KAP STUDY

EFFECTIVENESS OF TEACHING ECG STRATEGY IN PRECLINICAL YEARS: STUDENTS' PERSPECTIVE.

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ABSTRACT

Background: ECG interpretation is an important skill in patient care provision in all levels of health care system. Although its importance cannot be denied in clinical practice, ECG patterns of patients are often misdiagnosed causing adverse outcomes and even death of patients. This study aims to assess the basic knowledge in undergraduates about ECG interpretation and to determine the effectiveness of teaching ECG strategy during the preclinical years.

Methods: A cross sectional study was conducted in Ziauddin University Karachi in which 232 MBBS and BDS students from preclinical years participated. A structured questionnaire was administered regarding ECG teaching in preclinical years. Answers were recorded on Likert scale. Statistical analysis was done on SPSS version 20. Frequencies and percentages were calculated for categorical variables. Chi square test was used to compare groups. P value of ≤0.05 was considered as significant.

Results: Among 232 students 132(81.5%) MBBS and 62(88.6%) BDS, considered the use of practical classes as a good mode of teaching ECG while 124(76.5%) MBBS and 59(84.3%) BDS students considered problem based learning to teach ECG. 54(77.1%) BDS and 134(82.7%) MBBS students considered ECG to be taught by a cardiologist. The correct response rate of the basic knowledge of ECG was 83% among MBBS and 80% among BDS students.

Conclusion: The basic knowledge of ECG interpretation was good among students of Ziauddin University. However there is a need of more integrated program along with collaboration with cardiologists to teach this competency.

KEYWORDS: Electrocardiogram, learning, interpretation, competency.

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INTRODUCTION

Electrocardiogram (ECG) interpretation is an essential skill used in cardiology, internal, family and emergency medicine[1]. ECG is used for screening and diagnosis of most of the cardiovascular diseases that are life-threatening[2,3]. The importance of correct interpretation of ECG can be demonstrated in patients of acute myocardial infarction with cardiac arrest, in which ECG signs directly determine appropriate treatment[4,5].

Basic knowledge of ECG interpretation has been a core component of both undergraduate and postgraduate medical training[6-8]. Deficiencies in the interpretation of ECG among medical students have been reported by various studies all over the world[7,9]. Even senior medical students have been reported to miss 26% to 62% of acute myocardial infarctions (MI)[10-12]. Another study done recently, involving internal medicine residents reported that only half of the straightforward common ECGs were interpreted correctly, while 26% of trainees missed

an acute MI and 56% missed ventricular tachycardia[13]. Even the cardiology residents have shown poor performance in ECG interpretation and 26% reported to miss ST-elevation myocardial infarction on ECG [14]. These inaccurate interpretations of ECGs can lead to problems in the decision of patient management, resulting in adverse patient outcomes and even deaths[15-17]. Various international guidelines have emphasized on the importance of teaching ECG interpretation to undergraduate and post graduate medical students[18,19].

In Pakistan, the competency of performance and interpretation of ECG has been kept as compulsion for all undergraduate medical and dental students by Pakistan Medical and dental council in their core curriculum. However, little is known about the fact that, the current education in medical colleges assures ample capability in ECG interpretation among under graduate medical and dental students.

This study aims to assess the basic knowledge in undergraduates about ECG interpretation and to determine the effectiveness of teaching ECG strategy during the preclinical years.

METHOD

It was a cross sectional study done in Ziauddin University of Karachi. The study was completed within 3 months of approval from review committee. A total of 232 students were taken from preclinical years of MBBS and BDS. Participation in this study was on voluntary basis. Non probability convenience sampling was done. All MBBS and BDS students of preclinical classes who gave informed consent to participate in the study were included and there were no exclusion criteria. Data was collected through a structured questionnaire with 20 closed ended questions regarding the interpretation of ECG and the importance of teaching ECG in preclinical years. The answers were recorded on Likert scale. Demographic data of students were also recorded in the same questionnaire. Data was entered in SPSS version 20. Mean and standard deviation was calculated for numerical data. Frequency and percentages were calculated for categorical data. Chi square test was used to compare categorical data between the groups. A p value of ≤ 0.05 was considered significant.

