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Comparison of the effect of team-based learning and seminar-based learning on the knowledge of caring for patients with chronic obstructive pulmonary disease in nursing students



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KEYWORDS

Chronic obstructive pulmonary disease;
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Abstract

Introduction: Learning encompasses both traditional and active methodologies, with active methods involving students taking on an engaged role and actively participating in class discussions. This study aims to compare the impact of 2 learning methods, team-based learning (TBL) and seminar-based learning (SBL), on nursing students' knowledge of caring for patients with chronic obstructive pulmonary disease (COPD) at the Islamic Azad University, Mahabad Branch.

Methods: This semi-experimental study involved 60 nursing students divided into 2 groups. The TBL group received educational pamphlets 7 days before the workshop and participated in an Individual Readiness Assurance Test followed by a Team Readiness Assurance Test. The SBL group engaged in seminar presentations and discussions. Data were collected using a questionnaire with 2 sections: demographic information and a 24-question section on COPD care, with 20 questions approved after review by professors. Reliability was confirmed with a Cronbach's alpha of 0.86. Statistical analysis was conducted using SPSS 16 software.

Results: Pre-intervention, both groups had comparable knowledge levels. Post-intervention, the TBL group showed significantly higher knowledge levels than the SBL group. However, 1 month later, both methods had similar effects on long-term learning.

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Conclusion: The TBL method was more effective than SBL in improving short-term knowledge of COPD care among nursing students, although both methods were effective for long-term learning. This study underscores the importance of active learning methodologies in nursing education.

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PALABRAS CLAVE

Enfermedad pulmonar obstructiva crónica; Enfermería; Estudiante; Cuidado

Comparación del efecto del Aprendizaje Basado en Equipos y del Aprendizaje Basado en Seminarios en el Conocimiento de Cuidado de Pacientes con Enfermedad Pulmonar Obstructiva Crónica en Estudiantes de Enfermería

Resumen

Introducción: El aprendizaje abarca tanto metodologías tradicionales como activas, siendo los métodos activos aquellos en los que los estudiantes asumen un papel comprometido y participan activamente en las discusiones en clase. Este estudio tiene como objetivo comparar el impacto de dos métodos de aprendizaje, Aprendizaje Basado en Equipos (TBL) y Aprendizaje Basado en Seminarios (SBL), en el conocimiento de los estudiantes de enfermería sobre el cuidado de pacientes con Enfermedad Pulmonar Obstructiva Crónica (EPOC) en la Universidad Islámica Azad, Filial de Mahabad.

Métodos: Este estudio semexperimental involucró a 60 estudiantes de enfermería divididos en dos grupos. El grupo TBL recibió folletos educativos 7 días antes del taller y participó en una Prueba de Garantía de Preparación Individual (IRAT) seguida de una Prueba de Garantía de Preparación de Equipo (T-RAT). El grupo SBL participó en presentaciones y discusiones de seminarios. Se recopilaron datos utilizando un cuestionario con dos secciones: información demográfica y una sección de 24 preguntas sobre el cuidado de la EPOC, con 20 preguntas aprobadas después de revisión por profesores. Se confirmó la fiabilidad con un alfa de Cronbach de 0.86. El análisis estadístico se realizó utilizando el software SPSS 16.

Resultados: Antes de la intervención, ambos grupos tenían niveles de conocimiento comparables. Después de la intervención, el grupo TBL mostró niveles de conocimiento significativamente más altos que el grupo SBL. Sin embargo, un mes después, ambos métodos tuvieron efectos similares en el aprendizaje a largo plazo.

Conclusión: El método TBL fue más efectivo que el SBL para mejorar el conocimiento a corto plazo sobre el cuidado de la EPOC entre los estudiantes de enfermería, aunque ambos métodos fueron efectivos para el aprendizaje a largo plazo. Este estudio enfatiza la importancia de las metodologías de aprendizaje activo en la educación en enfermería.

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Introduction

Learning serves as the foundation of human progress and is essential in the nursing profession for cultivating professional knowledge and skills.^{1,2} Educational methods in nursing schools globally aim to enhance clinical decision-making abilities, foster continuous learning, and cultivate self-efficacy among students.^{3,4} Among these methods, seminar-based learning (SBL) and team-based learning (TBL) are standout approaches that emphasize active learner participation and problem-solving within group settings.⁵⁻⁷

While SBL focuses on scientific discourse and skill development, TBL is rooted in educational and constructivist learning theories, involving problem-solving tasks within

small groups to stimulate discussions and practical applications.^{8,9} Both methodologies aim to enhance students' engagement, critical thinking, and collaborative skills.^{10,11}

Chronic obstructive pulmonary disease (COPD) is a condition that requires specialized care due to chronic airway narrowing and progressive deterioration, resulting in symptoms like breathlessness and coughing.^{12,13} Diagnosis of COPD relies on lung function tests and symptomatology, necessitating lifestyle modifications for prevention.^{14,15}

This study aims to compare the impact of TBL and SBL on nursing students' knowledge of COPD care at the Islamic Azad University of Mahabad. By providing valuable insights into educational methodologies for enhancing patient care in the field of nursing, this research seeks to improve the quality of care for patients with COPD.

