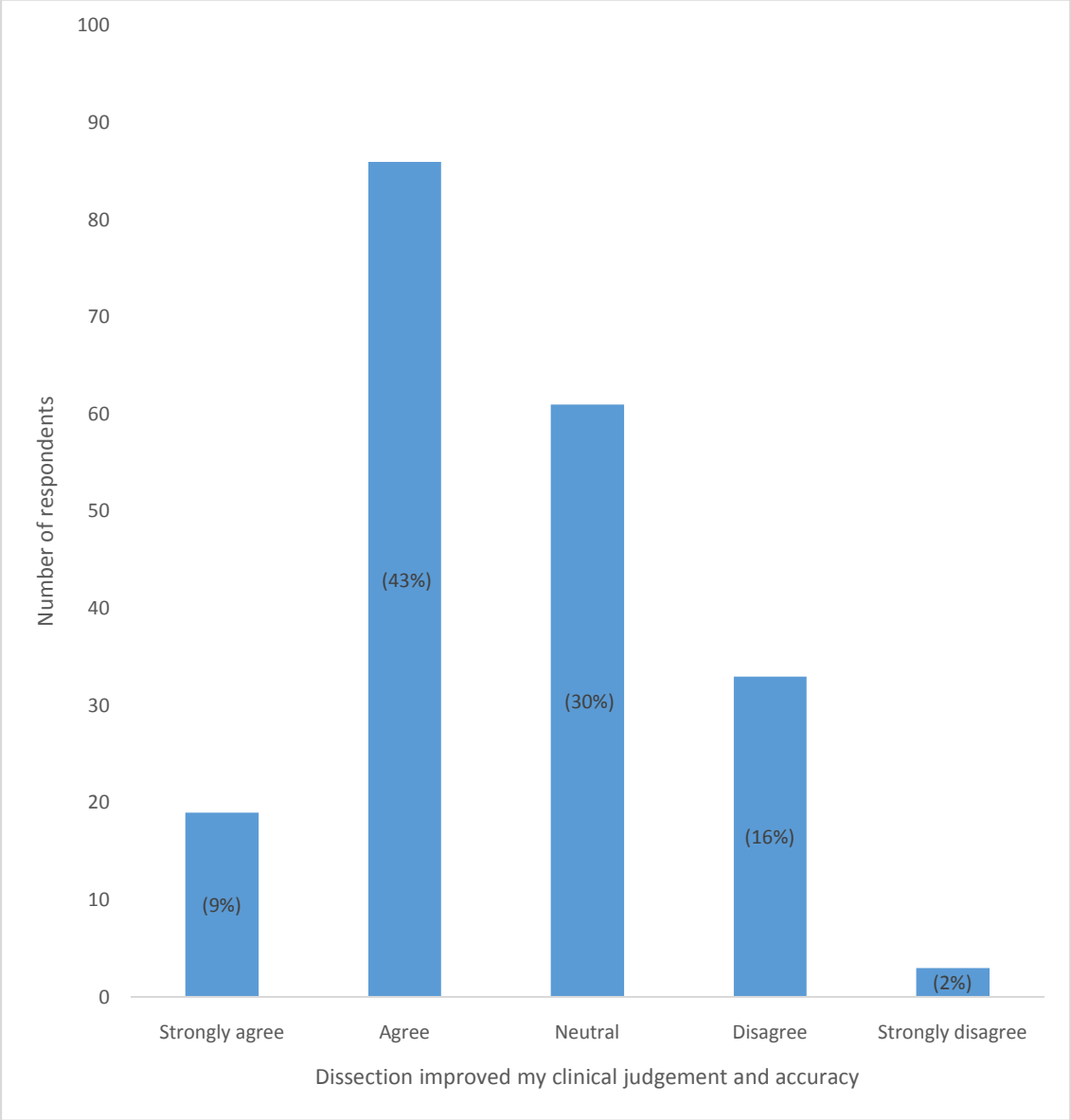

Figure 4.18: Perception "Dissection Improved my Clinical Judgement and Accuracy.

105 (53%) agreed that dissection improved their clinical accuracy however 36 (18%) of respondents disagreed.

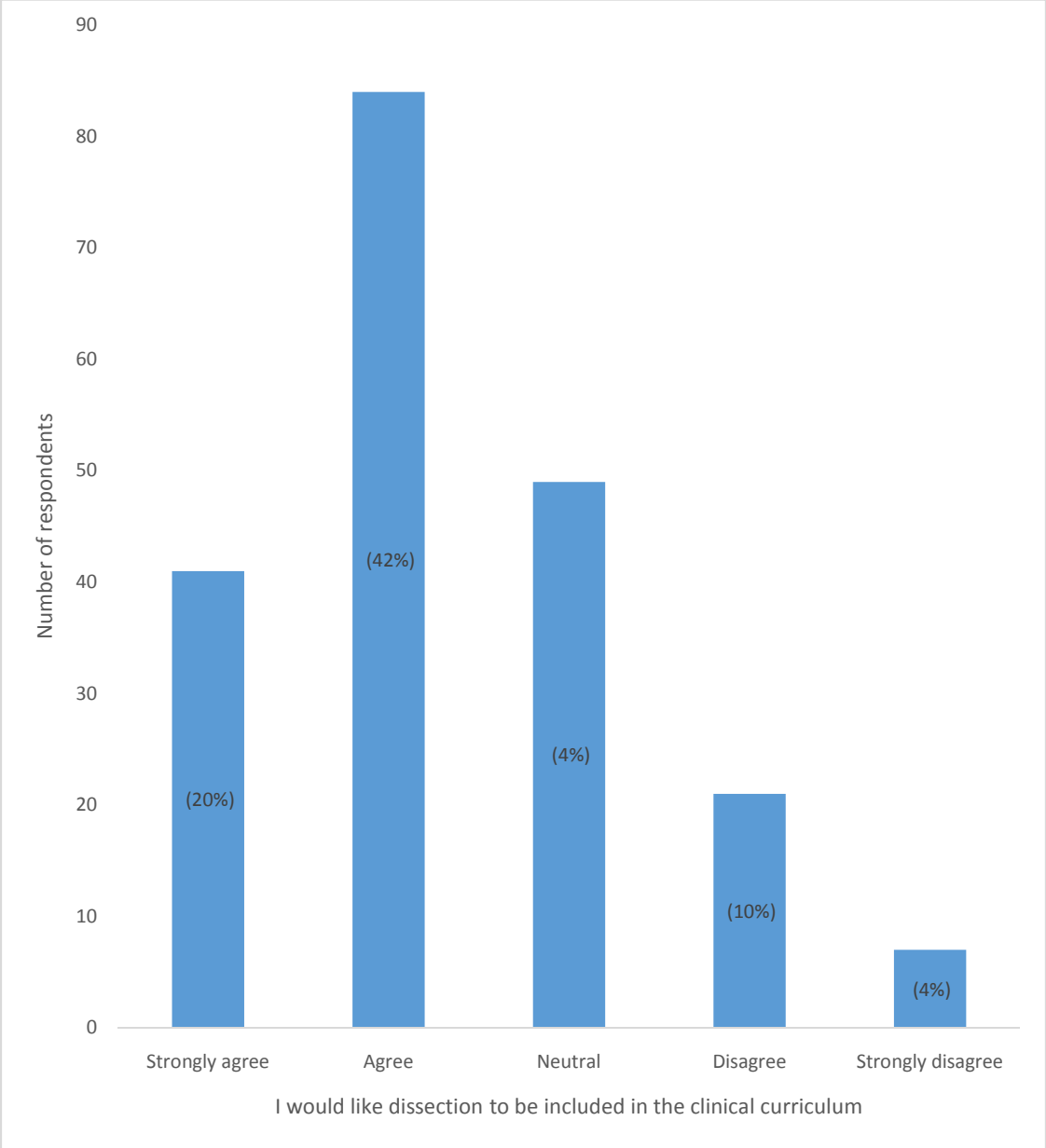

Figure 4.19: Perception on" Dissection should be Included in the Clinical Curriculum"

125 (62%) agreed that dissection should be included in the clinical curriculum while 28 (14%) disagreed.

1.1.4 Cadaver as Compared to Other Methods of Teaching Anatomy

Table 4.3: Awareness of Various modalities of Teaching Anatomy.

S/N	Awareness of the Use	Response	Frequency	Percentage
1	Cadaver	Not Aware	3	1%
		Aware	199	99%
2	Models	Not Aware	54	27%
		Aware	148	73%
3	Computer assisted learning	Not Aware	121	60%
		Aware	81	40%
4	Other Modalities	Not Aware	195	97%
		Aware	7	3%

Majority of the respondents 199 (99%) are aware of the use of cadaver as a modality of teaching gross anatomy.

Majority of the respondents 148 (73%) are aware of the use of models as a modality of teaching gross anatomy.

121 (60%) of the respondents are not aware of the use of computer assisted learning as a modality of teaching gross anatomy.

195 (97%) of the respondents are not aware of other methods of teaching gross anatomy.

Table 4.4 Availability of Various Modalities of Teaching Anatomy

S/N	Availability	Response	Frequency	Percentage
1	Cadaver	Not Available	4	2%
		Availability	198	98%
2	Models	Not Available	57	22%
		Available	145	78%
3	Computer assisted learning	Not Available	158	78%
		Available	44	22%
4	Others	Not Available	196	97%
		Available	6	3%

Majority of the respondents 198 (98%) have cadaver as a method of teaching gross anatomy in their school.

Majority of the respondent's 145 (78%) have models available as a method of teaching gross anatomy.

Majority of respondents 158 (78%) do not have computer assisted learning modality of teaching gross anatomy in their medical school.

Majority of the respondents 196 (97%) do not have other modality of teaching gross anatomy beside the use of cadaver in their medical schools.

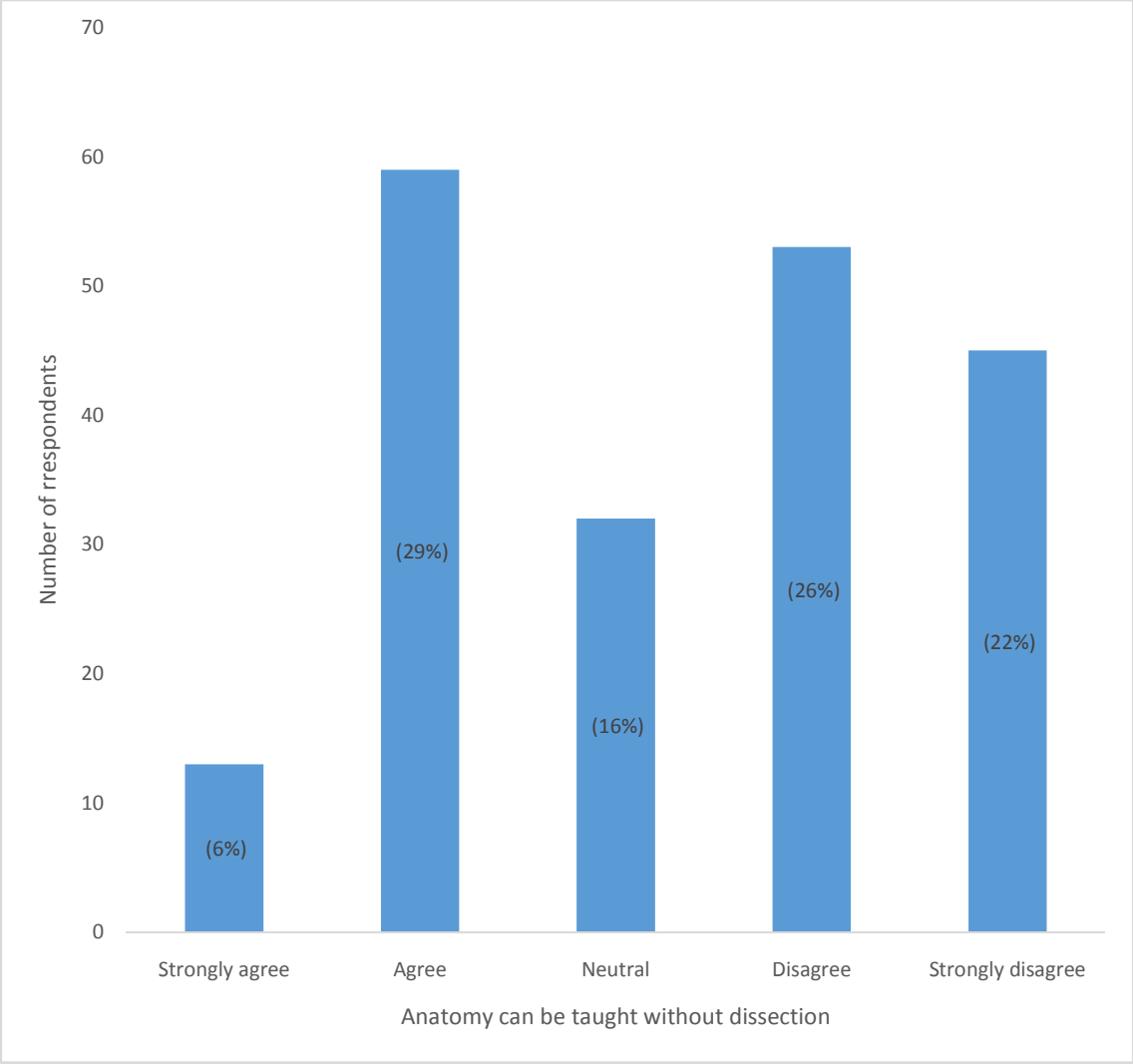

Figure 4.20: Perception on" Gross Anatomy can be Taught Without Cadaver"

72 (35%) agree that gross anatomy can be taught without cadaver while 98 (48%) disagree that gross anatomy can be taught without cadaver.

