

The Carpal and Tarsal Bones of the Human Body

Arabic mnemonics

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عِظَامُ الرَّسْغِ وَالرُّصْغِ فِي جِسْمِ الْإِنْسَانِ فن الإستذكار باللغة العربية

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ABSTRACT: Memorising human anatomy structures remains a challenge for nursing students. Educators endeavour to make human anatomy interesting and easy to memorise. Various instructional approaches can be used to help students enhance their memory. Mnemonics, for example, are well-established educational strategies that have proven useful in the encoding, retention and retrieval of anatomical terms. The carpal and tarsal bones are some of the anatomical structures that prove challenging to nursing students' study of anatomy. Although available online to students, most of the accessible mnemonics are in English and non-native English-speaking students (students who are native Arabic-speakers) might find them difficult to understand. Therefore, we have created two simple Arabic mnemonics that can simplify the memorisation of the carpal and tarsal bones. We believe that Arabic mnemonics effectively enhance memorisation by linking the new learning material to familiar information.

Keywords: Learning; Memory; Anatomy; Nursing; Carpal bones; Tarsal Bones; Oman.

المخلص: لا يزال حفظ تركيبات التشريح البشري يمثل تحدياً لطلاب التمريض. يسعى المعلمون إلى جعل علم التشريح البشري ممتعاً وسهلاً للحفظ. يمكن استخدام مناهج تعليمية مختلفة لمساعدة الطلاب على تعزيز ذاكرتهم. فن الإستذكار على سبيل المثال هو استراتيجيات تعليمية راسخة أثبتت فائدتها في ترميز المصطلحات التشريحية واستبقائها واسترجاعها. عِظَامُ الرَّسْغِ وَالرُّصْغِ هي بعض التركيبات التشريحية التي تمثل تحدياً لطلاب التمريض في دراستهم لعلم التشريح. على الرغم من توافر وسائل الإستذكار عبر الإنترنت للطلاب إلا أن معظم المتاح منها متوفر باللغة الإنجليزية مما يشكل صعوبة في فهمها لدى الطلاب غير الناطقين باللغة الإنجليزية (الطلاب الذين يتحدثون اللغة العربية). لذلك قمنا بإنشاء رمزين مختصرين بسيطين باللغة العربية يمكنهما تبسيط استذكار عِظَامُ الرَّسْغِ وَالرُّصْغِ. نحن نعتقد أن فن الإستذكار باللغة العربية يعزز الحفظ بشكل فعال من خلال ربط المواد التعليمية الجديدة بالمعلومات المألوفة..

الكلمات المفتاحية: التعلم؛ ذاكرة؛ علم التشريح؛ التمريض؛ عِظَامُ الرَّسْغِ؛ عِظَامُ الرَّصْغِ؛ سلطنة عُمان.

AS NURSING INSTRUCTORS, WE MUST EQUIP our students with the necessary competencies to meet the challenges of 21st century health-care. Worldwide, leading nursing educators agree that an understanding of anatomy and physiology (A&P) is critical to ensuring good nursing practice.^{1,2} However, it is well documented that nursing students struggle with A&P because they find it arduous to memorise huge numbers of anatomical terminology.¹ Over the years, as Gray's anatomy (the most extensive and detailed book on anatomy) grew to over 1,500 pages, educators have tried to find different strategies and apply new technologies to facilitate the teaching of anatomy.^{3,4} Both students and educators have managed to abbreviate anatomical structures into mnemonics, which are systems used to facilitate easy and effective retention of information.⁵

As previous students ourselves, mnemonics helped us immensely in retaining anatomical terms and recalling them more easily at a later time.

Mnemonics are a great teaching strategy which has shown to increase memorisation of human anatomy.⁶ In nursing education, a previous study has shown the effectiveness of mnemonics in facilitating the memorisation of an "Introduction to Nursing" course.⁷ Koksai *et al.* used mnemonics to help students remember basic knowledge about the healthcare system.⁷ Results have shown that nursing students who studied with mnemonics performed better in a retention test than the control group who did not employ the aforementioned technique. Through mnemonics, associations are created between new, unknown information and old information that have already been mastered.⁸ By acting on working memory, these mnemonics lower the introduced cognitive load and enhance the attainment and encoding of new information. Mnemonics use familiar words to form a cue that can be better encoded into memory. By using these familiar cues, the load is minimised while allowing an enhancement of the long-term memory.⁹

