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Problem-based learning for determination of fitness for work and return to work

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Abstract

Background: Learning about fitness for work and return to work is an important subject for students in the medical sciences, but the educational method is important too. Problem-based learning (PBL) is an important method that should be examined in occupational health studies. The objective of this study was to compare the effects of three educational methods for learning about fitness for work and return to work for students in the medical sciences.

Methods: This study was a quasi-experimental study using the curriculum of the Ministry of Health for 150 occupational health students in the School of Health at Mashhad University; fitness for work and return to work was taught with attention to various educational methods. Group A (n=50) received presentations and lectures; group B (n=50) received additional Clinical practice observations; and group C (n=50) received PBL. Pre- and post-assessments were used to determine change in knowledge and the results were compared among the three groups of participants; then results of exams were analyzed with SPSS 16, using Analysis of variance (ANOVA) (with post hoc Tukey), and statistical significance of $P<0.05$.

Results: The total grade (20) of fitness for work and return to work for group A was 13.22±0.64, for group B, 14.27±1.01 and for group C, 16.28±0.01. The between-groups comparisons showed significant differences among all three groups ($P<0.001$). The level of learning - change in knowledge - among the three groups was also significant, with $P<0.001$. The odds ratio was 1.44 (1.12-3.24) for group C with PBL.

Conclusion: According to the results, PBL was the best method for learning of fitness for work and return to work in students studying medical sciences.

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Introduction

Learning fitness for work and return to work is important subject for medical sciences students but the educational method is important too.

Problem-based learning (PBL) is a relatively new and suitable method for solving the problems.[1,2] Some researchers studied the effects of this method and others for finding the best methods for student learning.[3,4] Educational methods are very different and teachers must find the most suitable way for education.[5-7]

In PBL, one topic is presented and a main question or problem is determined for learning and solving.[8,9] Many health and medical problems must be solved by healthcare workers.[10-12] Medical sciences students must be prepared to solve health problems in the future.[13,14] Some lessons could help the healthcare workers.[15-17] For example, healthcare workers who work in occupational health and medicine need to know fitness for work and return to work associated with many diseases but others in the health system also need to know this information.[18-20]

In the occupational health field, some considerations of fitness for work include fitness in the following areas: renal failure, liver disorders, psychological stress, hearing loss, dermatitis, heart diseases, lung diseases, lower back pain, and shoulder disorders, while other considerations of fitness for return to work include the above areas as well: renal failure, liver disorders, psychological stress, hearing loss, dermatitis, heart diseases, lung diseases, lower back pain, and shoulder disorders.

Learning about fitness for work and return to work is difficult and related to memory, but with new learning methods this topic may be easier and more useful. One learning method is PBL.

The objective of this study was comparison the effects of

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three educational methods for learning of fitness for work and return to work in occupational health students. Thus, in this study, the author tries to find the effectiveness of problem based learning, practice and lecture in learning of fitness for work and return to work.

Materials and Methods

This study was a quasi-experimental study conducted from 2013 to 2016 which using the curriculum of ministry of health for 150 occupational health students in School of Health of Mashhad, according to a previous study[10] where $\alpha = 0.05$, $\beta = 0.20$. Fitness for work and return to work were taught with attention to educational methods for these occupational health students: presentations and lectures in group A (n = 50), practice observation in group B (n = 50), and PBL in group C (n = 50). The participants were allocated randomly to groups using random numbers tables. Changes in content knowledge were determined and results were compared among the three groups of participants.

The inclusion criteria were the occupational health students in three entrance years (2013 to 2016) in the field of occupational health; exclusion criteria were students studying another field or students who entered university in other years.

Examination grades were used to determine content gain for learning. Each item had one grade, and a student who answered completely received one grade overall. Examinations of the groups were at the same level at the end of term; these tests were prepared using teachers' input on the correction and validity (center validity ratio [CVR] = 90%, center validity index [CVI] = 88%). There was also a pilot study with a correlation of coefficient of 0.93 for assigning the reliability in a sample of occupational health students. These exams were administered according to educational standards.

