



Evolution of Attention During A Teaching Lesson of “Anatomy” in Physical Education Degree’ Students: The Time of Day Effect

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Abstract

The aim of the present study was to examine the evolution of the attention during a lesson of teaching anatomy of the humerus in physical education degree’ students (PES). Sixty-one students (32 males and 29 females), registered in the 1st year PES in the High Institute of Sport and Physical Education of Sfax (University of Sfax, Tunisia) voluntarily participated in the present study. They performed the digit cancellation test at the beginning and at the end of a 90 min teaching session of anatomy at two time-of-day: between 08h00 and 09h30 and between 15h30 and 17h00. The results showed that there is no difference between the males and females groups for the attention ($P > 0.05$). However, the present study showed that the attention decreased at the end compared to the beginning of the teaching session ($P < 0.05$). Also, the attention was significantly better in the morning compared to the afternoon hours ($P < 0.05$). For PES, anatomy requires good attention capacities and the scheduling of these lessons in the morning is better than the afternoon hours.

Keywords: Vigilance, Learning, Anatomy, Education, Diurnal

1. Background

Knowledge in anatomy is essential for clinicians and physicians (1). Also, as physical exercise is related to health promotion and needs a deep knowledge in anatomy, human anatomy is a crucial element in the physical education degree’ students (PES) training curriculum. Indeed, it is important that curricula in PES programs provide a good foundation in descriptive and functional anatomy. The quality of the education of PES is one of the guarantors of the proper functioning of the Tunisian education system. The education of the student must be of good quality and constantly updated in a dynamic process. In this context, McCuskey et al. (2) showed that the anatomical knowledge of students, young educators, is insufficient. These gaps are not related to the lack of information, but rather to methods and means of teaching anatomy that require a more structured approach that is more adapted to contextual realities.

Although, to the best of our knowledge, no-previous study has been conducted in PES, for physicians and clinicians, it has been reported that anatomy knowledge is meager (3, 4). The quality of the teaching of anatomy is affected by several factors. For example, in Senegal, Ndoye et al. (5)

have shown that this quality is affected mainly by the insufficiency or absence of material and pedagogical supports, the growing number of students and an altered student’ and teacher’ motivation.

Preservation of anatomy knowledge requires constant revision and analysis (6, 7). Thus, the student directs his attention to information or places according to his motivation and his memory (8). Vigilance is the maintenance of sustained attention to carry out the task in progress without being distracted. The attentional capacity of the study determines the amount of information it can grasp through its sensory modalities without specific cognitive mobilization.

Many factors contribute to the perturbation of vigilance during the anatomy learning process such as: classroom methodology, terminology and complex nature of the discipline (8). In this context, lack of motivation in students could affect their alertness during the anatomy session. Particularly, the difficulties of understanding a new vocabulary of learning could affect the attention of the students during the session of anatomy. For example, in Senegal, Manyacka Ma Nyemb and Ndoye (9) showed that learning anatomy is difficult, which justifies the importance of

attention during the teaching session. In addition, Boujon and Quaireau (10) have shown that the level of attention influences student success. The more attentive students are, the better their performance will be. So, attention plays an important role in the learning process.

In view of these facts, the organization of teaching sessions for students must take into account the evolution of the level of attention according to several factors (e.g., succession of courses, circadian rhythm). In this context, previous studies among students suggested that successive sessions should not be scheduled for courses requiring a high degree of attention (11, 12). Also, previous studies reported that attention is influenced by the time-of-day and was better in the morning than the early afternoon hours (13, 14).

2. Objectives

In view of the above consideration, the objective of the present study was to examine the evolution of the attention during a teaching session of the descriptive anatomy of the humerus in PES according to the time of day of the course.

We hypothesized that teaching the descriptive anatomy of the humerus in the morning hours could be better than the afternoon for the attention of the PES students.

3. Methods

3.1. Participants

Sixty-one students (32 girls and 29 boys), enrolled in the 1st year PES at the Higher Institute of Sport and Physical Education of Sfax (University of Sfax, Tunisia) voluntarily participated in this study after having been informed in detail about the experimental procedure. Participants gave their written consent to participate in the present study. The present study was conducted according to the Declaration of Helsinki and the project was approved by the research ethics committee before the commencement of the assessments.

3.2. Experimental Procedure

The participants performed the number cancellation test (as a measure of alertness) at the beginning and the end of a 90-minute "Anatomy" course at two time-of-day: between 08h00 and 09h30 and between 15h30 and 17h00. The session was devoted to the descriptive anatomy of the humerus (Figure 1).

