LEVEL OF MUSCULOSKELETAL ANATOMY RETENTION AMONG UNDERGRADUATE PHYSIOTHERAPY STUDENTS OF PESHAWER

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ABSTRACT

BACKGROUND: Musculoskeletal anatomy knowledge is an integral component in physiotherapy education and practice. However, the rate of retention of musculoskeletal anatomy is not satisfactory according to recent evidence. The results of several studies have shown a decrease in musculoskeletal anatomy retention, which highlights that there is a need to evaluate the retention rates

OBJECTIVE: To find out the retention of musculoskeletal anatomy among undergraduate students of physiotherapy.

METHODOLOGY: This cross-sectional study was conducted on students of physiotherapy from the second through the fifth year at Physiotherapy Colleges of Peshawar. Data to determine the retention level of musculoskeletal anatomy was collected from a sample of students selected through multistage sampling, our questionnaire consists of four parts which include demographic information, Blooming anatomy tool, carpal bone test and Tarsal bone test. Permission was taken from principals of all included colleges and consent was obtained from the participants. Data were analysed using SPSS version 22.

RESULTS: The result of overall retention in our study sample illustrated that only 11 (5.6%) students scored 76% or greater and attained high retention score while majority of students 105 (53.6%) scored low and were categorized as having mild retention. Number of students that scored moderate retention was 80 (40.8%).More than half of the students 107 (54%) had mild retention of the carpal bones. Majority of the students 73 (37.2%) scored 76% or greater (High retention) on tarsal bone test.

CONCLUSION: The results of our study concluded that majority of students in different physiotherapy institutes depicted mild retention of anatomy. Lowest scores that students got were in Blooms anatomy tool while greater percentage of students scored high on tarsal bone test as compared to carpal bones.

Clinical students demonstrated better anatomy retention as compared to preclinical students.

KEYWORDS: Anatomy, musculoskeletal anatomy, knowledge, retention

INTRODUCTION:

The main purpose of an undergraduate training program of medical students is to teach basic sciences subjects in such a way that strengthens the foundation for clinical practice which is safe and efficient and to produce healthcare professionals who have sufficient knowledge and can treat the patients effectively.[1],2 The basic branch of medicine which played a key role in development of vast amount of medical knowledge is the Human Anatomy and therefore anatomy education is one of the basic pillar in the course of any medical curriculum. Musculoskeletal anatomy deals with the study of musculoskeletal system of human body which consists of skeletal component such as ligaments, bones, connective tissues and joints on one hand and the muscular component such as muscles and tendons on the other hand.3,4 Sound anatomical knowledge is required for musculoskeletal physical examination and palpation of different structures of human body.5 The uses of anatomy is multifaceted in several areas of medicine but the most important use of anatomical knowledge is during the physical assessment and examination of a patient. With technological advancements the scientific and medical knowledge is increasing day by day and it is estimated that every 2-5 years, the medical knowledge is doubled.6 In today's curriculum which is condensed, small amount of time is allocated to anatomy despite the significant importance of the subject. Therefore, the subject of anatomy is underemphasized. [7] One of the major issues regarding anatomy education among the students is its retention level, the loss of knowledge occurs by each passing year and only 66 percent unrehearsed knowledge could be remembered after one year and less than fifty percent after two years.[8] Therefore, a mutual concern among the teachers and educators is the retention of knowledge in a curriculum. So, it is recommended that students should be tested at frequent intervals by certain tests.9 The aim of this study was to find out the level of musculoskeletal anatomy retention among undergraduate physiotherapy students of Peshawar. As the previous studies conducted on the topic used only a specific tool (carpal or tarsal bone test or BAT) limiting the evaluation of retention level to only one region, in this study all

combination of three tools are used to give a better insight into musculoskeletal retention levels.

METHODOLOGY:

This cross-sectional study was conducted on students of physiotherapy from second through fifth year at Physiotherapy Colleges of Peshawar. Total sample size was 280 calculated through proportionate sampling from each institute and study year. Data to determine retention level of musculoskeletal anatomy was collected from a sample of students selected through multistage sampling, our questionnaire consists of four parts which includes demographic information, Blooming anatomy tool which consists of 20 multiple choice questions evaluating musculoskeletal knowledge, ten from upper limb and 10 from lower limb, carpal bone test and Tarsal bone test. Scoring was based on the percentages of correct answers for each questionnaire.