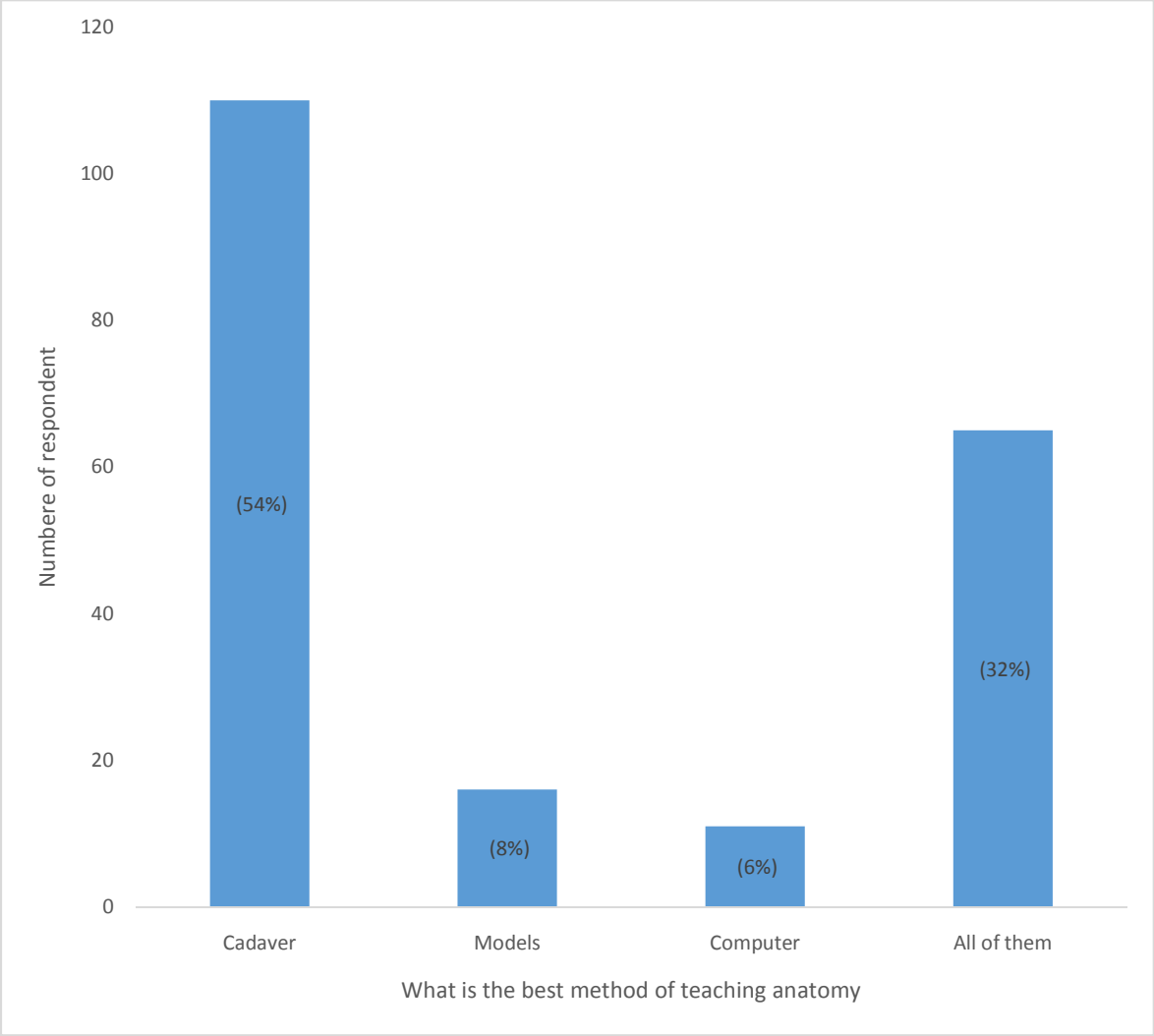

Figure 4.21: Perception on the Best Modality of Teaching Gross Anatomy.

Majority of the respondents 110 (54%) feel that the use of cadaver is the best for teaching and understanding gross anatomy however 65 (32%) believe that all the three methods combined together lead to better understanding of gross anatomy.

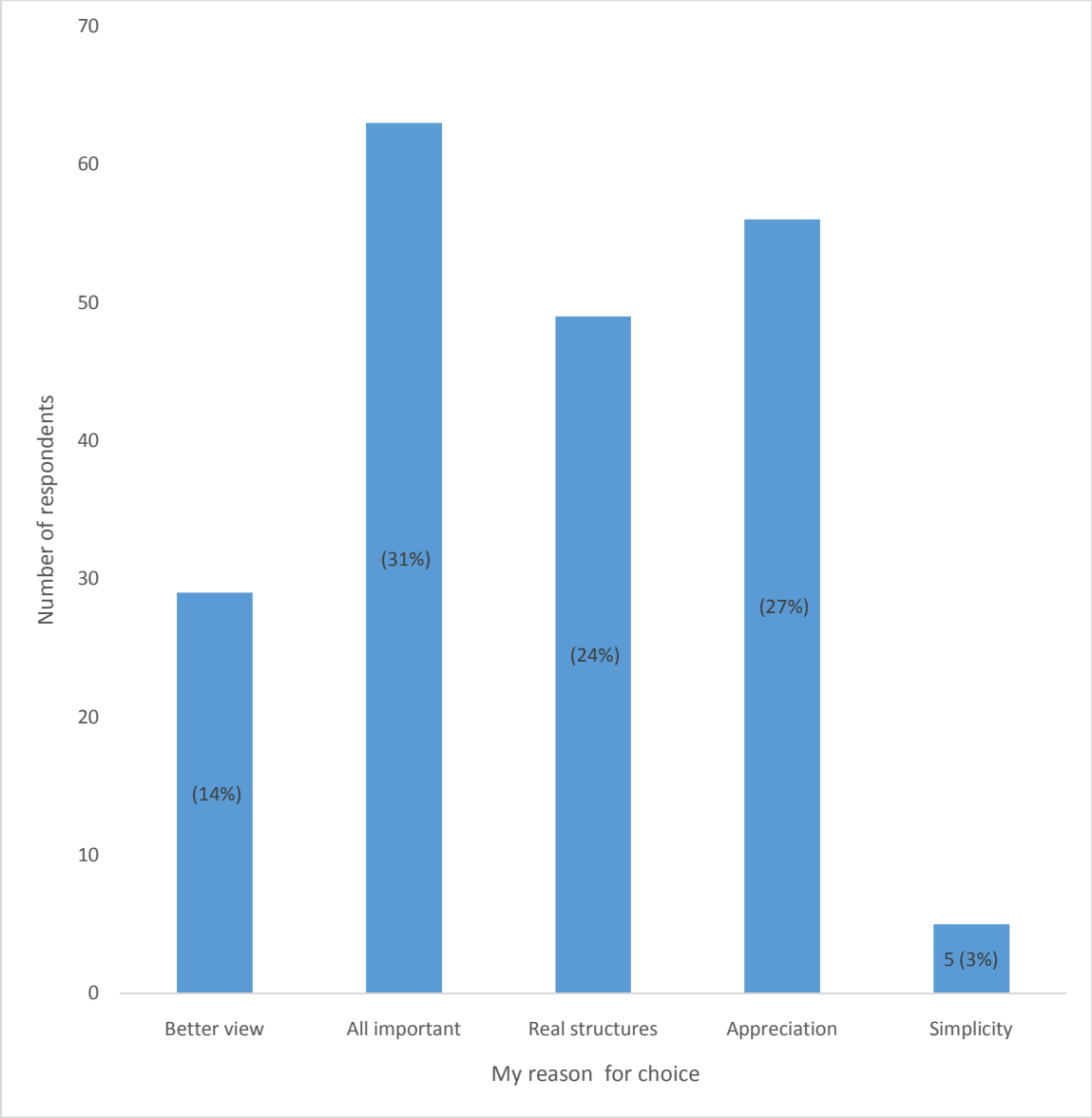

Figure 4.22: Perception Reason for Choosing the Best Option.

63 (31%) of the respondents choose cadaver as the best option because it provides better appreciation of the human body giving a better understanding of gross anatomy.

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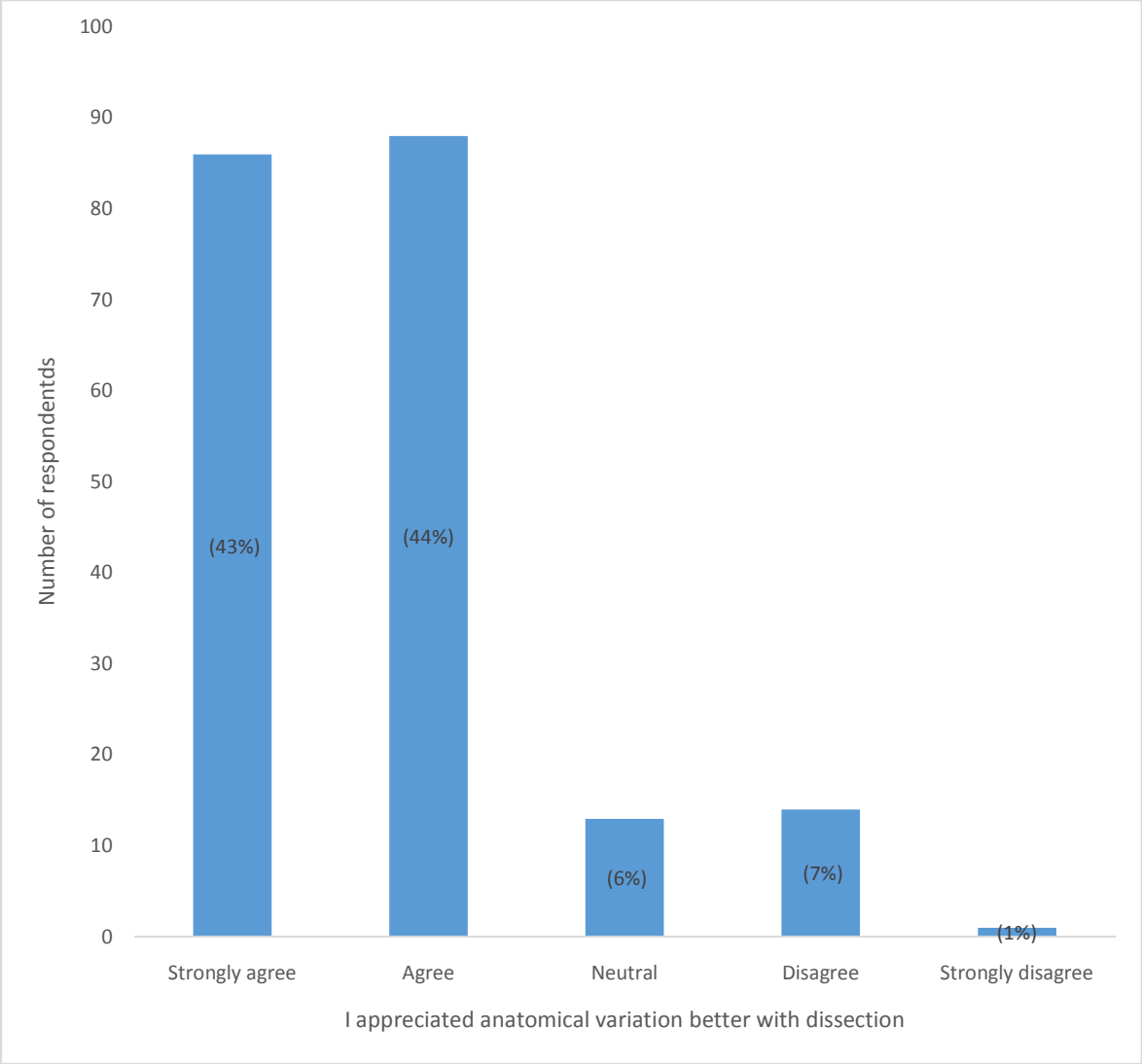

Figure 4.23: Perception of respondents on "Anatomical Variation can be Appreciatedbetter with Dissection.

174 (87%) of the respondents agreed that anatomical variations in humans can best be appreciated with the use of cadaver than with other methods while 15 (8%) disagreed.

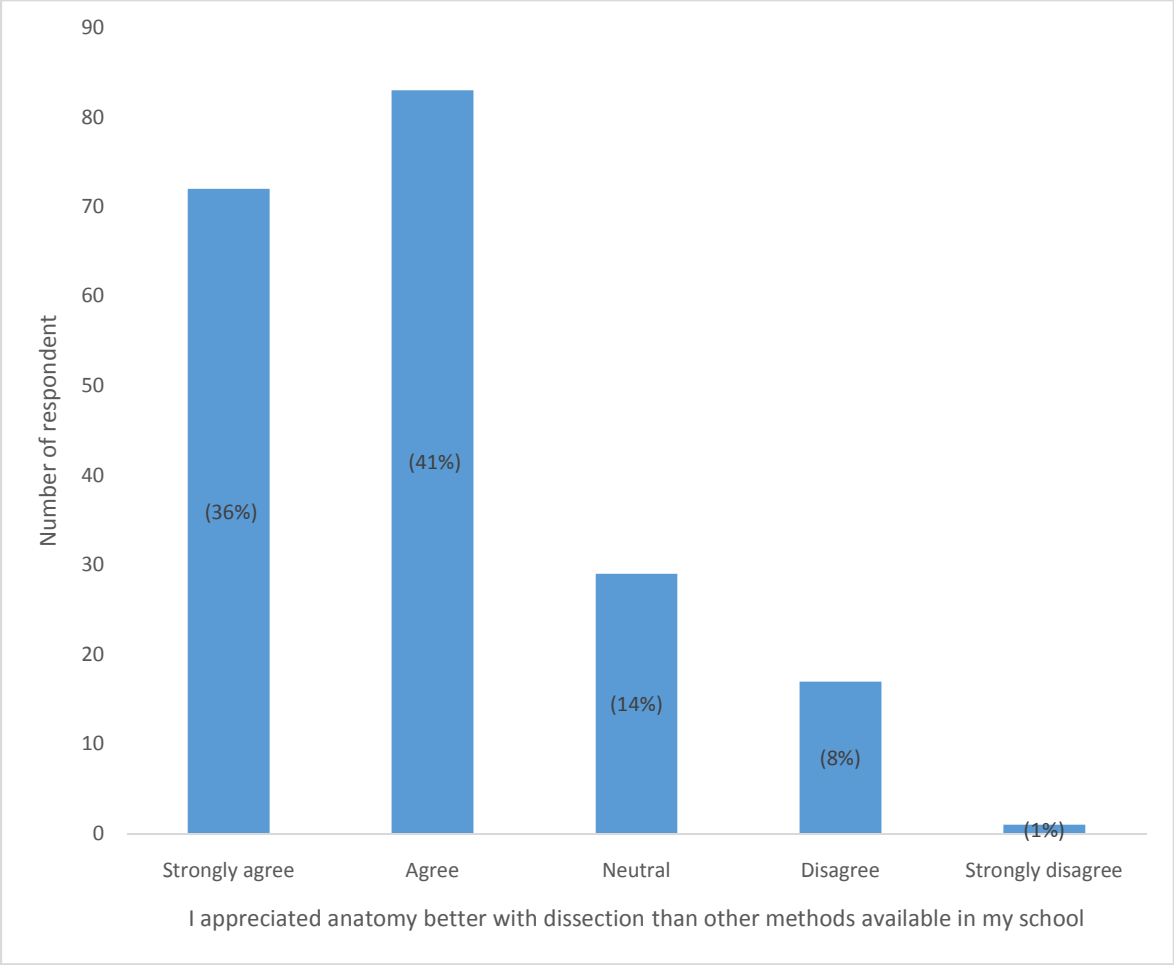

Figure 4.24: Perception of respondents on "Dissection helps to Appreciate the Human Body Better than other Methods Available in my School"

155 (77%) agreed that anatomy of the human body can best be appreciated with the use of cadaver than with other methods while 18 (9%) disagreed.

