

A Problem Assisted Course Delivery for Occupational Health Students' Improved Learning: An Experience of Using Problems and Real Cases

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Abstract

Background and Purpose: Problem based medical education had been useful in education of medical sciences students. The objective is the determination of effects of problem based medical education on occupational health students' learning.

Methods: This study was a semi-experimental study. By using the curriculum of Ministry of Health, occupational toxicology course had been taught based on a problem based plan for group A, then students' grades or data had been analyzed by SPSS 16, mean, standard deviation, t-test with $P < 0.05$.

Results: The total grade of occupational toxicology in group A (with problem based medical education) was 18.03 ± 1.84 and in group B (regular education), it was 17.60 ± 1.72 with $t = 0.852$ and $P = 0.398$ had not significant differences. The specific lessons such as cadmium and allergic disorders were promoted and its mean grades were more in group A than B.

Conclusions: Problem based medical education was helpful in learning of some chapters of occupational toxicology.

Keywords: PROBLEM BASED MEDICAL EDUCATION, OCCUPATIONAL TOXICOLOGY, MEDICAL SCIENCES EDUCATION, OCCUPATIONAL HEALTH

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Introduction

Educational methods are important in medical sciences. Teachers had to use effective methods for teaching such as problem based course plans (1). Each field of medical sciences had a curriculum (2, 3). Problem based medical education requires that the curriculum be modified accordingly (4, 5). Many of the related studies had been done on medical students and few on other medical sciences (6, 7).

According to the curriculum of health ministry occupational health has general and specific courses. One of the specific courses is occupational toxicology (2, 3). In this course the students had been taught some basic and some specific items in that area. The basic contents were: definition, Lead, Mercury, Chromium, Cadmium, Arsenic, pesticide, solvents. The specific content titles were: allergic disorders, cancer, application, biologic monitoring, related industries and prevention.

Course plans must be written according to expected competencies. Some items such as toxic metals and related disorders are more prominent in that area (2, 3). Röhrig et al. demonstrated the development of national problem-based learning objectives in the early clinical experience (8). Kadmon et al. showed the problem-based medical education

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by national catalogue of learning objectives in surgery (9). Lebensohn et al. assessed the curriculum and educational sessions according to the problem need (10).

In this study, the objective is to examine the effects of problem based education on students' learning in occupational toxicology.

Methods

This study has been performed as a semi-experimental study on occupational health students in 2011-13. Group (A) included 25 students and group (B) 25 too. Course plan of occupational toxicology were written according to the curriculum.

Occupational or industrial toxicology course had been taught with lectures and presentation of power point. In group (A) the lessons had been taught covering health knowledge, knowledge and application of basic sciences with practical examples and real cases from industry and in group (B) teacher had taught in the regular method.

Occupational or industrial toxicology had some basic and some specific chapters. In

industrial toxicology basic chapters there were definitions, Lead, Mercury, Chromium, Cadmium, Arsenic, pesticides and solvents.

In occupational toxicology specific chapters included allergic disorders, cancer, application, biologic monitoring, related industries and prevention.

The assessments of the both groups were equivalent and prepared by teachers'. The tests were reviewed and a pilot test retest procedure in a group of occupational health students was performed resulting in a correlation of 0.87.

Data had been gathered in SPSS 16 and means, standard deviation were calculated. For comparing the two groups' mean grades a t-test with a significant level of <0.05 was performed.

For research ethics; the researcher got oral consent from participants.

Results

The total grade of industrial toxicology in group A (with problem based education plan) was 18.03 ± 1.84 and in group B (regular

Table 1. The comparison of grades in occupational toxicology basic chapters between the two groups ($P < 0.05$).

