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ORIGINAL ARTICLE

Students' memorization of anatomy, influence of drawing

L'influence du dessin anatomique sur la mémorisation par l'étudiant

B. Alsaid[a,*], **M. Bertrand**[b]

[a] *Laboratory of Anatomy, Department of Anatomy, Histology and Embryology, Faculty of Medicine, University of Damascus, Fayez Mansour Street, Damascus, Syria*
[b] *Laboratory of Anatomy and Learning through Simulation, Nîmes Faculty of Medicine, 30029 Nîmes, France*

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KEYWORDS
Drawing anatomy;
Teaching methods;
Memorisation

Summary
Introduction. — Anatomy is the cornerstone of medical education. Different teaching methods can be combined. This study was designed to evaluate the influence of students' drawing of the anatomical region before and after the dissection session on their memorization of the studied anatomical region.
Method. — Four hundred and sixteen second-year medical students in the faculty of medicine of Damascus were included in this study during the 2013—2014 academic year. Students were randomly divided into three blinded groups. Two groups had to draw the anatomical region respectively before and after the dissection session, while the third group did not have to draw. The memorization of the region was evaluated twice, one and seven weeks after the course. Means were compared using a *t*-test.
Results. — Scores were significantly higher at 1 and 7 weeks tests in groups who were asked to draw either before or after the dissection compared to those who were not asked to draw. No statistical difference was found between the two groups who drew.
Conclusion. — The authors recommend the use of drawing in teaching anatomy.

MOTS CLÉS
Dessins anatomiques ;
Méthode d'enseignement ;
Mémorisation

Résumé
Introduction. — L'anatomie est une des pierres angulaires de la formation médicale. Différentes méthodes peuvent être combinées pour son enseignement. L'effet du dessin de planches anatomiques associé à la dissection de cadavres sur la mémorisation par l'étudiant a été étudié dans ce travail.
Méthode. — Quatre cent seize étudiants de 2e année de la faculté de médecine de Damas ont été inclus dans cette étude étendue sur l'année universitaire 2013—2014. Ils ont été répartis

* Corresponding author.
E-mail address: drbayan@gmail.com (B. Alsaid).

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de manière randomisée à l'aveugle en 3 groupes. Un groupe devait dessiner les muscles de l'expression du visage avant, un groupe après la séance de dissection portant sur le même thème. Un groupe ne dessinait pas. L'évaluation des connaissances était faite 1 et 7 semaines après la séance de dissection. Les moyennes étaient comparées par un *t-test* de Student.
Résultats. — Les groupes ayant dessiné avant et après la séance de dissection avaient des moyennes significativement meilleures à 1 et 7 semaines par rapport au groupe n'ayant pas dessiné. Il n'existait pas de différence entre les deux groupes ayant dessiné.
Conclusion. — Les auteurs recommandent le dessin dans l'enseignement de l'anatomie.

Introduction

Anatomy is considered as the cornerstone of medical education; anatomical knowledge is essential for doctors regardless of their specialty [1]. Furthermore, deep knowledge of anatomy is essential for surgeons and radiologists, due to the continuous development of surgical techniques and imaging technologies [2]. Thus, it is important for anatomy teachers to select effective teaching methods [3—5].

Drawing human form is used to explore, understand and reveal the human body scientifically and aesthetically [6].

In the literature, many articles refer to blackboard drawings as a powerful tool for teaching anatomy [7—9]. Some anatomy-teaching books propose drawing techniques [10] and coloration of preprinted drawings [11,12]. McMenamin found a positive influence of body painting on teaching and learning anatomy [13].

Cadaver dissection remains the commonly used method to put theoretical information into practice and is adopted in most anatomy courses [14,15].

Many articles compared anatomy-teaching methods: traditional dissection of human cadavers vs. plastic models ''dissection'', medical imaging or virtual computer programs [16,17]. The importance of varying teaching resources in anatomy teaching has been highlighted in the literature [18]. Thus emerges the need to explore if combining drawing with dissection session helps medical students to better understand and memorize anatomy.

This study was designed to evaluate the influence of students drawing of the anatomical region before and after the dissection session on their memorization of the studied anatomical region.

Materials and methods

Four hundred and sixteen second-year medical students in the faculty of Medicine, Damascus University (Damascus, Syria) were included in this study. The study took place during the first semester of the 2013—2014 academic year. The topic of the courses was the facial expression muscles.

Students were divided randomly into three blinded groups. Group 1 students ($n = 121$) were asked to drew the muscles in the region before assisting with the dissection session.

Group 2 students ($n = 159$) drew the region after the dissection session; an example of students' drawings is shown in Fig. 1. The students in group 3 ($n = 136$) attended the dissection session but were not asked to draw neither before nor after the dissection course.

The evaluation consisted in filling a picture with 10 anatomical terms in both Arabic and English (as mentioned in the Terminologia anatomica [19] and the Unified Medical Dictionary [20]).

The memorization of the region was evaluated twice, one and seven weeks after the course. We used a printed picture from Netter Atlas [21] (Fig. 2) on which the muscles of the face were targeted with arrows, students were asked in the quizzes to write the name of 10 muscles in both Arabic and English. Further supplement information were demanded such as last year's marks in anatomy exam, students' opinion about the drawing method and whether the student had revised the evaluated anatomical region before the second evaluation.

Data was coded and entered into an Excel® spreadsheet, then transferred into SPSS (version 19). *T*-test was used to compare means using a significance level of 0.05.

Results

The average of the last year's anatomy marks were 68.2%, 70.2% and 68,7% respectively for groups 1, 2 and 3 which was not statistically significant.

In the first evaluation, the highest average score was in group 1 (12.49/20) vs. group 2 (11.71/20) and group 3 (9.93/20). The difference between students who drew and those who did not was statistically significant (group 1 vs. group 3, $P < 0.0001$) and (group 2 vs. group 3, $P = 0.0007$). On the other hand, the difference between the two groups who drew did not reach a significant level (group 1 vs. group 2; $P = 0.079$).

The second evaluation 6 weeks later, demonstrated that students who drew had a better recalling of the terms and the anatomical structures in comparison to students who did not draw (group 1 14.08/20 vs. group 3 12.76/20, $P = 0.001$) and (group 2 13.40/20 vs. group 3 12.76/20, $P = 0.04$).

The influence of revision was studied to show if there was any significant difference between the groups. The students were asked how many times they had revised before the second evaluation (0 = no revision, 1 = revision once or 2 = revision twice), the percentages of students who revised in the three groups were respectively 61, 67 and 69%.

The average of number of revisions in groups 1, 2 and 3 was respectively 0.85, 0.94 and 0.86 without any significant difference between groups.