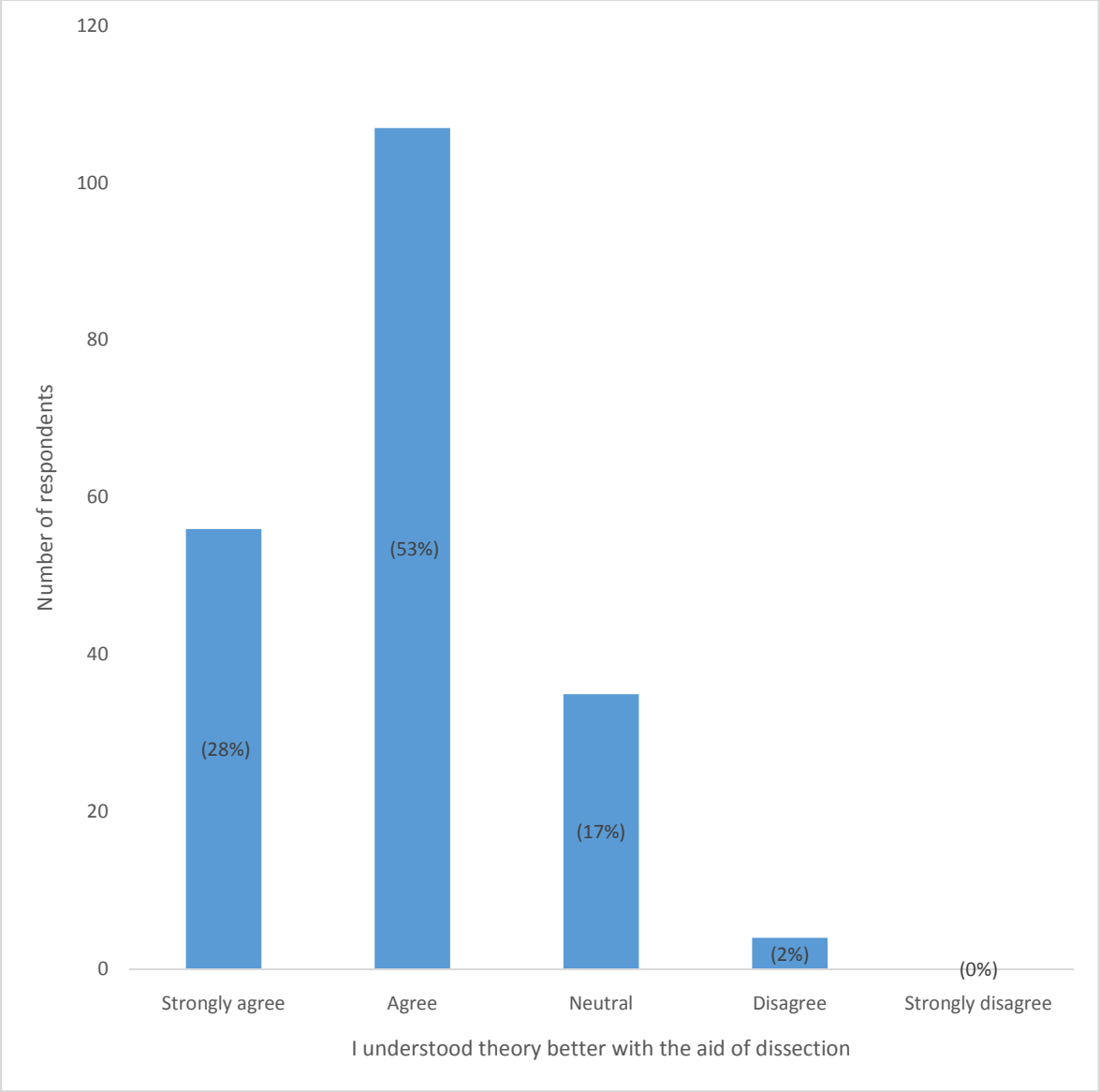

Figure 4.25: Perception of respondents on" Dissection helped me Understood Theory of Anatomy Better"

163 of the respondents (81%) agreed that dissection helped them understood theory taught in class better while only 4 (2%) disagreed.

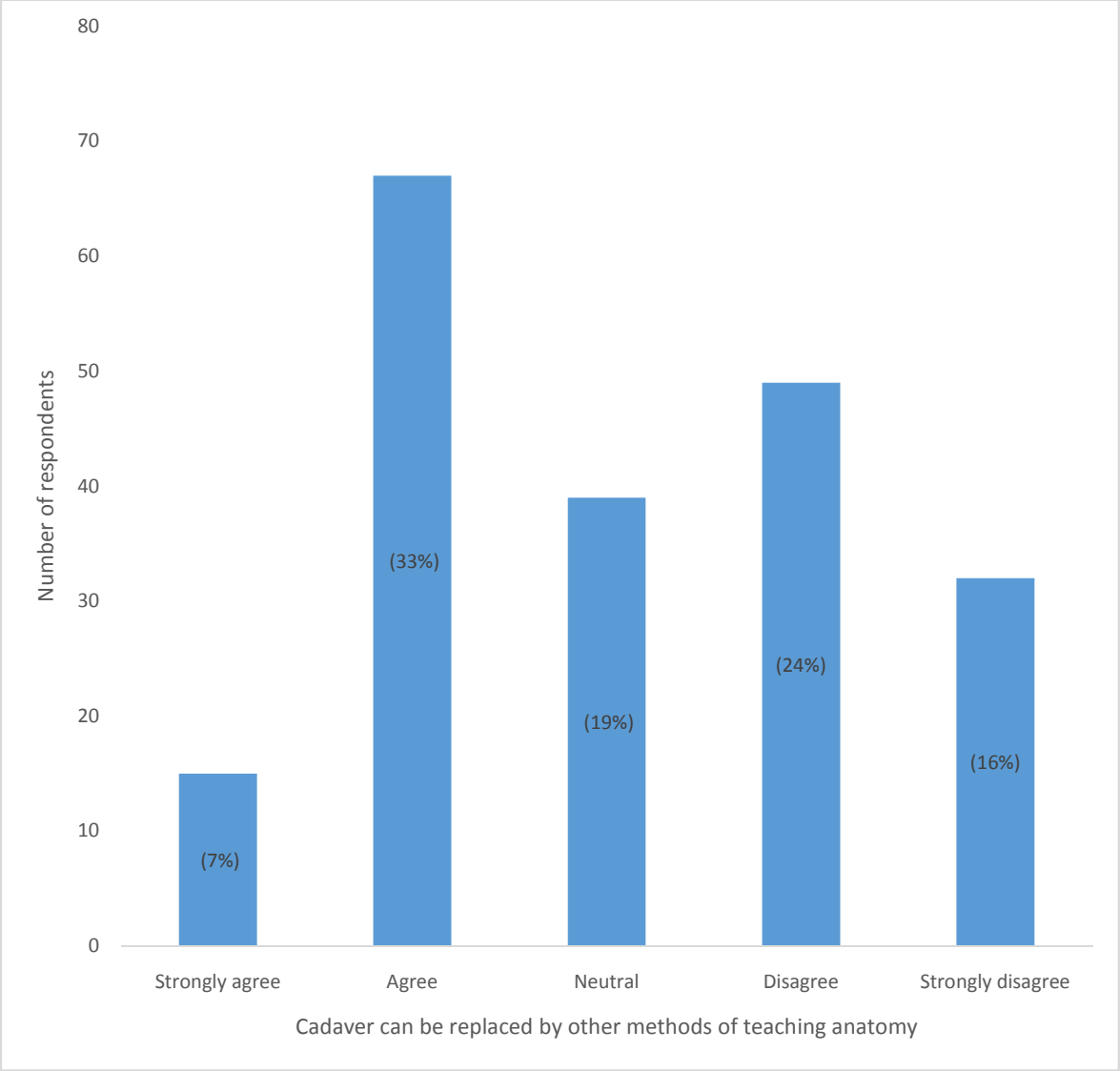

Figure 4.26: Perception on "Dissection can be Replaced by other Methods of Teaching Gross"

82 of the respondents (40%) agreed that the use of cadaver for medical education can be replaced by other methods of teaching anatomy while 81 (40%) disagreed.

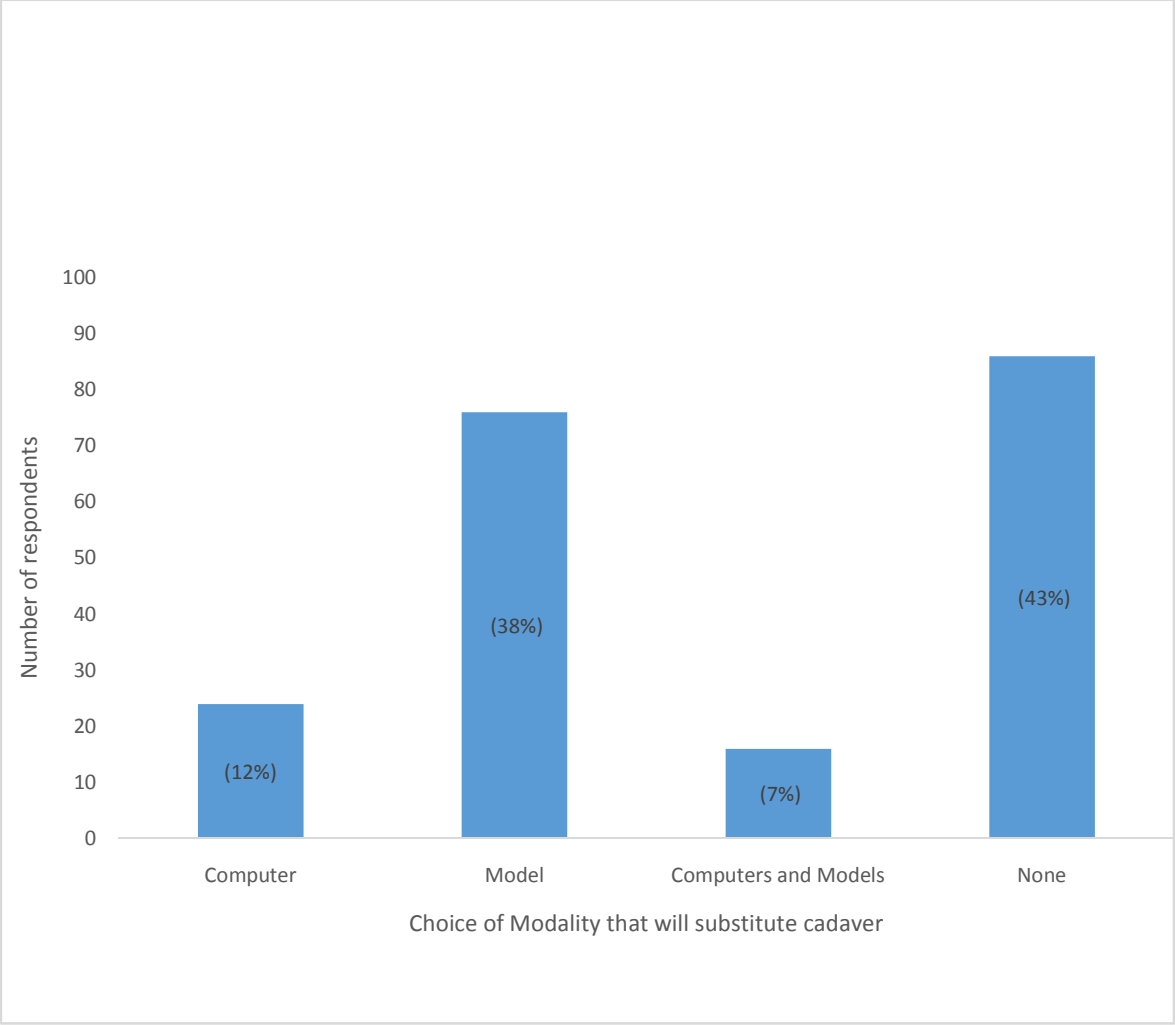

Figure 4.27: Modality of Teaching Gross Anatomy that will Substitute Cadaver.

86 of the respondents (43%) when asked of which method of teaching gross anatomy would substitute cadaver in their medical school responded none however 76 (38%) choose models, 12% Computer and 7% choose both computer and model.

Table 4.5: Chi-Square test of Association between exposure to a lot of dissection and significance of dissection to anatomy

Significance of dissection to anatomy					
A lot of Exposure to dissection		**Agree**	**Neutral**	**Disagree**	**Total**
	Agree	121	2	12	135
	Neutral	12	7	6	25
	Disagree	29	1	12	42
	Total	162	10	30	202

x^2=46.02, DF=4, P < 0.0001

There is statistically significant association between exposure to a lot of dissection and significance of dissection to anatomical knowledge (p=0.000).

Table 4.6: Chi-Square test of Association between significance of dissection to anatomical knowledge and relevance of dissection to clinical practice.

Dissection helped to Develop skill					
Significance of dissection to Anatomy.		**Agree**	**Neutral**	**Disagree**	**Total**
	Agree	102	19	41	162
	Neutral	1	7	2	10
	Disagree	12	10	8	30
	Total	115	36	51	202

x^2=29.25, DF=4, p< 0.001

There is statistically significant association between significance of dissection to anatomy and relevance of dissection to clinical practice (p=0.000).

Table 4.7: Chi-Square test of Association between significance of dissection to anatomy to housemanship and relevance of dissection to clinical examination and documentation.

Dissection helped in Documentation					
		Agree	**Neutral**	**Disagree**	**Total**
Significance of dissection to housemanship	**Agree**	61	17	25	103
	Neutral	8	23	7	38
	Disagree	23	8	30	61
	Total	92	48	62	202

x^2=46.91, df=4, p< 0.001

There is statistically significant association between significance of dissection to housemanship and dissection improved clinical examination/documentation (p=0.000).

Table 4.8: Chi-Square test of Association between relevance of dissection to housemanship and dissection improved skill.

Dissection improved clinical skills					
		Agree	**Neutral**	**Disagree**	**Total**
Dissection prepared me for housemanship	**Agree**	83	6	14	103
	Neutral	8	23	7	38
	Disagree	24	7	30	61
	Total	115	36	51	202

x^2=90.690, df=4, p< 0.001

There is statistically significant association between relevance of dissection to housemanship and dissection improved clinical skills (p =0.000).

Table 4.9: Chi-Square test of Association between relevance of dissections to housemanship and dissection improved basic clinical procedures.

Dissection improved Basic Clinical Procedures					
Relevance of dissection to Housemanship		**Agree**	**Neutral**	**Disagree**	**Total**
	Agree	64	13	26	103
	Neutral	9	25	4	38
	Disagree	24	8	29	61
	Total	97	46	59	202

x^2=60.069, DF=4, p< 0.001

There is statistically significant association between relevance of dissection to housemanship and dissection improved basic clinical procedures (p =0.000).

Gender differences in perception on the use of cadaver for medical education amongst house office.

