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Research Article

A STUDY OVER ASSESSING PODIATRIC KNOWLEDGE: TARSAL BONE TEST EFFECTIVENESS

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ABSTRACT

This study employed the Tarsal Bone Test (TBT) to gauge the anatomical knowledge of podiatry students regarding the bones of the lower limb. The TBT was administered without prior announcement and lasted for five minutes. Results indicated a high accuracy rate of 96% in identifying all tarsal bones. However, a small percentage (2.6%) of participants struggled to correctly identify the cuboid and navicular bones. Interestingly, there was no significant disparity between the accuracy of first-year and fourth-year students in identifying these bones. Overall, the TBT emerged as a valuable tool for objectively assessing podiatric knowledge across different stages of podiatric education.

Keywords:-Tarsal Bone Test, Podiatry Students, Virtual Anatomy, Musculoskeletal System, Navicular Bones.

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INTRODUCTION

Human anatomy is emphasized as a cross-disciplinary and structural component in academic curricula in many fields of the health sciences [1]. A medical student or other health professional should have knowledge of gross structure of body, functions, and pharmacology in order to prepare for clinical practice [2–4]. The development and implementation of this program have been guided by an educational model, which has been referred to as a paradigm shift. Therefore, in health sciences, students will need to integrate basic science subjects, such as anatomy, with clinical skills they will need to succeed in their career [5]. Health Sciences degree courses have been greatly reformed in order to harmonize educational systems across Europe [6]. Academic structures in universities have changed, as well as syllabi, courses taught in classrooms, and methods of teaching and learning. Thus, traditional methods of teaching anatomy, such as dissections, pro-sections, living anatomy, lectures, and models, are being replaced by new approaches. Seminars, small groups, academic tutorials, and specific project-based tasks are all ways students can learn through problem-based learning, computer-assisted learning, virtual anatomy, and virtual dissections [7]. Comparatively to those in other health professions, medical students are not well versed in the gross anatomy of the musculoskeletal system [8–10]. A number of studies in this area have been motivated by this need as well as the need to assess the impact of new teaching methods on knowledge acquisition. It has therefore been necessary to design a variety of measuring instruments. An example of this type of test is the test of carpal bones, which requires participants to label properly the bones of the wrist and hand on a picture. In order to benchmark physiological knowledge, the carpal region bones were selected since they are easy and objective to examine, and have clinical relevance in the musculoskeletal system. This test has been used to assess the knowledge of students in health science disciplines [11, 12]. A carpal bone test appears to be a valid method for assessing anatomy knowledge among health care professionals who treat musculoskeletal conditions of the upper limb.

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This type of test should, however, be expanded to include other parts of the body in order to be beneficial, according to the authors. Students in medical science have an apparent gap in their knowledge of specific anatomical regions. Clinical diagnoses and physical examinations are least confident in the foot and ankle, among different anatomical regions [13]. Musculoskeletal pain conditions of the foot and ankle affect a significant number of middle-aged to older people. It will be challenging and financially burdensome to provide public health services in the future [14, 15]. The tarsal bones seem to be a good test for evaluating anatomy knowledge. Femurs, tibias, and fibulas are the three biggest bones in the lower limbs. An understanding of tarsal bone anatomy may also be beneficial for health professions directly involved with foot care. We developed a tarsal bone test in order to determine how well Spanish podiatry students were familiar with the lower limb bones using that test.

METHODOLOGY

Anatomical content was not covered until the first year of study in other health disciplines. Since these students are preparing to become specialists in foot and lower limb care, they decided to evaluate the tarsal bone test on them specifically. Anatomy of the foot and lower limb is taught to students throughout their undergraduate studies. General human anatomy is discussed in the first chapter, while lower limb anatomy is discussed in the second chapter. These two subjects have 95 theory hours and 25 dissecting room hours combined. Student volunteers were given the test without prior notice, thus eliminating their ability to prepare answers in advance. It took the researchers 5 minutes to explain that all participants could not speak during the test. Once the tests had been completed, the researcher received them. To avoid disturbing the others or providing hints for the answers, students were encouraged to remain silent during the tests.

