ORIGINAL ARTICLE

The Effects of Problem Based Learning on Critical Thinking and Problem Solving Skills among Midwifery Students

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ABSTRACT

Background: Problem Based Learning (PBL) is a student centered teaching strategy. PBL help the students to develop critical thinking and apply this knowledge in a real life situation effectively. It also motivates the students to learn by themselves and develop their clinical reasoning skills[1].
Aim: To determine the effect of problem based learning on critical thinking and problem solving skills among midwifery student.
Methodology: This study was carried out by selecting the groups randomly. Pre and post-test were conducted with the control and intervention groups of 108 participants. Problem solving and critical thinking abilities were tested through a questionnaire and test respectively. Consent was taken. Descriptive analysis was done to calculate the mean and standard deviations. Non-parametric tests Man-Whitany and Chi Square test have been applied to analyze the data.
Results: Mean age of participant n=108 was 22.38±1.182, academic score mean is 735.19±84.871. Problem solving skills between control and intervention group reveals P-value .406 and .000 respectively analyzing that there was no improvement in control group while intervention group showed the statistical significance in improvement. Chi square analysis showed the significant improvement that was .000 which is less than p-value 0.05 indicating the significant difference.
Conclusion: This study concluded that problem based learning teaching methodology has effect on problem solving skills and critical thinking. Therefore, nursing education could include different teaching methodology to enhance learning and develop problem solving skill among nurses.
Keywords: Problem based learning, critical thinking, problem solving, midwifery, students, nurses.

INTRODUCTION

Problem Based Learning is a teaching strategy. It was initially applied in Canada by McMaster University and Howard Barrows in medical and health science education [(2-3)]. The problem-based learning (PBL) is an ideal teaching method for health professionals. Problem based learning is required to be included in the formal curriculum to develop knowledge, reasoning and study skills, simultaneously to construct the thinking process of clinical reasoning[4]. In addition, in professional education PBL achieves four objectives; it structures the knowledge in a special context utilization, develops the critical thinking among students, enhances self-directed learning skills in students and also motivate the future learning of the students[2,5]. Therefore, this study was aimed to determine the effect of problem based learning on critical thinking and problem solving skills among midwifery students in public institutes of Punjab.

In Pakistan, Ziauddin Medical University integrated PBL in its curriculum in 1996 and The Aga Khan University, school of nursing implemented the problem based learning as a teaching strategy in 2002[6]. Some other private institute may also be applying different teaching strategies to impart knowledge and skills to the health care professionals. However, government schools of nursing are following the same traditional lecture method for decades.

Nursing is a profession that deals with every aspect of life including patient families and communities[7]. Nurses deal with the real life and critical situations in health care setting. Nurses should be prepared as a competent professional to deal with the critical situations[5]. Because nurses have to deal with the critical clinical situations and also deal with the human being; they should be capable of dealing critical events in a quiet and comfortable manners. Therefore, nurses should be able to provide safe, competent, and skillful practice. Critical thinking is a way to serve the purpose[8].

Critical thinking (CT) was introduced in 2008 by American Nurses Association. The document included essential skills for the new graduates. One of these skills for nurses is the use of critical reasoning in a clinical situation and evaluation in the simple and complex situations[9]. He further included the definition of CT. Critical thinking is an active, ongoing cognitive process of logical reasoning. CT makes an individual to explore and analyzes issues methodically. He/ she takes care of all aspect of a situation and/or argument, guess difficult conditions and where required apply wise decision. Critical thinking skills of a nurse are analysis, evaluation, inference, deduction and induction[9].

The researcher has identified problem based learning as one of the most common innovative and effective teaching strategies[10]. In medical and nursing education PBL has been searched largely in the literature, PBL is a student centered method. It guides students to look for the best solutions of real-life problems through cooperative group work. In addition[11], he suggested that, to improve learning experiences, traditional teaching methods needs to be changed into the effective learning methods. He

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further suggested that learning by indulging in real situation and dialogue with others, promote learning experience. For this purpose problem based learning is the best strategy.

There are many studies conducted at the different parts of the world related to application and affectivity of PBL in nursing education. However, there is scarcity of data related to effects of different teaching strategies in nursing profession. Especially, diploma nursing in Punjab is following the traditional method of teaching for years and years. There is a dire need to change the teacher centered approach toward students centered approach in order to enhance the critical thinking and problem solving skills among nursing graduates. Research and investigation is required to find out the useful and effective teaching and learning methods in nursing educational systems in Punjab, Pakistan.