Method

This study is a semi-experimental interventional research endeavor. The statistical population for this study comprised all nursing students at the Nursing-Midwifery Faculty of the Islamic Azad University, Mahabad Branch study. The entry criteria are that they have not completed the official training course for caring for patients with COPD in the form of participation in COPD workshops or the internal respiratory surgery unit. Students must be in the second year of nursing,¹⁶ and have the desire to participate in this study. The exclusion criterion is non-cooperation in the implementation of the study.¹⁷

Participants who met the eligibility requirements were chosen through convenience sampling and subsequently provided written informed consent. The required sample size was determined using STATA software (StataCorp LP, College Station, TX, USA), with reference to the research conducted by Sayyah et al.⁵ The calculation indicated that a minimum of 27 individuals per group was needed, assuming a 95% confidence interval and 80% power. To account for a potential 10% drop-out rate, the study was designed with 30 participants in each group,

totaling 60 participants across both the intervention groups (Fig. 1).

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)^2 \left(\delta_1^2 + \delta_2^2 \right)}{(\mu_1 - \mu_2)^2}.$$

A sample size of 60 individuals was determined and divided into 2 groups through a lottery process. The sample size calculation was based on the entire population of nursing students, ensuring a representative sample for the study.

Tools for impact measurement

The study utilized a questionnaire as the primary tool for measuring the impact of the 2 learning methods on students' knowledge of caring for patients with COPD. The questionnaire was divided into 2 sections:

Demographic information: This section collected data on participants' marital status, gender, education level, residence, and age.

Knowledge assessment: This section included a 24-question questionnaire with 4 options related to COPD care. To ensure questionnaire validity, it was reviewed by