TABLE 1: Studied participants' characteristics

		Group – I		Group - II		Group - III	
	Total Sample	First year	Fourth year	First year	Fourth year	First year	Fourth year
N	127	32	20	17	20	24	16
Age (years)	23 ± 3.15	21 ± 2.74	24.28 ± 3.45	19.71 ± 2.42	23.64 ± 3.30	21.72 ± 5.75	24.84 ± 3.86
Gender (male/female)	36/91	9/23	6/14	2/15	08/12	11/13	2/14

RESULTS AND DISCUSSION

A total of 130 students offered to participate, 127 submitted their completed questionnaires in the classroom to the corresponding researcher. Seven of the other participants refused to take part in the study. As can be seen from Table 1, the distribution of participants by gender, age, and academic year is based on the gender, age, and academic year of the participants. One hundred and seventy-two percent of the 127 participants correctly labelled the tarsal bones, while only two percent incorrectly labelled at least one. There was no blank response on any of the questionnaires. The cuboid and navicular bones were incorrectly labelled 7 and 6 times, respectively. One fourth-year student, in particular, mislabelled only the cuboid. In addition, six first-year students labelled the cuboids and/or naviculars incorrectly. In spite of the fact that only one fourth-year student participated in the study and the rest of the students were first-year students, Fisher's exact test found no significant differences between the navicular and cuboid groups in terms of correct and incorrect responses. Using the tarsal bone test, we uncovered undergraduate podiatry students' knowledge about lower limb anatomy for the first time across universities. When it came to learning and remembering the names of the tarsals, students were not able to distinguish the cuboid and navicular bones. Research has been conducted to evaluate the anatomical knowledge of medical specialists, medical school course directors, and physiotherapy students using instructional techniques for teaching anatomy [16–20]. This purpose can sometimes be addressed using tests similar to the one used in this study. Using a drawing of the carpal bones, students label the proper bones.

Even though this instrument appears to be crude and unrefined, it can nonetheless be used effectively to assess anatomy knowledge at multiple levels of proficiency. The three universities are nationally renowned for their podiatry training programs. This test was administered as part of the early and late stages of the podiatry degree program. The anatomy courses required for students' courses have already been completed by the end of the first year. As the students progress through the program, they reinforce their knowledge through both theoretical and practical classes. The fourth-year podiatrist student must have adequate knowledge of anatomy before he or she becomes a fully qualified podiatrist after the end of their classes. Anatomy was an essential discipline in health professions in order to develop their subsequent clinical reasoning. It is crucial for health care professionals to understand anatomy and human function [21]. Anatomical

knowledge has long been regarded as essential or highly relevant to a number of medical practices, such as imaging diagnosis and physical examination. A high complete success rate (97.2%) observed on the tarsal bone test could be explained by using these results as a "gold standard" against which future research may be compared. The navicular was incorrectly labeled as the cuboid by two of the six students who labeled some bones. It is clear that both structures have distinct shapes and locations, but the authors believe that the confusion may be due to the fact that the navicular is commonly called “scafoides” in podiatry in Spain, which sounds very similar to the Spanish word for the other bone, the cuboides. Also, they are anatomically identical. Students may also have become confused because they memorize their names in an order different from the numbers they appear on the test, as some reported to us. Due to the clinical relevance of the two in midfoot biomechanics, this aspect of confusion was limited to a small number of students.

