ORIGINAL ARTICLE

Comparing the Influence of Three Educational Methods on the Epidemiology of Occupational Diseases' learning Qualities

Background: Teaching epidemiology of occupational diseases is an important course for occupational health students. If these courses are taught with problem-based learning or other new educational methods, they will be more beneficial. The objective of this study was the determination of the effects of three educational methods on the learning of epidemiology of occupational diseases.

Methods: This study was a cross-sectional study which was conducted by using the curriculum of ministry of health, these courses had been taught with lecture and power point presentation for group (A) , problem-based learning for group (B) , and evidence-based medical education for group (C). Then data had been analyzed by SPSS 11.5, ANOVA with $P<0.05$.

Results: The total grade of epidemiology of occupational diseases in group (A) was 16.71 ± 1.16, the minimum score was 13.25 and the maximum was 19.25 (Min:13.25 & Max:19.25) in group (B) ,it was 18.52 ± 1.03, (Min:16.50 & Max:20)and in group,(C) it was 18.46 ± 1.20 , (Min:14.0 & Max:20) ,ANOVA (F) $=14.752$ and $P=0.001$ had significant differences.

Conclusion: According to the total results, the problem-based learning was the best educational method.

Keywords: Problem-based learning, Lecture, Evidence-based medical education, Epidemiology of occupational diseases, Occupational health

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مقارنه تأثير ثلاثه أساليب تعليميه في مجال درس علم الأوبئه في مجال امراض العمل

التمهيد و الهدف: إن تعليم درس علم الأوبئه في مجال امراض العمل له اهميه كبيره بين دروس طلاب الصحه الحرفيه. إذ تم تدريس هذا الدرس على اساس اسلوب المبتنى على حل المسأله و الأساليب الحديثه قد يكون مفيد جدا إن الهدف الاساسي من هذه الدراسة هو تعيين تأثيرات ثلاث أساليب تعليميه في تعلم درس علم الأوبئه في مجال امراض العمل.

الأسلوب: تمت هذه الدراسه عبر أسلوب مقطعي با استعمال الكوريكولوم المصوب من قبل وزارة الصحه المحترمه تم تدريس الفريق (الف) محاضره و تم استخدام الباوربويت، الفريق (ب) التعليم المبنى على حل المسأله و الفريق (ج) التعليم الطبي المبنى على المشاهده و الإختبار. تم تحليل المعطيات عبر برنامج SPSS مع استعمال ANOVA وسطح أقل من ٠.٠٥

النتائج: العلامه الكليه في ماده علم الاوبئه في مجال امراض العمل في الفريق (الف) ١٦.٧١±١.١٦ مع أقل علامه ١٣.٢٥ و أكثر علامه ١٩.٢٥، في فريق (ب) ١٨.٢٥±١.٠٣ مع أقل علامه و أكثر علامه ٢٠ و في الفريق (ج) ١٨.٤٦±١.٢٠ مع أقل علامه ١٤ و أكثر علامه ٢٠

الإستنتاج: نظرا الى العلامات، أفضل أسلوب هو الاسلوب المبتنى على حل المسأله في دراسته علم الاوبئه في مجال امراض العمل.

الكلمات الرئيسه: التعلم المبنى على حل المسأله محاضره، التعليم الطبي المبتنى على الشواهد، علم الأوبئه في مجال امراض العمل، الصحه الحرفيه.

ملازمت کے دوران لاحق ہونے والی بیماریوں کی اپیڈی میالوجی کے تعلیم پر تین روشوں کے اثرات کا جائزہ۔

بیک گراونڈ: میڈیکل طلباء کے لئے ملازمت کے دوران ہونے والی بیماریوں کی اپیڈی میالوجی کی تعلیم اور اس سلسلے میں ٹریننگ بہت اہمیت کی حامل ہے۔ اگر یہ موضوع مسئلے کے حل کے ہمراہ ہو اور اسے تعلیم کی بعض نئي روشوں سے پڑھایا جائے تو اس کے بہت ہی مفید نتائج حاصل ہونگے۔ اس تحقیق میں ہم نے اس موضوع کی تعلیم پر تین روشوں کے اثرات کا جائزہ لیا ہے۔

روش: تحقیقاتی ٹیم نے وزارت صحت کے تیار کردہ میڈیکل کری کولیم کی اساس پر ٹرمز اور دروس کی تدوین کی۔ الف گروہ ملازمت کے دوران امراض کی اپیڈی میالوجی کے موضوع کو لکچروں اور پاور پوائنٹ کی روش سے شروع کیا گیا۔ ب گروہ کے لئے پرابلم بیسڈ روش سے کام لیا گیا۔ اور تیسرے گروہ کے لئے عملی روش اور ٹسٹ کا طریقہ اپنایا گیا۔ ڈاٹا کا تجزیہ اینووا اور ایس پی ایس ایس سافٹ ویر سے کیا گیا۔