MATERIALS AND METHODS

This study was carried out by utilizing the randomized control trial (RCT) design. Pre and post-test were conducted. The sample size was 108, 54 in control and 54 in intervention group. Four institutes were randomly selected through lottery for this study. The midwifery students enrolled from April 2018 to March 2019, willing to participate in the study was included in the study. The students were given a scenario a week before and asked to prepare the content thoroughly based on questions. The group sat in semi-circle and discussed the scenario. Students prepared the case following the guide lines. Teacher played the role of facilitator and kept the group on track. Student also applied the concept of team work and played it well.

Data was collected through pre and post-test of the intervention and control group. Critical thinking and problem solving skills were examined through pre and post-test evaluation technique. Pretest of both control and experimental group were conducted before the application of PBL strategy and post-test after 12 weeks, 3 hours per week intervention. Pre and post evaluation of critical thinking and problem solving was done to determine the effects of PBL.

RESULTS

Descriptive statistics has been applied to evaluate the age and academic score. Mean, standards deviation, minimum and maximum values are been calculated and presented in tabular form Shapiro-Wilk normality of this study is <0.05 that was .000 which indicates that the data is not normally distributed. Therefore, non-parametric tests have been applied to analyze the pre and post-test between control and intervention group. To analyze the nominal data that is problem solving skills, Man-Whitany test has been applied. To analyze the categorical data that is critical thinking skill based on likert scale of five option from not at all, somewhat not, not so, almost yes to very agree, Chi Square test has been applied after getting the score sum up.

Table 1 descriptive statistics shows the age, academic score, problem solving skill's pre and post-test analysis. The descriptive statistic showed the mean age of participant was 22.38±1.182, the mean of academic score was 735.19±84.871 and the mean of problem solving skills pre-test was 0.14±.347and post-test was 0.73±.445. The means of critical thinking skills pretest score remained 57.8704±5.70308 while posttest critical thinking skill's score was 82.6858±24.98360.

Table 1: Descriptive statistic of demographic & Problem Solving Skill of study participant

	N	Mean ± Std. Deviation	Min.	Max.
Age of the participant.	108	22.38±1.18	19	25
Academic score.	108	735.19±84.87	600	936
Problem solving skills score Pre-test	108	.14± .34	0	1
Problem solving score post-test	108	.73 ± .44	0	1
Critical thinking skills pre-test Sum	108	57.87 ± 5.70	46	71
Critical thinking skills posttest Sum	108	82.68 ± 24.98	44	110

Table 2: Comparison of Pre & Posttest of Problem Solving Skill& Critical Thinking Skills of study participant.

	Control Group (n=54)	Intervention Group (n=54)	Man-Whitany U test	
	Mean ±Std. Deviation	Mean ± Std. Deviation	z	P-Value
Problem solving skills score Pre-test	.11 ± .31	.17± .37	-.83	.406
Problem solving skills score post-test	.56 ± .50	.91 ± .29	-4.10	.000
Critical thinking skills score Pre-test	57.52±5.330	58.22± 6.083	-.502	.616
Critical thinking skills score Post-test	58.26±6.364	107.11±1.968	-8.980	.000

Table 3: Chi Square Analysis of Critical Thinking Skills of pre and post- test of study groups

Variables	Pre –Test (P- Value)	Post-Test (P- Value)
Problem solving skills	.404	.000
Critical thinking skills	.902	.000

Pre and post-test of problem solving skills between control and intervention group revealed the means of control group.11± .317and intervention group .17±.376 showing the P-value by Man-Whitany U test .406 which was greater than 0.05 of statistical value analyzing that there was a difference of means between groups. The post test of control group shows the mean .56 ± .502 and intervention group mean was .91 ± .293 with the Man-Whitany U test .000 which was less than P-value of 0.05. The analysis of Man-Whitany U test revealed that there was significant difference between groups in posttest concluded that there was an improvement in problem solving skill between pre and posttest. Similarly, the mean of critical thinking skills score of control group pretest was found 57.52±5.330 while the mean of critical thinking skills score of intervention group was 58.22±6.083. The mean with standard deviation of posttest of critical thinking skills score of control group was found 58.26 ± 6.364 as compare to the mean of intervention group which was 107.11±1.968. The test statistics by Mann-Whitany U test revealed the P-value of pretest of critical thinking skills greater than 0.05 that was .616 whereas the P- value of posttest of critical thinking skills was .000 which is less than .05 indicating the statistical difference of pre and post score after having the

intervention of problem based learning. The study has revealed an improvement in critical thinking skills of study participant by the intervention done.