About 20 percent of professional ballet dancers suffer injuries to their feet and ankles due to cuboid syndrome, which affects the lateral midfoot. Cuboid syndrome has also been linked with ankle sprains in which the plantar flexions or inversions occur [22, 23]. Furthermore, because of the unusual blood supply it requires, the tarsal navicular bone is also susceptible to subsequent stress injuries [24]. Among the three participating universities, this university studies dissecting room the least. There was only one student at that university who did not make mistakes. In spite of the fact that this study was not intended to examine whether dissection is an essential component of anatomy instruction, it would be consistent with those authors who assert that the number of hours spent studying anatomy in the dissecting room correlates with the level of anatomical knowledge acquired [25]. In several health care disciplines, dissections are used as a common method of teaching anatomy, but predictions for the future suggest that more time will be spent on imaging and palpation techniques, which will decrease the time spent on dissection. In Moore's view, physician-patient touch was essential to the relationship [26]. Additionally, previous studies have found no differences between students studying podiatric medicine who were taught using a novel approach, such as problem-based learning, and those who were taught through traditional methods [27]. However, it is widely believed that, while a student-centered approach, which emphasizes active learning, independent study, and resolving cases and/or problems, may provide a more effective way to develop professional competencies, particularly those related to social and cognitive skills, this approach has no direct bearing on the acquisition of basic knowledge [28]. Future health care professionals, not just podiatrists, must have anatomical expertise. Physicians' clinical skills improve the more anatomical facts they remember, according to older authors.

CONCLUSION

Students were tested on the tarsal bone test to evaluate their retention of lower-limb anatomy knowledge and monitor the quality of their podiatry education. 96% of the tests were completed correctly, and all mislabeled cases were caused by the cuboid and navicular bones. Using these results as a "gold standard", the authors propose to compare them with results obtained in other studies utilizing this test.

REFERENCES

1. L. J. Rizzolo and W. B. (2006). Stewart, “Should we continue teaching anatomy by dissection when...?” Anatomical Record. Part B, *New Anatomist*, 289, 6, 215–218,
2. B. Mompeo and L. Perez, (2003). “Relevance of gross human anatomy ´ in health primary care and in clinical disciplines of medical studies,” *Educacion M ´ edica*, 6, 41–51,
3. R. Pabst, (2009). “Anatomy curriculum for medical students. What can be learned for future curricula from evaluations and questionnaires completed by students, anatomists and clinicians in different countries?” *Annals of Anatomy*, 191, 6, 541– 546.
4. L. Arraez-Aybar, I. S ´ anchez-Montesinos, R. Mirapeix, B. ´ Mompeo-Corredera, and J. Sanudo-Tejero, (2010). “Relevance of ˜ human anatomy in daily clinical practice,” *Annals of Anatomy*, 192, 6, 341–348,
5. R. D. Lobato, A. Lagares, J. F. Alen, and R. Alday, (2010). “Implementa- ´ tion of the Bologna system in medical education. Current status and future prospects,” *Neurocirugia*, 21, 2, 146–156.
6. R. Merida, (2006). “Nueva percepci ´ on de la identidad professional del ´ docente universitario ante la convergencia europea,” *Revista Electronica de Investigaci ´ on Educativa*, 8, 1,
7. R. M. Chirculescu, M. Chirculescu, and J. F. Morris, (2007). “Anatomical teaching for medical students from the perspective of European Union enlargement,” *European Journal of Anatomy*, 11,(1), 63–65,
8. J. Bernstein, D. R. Alonso, M. DiCaprio, G. E. Friedlaender, J. D. Heckman, and K. M. (2003). Ludmerer, “Curricular reform in musculoskeletal medicine: needs, opportunities, and solutions,” *Clinical Orthopaedics and Related Research*, 415, 302– 308,