Mild Retention: The students are considered to have mild retention with the score of 0 to 50 %

Moderate Retention: The students are considered to have moderate retention with the score of 51 to 75 %

High Retention: The students are considered to have moderate retention with the score of 76 to 100 %

Permission was taken from Principals of all included colleges and consent was obtained from the participants. Data was analysed using SPSS version 22. General subject characteristics were analysed with descriptive statistics through frequency, percentage and Chi Square test was used to identify the association between different disciplines and levels of retention. Chi square test was also used to identify association between different variables and retention such as gender, year of study, institute and any past supply in anatomy. Statistical significance was assumed if $P < 0.05$.

RESULTS

Total sample size for our study was 280 but the number of responses received was 196 due to Covid pandemic as data was collected online. Response rate of our study was 70%.Of our total sample size 99 (50.5%) questionnaires were completed by females and 97 (49.5%) by males. Descriptive results are elaborated in table 1. By calculating the overall retention of anatomy by combining the scores of BAT tool, carpal and tarsal bone test, the result of our study illustrated that only 11 (5.6%) students scored 76% or greater and attained high retention score while majority of students 105 (53.6%) scored low and were categorized as having mild retention. Number of students that scored moderate retention was 80 (40.8%). It is evident from figure 1 that greater percent of students falls in low retention category. Results of musculoskeletal anatomy evaluated through BAT tool, carpal and tarsal bone test are illustrated in figure 2, 3 and 4.

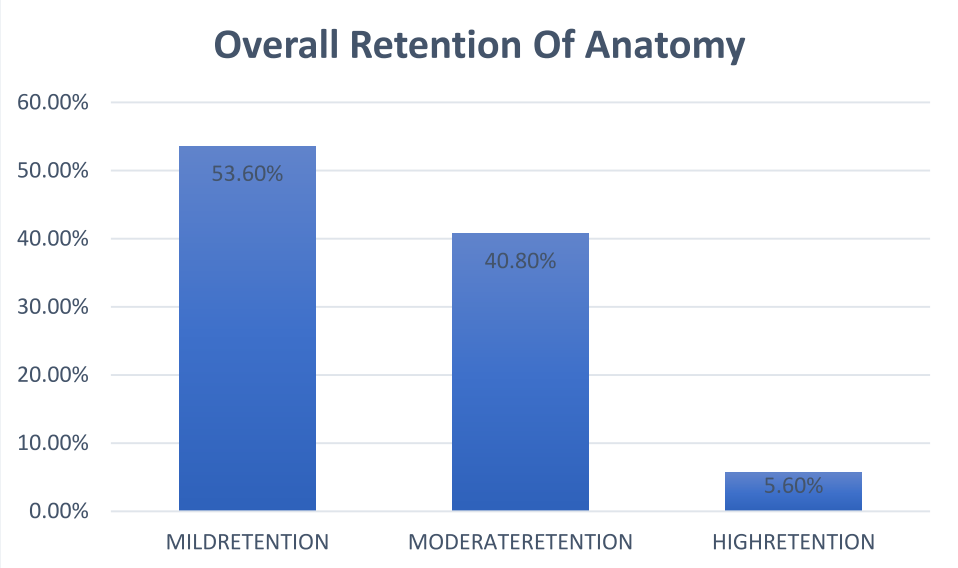

FIGURE 1: Overall Retention of Anatomy

TABLE 1: Descriptive Features of Sample

VARIABLES			FREQUENCY(PERCENTAGES)
Gender		Male	97(49.5%)
		Female	99(50.5%)
Name of institute		Institute A	49(25%)
		Institute B	46(23.5%)
		Institute C	29(14.8%)
		Institute D	24(12.2%)
		Institute E	18(9.2%)
		Institute F	8(4.1%)
		Institute G	22(11.2%)
Year of study		Second	52(26.5%)
		Third	48(24.5%)
		Fourth	35(17.9%)
		Fifth	61(31.1%)

