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The Efficacy of Web-Based Multimedia Education of Normal Electrocardiogram in Junior and Senior Medical Students

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ABSTRACT

Introduction*:** Wide spread availability of internet made the web based education as a real module for training under -graduate medical students. The aim of this study was to evaluate the efficacy of web based multimedia education in normal electrocardiography. ***Methods: In a semi-experimental study and based on the educational programs of medical students in their inpatient training courses, th**e** normal electrocardiogram selected for web based multimedia education. The materials necessary to teach normal electrocardiogram were provided and multimedia was prepared for installing into computers. Two groups of medical students, 30 in each group in their cardiology service (senior and junior students) were selected. Mean while the intervention group studied the multimedia for an hour and for comparison group classroom - based education was done. At the end of study all students answered to atwenty question questionnaire about normal electrocardiogram. ***Results*:** The percentage of correct answers in intervention and comparison groups was 72% and 71% respectively. The prevalence of correct answer for junior students in intervention and comparison group was 68% and 67% respectively. The percentage for senior students was 73% and 75%. ***Conclusion*:** Like other studies, this study showed the multimedia training can be as effective as the routine classroom based learning. Web based multimedia education is as efficient as classroom based education and can be used as a suitable alternative to conventional methods of training.

Introduction

The complexity of medical education was increased in past decades. For better diagnosis and treatment of diseases higher levels of knowledge and skills are necessary.[1] Wide spread availability of internet made the web based education as a real model for training of undergraduate medical students.[2]

Electrocardiogram (ECG) is a unique tool for diagnosis of cardiac disease. Taking electrocardiogram is simple and don't need sophisticated instruments.[1] It is not expensive and is available worldwide. Regardless of new techniques developed in the field of cardiology, the value of ECG is increasing[3] and is the first tool for diagnosis of cardiac disease especially in emergency rooms.

The interpretation of patient's ECG is the important part of educational curriculum of medical students in their cardiology and internal medicine services. All students should learn necessary parts of ECGs.

The study was done to evaluate the efficacy of multimedia web based education of normal electrocardiogram.

Methods

From October to December 2011, with an interventional intervention – comparison study and based on educational programs of medical students in their inpatient training courses, th**e** normal electrocardiogram selected for web based multimedia education. The materials necessary to teach normal electrocardiogram were prepared in five sections:

1. Introduction to ECG and its importance for diagnosis of cardiac disease.
2. Physiology of cardiac myocytes, impulse formation and action potential curve.
3. Registering and taking cardiac electrical activities.
4. Depolarization and registering P and QRS waves.
5. Repolarization and registering T and U waves and finally normal electrocardiogram, timing, segments intervals and QRS morphology.

Multimedia software was prepared based on subjects and figures to teach normal ECG. Before each section one pretest question was asked and students should answer it (true or false) to continue. After that the section continued

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with explanations and figures and at the end of the section the true answer to pretest question was explained. Then the next section started. At the end of program the student could learn generation and registration of normal electrocardiogram.

An example of each section

Q7: What is the explanation for negative P wave in lead aVR?

1. Because the P vector is perpendicular to aVR axis.
2. Because the P vector is parallel to aVR axis.
3. Because the P vector is opposite to aVR axis.
4. Because the aVR is in the same direction of V1 lead.

Generation of P wave

After generation of impulse from sinus node, it propagates to the atria via specialized bundles and to the atrioventricular node, the summation of electrical orientation makes the P vector from right to left and from top to down as shown in figure 1. This orientation of P vector makes the P wave positive in leads I and aVL and negative in lead aVR and biphasic in lead V1. So the correct answer to question is no: 3.

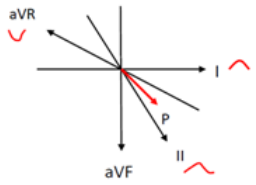

Figure 1. The P vector and its effects of various leads

Two groups of medical students, 30 in each group, in their cardiology service (senior and junior students) selected to examine the efficacy of this software. For intervention group the computer department of university prepared computers with the installed software. This group had to study the software for an hour and if they had time they could review it. At the same time for the comparison group a class was prepared and the cardiologist taught the same subjects by video projector and Power Point software. The same pre test questions of software were asked in the proper time during teaching. After a break all the students of two groups responded to atwenty question questionnaire about normal electrocardiogram which were not the same questions of software. The students in intervention group were asked if they were satisfied with the software.

Results

Each group consists of 15 senior and 15 junior medical students. Figure 2 shows the frequency of correct answers in intervention and comparison subgroups.

Percentage of correct answers in intervention and comparison groups was72% and 71% respectively. This difference was not significant statistically.

The prevalence of correct answers to pretest questions in the intervention group was 18% in junior and 25% in senior students.

In intervention group 87% of junior students found the software interesting and exciting. The percentage was 73% for senior students. Eighty percent of junior and 93% of senior students wanted to learn other portions of ECG by multimedia software. Eighty percent of junior students and 60% of senior students were satisfied with the time for learning by software.

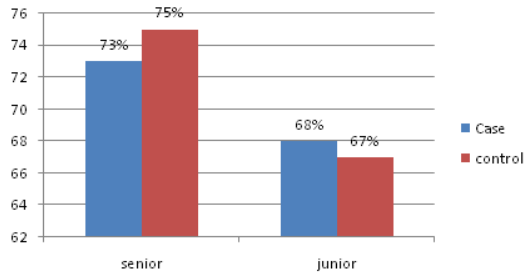

Figure 2. The prevalence of correct answers in the intervention and comparison subgroups.

Discussion

Like other studies,[1,2,3] this study showed the multimedia training can be as effective as routine classroom based learning. The web based availability of multimedia education is a unique characteristic because students can learn in their free time and can review it repeatedly. Classroom based education needs a specific time which are usually in the morning or at noon when they should do their clinical activities with patients.

This study showed senior students have less tendency for multimedia learning which was compatible with other available studies.[1,2,3]

The low percentage of correct answers to pretest questions showed the fact that students don't have sufficient knowledge at the beginning of new courses which may affect their further education.

In the countries like Iran the less availability of high speed internet services especially in the student residencies can affect the benefit of web based multimedia education.

Conclusion

Web based multimedia education can be as efficient as classroom based educations and can be used as suitable alternative to conventional methods of training.

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