9. M. R. DiCaprio, A. Covey, and J. (2003). Bernstein, "Curricular requirements for musculoskeletal medicine in American medical schools," *Journal of Bone and Joint Surgery A*, 85, 3, 565–567.
10. M. C. Valenza, E. Castro-Mart´ın, G. Valenza, M. GuiraoPineiro, A. I. De-la-Llave-Rinc ˜ on, and C. Fern ´ andez-de-las- ´ Penas, (2012). "Comparison of third-year medical and physical therapy ˜ students'knowledge of anatomy using the carpal bone test," *Journal of Manipulative and Physiological Therapeutics*, 35, 121–126,
11. P. M. Spielmann and C. W. Oliver, (2005). "The carpal bones: a basic test of medical students' and junior doctors' knowledge of anatomy," *Surgeon*, 3, 4, 257–259.
12. G. Strkalj, T. Schroder, N. Pather, and V. Solyali, (2011). "A preliminary assessment of the fifth-year chiropractic students' knowledge of anatomy," *Journal of Alternative and Complementary Medicine*, 17, 1, 63–66,
13. C. S. Day and A. C. Yeh, (2008). "Evidence of educational inadequacies in region-specific musculoskeletal medicine," Clinical *Orthopaedics and Related Research*, 466,10, 2542– 2547,
14. S. Rao, J. L. Riskowski, and M. T. Hannan, (2012). "Musculoskeletal conditions of the foot and ankle: assessments and treatment options," Best Practice and Research: *Clinical Rheumatology*, 26, 3, 345–368,
15. M. J. Thomas, E. Roddy, W. Zhang, H. B. Menz, M. T. Hannan, and G. M. Peat, (2011). "The population prevalence of foot and ankle pain in middle and old age: a systematic review," *Pain*, 152, 12, 2870–2880,
16. R. L. Drake, J. M. McBride, N. Lachman, and W. Pawlina, (2009). "Medical education in the anatomical sciences: the winds of change continue to blow," *Anatomical Sciences Education*, 2, 6, 253–259,
17. C. Melguizo, J. Prados, F. Rodr´ıguez-Serrano (2007). "Anatomy teaching to physiotherapy students: Preliminary study in the European higher education area setting," *European Journal of Anatomy*, 11, 1, 59–61,
18. J. Prados, C. Melguizo, F. Rodr´ıguez-Serrano (2007). "Methodology in the European higher education area for the anatomy learning in the health sciences," *European Journal of Anatomy*, 11, 1, 49–52,
19. D. L. Gabard, D. L. Lowe, and J. W. Chang, (2012). "Current and future instructional methods and influencing factors in anatomy instruction in physical therapy and medical schools in the U.S.," *Journal of Allied Health*, 41, 2, 53–62,
20. M. Meskell and J. E. O'Connor, (2007). "Nursing student's perceptions on the use of anatomical prosections as an educational tool," *European Journal of Anatomy*, 11, 1, 73–77,
21. K. Adam, E. Gibson, J. Strong, and A. Lyle, (2011). "Knowledge, skills and professional behaviours needed for occupational therapists and physiotherapists new to work-related practice," *Work*, 38, 4, 309–318,
22. P. Marshall and W. G. Hamilton, (1992). "Cuboid subluxation in ballet dancers," *American Journal of Sports Medicine*, 20, 2, 169–175.
23. J. Jennings and G. J. Davies, (2005). "Treatment of cuboid syndrome secondary to lateral ankle sprains: a case series," *Journal of Orthopaedic and Sports Physical Therapy*,35, 7, 409– 415,
24. J. Kindred, C. Trubey, and S. M. Simons, (2011). "Foot injuries in runners," *Current Sports Medicine Reports*, 10, 5, 249–254,
25. J. Older, (2004). "Anatomy: a must for teaching the next generation," *Surgeon*, 2, 2, 79–90.
26. N. A. Moore, (1998). "To dissect or not to dissect?" *The Anatomical Record*, 253, 1, 8–9,
27. P. M. Finch, (1999). "The effect of problem-based learning on the academic performance of students studying pediatric medicine in Ontario," *Medical Education*, 33, 6, 411–417,
28. J. Neville, (2009). "Problem-based learning and medical education forty years on. A review of its effects on knowledge and clinical performance," *Medical Principles and Practice*, 18, 1–9,

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