Presentations and lectures (group A) were prepared and implemented by the teachers. In the practice observation group (B), students went to an occupational health center and saw the healthcare workers working and then prepared a final report. In PBL (group C), students actively participated in their classes and tried to find the answers to health problems. This learning was done according to seven steps of PBL: explanation of special terms, design of problem, beginning the brainstorming, refining the brainstorming, creation of learning aims and objectives, study with teacher and other students, and discussion with teacher and other students.[1,2,10]

Step one: explanation of special terms and related words, in step two: design the occupational health problem, in step three: beginning the brainstorming with the teacher, in step four: refining the brainstorm and completed it with teacher guiding, in step five: making aims and objectives of this subject, in step six: study references, journals and related websites for finding the results and solving ways and in step seven: there were discussions between students with teacher guidance. There were some examples for fitness for work and return to work in each session.

The definition of fitness for work includes fitness in renal failure, fitness in liver disorders, fitness in psychological stress, fitness in hearing loss, fitness in dermatitis, fitness in heart diseases, fitness in lung diseases, fitness in low back pain and fitness in shoulder disorder, while the definition of return to work includes the same areas: renal failure, liver disorders, in psychological stress, hearing loss, dermatitis, heart diseases, lung diseases, lower back pain, and shoulder disorders.

Previous average grades was noted as a possible confounding factor that needed to be tested and controlled for.

Data were collected and analyzed in SPSS 16 using frequencies, means, standard deviation, odds ratio, and analysis of variance (ANOVA) (post hoc Tukey test) where $P < 0.05$.

Results

Number of participants are outlined here: in group A (n = 50), group B (n = 50) and group C (n = 50). The mean of age was 22.5 ± 0.52; 55% were women, 45% were men. The mean of the previous average grades of students had no significant differences; they were at the same levels (Table 1).

The total grade (20) of fitness for work and return to work for group A was 13.22 ± 0.64, for group B 14.27±1.01, and for group C 16.28 ± 0.01. Using ANOVA significant differences were seen among these grades ($P = 0.001$). All of the lessons were significant with $P = 0.001$.

Table 2 shows the comparison of grades in fitness for work lessons among the three groups of students.

Table 3 shows the comparison of grades in return to work lessons among the three groups of students. The difference between mean grades of lessons was significant ($P = 0.001$).

All grades in the fitness for work lessons were significant in all areas with $P = 0.001$. (Fitness for work includes fitness in renal failure, fitness in liver disorders, fitness in psychological stress, fitness in hearing loss, fitness in dermatitis, fitness in heart diseases, fitness in lung diseases, fitness in low back pain and fitness in shoulder disorder.) Return to work is included definition, return in renal failure, return in liver disorders, return in psychological stress, return in

Table 1. Demographic data

Variable	Group A	Group B	Group C	P[a]
Age (y) (mean ±SD)	22.05 ± 0.2	22.95 ± 0.22	22.07 ± 0.32	0.989
Gender (female, male)	56, 44	59, 41	51, 49	0.685
Previous average of grades (mean ±SD)	15.52 ± 0.54	15.22 ± 0.12	15.78 ± 0.02	0.997

[a]ANOVA, chi-square.

Table 2. Comparison in grades of the three groups in fitness for work lessons

Lesson	Group A Mean ± SD	Group B Mean ± SD	Group C Mean ± SD	*P* (ANOVA)
Definition	0.37 ± 0.42	0.65 ± 0.24	0.96 ± 0.21	0.001
Fitness in renal failure	0.36 ± 0.22	0.45 ± 0.04	0.76 ± 0.01	0.001
Fitness in liver disorders	0.05 ± 0.11	0.80 ± 0.01	0.78 ± 0.07	0.001
Fitness in psychological stress	0.11 ± 0.18	0.80 ± 0.01	0.78 ± 0.01	0.001
Fitness in hearing loss	0.16 ± 0.21	0.43 ± 0.01	0.70 ± 0.07	0.001
Fitness in dermatitis	0.14 ± 0.19	0.61 ± 0.10	0.71 ± 0.06	0.001
Fitness in heart diseases	0.13 ± 0.19	0.40 ± 0.07	0.48 ± 0.06	0.001
Fitness in lung diseases	0.08 ± 0.25	0.43 ± 0.11	0.56 ± 0.20	0.001
Fitness in low back pain	0.13 ± 0.17	0.45 ± 0. 04	0.76 ± 0. 01	0.001
Fitness in shoulder disorder	0.13 ± 0.17	0.52 ± 0.09	0.71 ± 0.06	0.001