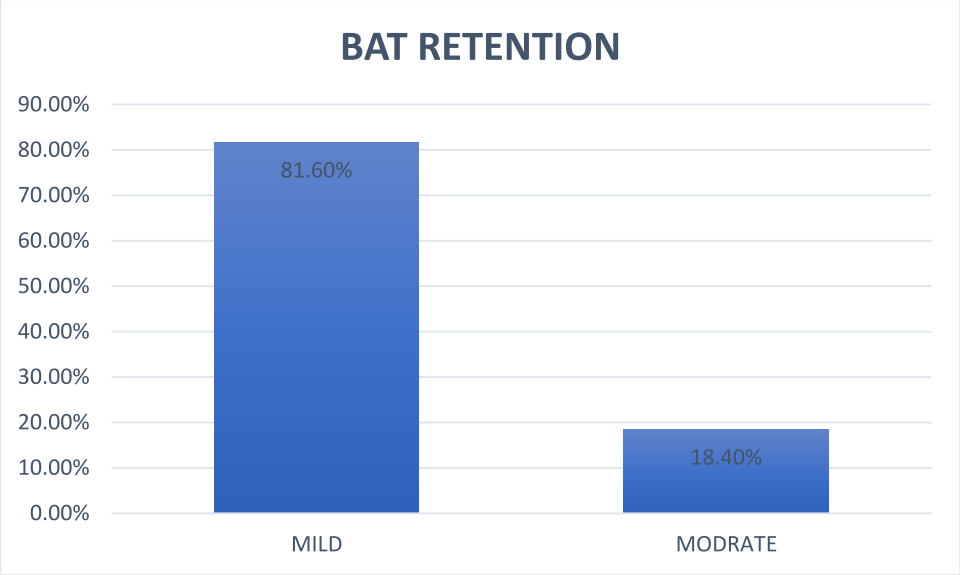

FIGURE 2: Retention of Anatomy by BAT Tool

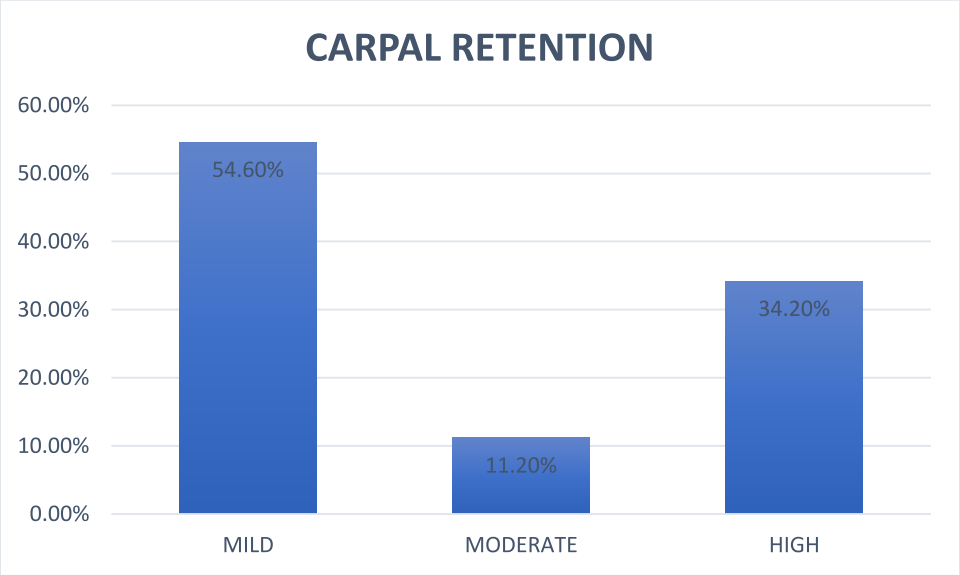

FIGURE 3: Retention of Anatomy by Carpal Bone Test

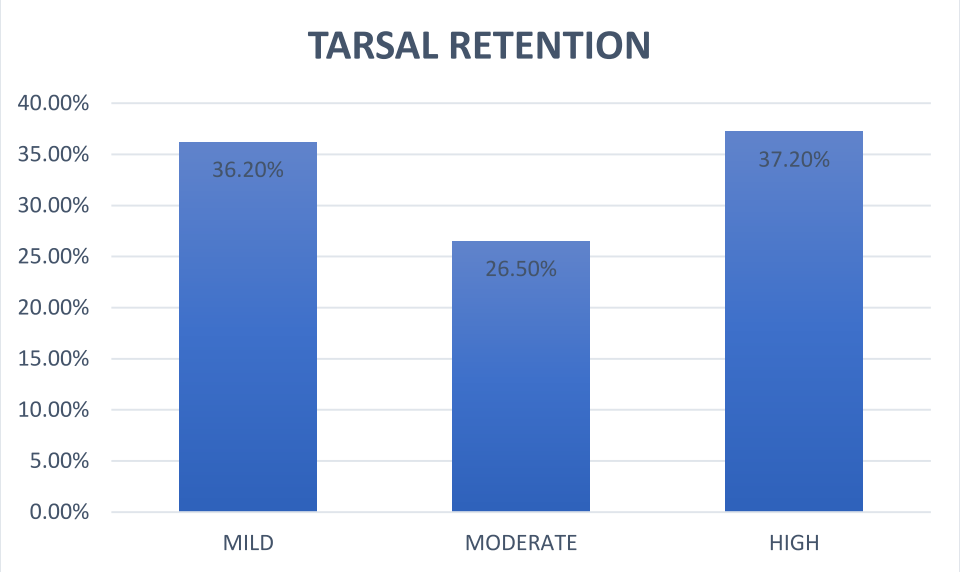

FIGURE 4: Retention of Tarsal Bones Using Tarsal Bone Test

Our results show that students in different institutes and year of study on average had mild anatomy retention. In our sample, there were no significant differences between anatomy retention in relation to institute (p value=0.562), year of study (p value=0.274) and with past supply in anatomy (p value=0.095). However, a positive association was found between anatomy retention and gender (p value= 0.003) which showed that female demonstrated better anatomy retention as compared to males.