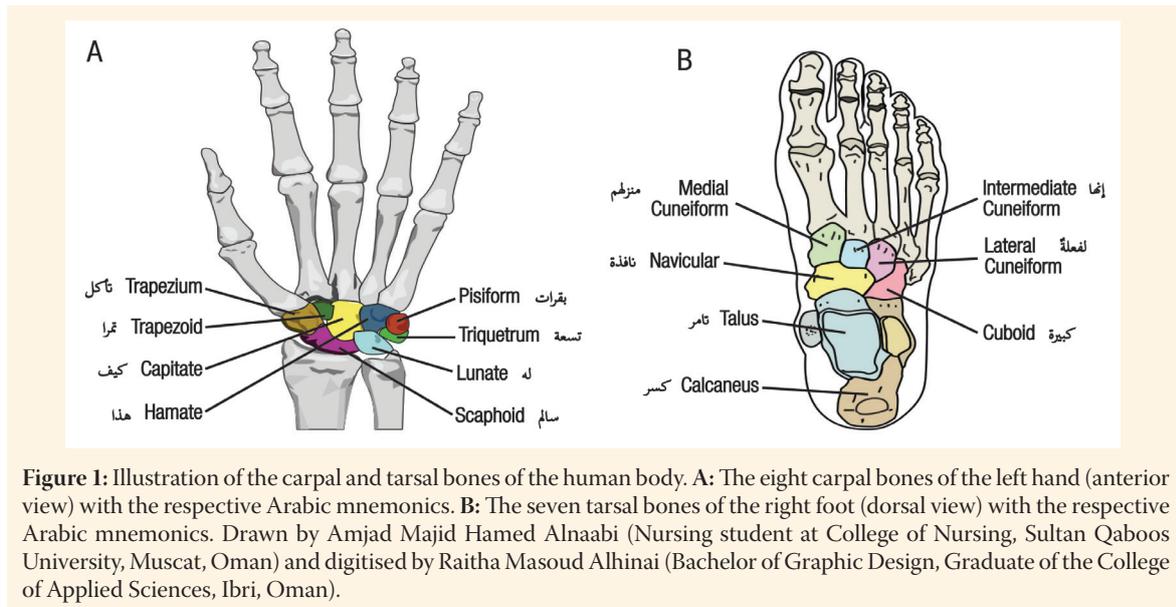


Figure 1: Illustration of the carpal and tarsal bones of the human body. **A:** The eight carpal bones of the left hand (anterior view) with the respective Arabic mnemonics. **B:** The seven tarsal bones of the right foot (dorsal view) with the respective Arabic mnemonics. Drawn by Amjad Majid Hamed Alnaabi (Nursing student at College of Nursing, Sultan Qaboos University, Muscat, Oman) and digitised by Raitha Masoud Alhinai (Bachelor of Graphic Design, Graduate of the College of Applied Sciences, Ibri, Oman).

Different forms of mnemonic strategies such as acronyms and acrostics have made it easier to remember new information by making it more familiar and meaningful.¹⁰ Acronyms are words in which each letter stands for a piece of information to be remembered. For example, “RICE” is an acronym that is used for a sprained ankle treatment where “R” stands for rest, “I” for ice, “C” for compression and “E” for elevation.⁹ On the other hand, an acrostic is a sentence where the first letter of each word plays the role of a cue for the information to be recalled. An anatomical acrostic was used by Larson to memorise the bones of the orbit: “many friendly zebras enjoy lazy summer picnics” was used, where the acrostic represents the maxillary, frontal, zygomatic, ethmoid, lacrimal, sphenoid and palatine bones, respectively.¹¹ Other acrostics have been used to remember the branches of the facial nerve. For instance, the sentence “To Zanzibar by motor car” helped students to recall the order of the nerves correctly as temporal, zygomatic, buccal, mandibular and cervical.⁹ A vast amount of mnemonic examples are readily available with a quick internet search. However, all these mnemonics are in English and sometimes contain complicated words which increase the difficulty for non-native English students.

Undergraduate nursing students need to be knowledgeable about the skeletal system. In fact, one of the first systems that is taught at Sultan Qaboos University in A&P is the skeletal system. Learning the names of the bones of the human body is particularly important since students need this information to be able to find these landmarks when assessing patients. Students must memorise the 206 bones of the human body, a task which have often perturbed nursing students.

Traditionally, the names of the bones of the human body are taught to undergraduates by means of didactic lectures. Teaching these names can be challenging for many educators. Consider the carpal and tarsal bones, students need to learn the names of the eight carpal and the seven tarsal bones in order. These short bones can be difficult to distinguish from one another due to their similarities in size and shape.¹² Using didactic lectures to teach the names of these bones often fail to engage students and, consequently, many students feel overwhelmed. Therefore, the use of mnemonics can provide a better and more engaging way of learning.

Methodology: *Creating Arabic mnemonics*

A handful of mnemonics addressing the order of carpal and tarsal bones have been published online, yet none are in Arabic. Furthermore, mnemonics cannot be translated. Therefore, we have composed Arabic mnemonics that could be used by nursing and other Arabic-speaking healthcare students to enhance the memorisation of the names of these bones.

The wrist has eight bones, arranged in two rows: scaphoid, lunate, triquetrum, pisiform, trapezium, trapezoid, capitate and hamate [Figure 1A]. These bones can be learned by the Arabic mnemonic: سام له تسعة بقرات تاكل تمرا كيف هذا؟ [Table 1].

