

## Effect of a Course of Biostatistics in an Integrated Curriculum

Sayed Ibrahim Ali<sup>1\*</sup> and Abdul Sattar Khan<sup>2</sup>

<sup>1</sup>Department of Statistics and Assessment, College of Education, Helwan University, Egypt

<sup>2</sup>Department of Family Medicine, College of Medicine, King Faisal University, Saudi Arabia

\*Corresponding author: Sayed Ibrahim Ali, Lecturer, Department of Statistics and Assessment, College of Education, Helwan University, Egypt, Tel: 00966504472991; E-mail: [drsamas38@gmail.com](mailto:drsamas38@gmail.com)

Received date: Feb 01, 2018; Accepted date: Feb 26, 2018; Published date: Mar 12, 2018

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### Abstract

**Aim:** Lack of knowledge for biostatistics adversely affect the skills required for a competent physician. However, literature is deficient to show whether medical students learn it and course of biostatistics is effective. Hence, this study designed to assess the effect of a biostatistics course in an integrated PBL curriculum.

**Materials and methods:** It was a cross-sectional study conducted for first year male (92) and female (88) medical students in public medical school in Eastern province. This 10-item scale has applied as pre and post-test at the beginning and end of the course. A student t-test applied to compare the mean difference in between male and female students for the mean scores.

**Results:** With this questionnaire, the maximum possible score was 10. The range of scores obtained by the study subjects was 7 and the median was 5. Appropriate use of biostatistics was independent of sex ( $P>0.05$ ). T-test showed a significance difference in the mean score before and after teaching the course of biostatistics.

**Conclusion:** In new evidence based medicine practices epoch an introductory course of biostatistics is not sufficient and need more courses integrated in the curriculum for the better understanding and application of the biostatistics knowledge.

**Keywords:** Biostatistics; Medical students; PBL: Problem based learning; Curriculum

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### Introduction

Biostatistics is a branch of applied statistics and it must be taught with the focus being on its various applications in biomedical research [1]. It is an essential tool for medical research, clinical decision making, and evidence based practice [2]. Therefore, it is an essential part of every medical curriculum either traditional/subject based or integrated problem based learning (PBL). It is well-recognized and established component of the medical curriculum in order to acquaint our students about medical research, clinical decision making, and evidence based practices. The doctors have been worried about the increasing pressure to make use of techniques that they do not fully understand [3]. Keeping in mind the importance of the biostatistics, a course has been designed for the block teaching of the integrated curriculum which mainly covers data display and summary, summary statistics for quantitative data, summary statistics for binary data, populations and samples, confidence intervals, testing hypotheses, t tests, chi square test and analysis of Variance test (ANOVA). These all statistics usually apply in medical researches and would help our students to understand the articles published and use these articles for their practices. Thus these skills are essential for evidence based medicine practices.

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### Materials and Methods

It was a cross-sectional study conducted for the first year males & females medical students in a public medical school in Eastern Province, Saudi Arabia. A PBL curriculum has been adopted in this medical school for the development of the competent doctors. This PBL curriculum has many components, which makes this curriculum more effective and applicable to the Evidence Based Medicine practices. Since it is a competencies based curriculum and biostatistics course is the component of mentor line activity that is the compulsory for the final research project as part of the gradation thesis.

A questionnaire developed having 10 item scale with 5 multiple choice answers developed by a Delphi technique and these questions have covered; descriptive statistics including tables and graphs, central tendency measures, binary variables, confidence intervals, hypothesis, and testing. One correct answer was scored 1 so the maximum score for 10-items carried 10 in total. This 10-item scale has applied as pre & posttest at the beginning and end of the course. A student t-test applied to compare the mean difference in between male & female students for the mean scores.

### Results

With this questionnaire, the maximum possible score was 10. The range of scores obtained by the study subjects was 7 and the median was 5. Appropriate use of biostatistics was independent of sex

( $P > 0.05$ ). T-test showed a significance difference in the mean score before and after teaching the course of biostatistics (Tables 1 and 2).

Tests	n	Mean	SD	t	df	p-value
Pre-test	180	4.67	1.25	17.2	179	0.0001
Post-test	180	7.59	2.03			

**Table 1:** Comparison of mean results in between pre and post-test scores.

Tests	n	Mean	SD	t	df	p-value
Males	92	7.25	1.02	1.67	178	0.24
Females	88	6.97	1.21			

**Table 2:** Comparison in between males and females post-test scores.

## Discussion

The results showed that there is a significant difference in between the mean scores about the knowledge related to the topics taught in the Biostatistics course. Which demonstrated that courses related to the Biostatistics effectively taught at the undergraduate level. There was no difference found in between males and females students and both had performed better in the posttest.

The biostatistics and epidemiology are the pillars of any research activity and if the students learn these skills at the undergraduate level then they will not face any problem in their practices. As we know that the practicing doctor needs have changed now and because of the advancement in the information technology and emphasis of evidence-based medicine [4]. Hence, this course has been designed for undergraduate medical students.

The course offers in our curriculum is integrated and aligned with research as well as respective block teaching to cover all objectives. Hence, it supports the students with all aspects and provide them opportunities for more learning in an integrated system. The results also highlighted that their understandings of the core knowledge are sufficient to apply knowledge for literature review and critical appraisal of the papers. And later apply to, prepare a good proposal for the preparation of their thesis to complete their graduation. An introductory statistics courses are important as they may often be the only course that students undertake and they are important in shaping students' beliefs and attitudes [5].

This requirement of the Biostatistics in the work of the doctors has mentioned by Swift et al. and Windish et al. found that 79% and 95%, respectively, of the participants in their studies considered statistics as important for their work [6,7]. This point has been reinforced by another study conducted on postgraduate students in which the most of the respondents wished to upgrade their knowledge of Biostatistics

and suggested refresher training programs, workshops, Continued Medical Education, and self-learning as the means of achieving this [8].

Thus, it is important to study the statistics and the concept should be clear from the first year, which ultimately helps them for more understanding of their subjects. However, usually students underperform and don't like in courses involving mathematics, numeracy or statistics [7,9]. Furthermore, it becomes more challenging for medical students because they have varied backgrounds. In addition, it is increasingly clear that teaching statistics in a traditional didactic way, neither engages the students nor meets their needs [10].

This study has limitation because conducted in a small scale and only first year students have participated and assessed only knowledge part in relation to practice. Therefore, suggested to have a large scale study with the assessment of their practices in other years of their study at medical school.

## Conclusion

An introductory course of biostatistics in traditional curriculum was considered sufficient for shaping students' beliefs and attitudes [5]. However, in new evidence based medicine practices epoch it is not sufficient and need more courses integrated in the curriculum for the better understanding and application of the biostatistics knowledge.

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