RESULTS

In the present study 232 students participated in which 70 students were BDS and 162 were MBBS. All of these students were from preclinical years that were taught the basic concepts of ECG in their relevant semesters.

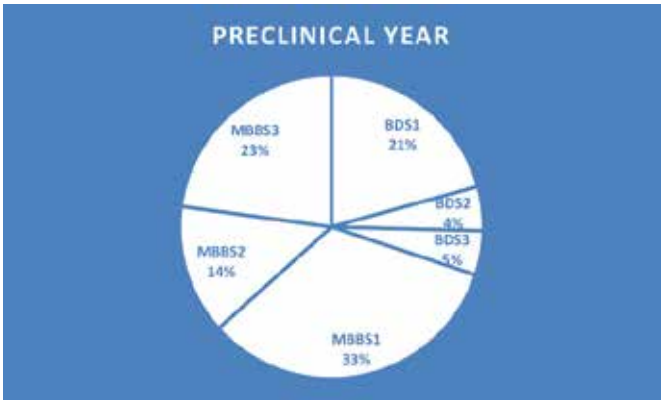

Figure 1: Level of participation of MBBS and BDS students.
The level of participation among preclinical year was that MBBS 1st year participated 33%, MBBS 2nd yr participated14%, MBBS 3rd yr participated 23%, BDS 1st yr participated 21%, BDS 2nd yr participated 4% and BDS 3rd year participated 5%.

Table 1: The positive responses regarding the importance of teaching ECG in preclinical years

Responses	Positive responses		*P* value
	MBBS	BDS	
Difficult to learn	122(75.3%)	48(68.6%)	0.552
Knowledge of basics of ECG	139(85.8%)	65(92.9%)	0.317
Compulsory part of final exam	95(58.6%)	45(64.3%)	0.676
Teaching in preclinical classes	133(82.1%)	27(81.4%)	0.253
Effective to learn in preclinical years	137(84.6%)	64(91.4%)	0.195

Table 1 shows the agreed responses of participants regarding importance of teaching ECG in preclinical years. Out of 232 students 85.8% MBBS and 92.9% BDS students considered that preclinical students should know the basics about ECG. A total of 84.6% MBBS and 91.4% BDS students considered that learning ECG in preclinical years is effective in clinical years.

Table 2: The Positive Responses for mode of teaching ECG

Responses	Positive responses		*P* value
	MBBS	BDS	
Self-learning importance	85(52.5%)	48 (68.6%)	0.044
Taught by cardiologist	134(82.7%)	54 (7.1%)	0.539
Physiology teachers are capable	71(43.8%)	47(67.1%)	0.005
Senior students help	72(44.4%)	38(54.3%)	0.135
Use of Pbl	124(76.5%)	59(84.3%)	0.337
Use of practical classes	132(81.5%)	62(88.6%)	0.406
Use of lectures	87(53.7%)	41(58.6%)	0.391

Table 2 shows the participants agreed responses regarding mode of teaching ECG competency. 81.5% MBBS and 88.6% BDS students considered practical classes to be the most useful mode of teaching ECG. Problem based learning along with lectures and other methods of teaching ECG were considered as effective by 76.5% MBBS and 84.3% BDS students.

Table 3: Basic knowledge of the respondents about ECG

Responses	Correct Responses		*P* value
	MBBS	BDS	
Knowing ECG paper graphics	133(82.5%)	66(94.3%)	0.048
Heart rate calculation	130(80.2%)	57(81.4%)	0.658
Information of heart rhythm	143(88.8%)	60(85.7%)	0.591
Cardiac axis detection	133(82.1%)	51(72.9%)	0.038
Cardiac electrical conducting system	134(82.7%)	59(84.3%)	0.755
Amplitude and duration of QRS complex	133(82.1%)	55(78.6%)	0.278
P wave and ST segment changes	137(84.6%)	55(78.6%)	0.452
Skill of recording ECG	102(63%)	58(82.9%)	0.004

Table 3 shows the response rate of the participants in basic concepts of ECG interpretation. The correct response rate regarding heart rate, rhythm, axis, P wave and ST segment changes and QRS complex amplitude and duration was more than 80% for both MBBS and BDS students.