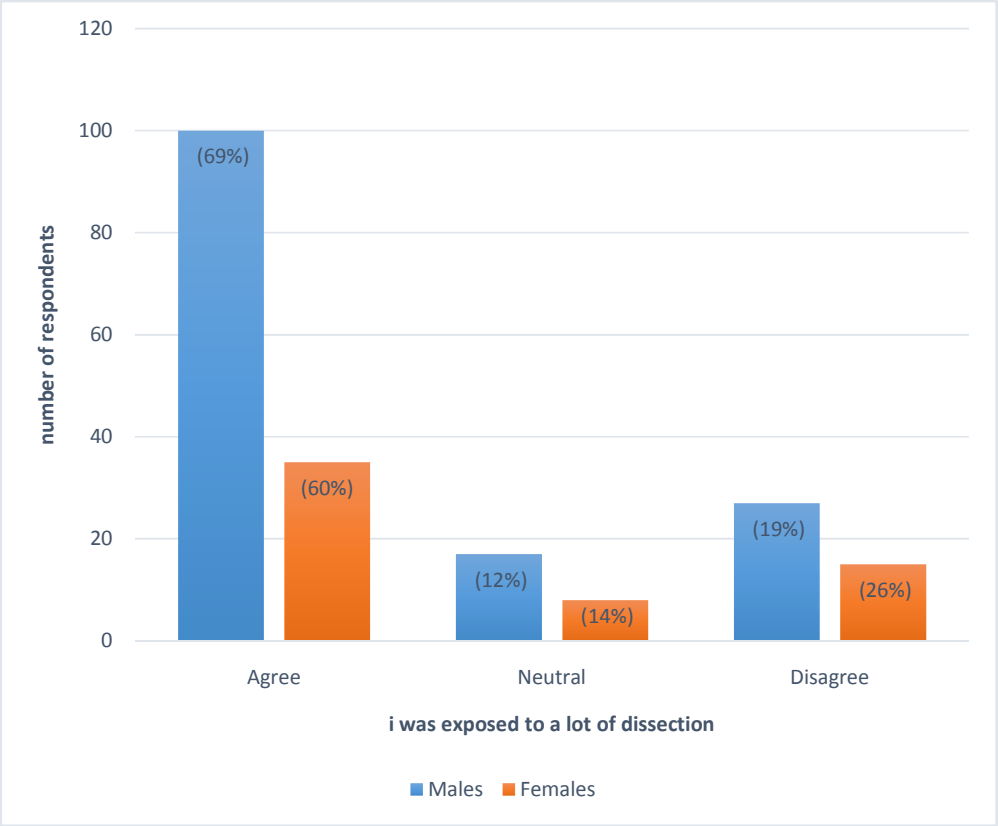

Figure 4.28 Gender Perception on Exposure to a lot of dissection

There is no much difference in the gender perception on exposure to a lot of dissection while at medical school as shown in the figure above.

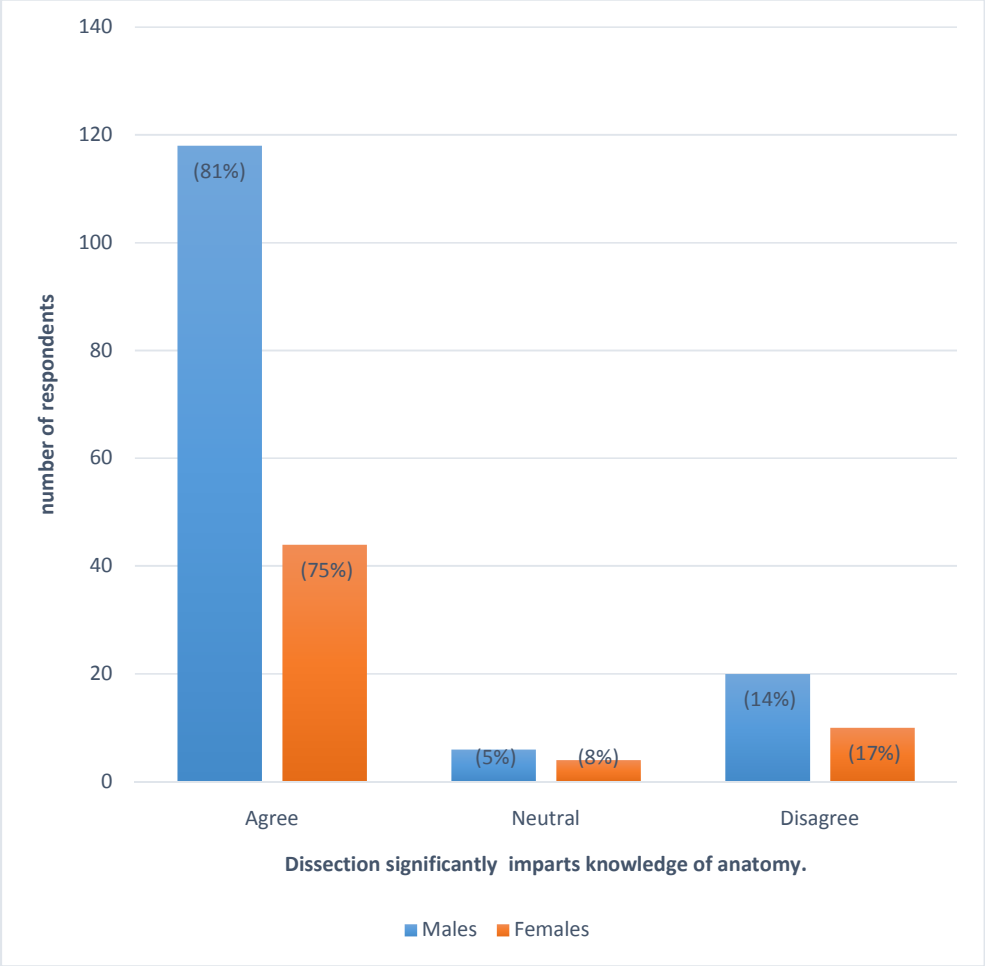

Figure 4.29 Gender Perception on Significance of Dissection to Anatomical Knowlegde.

There is no much gender difference on the perception of significance of dissection to anatomical knowledge as shown in the figure above.

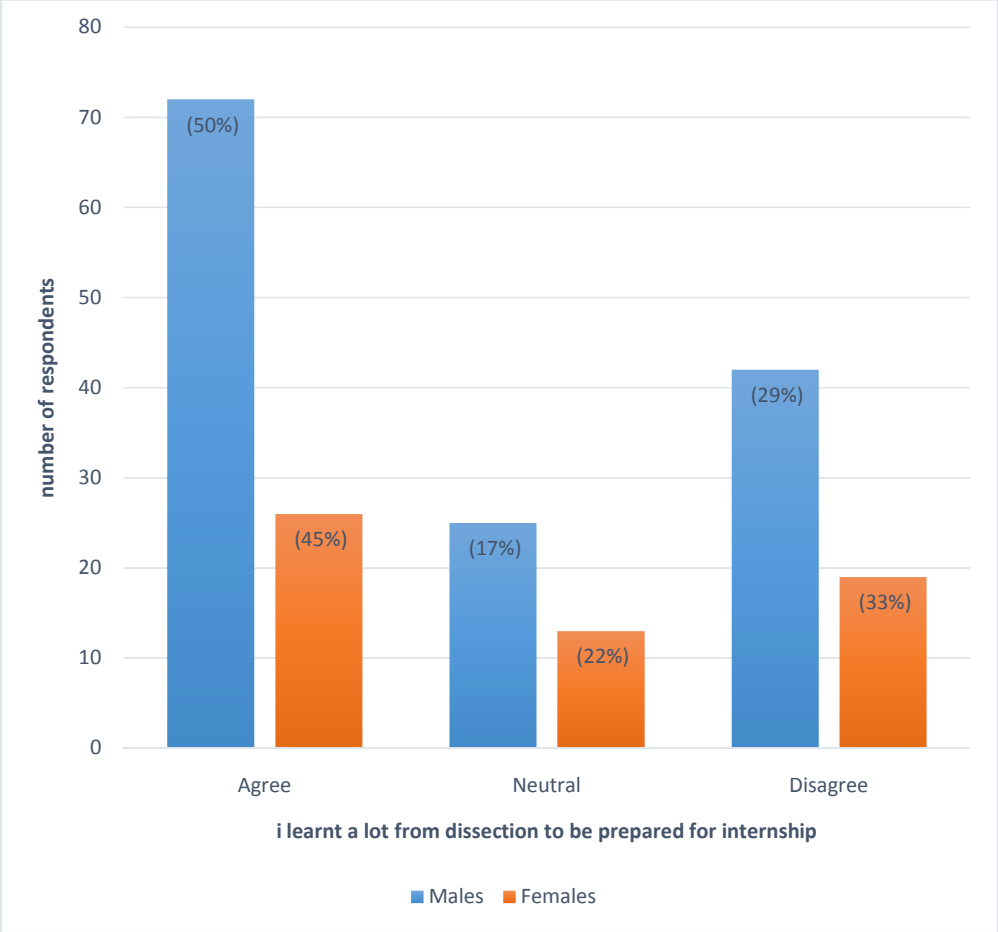

Figure 4.30 Gender Perception I learnt a lot of Anatomy from Dissection to Prepare me for Housemanship.

There is no much gender difference on the perception of I learnt a lot of anatomy from dissection to have made me ready for housemanship as shown in the figure above.

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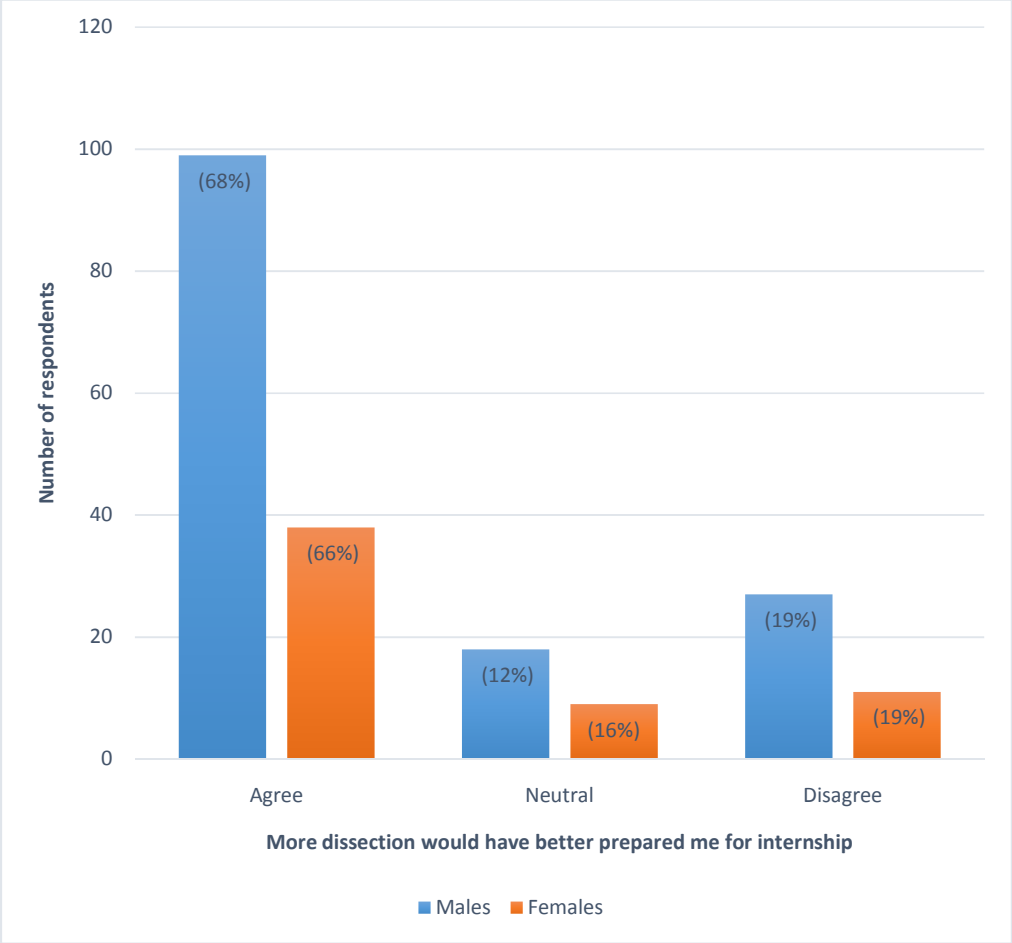

Figure 4.31 An Intensive Dissection would have Prepared me better for Housemanship

There is no much gender difference on the perception that a more intense dissection would have better prepared me for housemanship.as shown in the figure above.

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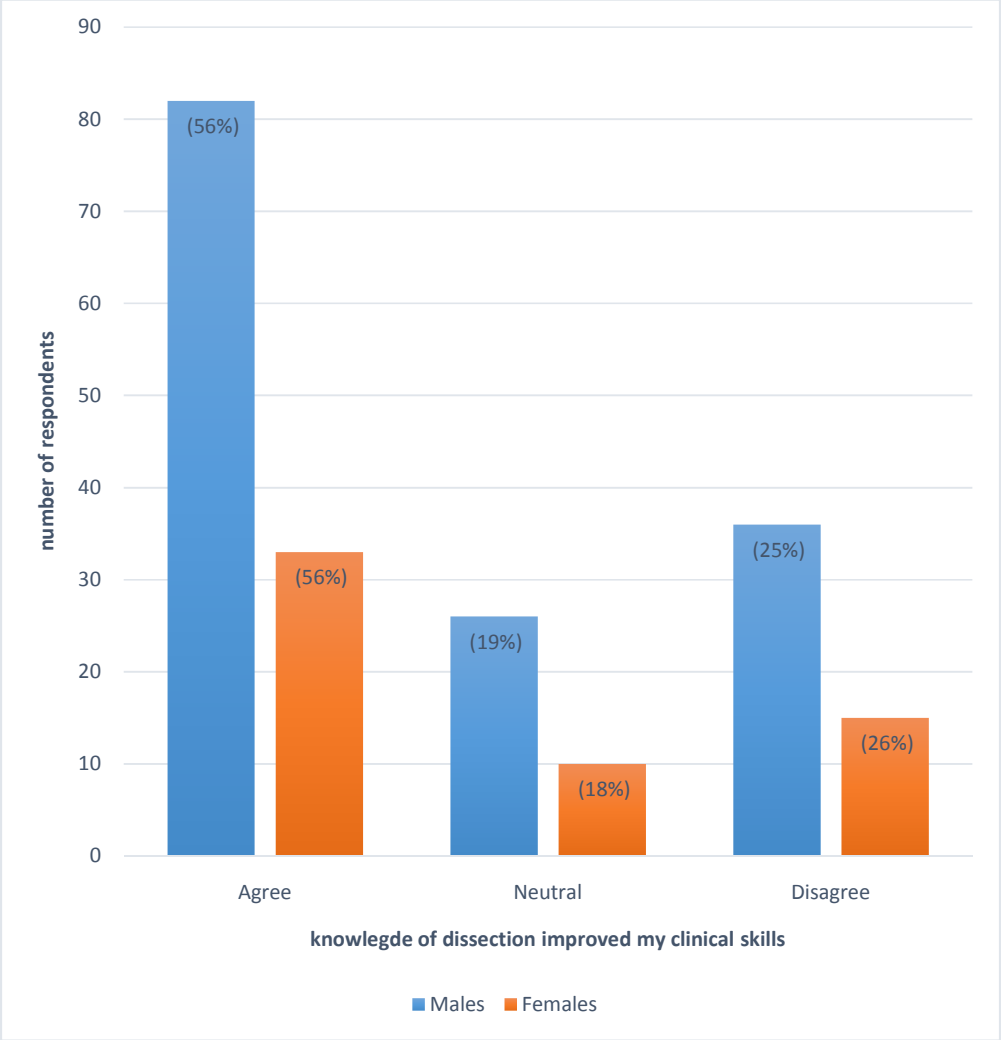

Figure 4.32 Knowledge of Dissection Improved my Clinical Skill.