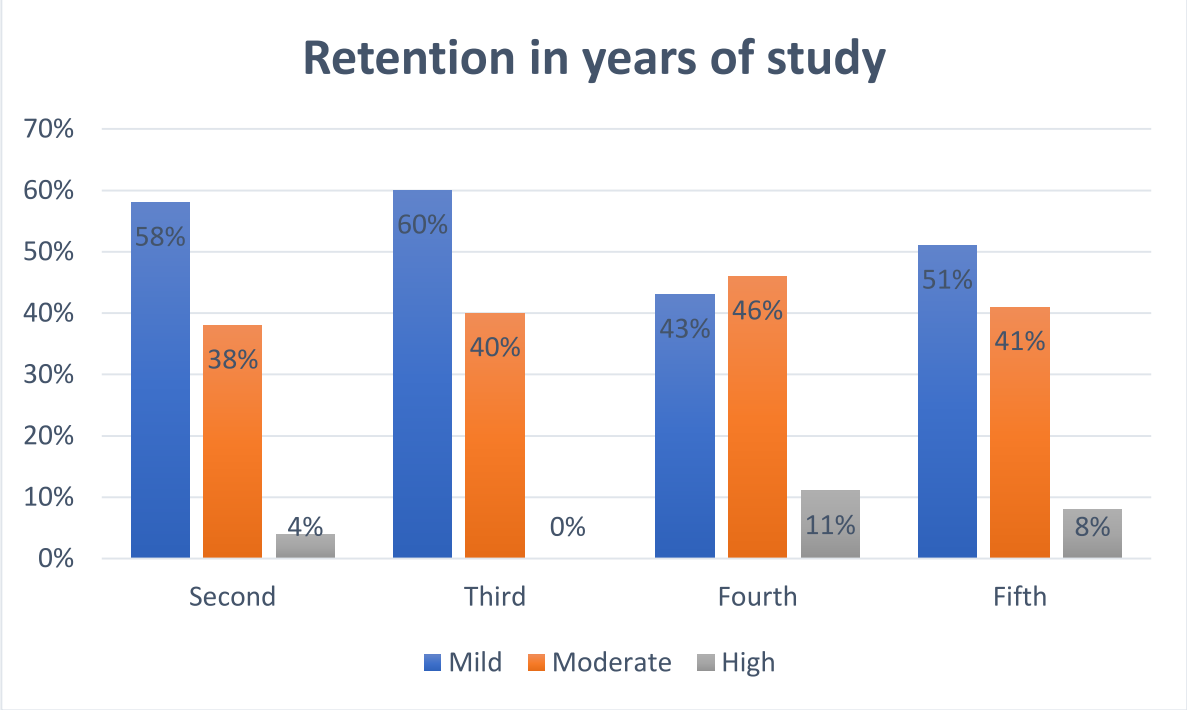

FIGURE 5: Retention in Years of Study

DISCUSSION

The aim of this study was to determine the musculoskeletal anatomy retention of undergraduate physiotherapy students from second year till final year of different physiotherapy institutes of Peshawar. The result of this study concluded that more than half of students i.e. 105 of total 196 illustrated mild retention of overall anatomy while only 11 students (5.6%) attained high scores and demonstrated high retention. Majority of students 107 (54.60%) had mild retention of carpal bones while greater frequency of students 73 (37.20%) scored high retention on tarsal bone test; there were no students who scored high on Blooms Anatomy Tool (0%) and 4/5th of the students 160 (81.60%) were categorized as having mild retention; this signifies that the students of physiotherapy are not well equipped with the knowledge of musculoskeletal anatomy which plays a pivotal role in the field of physiotherapy and in patient care. The underlying reason might be that due to the large number of subjects studied throughout the course, the students cannot give the amount of time needed to revise musculoskeletal anatomy at different intervals which is necessary for the retention of any subject especially for the anatomy.4 Beside that the way of learning anatomy (theory vs clinically integrated with case scenarios and dissection and prosecution) may affect the retention level of anatomy as dissection and prosecution learning is not implemented in today's curriculum as it should be.