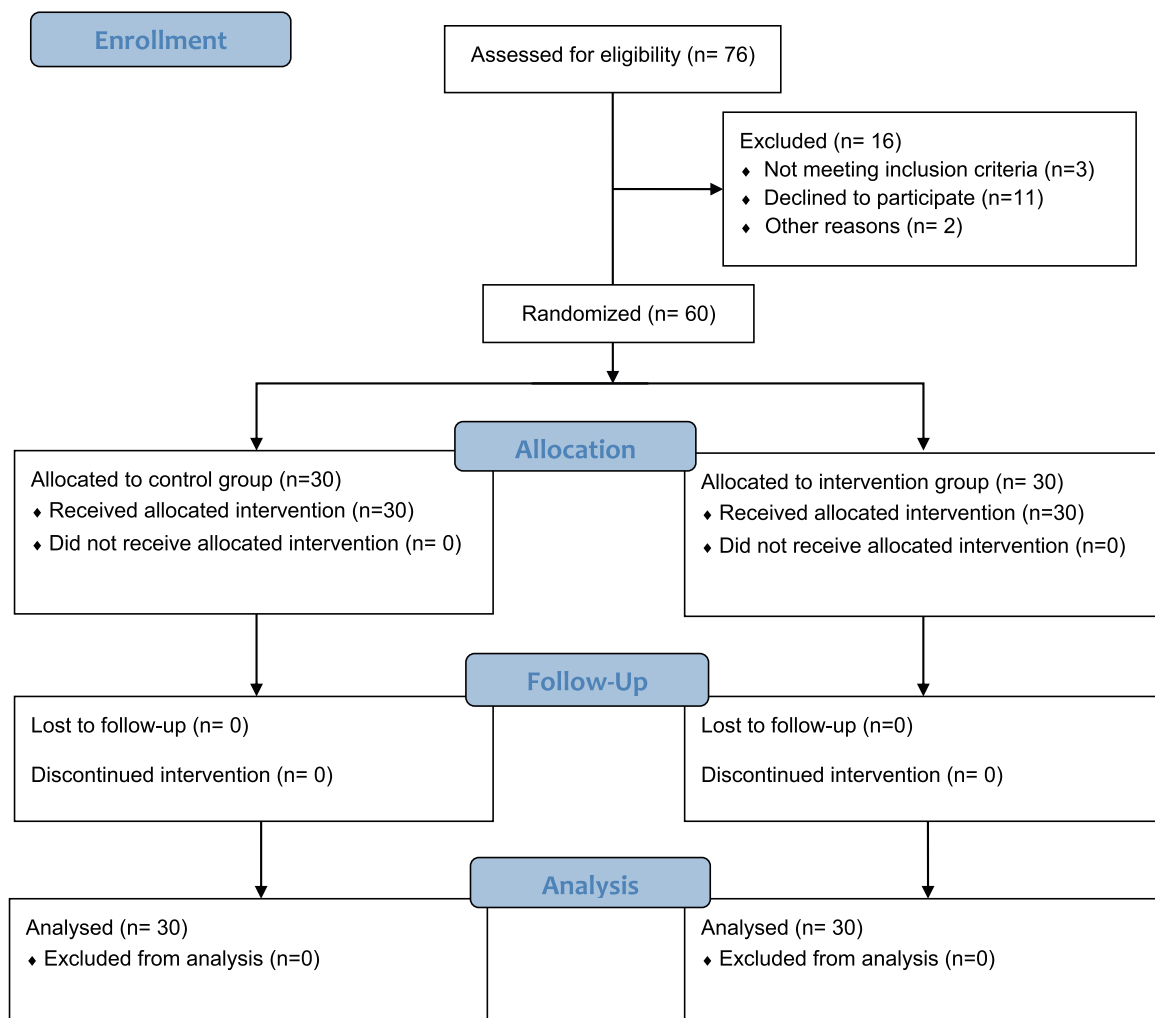


Fig. 1 Consort flow diagram.

10 professors, resulting in the approval of 20 questions after necessary amendments. The questionnaire aimed to measure students' knowledge and understanding of COPD care. Furthermore, the reliability of the research tool was confirmed by calculating Cronbach's alpha ($r=0.86$) post-data collection.

Variables

The study considered several variables:

Demographic variables: Marital status, gender, education level, residence (domestic/international, rural/urban), and age. **Knowledge levels:** Pre-intervention and post-intervention knowledge levels of students concerning COPD care.

Learning methods

TBL: Involved the following steps:

First stage: Students received educational pamphlets 7 days before the workshop and studied the contents outside the class.

Second stage: At the beginning of the class, students answered the Individual Readiness Assurance Test (IRAT) to evaluate their understanding of the knowledge and concepts learned in the first stage. The IRAT included 20 four-choice questions from the course's educational materials. After completing the IRAT, students were randomly divided into 4 groups of 5 people and participated in the Team Readiness Assurance Test, where each group reached a consensus on the answers.

SBL: Involved the following steps:

First stage: The educational method of the seminar and the objectives were explained to the students. Each group of 2 people was given 1 material to prepare and present.

Second stage: Each group presented their researched materials, and discussions were held to clarify any unclear or incorrect topics.

Statistical analysis

Data analysis was conducted using SPSS 16 software. Various statistical tests were employed to ensure a comprehensive analysis of the data:

Kolmogorov–Smirnov test: Used to assess the normality of the data distribution. **Chi-square test and t-test:** Employed for comparing demographic characteristics between the intervention and control groups. Due to the small sample size, the researchers chose to use non-parametric statistical tests to analyze the data. The Wilcoxon signed-rank test was used to compare the pre- and post-intervention scores within each group, as this test does not require the data to follow a normal distribution. Similarly, the Mann–Whitney *U* test was used to compare the scores between the 2 intervention groups, as this test is also suitable for non-normally distributed data. The use of these non-parametric tests was appropriate given the low population sample size, as they do not rely on the assumption of a normal distribution, which may be difficult to achieve with small sample sizes.

Findings

The [Table 1](#) compares the demographic characteristics of participants in both the intervention and control groups. It includes variables such as marital status, gender, education level, residence, and age. The table presents the number and percentage of participants in each category for both groups, along with the results of the chi-square and *t*-test analyses. In the intervention group, 30% of participants were single, 70% were married, 46.7% were male, 53.3% were female, 76.7% were domestic, 23.3% were international, 16.7% resided in rural areas, and 83.3% resided in urban areas. The mean age in the intervention group was 22.73 with a standard deviation of 5.98. In the control group, 46.7% of participants were single, 53.3% were married, 50% were male, 50% were female, 80% were domestic, 20% were international, 16.7% resided in rural areas, and 83.3% resided in urban areas. The mean age in the control group was 22.03 with a standard deviation of 4.13.