There is no much gender difference on the perception dissection improved my clinical skills as shown in the figure above.

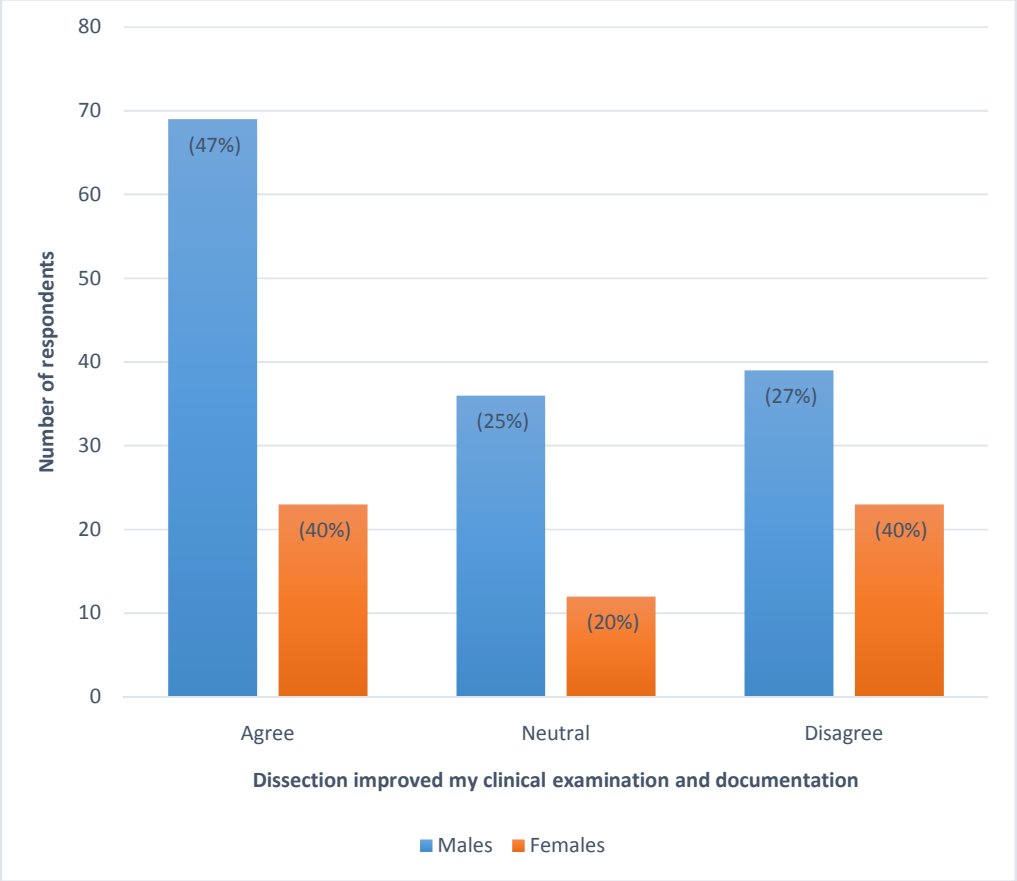

Figure 4.33 Dissection Improved my Clinical Examination and Documentation

More females (40%) tend to disagree that dissection improved their clinical examination and documentation than males (27%) as shown in the figure above.

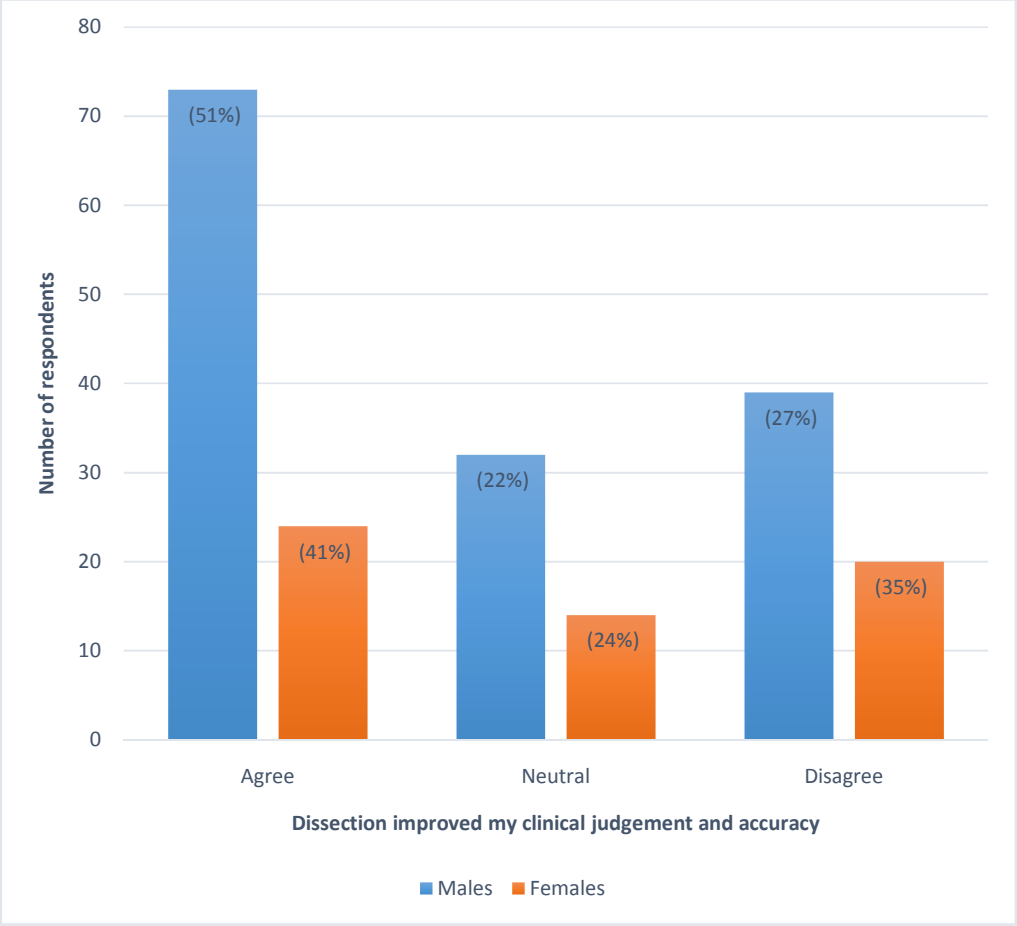

Figure 4.34 Dissection Improved my Clinical Judgement and Accuracy

More males (51%) tend to agree that dissection improved their clinical accuracy and judgement than females (41%) as shown above.

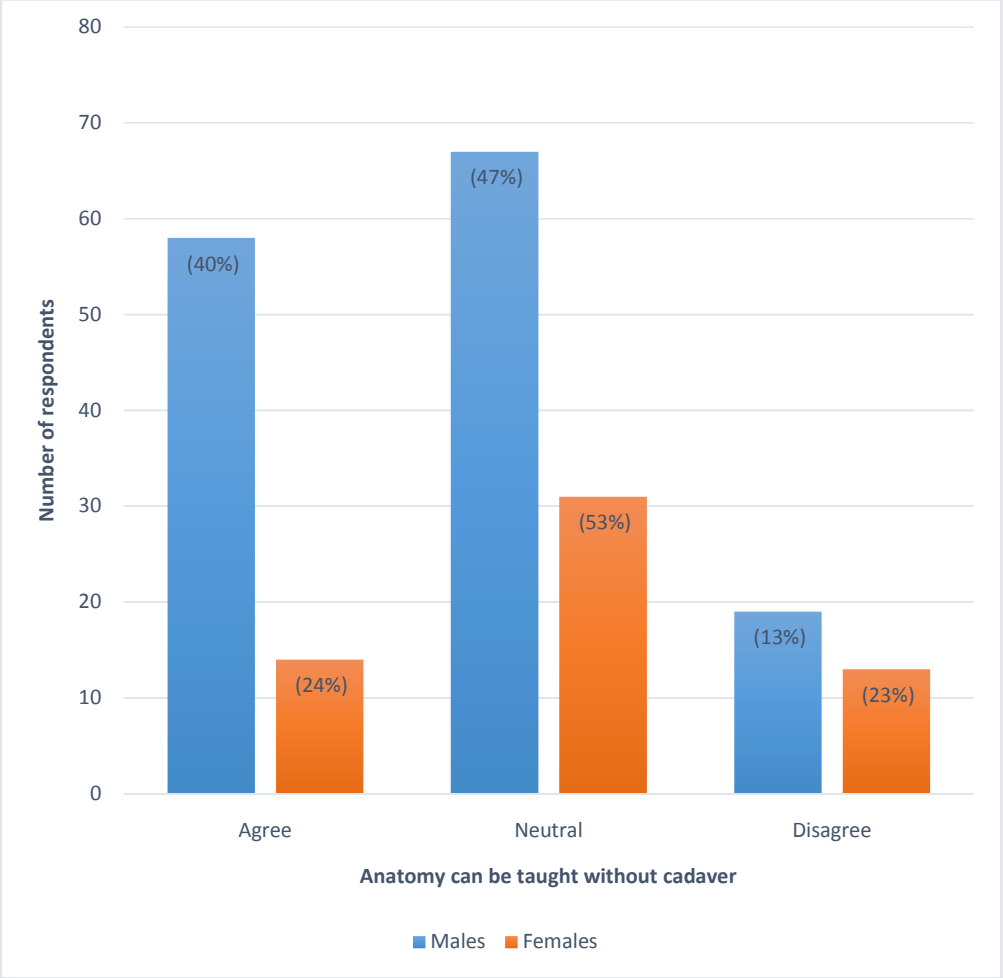

Figure 4.35 Gender Perception on Anatomy can be Taught without Cadaver

More males (40%) tend to agree that Anatomy can be taught without cadaver than females (24%). It was also observed that more females (23%) tend to disagree than males (13%)

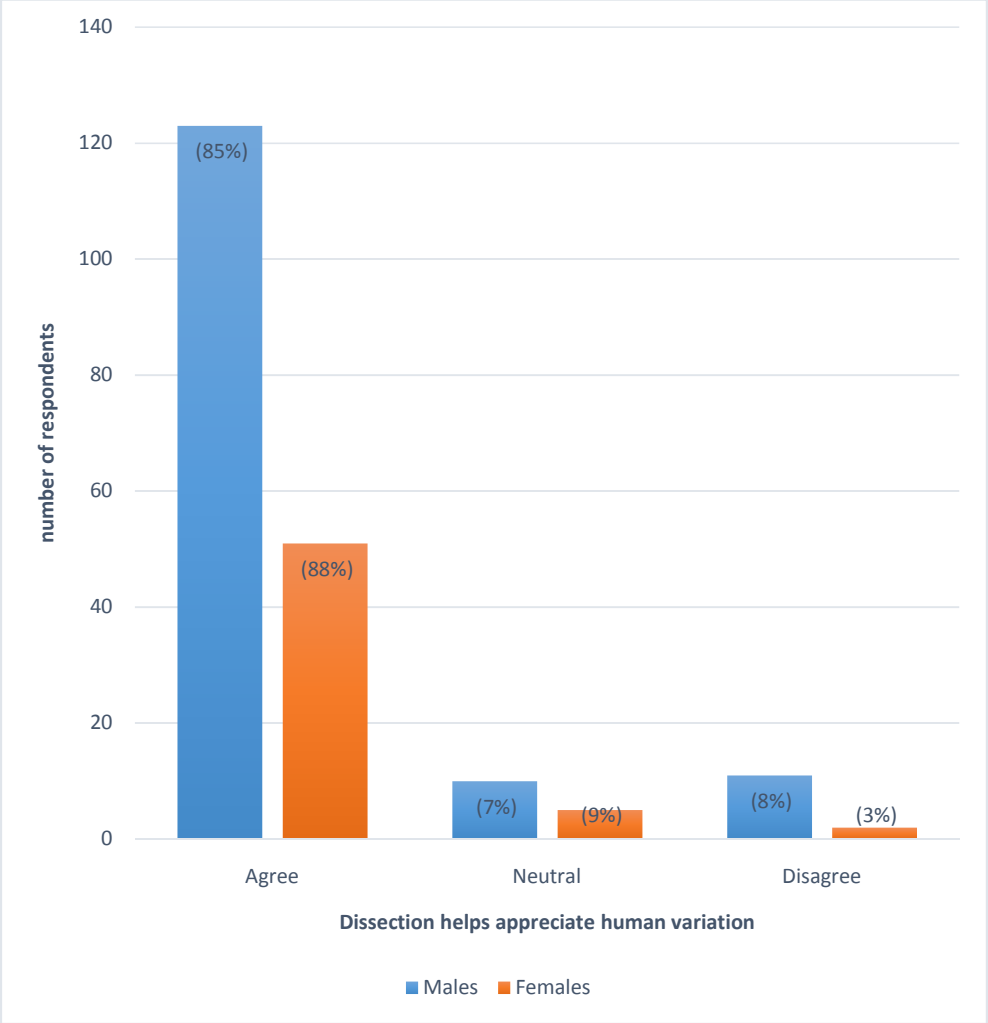

Figure 4.36 Gender perception on Dissection helps Appreciate Human Variation.

There is no much gender difference on the perception dissection helps appreciate the human architecture.