Table 3. Comparison in grades of the three groups in return to work lessons

Lesson	Group A Mean ± SD	Group B Mean ± SD	Group C Mean ± SD	P (ANOVA)
Definition	0.01 ± 0.06	0.40 ± 0.02	0.79 ± 0.01	0.001
Return in renal failure	0.01 ± 0.05	0.40 ± 0.01	0.79 ± 0.01	0.001
Return in liver disorders	0.01 ± 0.05	0.40 ± 0.01	0.79 ± 0.02	0.001
Return in psychological stress	0.10 ± 0.03	0.40 ± 0.001	0.79 ± 0.01	0.001
Return in hearing loss	0.10 ± 0.01	0.39 ± 0.01	0.79 ± 0.004	0.001
Return in dermatitis	0.10 ± 0.02	0.39 ± 0.02	0.78 ± 0.08	0.001
Return in heart diseases	0.10 ± 0.01	0.39 ± 0.03	0.79 ± 0.04	0.001
Return in lung diseases	0.10 ± 0.018	0.39 ± 0.03	0.78 ± 0.04	0.001
Return in low back pain	0.10 ± 0.008	0.38 ± 0.04	0.78 ± 0.05	0.001
Return in shoulder disorder	0.10 ± 0.004	0.38 ± 0.05	0.78 ± 0.06	0.001

hearing loss, return in dermatitis, return in heart diseases, return in lung diseases, return in low back pain and return in shoulder disorder were significant with $P = 0.001$.

The odds ratio was calculated at 1.44 (1.12-3.24) for group C (PBL). It was 1.10 (1.01-2.34) in group B (practical observation) and 0.80 (0.71-1.25) in group A (lecture and presentation). The odds ratio calculation shows the positive effect of PBL teaching methods on increased content knowledge of participants.

Discussion

Fitness for work and return to work are major factors in the medical sciences, and practical studies are necessary; problem based learning thus can be helpful in introducing problems and finding the best way or method for solving problems in the occupational health field. These results show the effects of PBL in determining training in learning about fitness for work and return to work. Groves et al defined the effects of PBL teaching methods on learning of students.[1] In this study the author demonstrated the effectiveness of PBL for specific medical sciences students. Butler et al showed the effectiveness of PBL on medical students' learning.[2] In this article the researcher studied about the effectiveness of problem based learning in medical sciences. Some studies demonstrated the promotion of learning by using various educational methods.[9,10] In this study the author tried to find the best method for fitness for work and return to work. Callis et al studied the cumulative effects of educational methods, particularly PBL.[3] In this study the researcher showed the results of tests for effectiveness of problem based learning for these subjects. Studies demonstrated the effect of educational methods and assessment on learning.[16,17,19] In this study the author used three types: presentation and lecture, practice observation, and PBL.

According to the results, the total grade of fitness for work and return to work in Group A was 13.22 ± 0.64, in group B was 14.27 ± 1.01 and in group C was 16.28 ± 0.01 had significant differences ($P = 0.001$). All lessons were significant with $P = 0.001$.

In this article the grades of students in group C, the PBL group, were the highest. The difference in grades of fitness for work and return to work were all significant for group C.

Definition, fitness for work in psychological disorders, and liver disorders were the highest in group C. Definition, return to work for psychological disorders, liver disorders renal disorders, hearing loss and heart disorders were the highest in group C as well.

Practical use of these results was the determination of fitness for work and return to work in occupational health setting by PBL methods could be studied and determined. This research had some limitations: the number of students with entrance years to school, another study is rec-

ommended with more students and other fields in medical sciences.

Conclusion

According to the results, PBL was the most useful of three methods for learning of fitness for work and return to work in occupational health students. This study recommends use of PBL for teaching fitness for work and return to work in occupational health students. If the seven steps of PBL are followed, it will have more useful and practical effects on learning and determining fitness for work and return to work.

Ethical approval

The researcher obtained consent from participants and their names were kept confidential (Research code No. 911043, date = 8/17/2013)

Competing interests

The author declares no conflict of interest.

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