نتیجے: اعداد وشمار سے معلوم ہوا کہ سب سے اچھی روش مسئلے کے حل کی روش تھی جس میں اپیڈمیالوجی کے موضوع کو اچھی طرح پڑھایا جاسکتا ہے۔

کلیدی الفاظ: مسئلے کا حل، لکچر ، اپیڈی میالوجی۔

مقایسه تاثیر سه روش آموزشی بر یادگیری درس اپیدمیولوژی بیماری های شغلی

زمینه و هدف: آموزش درس اپیدمیولوژی بیماری های شغلی اهمیت زیادی در بین دروس دانشجویان بهداشت حرفه ای دارد. اگر این درس با استفاده ازروش های آموزشی مانند یادگیری مبتنی حل مساله و یا برخی روش های نوین آموزشی ارائه شود بسیار مفید خواهد بود. هدف اصلی تعیین تاثیرات سه روش آموزشی بر یادگیری درس اپیدمیولوژی بیماری های شغلی است.

روش: با استفاده از یک مطالعه مقطعی با استفاده از کوریکولوم مصوب وزارت محترم بهداشت طرح دوره و طرح درس ها تدوین شد درس اپیدمیولوژی بیماری های شغلی برای گروه الف سخنرانی با ارائه پاورپوینت، برای گروه ب یادگیری مبتنی بر حل مساله و برای گروه ج آموزش پزشکی مبتنی بر شواهد ارائه و آزمون انجام شد. داده ها در نرم افزار SPSS ۱۱/۵ با استفاده از ANOVA و سطح معنی داری کمتر از ۰/۰۵ مورد ارزیابی قرار گرفت.

یافته ها: نمره کل اپیدمیولوژی بیماری های شغلی در گروه الف ۱/۱۶± ۱۶/۷۱ با حداقل نمره ۱۳/۲۵ و حداکثر ۱۹/۲۵ بود، در گروه ب متوسط نمره ۱/۰۳± ۱۸/۵۲ با حداقل نمره ۱۶/۵۰ و حداکثر ۲۰ و در گروه ج متوسط نمره ۱/۲۰± ۱۸/۴۶ با حداقل نمره ۱۴/۰۰ و حداکثر ۲۰ بود با انجام آزمون ANOVA
$F=14/752$ و $P=0$ اختلاف معنی دار بدست آمد.

نتیجه گیری: بر اساس نمره کل بدست آمده یادگیری مبتنی بر حل مساله بهترین روش آموزشی برای درس اپیدمیولوژی بیماری های شغلی بوده است

واژگان کلیدی: یادگیری مبتنی بر حل مساله، سخنرانی، آموزش پزشکی مبتنی بر شواهد، اپیدمیولوژی بیماری های شغلی، بهداشت حرفه ای

INTRODUCTION

The importance of new educational methods is clear. Every university lecturer or teacher is somehow aware of this crucial issue and many of them have used one or more of these methods but may not have perfect knowledge about the specific effects of these methods (1, 2).

In recent years, new educational methods such as problem-based learning, evidence-based medical education, and utilizing didactic assists have been used for educational programs at universities. We know that presenting lecture is a traditional method in education but with the presentation of power point, educational animation and film, this method can be improved and become more useful(2).

Problem-based learning is a recommended educational method; in this method students try to solve a specific problem under the guidance of the professor (3, 4). In medical sciences this problem is a disorder, disease, or health disturbance. According to the program, students prepare themselves for class and study about the subject of the next sessions. In the beginning of each session, the professor presents the subject in the form of a question or a problem (5, 6). Under the guidance of the professor, students discuss the issue until they solve the problem and answer the main question. It seems that it fits clinical problems (7-9).

Evidence-based medical education is the next educational method (10, 11). In this method, some of students search about the subject of the previous session (12) in educational and related journals and websites (13, 14). In this study, the author introduces some specific websites for occupational health (15-17). Students search about the title in up-to-date websites and other references for new lessons.

Occupational health has general, basic, and specific courses that epidemiology of occupational diseases is a base for a lot of specific courses such as epidemiology of occupational diseases, toxicology, ergonomic and occupational risk factors.

One of the main courses in occupational health is epidemiology of occupational diseases .This course includes specific chapters on epidemiology of occupational diseases such as occupational lung diseases, occupational toxicities, musculoskeletal disorders, occupational cancers, noise induced hearing loss , epidemiology of occupational diseases application and general epidemiology chapters such as definitions, types of epidemiological studies, studies application in occupational health , prevention levels , prevention application in occupational health , and epidemiological samples(18-20).