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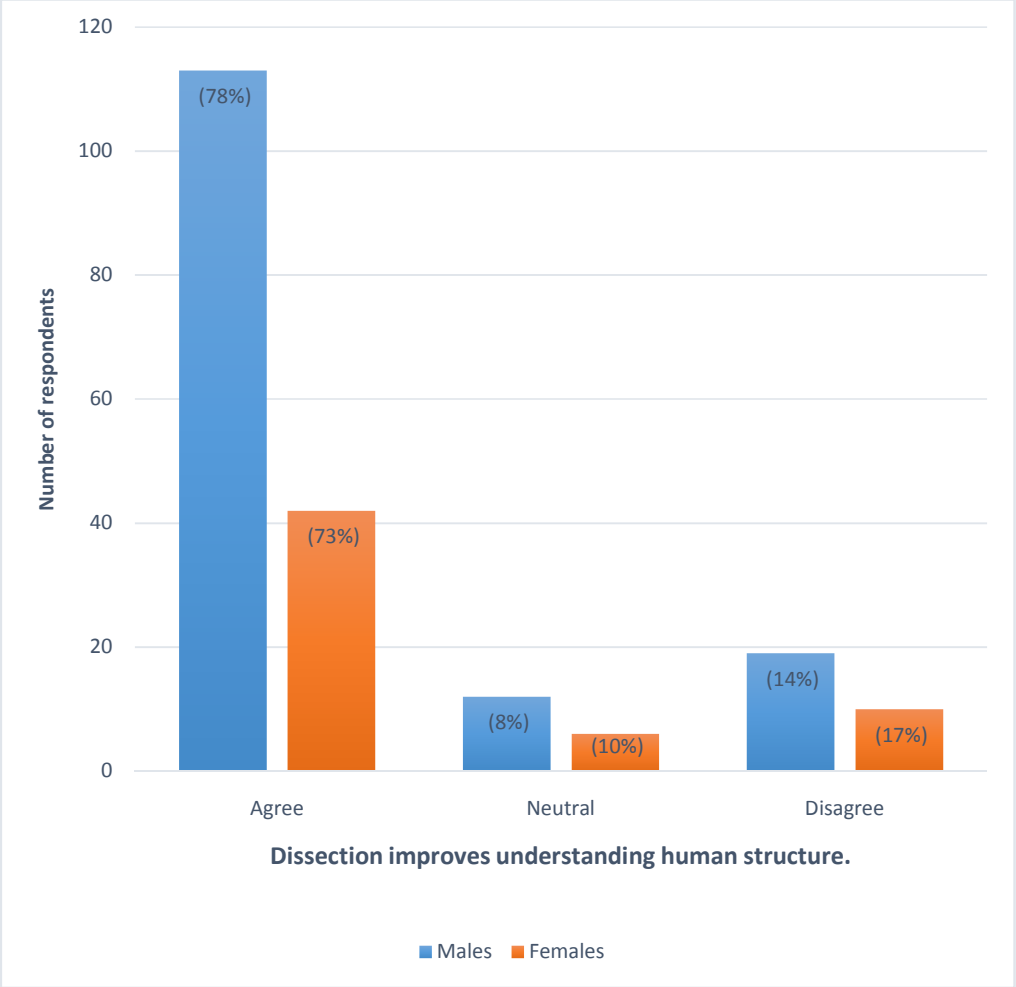

Figure 4.37 Gender Perception on Dissection Improves Understanding Human Structure.

There is no much gender difference on the perception dissection improves understanding of the human structure.

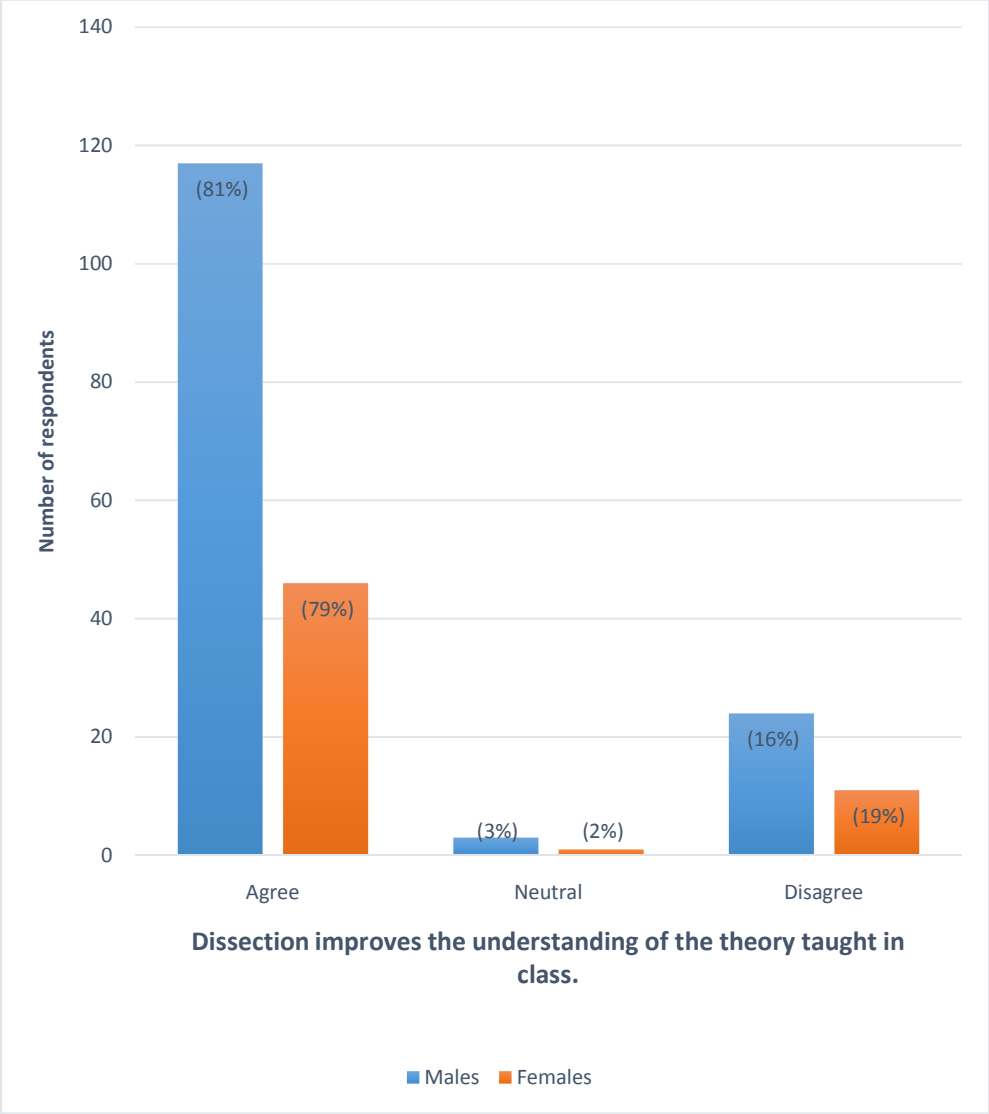

Figure 4.38 Gender Perception on Dissection Improves the Understanding of the Theory Taught in Class.

There is no much gender difference on the perception dissection helps to understand the theory of gross anatomy as shown above.

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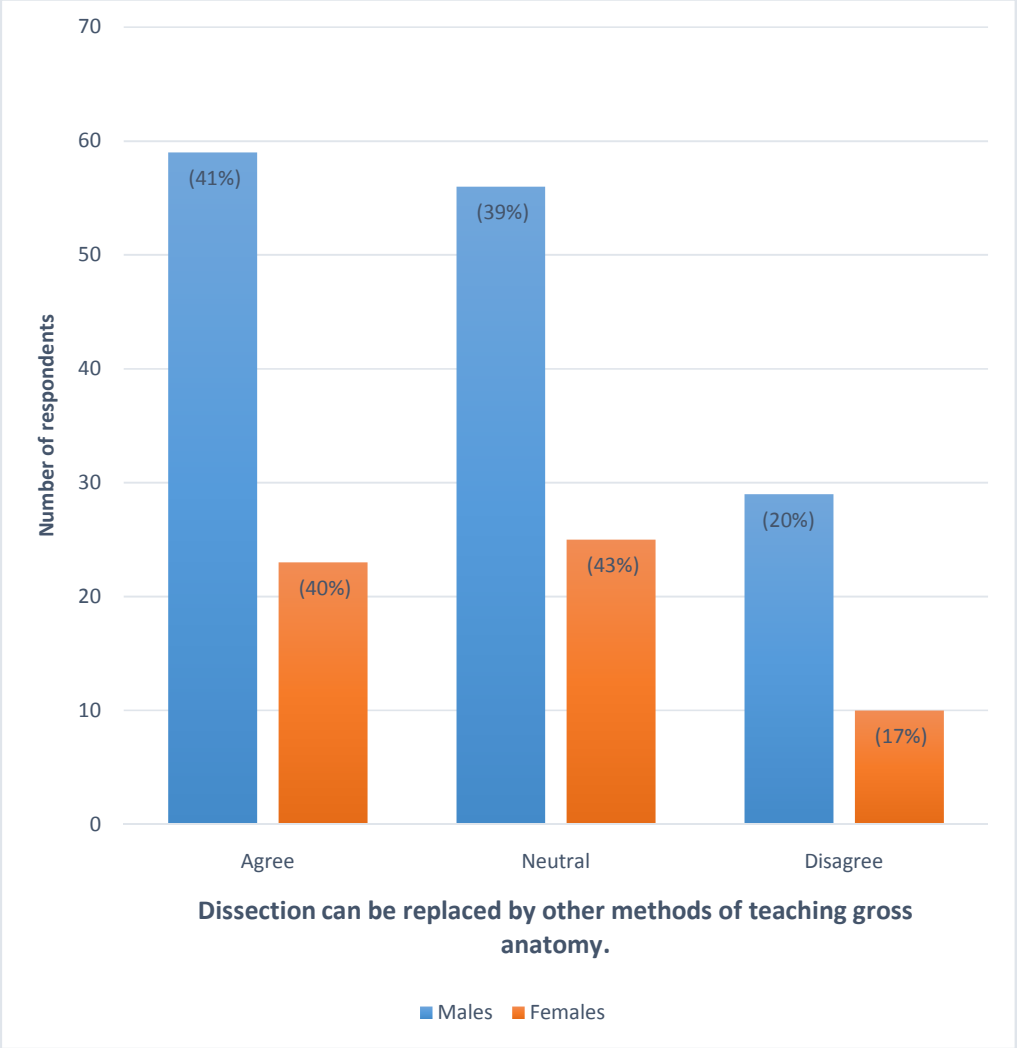

Figure 4.39 Gender Perception on Dissection can be Replaced by other Methods of Teaching Gross Anatomy.

There is no much gender difference on perception that anatomy can be taught without cadaver as shown in the figure above.

Table 4.10; Mann Whitney U test for gender difference on Perception on the use of cadaver for medical education.

SN	PERCEPTION	Mean Rank		Mann-Whitney U	Z-value
		MALE[1]	FEMALE[2]		
1.	Exposure to a lot of dissection.	98.73	108.39	3776.500	-1.279
2.	Significance of cadaver dissection to anatomy.	99.24	105.71	3932.000	-0.936
3.	Dissection prepared me for housemanship	99.24	107.11	3850.500	-0.949
4.	A more intense Dissection course would have better prepared me for	100.72	103.44	4063.500	-0.363
5.	Dissection developed skill	101.38	101.79	4159.000	-0.051
6.	Dissection improved documentation	97.85	110.55	3651.000	-1.503
7.	Improved Clinical procedures	98.47	109.02	3740.000	-1.256
8.	Anatomy can be taught without cadaver	95.84	115.55	3361.000	-2.371*
9.	Cadaver aids appreciation of anatomical variation.	102.35	99.39	4053.500	-0.543
10.	Cadaver aids to understand the anatomy of the human body	99.72	105.91	3920.000	-0.923
11.	Cadaver aids to understand theory taught in class	100.91	102.97	4090.500	-0.332
12.	Cadaver can be replaced by other method	101.69	101.03	4148.500	-0.079

[1]n=144, [2] n=58, * P < 0.05

The above table shows Mann Whitney U test on various perception ingender difference on the use of cadaver for medical education. There is no statistically significant difference regarding gender and the perception on the use of cadaver for

medical education, except on the perception that anatomy can be taught without cadaver.

4.2 DISCUSSION

4.2.1 Dissection and Knowledge of Anatomy

Cadaver based anatomical education is a prerequisite for optimal training and is necessary for establishing the solid foundation of patient contact, comprehension of the multidimensional body structure, appreciation of anatomical variability, learning the basic language of medicine and touch, mediated perception of the cadaver or patient. House officers are doctors, first year in medical practice. During this internship period they integrate what they have learnt in the basic sciences with their clinical science to generate ideas of diagnosis and to institute proper intervention. This study reflects a sample opinion of the house officers in the age group of 24years to 37 years which comprised of one hundred and forty four males (71.29%) and fifty eight females (28.71%). Gross anatomy is the cornerstone of medical education because anatomical knowledge is undoubtedly essential for doctors regardless of their specialty, particularly since they continue to perform physical examinations, make medical decisions, communicate with colleagues, and provide explanations to patients. Furthermore, expert knowledge of anatomy is essential in the present day, particularly for surgeons, because of the development of various surgical techniques and emergence of more sophisticated imaging technologies. The study showed that 135 (66%) of the respondents have been exposed to a lot of dissections while at medical school, however 25 (12%) have not been exposed to a lot of dissection. A study done by Saima*et al.,* (2011) showed that 33% of respondents performed a lot of dissection, while 35% of respondents performed few dissections and 32% were neutral on the number of dissections performed. This difference can be explained

from the fact that in this study, majority of the respondents did not avoid dissection due to any of the factors studied as a deterrent (such as religion, fear, respect of human body and the smell of formaldehyde). Majority also believe that dissection is indispensable in the study of anatomy. This can explain why they like dissection and performed a lot of dissection. The differences in the two study groups on the number of dissection performed can also be attributed to differences in academic curriculum. However Min and Young-il, (2013) findings was that, with regard to the adequacy of hours allocated for anatomy lectures and dissection laboratory for achieving the desired anatomy knowledge, most of the students responded that they were adequate (lectures, 63.3%. Dissection, 71.3%).These respondents were of the opinion that 50 hours of lectures and 120 hours of laboratory were adequate for gaining an understanding of the structure of the human body and acquiring basic medical terminology.

The houseofficers perception revealed that 162 (80%) of the respondents have acquired knowledge of anatomy from dissection, however 10 (5%) did not. There is also a statistically significant association between number of dissections performed as compared to its impact in acquisition of anatomical knowledge (p=0.000). The findings of Min and Young-il, (2013) in a study which showed that 91% of the respondents have acquired knowledge of anatomy from dissection, only 2% did not and 7% remained neutral. Azer and Eizenberg, (2007) also found that dissection imparted knowledge of anatomy in their study. There was a statistically significant association between the respondents who perceived that dissection was important for deep understanding of anatomy ($P< 0.001$), and thereby making learning interesting. This can also be explained from the fact that the respondents have performed a lot of

dissection while at medical school. The practical knowledge gained from dissection had led to improvement in knowledge of anatomy. The study equally showed that 190 (94%) of the respondents appreciated the human structure better with dissection. It can be observed also from the result that since the respondents have been exposed to a lot of dissection while at medical school, which had significant input in anatomical knowledge. This can be the reason why they really appreciated the human structure with the aid of dissection. The study of Min and Young-il, (2013) showed that 79% of respondents appreciated the human structure better with the use of cadaver for medical education.