3.3. Numbers Cancellation Test

The number cancellation test is a task for the estimation of attention (15). It consists of the cancellation of the three digits numbers during one minute on a sheet with several numbers (i.e., 187 of which consist of 3 digits). For each student, the number of correct answers was calculated.

3.4. Statistical Analysis

Statistical analysis of the results was performed using the STATISTICA software version 10 (StatSoft, France). All results are presented as means and SDs (standard deviations) in the figures.

After the confirmation of the normality by the Shapiro-Wilk W-test, parametric tests were performed. As the aim of the present study was not related to the interaction between groups (i.e., males and females), time of day and the anatomy course (i.e., at the beginning and after the course), a Student's *t*-test was utilized to compare (i) the pre- and post-session values of attention, (ii) the two time-of-day of the courses and (iii) females and males groups. The level of significant difference was set at $P < 0.05$.

4. Results

The data of correct responses registered at the beginning and after the anatomy course, at the two time-of-day and for females and males groups are presented in Figures 2 - 4 respectively.

The results showed that there is no-significant difference between the males and females groups for the attention ($t = 0.43$, $P = 0.66$, Figure 4). However, the present study showed that the attention decreased at the end compared to the beginning of the teaching session ($t = 4.23$, $P < 0.001$, Figure 2). Also, the attention was significantly better in the morning compared to the afternoon hours ($t = 2.09$, $P < 0.05$, Figure 3).

5. Discussion

The results of the present study reported that there is no-significant difference between females and males participants in terms of the attention (i.e., the number of correct responses). In addition, the results showed that the attention decreased at the end compared to the beginning of the teaching session of anatomy. Also, the attention was significantly better in the morning compared to the afternoon hours.

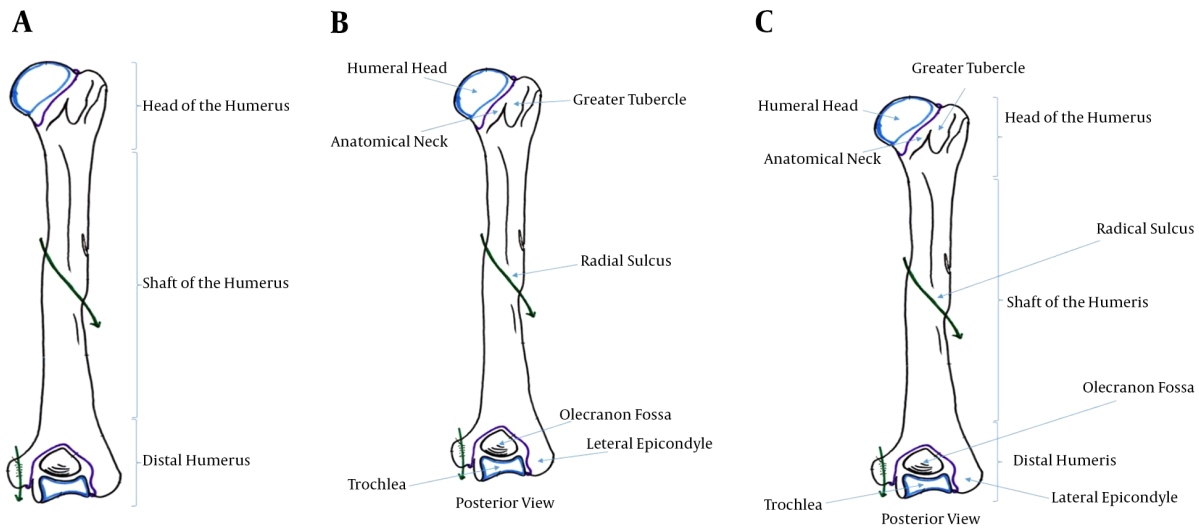


Figure 1. Descriptive anatomy of the humerus

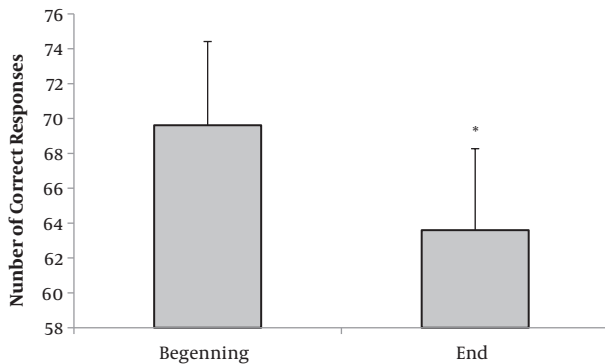


Figure 2. Number of correct responses registered at the beginning and the end of the course. *: Significant difference compared to the end of the course.