Some studies have demonstrated the effectiveness of problem-based learning; Groves M. et al have shown the influence of tutoring in problem-based learning medical curricula (3), Butler R. et al have talked about the problem-based learning in the medical school (4) , Callis A.N. et al have cleared the difference between traditional and hybrid problem-based learning in application of basic sciences to clinical problems (5). Some studies have shown the usefulness of evidence-based medical education; Dornan T. et al have talked about the identification of the best evidence in medical education (10), and Ramstrand N. et al have considerations for developing an evidence-based practice in orthotics and prosthetics (11).

In this study, the author tries to find the best educational method for occupational diseases' epidemiology since this course is a basic for many future courses.

The objective is to determine the effects of three educational methods on learning occupational diseases' epidemiology.

METHODS

This study has been performed as a cross-sectional study from 1389 to 1391 on occupational health students. Group A and B included 25 students and in group C there were 28 students. Course plans were written according to curriculum of the ministry of the health website.

Each group had a special educational method for epidemiology of occupational diseases. Lecture with power point presentation was used for group A, problem-based learning was used for group B and evidence-based medical education was utilized in for group C.

In problem-based learning, students participated in the classes actively, before each session they studied the subject and at the beginning of the classes a question was raised about the subject on which they discussed about and the professor directed them. Mostly, the professor posed a question in the case presentation at first.

Example number (1): a battery worker who had neuropathy symptoms. Is it a work related problem? Is it frequent? What can we do? This was a problem in industry and students were supposed to solve it and answer the teacher's questions.

Example number (2): Industry worker who had low back pain. Is it a work related problem? Is it frequent? What can we do? This was a problem in industry, too. These questions can be related to occupational diseases, toxicology, ergonomic, and statistics and help the future specific courses learning in occupational health students.

In evidence-based medical, students participated in the classes actively. Each session at the end of the class a question was planned by the professor and the next session one or more students who had looked for the answer in related journals and websites, such as national institute for occupational safety and health, haz -map, international labor organization discussed the answer.

In general epidemiology chapters, there were definitions, types of epidemiological studies, studies application in occupational health, prevention levels, prevention application in occupational health, and epidemiological samples.

In specific epidemiology of occupational diseases there were epidemiology of occupational lung diseases, occupational toxicities, musculoskeletal disorders, occupational cancers, noise induced hearing loss, and epidemiology of occupational diseases application.

Examinations of the three groups were at the same level at the end of the term, these tests were prepared by professors' and teachers' opinions for making sure about the correction and validity and there had been a pilot study with correlation of 0.85 for assigning the reliability in a

sample of occupational health students. These tests included the general and specific epidemiology of occupational diseases according to the educational programs.

The inclusion criterion was the occupational health students in three entrance year of 1388, 1389 and 1390 in the field of occupational health, and exclusion criteria were studying another field or having entered university in other years.

Data had been gathered in SPSS 11.5, and analyzed for the calculation of means, standard deviation, ANOVA and $P<0.05$.

In research ethics, the researcher got oral satisfaction from participants and the names of the students were kept confidential.

RESULTS

The total grade of epidemiology of occupational diseases in group A (lecture and presentation with power point) was 16.71±1.16, (Min: 13.25 and Max: 19.25), in group B (problem-based learning) was 18.52±1.03,(Min:16.50and Max: 20) and in group C(evidence-based medical education) was 18.46±1.20 ,(Min: 14.00and Max: 20), ANOVA (F) =14.752 and P=0 had significant differences.

Table 1. The comparison of grades in specific epidemiology of occupational diseases chapters among the three groups (P<0.05)

P value	ANOVA (F)	Grade of specific epidemiology in group C	Grade of specific epidemiology in group B	Grade of specific epidemiology in group A	subject	number
0.001	231.823	1.29±0.15	1.93±0.16	0.80±0.18	Epidemiology of occupational lung diseases	1
0.001	43.173	1.29±0.17	1.87±0.27	0.95±0.44	Epidemiology of occupational toxicities	2
0.001	16.349	1.32±0.25	1.80±0.29	1.14±0.51	Epidemiology of musculoskeletal disorders	3
0.001	25.927	1.30±0.17	1.86±0.27	1.06±0.52	Epidemiology of occupational cancers	4
0.001	18.611	1.31±0.24	1.83±0.28	1.13±0.52	Epidemiology of noise induced hearing loss	5
0.001	19.901	1.32±0.23	1.84±0.27	1.12±0.52	Epidemiology of occupational diseases application	6

Table 2. The comparison of grades in general epidemiology chapters among three groups (P<0.05)