Findings also reveal the respondents perception of 135 (67%) agreed that the use of cadaver gives a better reflection of life and death, while 25 (12%) disagreed. The respondent have been working with the dead body which was preserved i.e. cadaver to learn the gross anatomy of the living, so as to acquire knowledge of how the living body is designed to work. This had led to the appreciation of the human structure and has given the respondents a better reflection of life and dead.The findings of Min and Young-il, (2013) showed 50% of respondents agreed that dissection helps give a better reflection of life and death. The cadaver is the real human body that was once a living human being.

It was found in this study that 119 (59%) of the respondents agreed that dissection helps improve medical student's vocabulary, while 34 (17%) disagreed. It can be explained from the observation that the respondent have been exposed to a lot of dissections while at medical school, which lead to significant input in anatomical knowledge. The impact of such knowledge was observed from improvement in their

vocabulary in anatomy. The study of Min and Young-il, (2013) showed 80% of respondents agreed that the use of cadaver for medical education helps anatomical vocabulary.

The study showed that 159 (78%) agreed that dissection is indispensable in the study of anatomy while 21 (11%) disagreed. Findings of Mulu and Tegabu, (2012) showed that almost all (99%) of the respondents considered cadaver dissection had very important educational value for learning anatomy. This observation has shown that cadaver dissection to be of important value according to the respondents in teaching gross anatomy. This is probably because they have performed dissections and it had significant input in knowledge of anatomy with respect to improvement in appreciation of the human structure better and anatomical vocabulary. This might be the reason why majority of the respondents really believe that dissection of the cadaver is indispensable in the study of anatomy. In another study by Min and Young-il, (2013) showed that 91.3% of the respondents found the use of cadaver to be indispensable in the study of anatomy. A study by Paul *et al.,* (2014), showed 92% of respondents agreeing that the use of cadaver to be indispensable in the study of anatomy. In a study by Saima*et al.,* (2011) which showed 62% of respondents considered dissection indispensable in the study of anatomy. In another study by Izunya*et al.,* (2010) which showed that a vast majority of the students (90%) considered cadaver dissection as important and indispensable in the study of human anatomy. It has been ascertained that the manual skills learnt in the dissection room are essential in almost every branch of the medical profession. Moreover, dissection has been considered as an essential requirement in learning gross anatomy particularly the three-dimensional aspect of human anatomy and has remained the universally

recognizable step in becoming a doctor, which puts undergraduates at the sharp end of medical education.

In this study 95 (47%) of the respondents agreed that the time allotted to dissection is sufficient to improve understanding of gross anatomy, while 60 (30%) disagreed and 23% were neutral with this regards. The findings of Nagar *et al.,* (2012) which revealed that about 52% of the respondents feel that the time in the dissection hall is more than enough to have imparted knowledge of anatomy this can be explained due to the different educational curriculum of the study groups.

4.2.2 Factors that affect performing dissection.

Cadavers worldwide are preserved with formaldehyde and it has peculiar smell which is a hallmark of dissection hall, in addition it can provoke some allergic diseases like asthma in some students. Formaldehyde is a hapten and formaldehyde-protein complex may be immunogenic (Maibach, 1983). The chemical is extensively used to preserve cadavers in departments of anatomy. The primary route of exposure to formaldehyde is by inhalation, where it is absorbed by the lungs and gastro-intestinal tract and to a much lesser extent through the skin. The literature on formaldehyde contains reports on dermatitis and asthma. On industrial exposure to formaldehyde, few reports mentioned the effect of formaldehyde on medical students during dissection. The process of embalming a cadaver is by introducing a fixative into the body tissues. This helps to preserve the cadaver by maintaining, as far as possible, a life-like state, and in the process, retaining the normal anatomical relations as are required for dissection purposes. The embalming fluid is made up of a combination of chemicals that include fixatives, preservatives, germicides, buffers, wetting agents,

anticoagulants, dyes, perfuming agents, *etc*. The formulation for the preparation of embalming fluid varies. It depends on the laboratory and some other factors such as the size, extent of edema and stage of decomposition of the cadaver(Onjiye andAvwioro, 2012). In this study 92 respondents (46%) agreed that they hated dissection because of the smell of formaldehyde, while 71 (35%) disagreed. In a study by Saima*et al.,* (2011) which showed 45% of respondents attributed their repulsion of cadaver dissection due to the smell of formaldehyde. In another study by Mulu*et al*., (2012) which showed that about 75% of students considered the dissection room as slightly or highly stressful due to the smell of formaldehyde. Khadija and Muhammad*,* (2014) findings revealed that 68% of the respondents agreed that the smell of formaldehyde is a deterring factor to dissection. The environment of the dissection hall is laden with persistent odour of the cadavers and their preservatives. Formaldehyde has been for its toxic effects like nausea, conjunctival irritation and even emotional impact like depression amongst the students. This can explain the reason for the repulsion of dissection by the respondents.

Most of the religions and cultures give high respect and dignity to dead bodies. It is therefore natural for some respondents to develop very personal and respectful relationships with the cadavers they handle.According to Ibn Rushd, “He, who is engaged in the science of anatomy, increases his belief in God.” (Savage-Smith, 1995). However, the anatomical study of the human body has sometimes been problematic because it requires dissection. A number ofscholars - religious scholars in particular - seem to be opposed to the practice, since it implies mutilation of God’s most noble creation. The utilization of the human body and organs are supposed to be points of constant debate in Islam (Hehmeyerand Khan, 2007). Other religions,

including Christianity, have their own sociocultural obligations and limitations with the main aim of upholding human dignity and the sanctity of human life. But whatever may be the geo-political-socio-cultural differences, there is a definite bond between the medical student and the cadaver (Dhastagir and Omer, 2010). In this study it was observed 44 (22%) of the respondents agreed that dissection is disrespectful to human creation while 122 (60%) disagreed. In a study by Saima*et al.,* (2011) which showed 21% of respondents repelling cadaver dissection because of respect of the human body. With regards performing dissection and fear of the dead 132 (66%) of the respondents did not hate dissection because of fear the dead while 35 (16%) of respondents hated it. In the findings of Saima*et al.,* (2011) 16% of respondents did not like dissection because of fear of the dead while 55% liked it and 29% remain undecided regarding this perception.

In almost all religions dissection is permitted as an exception for the sake of seeking knowledge for future doctors. Even in Islam using the bodily parts of a dead person is permissible for the students of medicine who do so as a way of training. In this study 32 (16%) agree that dissection of the human body is prohibited from their religious point of view while 121 (61%) of the respondents disagree. In the study by Saima*et al.,* (2011) which showed that 19% of respondents avoided dissection because of religious belief while 58% disagree and 23% remain undecided regarding this perception. This can also explain why the respondents have performed a lot of dissection, because most of the respondents disagreed with the factors that affect dissection. It can also explain the reason why they regard it as in dispensable in the study of anatomy.

4.2.3 Relevance of Cadaver Dissection to Practice

Regarding goals of anatomy education, 103 (51%) of the respondents agreed that the use of cadaver for anatomy education in medical school prepared them well for housemanship, however 38 (19%) of the respondents disagreed. The result also showed that 115 (52%) agreed that dissection sessions in anatomy helped them as an intern to improve their skills, while 36 (18%) disagree. Findings also showed a statistically strong relationship between cadaver dissection and skills acquisition during house job ($p< 0.001$). Majority the respondents have been exposed to a lot of dissection while at medical school and considered it to have significant input to their knowledge of anatomy. This can be the reason why they were prepared for housemanship. It was found out in this study that 92 (45%) agreed that dissection improved their clinical evaluation and documentation, however 48 (23%) disagreed while 62 (31%) remain neutral. The cadaver is a dead body preserved in formalin, while making clinical observations, examinations, or assisting during surgeries, the anatomical fields or landmarks can be obscured by bleeding. This is not seen in the cadaver, and can therefore be the reason why 45% of the respondents agreed that dissection improved their clinical evaluation and description during documentation. The result showed that 97 (48%) agreed that dissection improved their ability to perform basic clinical procedures e.g. Nasogastric tube insertion, catheterization, cannulation etc. and 46 (22%) disagree. Even though the respondents have been exposed to a lot of dissection and considered it important in the study of anatomy, basic clinical procedures in the patient can be difficult at times. This is because of disease condition obscuring the anatomy or resistance by the patient despite adequate counselling. This is observed for example the patient can strain to prevent NG tube or catheter from passing through during the procedure. Another finding was that 105

(53%) of respondents agree that dissection had improved their clinical accuracy, however 36 (18%) of respondents disagreed. A statistically significant association was found between dissection and ability to perform basic clinical procedures during housemanship ($p< 0.001$). This can be because majority of respondents in this study agreed that dissection is indispensable in teaching anatomy, with quite a number being exposed to a lot of dissection and its significant input to their knowledge of anatomy. Dissection also improved their skills and made them acquire anatomical knowledge to be prepared for internship. This can the reason why they believed that it improved tier clinical accuracy. The findings of Min and Young-il, (2013) also showed 58% of the respondents agreeing that dissection helped improved their knowledge of anatomy and thus improving their clinical anatomy and application. The finding of Izunya*et al.,* (2010) showed 79% of the respondents agreed that dissection session enhance their thinking in a logical manner to enhance accuracy and skill as a future clinician. Lempp, (2005) study showed apart from learning to cope with the overt emotional confrontation with the cadavers which assists anatomical learning, seven additional covert learning outcomes were identified by the respondents of this study which include, respect for the body, familiarization of the body, application of practical skills, integration of theory and practice, preparation for clinical work, and appreciation of the status of dissection within the history of medicine. Levine *et al.,* (2006) study showed that 79% of the respondents have acquired skills and performed skills more quickly after training and 72% of the respondents showed improved performance after training with the use of cadaver. A study done by Muhammad, (2012) showed a total of 74.6% of the respondents agreed that the study of gross anatomy was essential for the understanding of other clinical courses. Furthermore, 60.4% of the respondents said that the study of gross anatomy did not develop their

ability to perform common clinical procedures, such as lumbar puncture, catheterization, intravenous lines, etc. A study by Azer and Eizenberg, (2007) also showed that dissection improved the respondents' skills to do emergency procedures ($p< 0.001$). The study found that 137 (68%) agreed that a more robust dissection course in anatomy in medical school would have better prepared them for housemanship however 27 (13%) disagreed. A study by Michael and Thomas, (2011) found that the respondents felt that their anatomy education prepared them very well for internship. Respondents also reported as a whole that the robustness of their anatomy course was appropriate, with only a slight bias toward feeling that a more robust anatomy course would have better prepared. The manual skills learnt in the dissecting room are essential in almost every branch of the medical profession. In this study 125 (62%) agreed that dissection should be included in the clinical curriculum, while 28 (14%) disagreed. Also 54% of the respondents in this study agreed that a more intense dissection in anatomy in medical school would have better prepared them for internship. The usefulness of cadaver dissection to anatomy education has long been debated. While some authors argue that the dissection laboratory is indispensable for anatomy education, others note possible disadvantages of dissection compared to other tools such as models, computer assisted techniques etc. Some observers argue in favor of complete cadaver less anatomy education. In this study 72 (35%) agreed that gross anatomy can be taught without cadaver, while 98 (48%) disagreed. Literature has also shown that students who have experience with the dead body will be better equipped to deal with issues surrounding death and more aware of medical uncertainty which will make them better doctors (Parker, 2002). The findings of Fazal*et al.,* (2012) showed that 40% of the respondents believed that teaching anatomy without cadaver is not preferable at all. Human dissection is the one

remaining educational modality that teaches preclinical medical students how to use their hands. This helps them to develop touch-based skills which can be transformed to palpation, percussion and auscultation. The man Whitney test showed a statistically significant association between gender and perception that anatomy can be taught without cadaver (Z= - 2.371, U=3361.000) as shown. It can be observed that more females (23%) tend to disagree than males (13%). This can explain the reason why there is a statistically significant difference. It can also be observed from the study that even though slightly more than half of the respondents choose cadaver as the best modality of teaching anatomy, quite a number agreed that all methods combined together will give better results.

4.2.4 Use of Cadaver versus Other Methods of Teaching Anatomy

The findings in this study showed that 110 (54%) of the respondents feel that the use of cadaver is the best for teaching and understanding gross anatomy. However 65 (32%) believe that all the three methods (cadaver, models and computer assisted learning) combined together lead to better understanding of gross anatomy. The study showed majority of the respondents feel that cadaver dissection is indispensable in the study of anatomy. It also showed the significance of dissection in acquiring anatomical knowledge, improvement in anatomical vocabulary and skills. This can be the reason why more than half of the respondents feel that cadaver is the best for teaching gross anatomy. A study by Paul *et al.,* (2014) found that 98% of the respondents feel that the best method of learning gross anatomy is with the use of cadaver. According to Nagar *at el*., (2012) in a study which found respondents feeling that dissection hall teaching is the best method followed by slide projector, Audio visual projection, Multimedia, conventional chalk and board methods. None of the

respondents agreed with the self-directed learning in the museum. The study revealed 46.72% students are aware of internet as a tool to learning and judge it as an effective source of self-learning. In a study by Gholamreza*et al.,* (2012) which showed 83.5% of the respondents believe that dissection is the best method for teaching Anatomy. The findings of Izunya*et al.,* (2010) showed that majority (84%) of the respondents agreed that dissection remains the best method of learning anatomy. This is consistent with the view held by many anatomists. A study by Zagga*et al.,* (2010) found that only 7% of the respondents agree that they understand anatomy without dissection.Oyeyipo and Falana (2012) found out in their study that on the issue of replacing cadaver dissection with plastic models, computer assisted learning in the nearest future, 48% of the students favoured such a replacement, while 51.7% did not. A study by Ambica, (2012) also found that 80% of the respondents believe that teaching by cadaver dissection was beneficial to them as compared to teaching through multimedia slides. Another study by Patel and Bajem, (2008) found out that 69% of the respondents favored the use of cadaver compared to other methods of teaching gross anatomy. According to Egwu*et al.,* (2008) in a study which showed 79.1% of the respondents preferred learning with cadavers to computer assisted learning and human models, while 20.9% preferred a computer based learning approach and the use of models to cadaveric learning/dissection. A study by Gaurav and Mandep, (2010) also found that majority of respondents (83.66%) agreed that actual hands on training on cadaver dissection gave better results than demonstration of prosected specimen and also enhanced learning and confidence in the subject matter. On the preferred method of learning anatomy, it was observed that overwhelming majority (93.3%) believed that dissection remains the best method of anatomical studies this is according to Oyeyipo and Falana (2012).

This study found out that 109 (58%) of the respondents choose cadaver as the best option because it provides better appreciation of the human body, aiding better understanding of gross anatomy. This study showed that majority of the respondents have acquired knowledge of anatomy from dissection, with quite a number also agreeing that cadaver dissection is indispensable in the study of anatomy. This can explain the reason why they choose cadaver as the best option that provides better appreciation of the human body. The study of Min and Young-il, (2013) which reveal that 78% of the respondents agreed that the use of cadaver leads to better understanding of gross anatomy.