The test statistics by Chi Square Analysis results revealed the comparison between pre and posttest among study subject at the P- value of 0.05. The test statistics found the significant difference between pre and posttest of study participant results that is .404 which is greater than P- value of 0.05 for the pretest and0.000 at the post test which is less than P- Value 0.05 indicating the significant difference of pre and posttest. It showed the improvement of posttest after intervention. Similarly, the critical thinking skills of study participant was improved after the intervention of problem based learning strategy. The test statistics revealed .902 at pretest and .000 at posttest making the clear difference of pre and posttest.

DISCUSSION

The results of this study had revealed that there is difference in critical thinking and problem solving skill among control and intervention groups after intervention of problem based learning (PBL). Many studies have already highlighted the affectivity of problem based learning. The study conducted by Ozturk C, Muslu GK, Dicle A (2008), they revealed the same result after the implementation of learning strategy of PBL. The study statistics P-value < 0.05 found the difference between traditional and problem based learning teaching strategy on critical thinking among nursing students of n=147. Similarly, the present study also found the P-value <0.05 signifying the difference of intervention group and traditional group[12].

Choi E, Lindquist R, Song Y (2014), found the difference among critical thinking and problem solving skills in Korean 1st year nursing students as p-value < 0.001[13]. The present study was done on midwifery diploma student showing the similar result. The test statistics revealed the difference of problem based learning on critical thinking and problem solving skills.

Yew EH and Goh K (2016) evaluated the impact of the phases of problem based learning on critical thinking. Their study revealed that every phase of problem based has impact on learning and critical thinking. However, this study revealed the overall effect of problem based learning on critical thinking and problem solving skills. The study has rejected the null hypothesis and prove that problem based learning has positive effect on critical thinking and problem solving skills[14].

Gholami M *et al* (2016) conducted a quasi-experimental study to compare the effects of problem based learning on critical thinking and problem solving skill in nursing students in Iran. The study revealed no difference in traditional group and evident difference in interventional group whom problem based learning was implemented. The statistics of P-value .001 depicted the statistical difference in intervention group. Similarly, this study shows the statistical difference of improvement in intervention group participant while traditional teaching group could not present the differences[15].

This study is one of many studies that found out the efficacy of problem based learning on critical thinking and problem solving skills. A qualitative meta-analysis was done by Wosinski, J et al (2016), the researcher evaluated the 101 article to find out the effects of problem based learning on critical thinking, problem solving and clinical reasoning. Out of 101 articles 51 revealed the efficacy of problem based learning on clinical reasoning and critical thinning[16].

This study has contributed in the number of studies that have positive outcome of problem based learning on critical thinking and problem solving skills in midwifery students. It showed that there are similar effect of problem based learning on critical thinking, problem solving, clinical reasoning and self-directed learning on different categories of nursing and midwifery students. The study has accepted the alternative hypothesis that is problem based learning effects the critical thinking and problem solving skills among midwifery students in Punjab.

CONCLUSION

The effects of problem based learning on critical thinking and problem solving skills were determined by applying the quasi experimental study design on 108 midwifery nursing student at four public nursing school in Punjab. This study concluded that problem based learning teaching methodology has effect on critical thinking and problem solving skills. The intervention group of PBL has shown the significant improvement in CT and problem solving skill. Therefore, nursing education could include PBL as a teaching methodology to enhance learning and develop problem solving skill among nurses.

Recommendations: As the study has proven the effects of problem based learning on critical thinking and problem solving skills among midwifery students, it is recommended that problem based learning may be included in curriculum. Teachers and faculties would be prepared to apply this strategy as teaching methodology. Clinical subjects like adult health nursing, critical care nursing obstetric nursing etc should have this strategy to enhance critical thinking and problem solving skills among graduate nursing.

Limitations: This study has the limitation of well-prepared faculty familiar to problem based learning therefore, problem based learning session had been conducted to facilitate the faculty. Similarly, the students were not aware and familiar with different strategy except traditional one. Students also took the time to understand the strategy and its implementation. Moreover, students felt the burden of preparing the content and responsibility of learning. In addition, the difference of tertiary teaching hospital city and district head quarter hospital also contributed to the difficulties. Instead of having the same curriculum by Pakistan Nursing Council, the implementation is been found different that should be monitor and apply at same level. Therefore, all nursing students could be graduated with similar qualities.

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