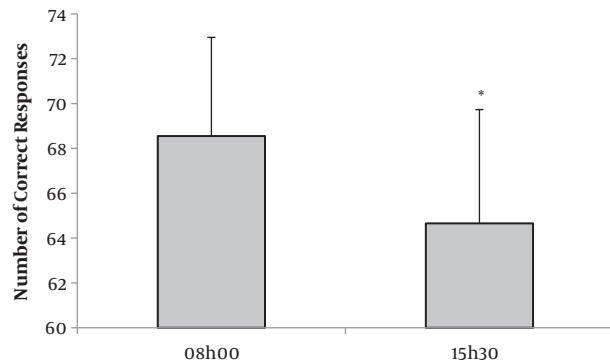


Figure 3. Number of correct responses registered at 08h00 and 15h30. *: Significant difference compared to 08h00.

The decreases of the attention during the course of anatomy could be related to a deterioration of the motivation during the session that could be related to the duration of the lesson or the number of the new information (8). Previous studies have adopted the strategy of varying the pedagogical supports and methods to improve the motivation of the students and to attract their attention for the memorization of the new terminology (5, 6, 9, 16-19). For example, Reinke (8) showed that students engaged in cognitive active learning during the course have better outcomes. Also, the authors reported that physiotherapy students are cognitively more active than students in sport science (8). This could in part explain the reduction of attention from the beginning to the end of the session in

PES students reported in the present study. Indeed, this decrease could be related to non-active cognitive learning adopted in the present study and that for sport science students, the maintenance of good attention during the course is difficult. Perhaps, the duration of the course session should be reduced to observe a good attention during the whole lesson.

In another study, Alsaïd and Bertrand (16) examined the effect of the reproduction of the information on learning and motivation. The author reported that self-reproduction of the information and the image helps to improve the attention and the memorization. Benleghib et al. (20) suggested that the utilisation of animated images during the anatomy courses helps to improve the atten-

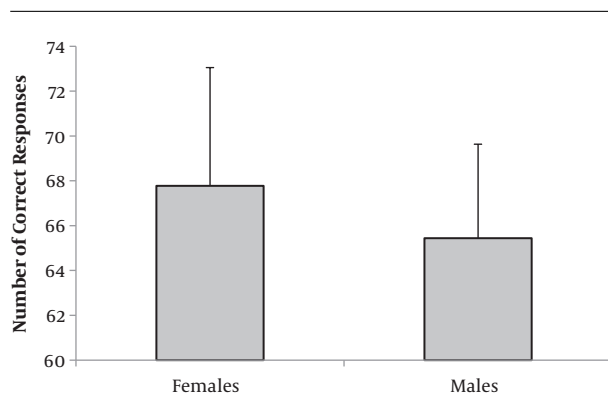


Figure 4. Number of correct responses registered in females and males participants

tion of the students. All these studies demonstrated clearly the importance to sustain attention during an anatomy course that could depend on: the duration of the session, the number of information, the pedagogical method, etc. Thus, further studies could investigate the effect of these factors on learning and attention during an anatomy course. In this context, Klingner et al. (12) reported that the attention during a learning session is affected by the number of information. This factor is very important in the human anatomy that needs the memorization of novel and difficult terminology (21).

The results of the present study reported also that the attention level of the students was better in the morning compared to the early afternoon. In a review study, it has been concluded that the time-of-day affect the human physiology, psychology and behavior (22). These results are supported by previous studies that showed a significant circadian variation of the attention level (13, 14). Indeed, these studies clearly indicated that the attention level is better in the morning hours compared to the early afternoon (13, 14). The reduction of attention during the afternoon could be related to the “post-lunch dip” period characterized by a reduction of the attention and an increase sensation of sleepiness (i.e., some people perform a short-nap during this period (23-25)).

5.1. Conclusions

For PES students, no-significant difference between males and females students was reported. However, the attention level was reduced from the beginning to the end of an anatomy course. This suggests that we should reduce the duration of the course to sustain the attention of the students during the whole session. Also, the results showed that the attention level was better in the morning compared to the afternoon. Thus, anatomy course should be scheduled in the morning hours.

Footnotes

Conflict of Interests: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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