P value	ANOVA (F)	Grade of specific epidemiology in group C	Grade of specific epidemiology in group B	Grade of specific epidemiology in group A	subject	number
0.001	66.434	1.96±0.13	1.02±0.11	0.95±0.52	Definitions	1
0.001	55.490	1.94±0.16	1.05±0.16	1.00±0.53	Types of epidemiological studies	2
0.001	56.603	1.93±0.16	1.04±0.11	1.01±0.52	Studies application in occupational health	3
0.001	54.909	1.92±0.17	1.05±0.13	1.02±0.51	Prevention levels	4
0.001	52.415	1.91±0.17	1.06±0.14	1.03±0.51	Prevention application in occupational health	5
0.001	391.53	1.90±0.17	1.05±0.18	0.58±0.14	Epidemiological samples	6

Table 1 shows the comparison of grades in specific epidemiology of occupational diseases chapters among the three groups.

Table 2 shows the comparison of grades in general epidemiology chapters among the three groups.

In specific epidemiology of occupational diseases ,there was a significant difference between the grade of epidemiology of occupational lung diseases, occupational toxicities, musculoskeletal disorders, occupational cancers, noise induced hearing loss , epidemiology of occupational diseases application were significantly different among the three groups with P=0.001 and the highest grade related to group(B) with problem-based learning. The mean of grades were more in musculoskeletal disorders and epidemiology of occupational diseases applications.

In general epidemiology ,the grades of definitions, types of epidemiological studies, studies application in occupational health, prevention levels, prevention application in occupational health, epidemiological samples were significantly different among the three groups with P=0.001 and the most in group(C)with evidence-based medical education. The mean of grades were more in definitions and types of studies.

DISCUSSION

According to the results, the total grade was the best with problem-based learning educational method.

The specific epidemiology of occupational diseases learning levels had been promoted in teaching with problem-based learning than evidence-based medical education and the general epidemiology learning levels had been promoted in teaching with evidence-based medical education than problem-based learning.

In specific epidemiology of occupational diseases: the grade of epidemiology of occupational lung diseases, occupational toxicities, musculoskeletal disorders, occupational cancers, noise induced hearing loss, epidemiology of occupational diseases application had significant differences and the highest grade related to in group (B) with problem-based learning.

In general epidemiology, the grade of definitions, types of epidemiological studies, studies application in occupational health, prevention levels, prevention application in occupational health, and epidemiological samples had significant differences and the most in group(C) with evidence-based medical education.

Group (B) got the highest mean grade of this course with problem-based learning but it seems that this method is the best for specific epidemiology of occupational diseases. In general epidemiology evidence-based medical education is the best educational method. Health ministry' curriculums can be helpful in teaching and learning and writing the course plans, educational standards help, as well.

Groves M. et al. have shown the usefulness of problem-based learning in medical education and had found the effectiveness of this method (3). Butler R. et al. have demonstrated the same results in another study about problem-based learning (4).

Professors can use problem-based learning in methods of teaching but they should write it in the course plans and share their educational experiences with other professors.

In this study, students were satisfied with problem-based learning method and could participate and were active in classes and experienced scientific discussion with other students.

Callis A.N. et al. have found out that problem-based learning was a fit educational method in dental education (5) also Von Bergmann H.C shown the effectiveness of problem-based learning in another study and they have investigated the relationship between problem-based learning process grades and content acquisition performance in a problem-based learning dental program (6), Savery R. et al have talked about the overview of problem-based learning that included the definitions and distinctions (7), Hur Y has shown the difference between the outcomes of active and reflective students in problem-based learning (8), Alghasham A. conducted a study about the effect of problem-based learning on students' performance. (9) This article has demonstrated the importance of problem-based learning.

In another study, the effectiveness of evidence-based medical sciences education was shown. McGuckin C. et al searched the best evidence medical education in psychiatry training (12), Assadi S.N. et al demonstrated the effectiveness of evidence-based morning report (13), Patrício M. et al had systematic review of evidence in medical education and clinical medicine (14).This article has shown the usefulness of evidence-based medical sciences education.

There were some studies about the use of these new educational methods such as kazemi T. et al study in problem based learning and Dadpour B. et al study in evidence-based decision making. (21, 22)

This study had some limitations including the number of students with three entrance years to university and searching on internet which was provided. Another study is recommended with more students with the same entrance year.

This study recommend that for teaching the specific epidemiology of occupational diseases or some clinical chapters, teachers can use problem-based learning and for teaching the general epidemiology they can use evidence-based medical education, but overall, problem-based learning is the best educational method for epidemiology of occupational diseases.

According to the total grade, the problem-based learning was the best educational method. Problem-based learning was more effective for specific epidemiology of occupational diseases and evidence-based medical education was more effective for general epidemiology.

Conflict of interest statement:

The author declares no conflict of interest.

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