Number	Subject	Group (A) $\mu \pm SD$	Group (B) $\mu \pm SD$	P value
1	Definitions	1.30 \pm 0.35	1.50 \pm 0	0.007
2	Lead	1.35 \pm 0.36	1.35 \pm 0.30	1.000
3	Mercury	1.43 \pm 0.30	1.29 \pm 0.40	0.173
4	Chromium	1.44 \pm 0.21	1.26 \pm 0.51	0.116
5	Cadmium	1.38 \pm 0.88	0.78 \pm 0.59	0.007
6	Arsenic	1.29 \pm 0.37	1.32 \pm 0.39	0.783
7	Pesticides	1.08 \pm 0.47	1.32 \pm 0.39	0.056
8	Solvents	1.42 \pm 0.31	1.44 \pm 0.20	0.791

Table 2. The comparison of grades in occupational toxicology specific chapters between the two groups (P<0.05).

Number	Subject	Group(A) $\mu \pm SD$	Group(B) $\mu \pm SD$	P value
1	allergic disorders	1.50±0	1.17±0.37	<0.001
2	Cancer	1.42±0.17	1.29±0.34	0.097
3	Application	1.48±0.10	1.44±0.20	0.390
4	Biologic monitoring	1.36±0.39	1.50±0	0.083
5	Related industries	1.30±0.43	1.41±0.24	0.276
6	Prevention	1.36±0.39	1.50±0	0.083
9	Total	18.03±1.84	17.60±1.71	0.398

education), it was 17.60±1.72 with no significant difference (P=0.398). The specific lessons such as cadmium and allergic disorders were promoted and its mean grades were more in group A than B. Definition was more in group (B).

Table 1 shows the comparison of grades in occupational toxicology basic chapters between the two groups.

Table 2 shows the comparison of grades in occupational toxicology specific chapters between the two groups.

Table 3 shows the odd's ratio of wrong answer in occupational toxicology chapters in two groups.

Discussion

The total grade was better in group (A) with problem based medical education but the difference was not significant. Some chapters such as cadmium and allergic disorders were better in group (A) and had significant difference. Definition was better in group (B). Because cadmium and allergic disorders were more promoted than the others by problem based medical education in that area and students might be learn these items very well. They got promoted grades in some chapters of this course.

Health ministry' curriculums had been emphasized to problem based medical education in recent years. Criscione-Schreiber et al. showed the effectiveness of problem-based goals, objectives, and linked evaluations for rheumatology training programs (11). In this study author had tried to reach the goals and objectives of problem based medical education.

Scott et al. demonstrated the problem-based patient care provider training in disaster could be useful (12). It means that problem based learning could enhance function in real scene. In this study researcher has demonstrated the

Table 3. The odd's ratio of wrong answer in occupational toxicology chapters in two groups (P<0.05).

Number	Wrong in the answer	Group (A)	Group (B)
		OR(CI)	OR (CI)
1	Definitions	2.563 (1.748-3.757)	-
2	Lead	1.00 (0.500-2.000)	1.00 (0.500-2.000)
3	Mercury	0.457 (0.133-1.564)	1.658 (0.985-2.790)
4	Chromium	0.534 (0.160-1.781)	1.536 (0.871-2.709)
5	Cadmium	0.519 (0.285-0.945)	1.962 (1.044-3.687)
6	Arsenic	1.446 (0.847-2.469)	0.643 (0.300-1.376)
7	pesticides	1.926 (1.132-3.276)	0.444 (0.201-0.981)
8	solvents	1.000 (0.360-2.778)	1.000 (0.360-2.778)
9	cancer	0.792 (0.380-1.650)	1.231 (0.687-2.208)
10	allergic disorders	-	2.786 (1.831-4.237)
11	application	0.653 (0.129-3.314)	1.362 (0.581-3.193)
12	Biologic monitoring	2.136 (1.575-2.898)	-
13	Related industries	1.833 (1.132-2.970)	0.306 (0.050-1.866)
14	prevention	2.136 (1.575-2.898)	-

effect of this method on student's later work in industries.

Hassan had studied the models for enhancing problem-based training and contextual clinical decision making (13). He found the applications of problem based education.

Problem based medical education had an important effect on students' learning of occupational toxicology course.

This study recommend that problem based medical education is effective for students' learning.

Conclusion

According to the grades, problem based medical education was helpful in learning of some of chapters in occupational toxicology.

Conflict of Interest

The author declares no conflict of interest.

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