The tarsal bones are found in the ankle and include the calcaneus, talus, navicular, medial, intermediate and lateral cuneiform and cuboid [Figure 1B]. The bones can be learned by the Arabic mnemonic: كسر تامر نافذة منزظم، إحما لنعلة كبيرة [Table 2].

Table 1: Acrostic mnemonics in Arabic to help students remember the carpal bones from lateral to medial for the proximal and distal row

English	Acrostic Arabic mnemonics
Scaphoid	سالم
Lunate	له
Triquetrum	تسعة
Pisiform	بقرات
Trapezium	تأكل
Trapezoid	تترا
Capitate	كيف
Hamate	هذا

Discussion

Students and educators can find a plethora of mnemonics on online databases. However, the majority of these mnemonics are in English, which is unfortunate for non-native English-speaking students.¹⁴ Therefore, there is a need for creating Arabic mnemonics to make the recollection process easier for these students.

It is imperative to stress the limitations of these tools. Mnemonics are useful merely for memorisation; they are not strategies for understanding, application or analysis.¹⁰ They encourage surface learning rather than developing in-depth learning. Some nursing educators might abstain from teaching mnemonics because of their perception that this method is a lazy way to study. Some even believe that using mnemonics for patient-care might damage the humanistic approach by condensing patients' symptoms into a 'laundry list'.⁹

Table 2: Acrostic mnemonics in Arabic to help remember the tarsal bones from proximal to distal

English	Acrostic Arabic mnemonics
Calcaneus	كسر
Talus	تامر
Navicular	نافذة
Medial cuneiform	منزهم
Intermediate cuneiform	إنحا
Lateral cuneiform	لفعلة
Cuboid	كبيرة

Table 3: The nomenclature of the carpal and tarsal bones with the respective Arabic terminology

Bones	Meaning	Arabic terminology
Carpal bones		
Scaphoid	Boat-shaped	العظم القاري
Lunate	Crescent-shaped	العظم الهلالي
Triquetrum	Three-sided	العظم ثلاثي الأركان (المثلثي)
Pisiform	Pea-shaped	العظم الحمصبي
Trapezium	Irregular four-sided	العظم المربعي
Trapezoid	Four-sided	العظم المنحرفي
Capitate	Head-shaped	العظم الكبير
Hamate	hooked	العظم الكلابي
Tarsal bones		
Calcaneus	Heel	عظم العقب
Talus	Ankle bone	عظم القعب
Navicular	Boat-shaped	العظم الزورقي
Cuneiform bones	Wedge-shaped	العظام السفينية
Cuboid	Cube-shaped	العظم النردبي

In addition, various mnemonics use humour to increase retention and some teachers decline their use, describing them as unprofessional or even uncivil.¹⁴ It is worth mentioning that students can find mnemonics everywhere and it is likely that they are using them without the educators' knowledge. Therefore, it would be appropriate for teachers to be aware of the mnemonics their students are using and to check these learning aids for mistakes.

When considering the benefits of mnemonic strategies, it is necessary to mention that many experiments show the beneficial effect of these aids on facilitating learning and memory of students.¹⁵ Although the benefits of mnemonics use have been documented in many research articles, it must be considered that mnemonics do not address all levels of Bloom's taxonomy and cannot cover all courses' objectives.⁵⁻⁷ Therefore, these memory tools should not be considered as the only study aid needed for learning anatomy. However, we believe that mnemonics could allow students to establish a base-knowledge that could be developed and built upon. Furthermore, they allow students to memorise the

information quickly, leaving more time for higher-order learning. Whenever students show difficulties in memorising lists of information, mnemonic devices constitute a powerful tool in the array of instructional resources and strategies.

It is worth noting that not only mnemonics can facilitate the learning of the carpal and tarsal bones. Knowledge of the terminology used for the nomenclature of these bones can also be helpful. Carpal and tarsal bones' names reflect their shape which can be additionally useful for learning and identification.

The English name of each carpal and tarsal bone is derived from either Latin or Greek. For example, the scaphoid name stems from the Greek word *skaphidion* meaning "a small ship". Due to its boat-like shape it is commonly referred to as the "boat bone" in Arabic (العظم القاربي). The lunate was named for its resemblance to a crescent, which is derived from the Latin word *luna*. In Arabic, it is known as the crescent bone (العظم الهلالبي) [Table 3].^{16,17} Therefore, understanding the terminology might help in recognising the morphological characters of the carpal and tarsal bones.

Finally, in-depth analysis should be carried out in the future to test whether these Arabic mnemonics will improve students' learning and enhance their recollection of the names of bones. In addition, students' perception of the use of Arabic mnemonics should be investigated. The observation in the classroom, however, indicated that students enjoyed the use of these tools.

The two created mnemonics were found to be helpful in teaching the anatomy of carpal and tarsal bones. The students can now use a simple *aide-mémoire* to simplify the memorisation of these bones. We encourage our students to create their own Arabic mnemonics. We also encourage the readers to publish more of these tools to help our non-native English-speaking students to improve their retention.

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