The results of our study illustrated that the retention of anatomy increased through subsequent years from second year (mean rank 84.97) to third (mean rank 100.25),fourth year (103.13) and fifth (106)and fifth year students and clinical students demonstrated better anatomy retention as compared to preclinical years. The findings of our results are consistent with a study carried out in Sydney, Australia in which no attrition of knowledge was observed across the years but demonstrated an increase in knowledge through subsequent years of study.[10] The reason for this is may be that the in the curriculum of physiotherapy anatomy is integrated directly or indirectly in each year and in clinical years students applies the knowledge of anatomy practically e.g. Through palpations and manual therapy and therefore enhances the retention of anatomy.

The results of our study depicted that small number of students 68 (34.7%) correctly identified all of the tarsal bones on tarsal bone test. Calcaneus was the most frequently identified bone 149 (76%) by the participants. Lateral cuneiform was the bone not readily identified by more than half 105 (53.6%) of the participants. However, a study carried out in Spain on podiatry students illustrated that greater percentage of students (97.2%) correctly labelled all the tarsal bones while only 2.7% students incorrectly labelled at least one bone. Cuboid was the bone not readily identified by most of the students.[11] It may be due to the reason that podiatry students, more than any health care

discipline, have a better understanding of bony landmarks of the foot as compared to any other medical speciality. Physiotherapy students in our study demonstrated less retention of tarsal bones as compared to podiatry which may be due to the fact that physiotherapy is concerned with all joints of the body and doesn't specialize on a single area of joints (lower limb) as in podiatry.

The results of carpal bone test illustrated a significant association (p value 0.023) between retention of carpal bones and second and fifth year students (preclinical vs clinical). The results suggested that fifth year students (clinical) demonstrated good anatomy retention (mean rank 62.75) as compared to second year students (mean rank 50.25).The results also depicted that trapezium and trapezoid were the most incorrectly identified bones (Trapezium 105 (53.6%) Trapezoid 97 (49.5) %) by the undergraduate physiotherapy students. The results of our study are supported by a research carried out in Australia which demonstrated that fifth year students performed better on carpal bone test as compared to second year students and had better retention of anatomy(p value <0.001).The study illustrated that 98% of clinical students correctly identified five or more bones as compared to preclinical students (48%).[12] A study carried out in Sydney also identified that trapezium and trapezoid were the bones in which greater percentage of students had incorrect responses and were mostly unrecognized. But in contrast to our study, the study demonstrated that preclinical students performed better as compared to clinical students and study suggested that underlying reason could be due to the fact that first year students had freshly completed their anatomy course so their knowledge regarding anatomy will be fresh and satisfactory.[13] The underlying reason of the good retention of clinical students may be due to the increase clinical experience and application of knowledge (palpation of carpal bones) as compared to preclinical students. And as there is a similarity in the pronunciation of the bones named trapezium and trapezoid so this might be the reason that the students are often unable to name them correctly.

A positive association (p=0.003) was found between gender and overall retention of anatomy. In the study, females on average demonstrated good anatomy retention. The number of females who scored moderate retention were 52(53%) as compared to males 28 (29%) and majority of male students had mild retention 63(65%) as compared to females 42(43%). The results were consistent to a study undertaken at Saudi Arabia that yielded overall high grades of female students with mean score of 4.17 as compared to males (2.94) with p value of <0.001.[14] The differences in memory levels due to gender differences is due to multifactorial phenomenon's such as physiological (neural pathways, hormonal influences and psychological (different strategies of learning).

One of the major limitations of our study is related to the corona pandemic lockdown as data could not be collected physically from the students due to which test taken was not under supervision and may predispose to false high scores of the participants. Due to constraint of time, cross sectional design was adopted which is the limitation of our study because a longitudinal study design will give a better insight into the amount of knowledge retained or gained as the physiotherapy students progresses through their five years program.

Further research is required to find out about the perceptions of students regarding importance of musculoskeletal anatomy and level of satisfaction of their gained knowledge about the subject. More extensive methods of assessment such as practical knowledge based on clinical scenarios and medical images needs to be implemented. Longitudinal studies on anatomy retention should be carried out to determine the amount of knowledge retained or gained as the physiotherapy students progresses through their five years' program.

CONCLUSION

The results of our study concluded that majority of students in different physiotherapy institutes depicted mild retention of anatomy. Lowest scores that students got were in Blooms anatomy tool while greater percentage of students scored high on tarsal bone test as compared to carpal bones.

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