One of the most important concepts in medicine is biological variation. No two individuals are necessarily the same anatomically. This study found 174 (87%) of the respondents agreed that anatomical variations in humans can best be appreciated with dissection than with other methods, while 15 (8%) disagreed. Majority of the respondents have been exposed to a lot of dissection while at medical school, which lead to significant input in anatomical knowledge. The response also showed that the appreciation of the human body is better with dissection than other methods of teaching anatomy. This can explain why they really appreciated the variation of the human body better with the use of cadaver. A study done by Sprunger, (2008) which found out that developing a mental map of the body in three dimensions incorporating normal anatomical variations is a challenge for students of gross anatomy. Acquisition of this ability is facilitated by frequently reassigning students to work on different specimens in gross anatomy laboratories, a significant departure from traditional teaching strategies. Students were strongly supportive of the method, noting that specimen reassignments facilitated learning, encouraged dissection skill building, and fostered collaborative interactions. Students' perception of the value of the

contribution of each cadaver to their education was preserved and, for many, enhanced. Frequent specimen reassignments offer an opportunity to model public accountability for work and some aspects of the relationships between multiple health care teams caring for a patient.

It was also observed in this study that 155 (77%) agreed that anatomy of the human body can best be understood with the use of cadaver than with other methods while 18 (9%) disagreed. A study by Izunya*et al.,* (2010) showed 87% of the respondents agreed that gross anatomy can best be appreciated with the human body than with other methods of teaching gross anatomy. Another study by Paul and Bajem, (2008) showed that 74% of the respondents agree that cadaver gives the best understanding of the human body.

This study found 163 of the respondents (81%) agreed that dissection improved their ability to understand the theory taught in class, while only 4 (2%) disagreed. It also showed that dissection significantly improved their ability to understand the human body. When this anatomy is well understood it will aid in better understanding of the theory taught in class, since what is taught has been demonstrated during cadaver dissection. The study of Ambica, (2012) showed that since during dissection a student traces the course of vessel, dissects the relations and a whole picture is painted in his mind. A model is like the picture in a book. It was strongly suggested that dissection should be done in under graduate years. Respondents agreed that dissection deepened their understanding of anatomical structures, provided them with a three-dimensional perspective of structures and helped them recall what they learnt. The findings of Dubhashi*et al.,* (2011) showed that 80% of the respondents agreed that actual hands

on training on cadaver dissection gave better results, than demonstration of specimens or computer assisted learning packages. Respondents of the study also reported that dissection enhanced their ability to think in a logical manner.

Generally, on the issue of replacing cadaver dissection with plastic models in the near future, 82 of the respondents (41%) agreed that dissection can be replaced by other methods of teaching anatomy, while 81 (40%) disagreed with other methods and 39 (19%) of respondents remain neutral. In this study dissection had a significant input in knowledge of anatomy. It has led to better appreciation of variations of the human body and better understanding of the three dimensional nature of the body, when compared with other methods. This can be the reason why they feel that the use of cadaver cannot be replaced with other methods. The findings of Izunya*et al.,* (2010) showed that 45% of the respondents agreed that the use of cadaver for medical education can be replaced by other methods, 39% of the respondents disagree, while 19% remain neutral. A study by Fazal*et al.,* (2012) showed that 57% of the respondents disagreed that the use of computer assisted learning can replace cadaver.

It was noted in this study that 86 of the respondents (43%) believed that none of the method of teaching gross anatomy would substitute or replace dissection in their medical school. The perception of 76 (38%) however was that model would substitute cadaver. Majority of the respondents agreed that dissection had an input significantly to anatomical knowledge. It has aided their understanding of the three dimensional structure of the human body, improved skills acquisition and improved understanding of the theory taught in class. This can explain the reason why they feel that the use of cadaver for medical education cannot be substituted by other methods.

A study by Izunya*et al.,* (2010) showed that generally, on the issue of replacing cadaver dissection with plastic models in the near future, majority of the respondents under study (47%) favoured such a replacement, while 41% did not. Dissection gives students a better appreciation of the 3-dimensionality view of human anatomy, which is not possible with plastic models. A study by Egwu*et al.,* (2008) showed that (11.5%) of the respondents suggested that the use of models and Computer-assisted learning as a supplement to dissection could improve the quality of their training. Moreover, Aziz *et al.,* (2002) had stated earlier that the removal or attenuation of cadaver dissection is bound to impair the student's ability to apply the scientific method during diagnosis. In as much as the students favored cadaver dissection as the best method of learning anatomy, one can attribute their call for the replacement of cadaver dissection with plastic models to the relative difficulty in the procurement of cadavers considering the attention given to the burial rites of dead relatives in our society. The issue of voluntary body donation by individuals or families is alien to our society unlike it is in some other regions of the world. In a study by Patel and Bajem, (2008) which showed that most of the respondents (69%) favored the use of cadaveric dissection above other teaching methods when considering learning outcomes, this method seeming to achieve a range of different course aims and objectives.

According to this study there is a statistically significant association between amounts of dissection performed and impart of dissection to anatomical knowledge (p= 0.000). This can be explained from the finding that 66% of the respondents have been exposed to a lot of dissections while at medical school. It was also found out that 77%

of respondents agreed that anatomy of the human body can best be appreciated with the cadaver than other methods of teaching anatomy.

There is also a statistically significant association between skills developed during housemanship and use of cadaver imparted anatomical knowledge ($p < 0.001$). This can be explained from the fact that 57% of the respondents agreed that dissection helped acquired skills. Dissection had a significant input to the respondent's anatomy knowledge (80%).

A strong association statistically between anatomy knowledge acquired during dissection and ability to write meaningful clinical notes during housemanship ($p <0.001$). This can be explained from the study findings that dissection significant input to anatomy knowledge and therefore can explain why it can translate into writing meaningful clinical notes.

A statistically significant difference was also found in this study between role of dissection in preparation for housemanship and its roles regarding skill acquisition ($p < 0.001$). This can be explained from the study that 51% of the respondents agreed that dissection prepared them for horsemanship. It was also found out that 57% of the respondents agreed that dissection session helped acquired skill.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The findings of this study revealed that Cadaver dissection had imparted knowledge of anatomy. From the fact that 66% of the respondents have performed a lot of dissections, 80% of respondents have acquired knowledge of anatomy from dissection, and 94% of the respondents have appreciated the human architecture better with dissection. It was also observed that 67% of the respondents agreed that dissection gave a better reflection of life and death, agreed that cadaver improved their anatomical vocabulary (59% of respondents). Cadaver dissection was found to be indispensable in the study of anatomy by 78% of the respondents. Cadaver dissection is also relevant to clinical practice. This was observed from the findings that 51% of the respondents agreed that cadaver dissection prepared them for

housemanship, helped develop skills (57%). It also improved clinical accuracy according to 53% of the respondents. Some respondents (61%) really felt that it should be included in the clinical curriculum. The role of cadaver plays in teaching gross anatomy as compared to other methods still remains the bed rock of teaching anatomy. This is due to the fact that 74% of the respondents disagreed that anatomy can be thought without cadaver. It was also observed that 54% of the respondents agreed that the best method of teaching anatomy was cadaver, because it provides better appreciation of the human architecture. According to 87% of the respondents anatomical variation can best be appreciated with the use of cadaver than other modalities of teaching anatomy. Majority of the respondents (80%) feel that the use of cadaver improved their ability to understand the theory taught in class.

5.2 CONCLUSION

The study surveyed the opinion of house officers on the use of cadaver for medical education. Findings revealed that dissection is very important in imparting knowledge of anatomy. Dissection was also found to be of significant relevance to clinical practice. This is with regards to its role in skills acquisition, anatomical vocabulary, procedures and clinical accuracy. This study also showed the importance of including cadaver dissection in the clinical curriculum. The dominant role of the cadaver dissection in teaching anatomy as compared to other methods such as models and computer assisted techniques was also observed in this study. Regarding understanding of the human architecture and appreciation of variations cadaver dissection was considered the best when compared to other methods.

5.3 RECOMMENDATIONS

1. Anatomy Departments should aim towards a teaching of anatomy that is clinically oriented and as applicable as possible with closer links between basic scientists and clinicians to enhance teaching and research.
2. Refresher courses to be given to house officers especially before a surgical specialty posting on dissection regarding that aspect. This would enhance their learning, teaching and communication skills. Producing better clinician and good surgeons in the future. These courses in surgical anatomy should be established to attract and train our future surgeons.
3. The department to facilitate more studies on anatomy teaching methodologies on students and teachers of anatomy, amongst various surgical subspecialties which be either retrospective or prospective studies. This will go a long way to foster better understanding of anatomy as a subject and to add more literature for anatomy education.

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APPENDIX

CONSENT FORM

Consent to Participate in this Research

1. RESEARCH TOPIC: Perception of house officers in Kano towards the use of cadaver for medical education.

You are cordially invited to participate in this Msc. (Anatomy) academic research study to be conducted by IBRAHIM ALIYU MUKHTAR from the Department of Anatomy, Faculty of Biomedical Sciences, Bayero University Kano.

If you have any question or concerns about the research, please feel free to contact IBRAHIM ALIYU MUKHTAR from the Department of Surgery, Murtala Muhammad specialist hospital, Kano. 07066411980 abbaibrahim474@hotmail.com

1. **Purpose of the Study**

To study the perception of house officers in Kano towards the use of cadaver for medical for medical education.

2. **Procedures**

The data collection will involve collecting information using a questionnaire. The questionnaire is a semi-structured, self-administered. The questionnaire consists of 6 sections lettered A-F. Section A of the questionnaire will assess the socio demographic characteristics of the respondents. Section B will assess the respondent's perception of dissection in knowledge of anatomy; section C perception of dissections input to clinical practice. Section D will assess perception of dissection as compared to other methods of teaching anatomy.

3. **Potential Risk and Discomfort**

There is no associated risk with the entire process and the only discomfort may be the time you will sacrifice to fill the questionnaire.

4. **Potential Benefits to Participant and/or to society**

This research may be of potential benefit to the participant and/or society in the following ways;

- This exercise will give House officers the chance to express their views and feelings regarding dissection of the human body.
- To survey House officers opinion/perception on the use of cadaver for teaching anatomy and to determine the place of cadaver in the teaching—learning process of anatomy to bachelor of medicine and

bachelor of surgery (MBBS) students, as whether they can replace or substitute Models, computer aided devices etc**.**

- To study the fact that dissection can impart anatomical knowledge as well as offer other relevant, positive learning opportunities to enhance the skills and attitudes of future clinicians.

5. **Potential incentives for Participation**

   Incentive, in the form of refreshment may be offered to the participant after participation

6. **Confidentiality**

Every effort shall be made to ensure confidentiality of any identity information that is obtained in connection with this study. The information collected shall be used in line with the aims and objectives of the study as well as scientific publications. I assure you that the information collected shall be kept in strict confidence.

7. **Participation and Withdrawal**

You may choose whether to participate in this study or otherwise. If you voluntarily accept to participate in this study without any legal recourse, you may withdraw at will and this shall not in any way affect the services being rendered to you.

You may also refuse to answer any questions you don't want to and still remain in the study.

DEPARTMENT OF ANATOMY,

COLLEGE OF HEALTH SCIENCES
FACULTY OF BIOMEDICAL SCIENCES
BAYERO UNIVERSITY, KANO.

Msc Anatomy STUDENTS' PROJECT
QUESTIONAIRRE

Topic: PERCEPTION OF HOUSE OFFICERS IN KANO STATE ON THE USE OF CADAVER FOR MEDICAL EDUCATION

This questionnaire is designed only for the purpose of the above research. All the information you provide will be treated with utmost confidentiality. Therefore, feel free to answer the following questions sincerely please. Thank you for your cooperation.

SECTION A: SOCIODEMOGRAPHIC DATA

1 Age:

2 Sex: A MALE ()

B female ()

3 Religion: A Islam ()

B Christianity ()

C others specify ()

SECTION B: DISSECTION AND KNOWLEDGE OF ANATOMY.

1 I was exposed to a lot of dissection while at medical school.

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

2 Dissection sessions had a significant input to my Anatomy knowledge?

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

3 The use of cadaver for medical education is important for the following reasons?

I. To better appreciate the human architecture

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree ()

II. To have a better on reflection of life and death

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

III. Improved my anatomical vocabulary

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

IV. Use of cadaver is indispensable in the study of anatomy?

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

V. The time allotted to dissection is sufficient to have imparted knowledge of gross anatomy.

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

6. I avoided dissection because of?

I. The smell of formaldehyde

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

II. I feel it is inhumane

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

III. I feel it is disrespectful of the human creation

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

IV. I was always scared of the dead

A. strongly agree () B. agree () C. neutral () D. disagree () E. Strongly disagree()

V. It is not allowed in my religion

A strongly agree () B agree () C neutral () D disagree () E Strongly disagree()

SECTION C: RELEVANCE OF CADAVER DISSECTION TO PRACTICE.

1. The use of cadaver for anatomy education in medical school prepared me well for housemanship.

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree ()

2. A more intense dissection course in anatomy in medical school would have better prepared you for housemanship?

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

3 Dissection really helped me as an intern to develop skills in working as a member of a team.

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

4 Dissection helped me in writing operation notes accurately with anatomical descriptions and documentation of examination.

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

3 The study of anatomy with cadaver developed my ability to perform basic clinical procedure e.g. N G tube insertion, catheterization, cannulation etc.

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

4 Dissection sessions in anatomy have greatly improved my clinical accuracy.

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

5 I feel that dissection sessions should be included in the clinical curriculum

A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

SECTION D: CADAVER AS COMPARED TO OTHER METHODS OF TEACHING ANATOMY (select what is applicable)

1. What methods of teaching gross anatomy are you aware of

   A Use of cadaver () B Use of models () C Use of computer assisted learning ()

   D Others specify…….

2. Which of them are available in your medical school

   A use of cadaver () B use of models () C use of computer assisted learning ()

   D others specify……

3. Gross anatomy can be taught without cadavers.

   A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

4. Which of them do you feel is the best for teaching and understanding anatomy

   A use of cadaver () B use of models () C use of computer assisted learning ()

   D All the three above.

   D others specify……

5. What was the reason for choosing your option as the best?

   ……

   ……

   ……

   ……

6. I feel anatomical variation in humans can best be appreciated with dissection than with other methods.

   A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

7. I feel that anatomy of the human body can be best be appreciated with the use of cadaver than with other methods available at my school.

   A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

6 The use of cadaver during dissection sessions helps to improve my ability to understand the theory taught in class.

   A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

7 The use of cadaver for medical education can be replaced by other methods of teaching anatomy

   A Strongly agree () B Agree () C Neutral () D Disagree () E Strongly disagree()

8 Which of the methods of teaching gross anatomy would you recommend to your medical school?

……

…….