DISCUSSION

The major findings regarding the mode of teaching ECG competency in our study were that 81.5% MBBS and 88.6% BDS students considered practical classes conducted as small groups to be the most useful mode of teaching ECG. A similar study was conducted by Raupach et al. on teaching and assessment formats of ECG interpretation skill in which they followed two cohorts of 4th year medical students, one was exposed to traditional lectures and other cohort was exposed to same sessions of small group format and peer assisted learning. A written assessment test on ECG interpretation was done before and after the exposure to these teaching modes. They found that small group and peer assisted learning was more effective than conventional lectures based teaching [20]. However in our study we found that only 44% MBBS and 54% BDS students considered peer assisted learning as useful. A total of 76.5% MBBS and 84.3% BDS students considered using problem based learning along with traditional teaching system as more effective. A study conducted in cardiorespiratory module of nursing students found problem based learning to be more effective than traditional lectures similar to our study [21].

The study conducted by Rubinstein et al. showed that lectures to be more effective than puzzle-based teaching [22]. In our study we found that lectures were considered more effective than self directed learning .Similar findings were reported by Mahler et al. in their study who reported that self directed study was less effective than both lectures and workshop based ECG learning [23]. In another study conducted by Nilsson et al. web based ECG interpretation programs were found to be beneficial than conventional teaching methods [24].

In the present study we found that basic knowledge regarding ECG parameters such as heart rate, heart rhythm and axis, QRS complex, ST segment changes was good in Ziauddin University students. The correct response rate among MBBS students was 83% and was 80% among the BDS students in our study. Similar findings were reported by a study by Kopeć et al. in which the correct response rate was 86% among polish medical students [25]. In another study conducted at Jagiellonian University Pudło et al. compared 4th, 5th and 6th year medical students on the basis of knowledge of rules and practical skills of ECG and found that students have comparable knowledge of ECG similar to our study[26]. Contrasting results were found by a study in which ECG interpretation of abnormalities were studied in 52 final year medical students by Nigel et al. this study reported only 52% accurate response rate [27]. Similarly, Jablonover et al. found 37% accurate response rate in ECG interpretation among 231 graduating medical students[9]. The latter two studies used open ended questions for interpretation of ECG abnormalities, which are more difficult to answer.

As far as assessment plan is concerned 88% of the participants of the present study agreed to keep ECG as a compulsory part of final examination. Two studies regarding assessment format of ECG competency found summative assessment to be more effective than formative assessment similar to this study [20,28]. In the present study 82% MBBS and 77% BDS students agreed to the option of ECG being taught by a cardiologist along with physiologists. Another study conducted by Salerno et al. also emphasized that ECG training sessions should be conducted by cardiologists along with input from own specialty [7].

In this study more than 85% of students considered teaching and assessing ECG competency in preclinical years as crucial for strong basis in clinical years, house job and post graduate trainings. The findings of the present study were similar to a study conducted in George Washington School of medicine. In the aforementioned study 93% of students considered it important to teach ECG competency in medical school for strong clinical basis [29].

The strength of this study is that it is the first study of Pakistan conducted in both MBBS and BDS students with a sample size of 232 students. However, this study was confined to only Ziauddin University where a modular integrated system is followed and the findings deduced through this study may not be the true reflection of medical students all over the country. Planning a more integrated curriculum and guidelines for the preclinical years both nationally and internationally to bring an improvement in the skill of ECG interpretation is the need of the time.

CONCLUSION

The competency of ECG interpretation was found excellent among students of Ziauddin University as far as the basic knowledge was concerned. This study also highlighted the importance of ECG interpretation skill in an integrated curriculum.

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