The results of the chi-square and *t*-test analyses for each variable demonstrate a lack of statistical significance in the differences between the intervention and control groups. This suggests that the demographic characteristics of the 2 groups do not significantly differ based on the provided data. Based on the Kolmogorov–Smirnov test, the distribution of the pre-test score in the team-based group and the post-test based on the seminar was normal distribution. In the rest of the scores, the distribution was not normal. According to the definition of skewness, all the values had a normal distribution, except for the team-based pre-test scores, which were in the range of -2 to 2 .

[Table 2](#) presents the results of a study examining the effectiveness of 2 different interventions aimed at improving the knowledge of a group of participants. The 2 interventions were a "team intervention" and a "seminar intervention", each involving 30 participants. For each intervention, the table shows the mean (*M*) scores and standard deviations (*SDs*) of the participants both before and after the intervention. The results indicate that for both the team intervention and the seminar intervention, there were statistically significant improvements in the participants' scores from before to after the intervention ($p < .001$ in both cases, as determined by the Wilcoxon signed-rank test). Additionally, the table includes the results of a Mann–Whitney *U* test, which was used to compare the scores between the 2 intervention groups. This test revealed that there was no significant difference in scores between the 2 groups prior to the interventions ($p = .64$). However, after the interventions were completed, a significant difference was detected between the 2 groups ($p = .04$). This suggests that while both interventions led to improved knowledge, the seminar intervention may have been slightly more effective than the team intervention.

Discussion

The results of this study show that there is no difference in the average knowledge score of COPD patient care in 2 learning methods based on team and seminar before the intervention in nursing students of Islamic Azad University,

Table 1 Comparison of the demographic characteristics of the participants between the intervention and control groups.

Variables		Intervention		Control		Results
		Number	Percent	Number	Percent	
Material status	Single	9	30	14	46.7	$p^*=.184$
	Married	21	70	16	53.3	
Gender	Male	14	46.7	15	50	$p^*=0.965$
	Female	16	53.3	15	50	
Student type	Domestic	23	76.7	24	80	$p^*=.754$
	International	7	23.3	6	20	
Residence	Rural	5	16.7	5	16.7	$p^*=1.000$
	Urban	25	83.3	25	83.3	
		Mean	Deviation	Mean	Deviation	
Age		22.73	5.98	22.03	4.13	$p^{**}=.067$

* Chi square; ** *t*-test.

Mahabad branch in 1401. Also, a number of studies that are aligned with this study, including the study by Zarei and Hemti (2013) with the aim of investigating the effect of the TBL educational method on learning skills related to nervous system examinations in patients with neurological disorders, were conducted on nursing students. The findings show that the students of the team-based group performed better in the knowledge of nervous system examinations compared to the lecture-based group, and it also states that the 2 groups were similar in terms of knowledge of nervous system examinations before the intervention. And, there was no statistically significant difference.¹⁸

Also, the results of this study show that in the post-test phase, the knowledge of TBL group students was significantly higher than that of SBL group. In the post-test stage, the knowledge in the SBL group was more than the TBL group, although this difference was not statistically significant. A number of studies conducted in line with this study, including the study of Mustafa Kamal Alimglu et al. (2017), concluded that the average score of the knowledge retention test of the TBL group was significantly higher than that of the LBL group. However, no difference was seen between the groups regarding the scores of the end-of-internship exams.¹⁹

The results of this study show that it is encouraging to use TBL performed with real patients in neurology education to achieve better long-term knowledge retention and higher class participation and student satisfaction.¹⁹ Also, the study of Vasantha Mallika and Siva Sri Ranga (2014), who conducted a study on 64 medical students in India, concluded that team discussion is a better teaching-learning method compared to conventional seminars, and the post-test score of the team discussion was higher than

the post-test score for the seminar group, and this difference is statistically significant.

Moreover, the study of Adel Aborgla et al. (2022) showed that for medical students of Bisha University, even in practical sciences such as anatomy, they have gained more favorable learning. This is possible because peer group learning activities reinforce students' knowledge, maintain student-to-teacher relationships, and motivate students to improve their performance. In this research, the scores of students after the intervention compared to before the intervention in TBL method are better than SBL and there is a statistically significant difference.²⁰

In a study conducted by Dina et al. (2016), it was found that patients' knowledge about COPD and its management significantly improved after the implementation of a COPD care protocol. This improvement was particularly prominent among educated individuals who were able to adhere to the care instructions and effectively reduce exacerbations of the disease.²¹ Similarly, Salah et al. noted that none of the patients in their study had a satisfactory level of knowledge about COPD prior to intervention, but the majority (88%) showed significant improvement in knowledge after the intervention.²²

The results of this research show that in the comparison between the 2 groups in order to achieve the overall goal of the research, the average scores of the 2 groups in the pre-test did not have a significant difference. This indicated that the level of knowledge of the 2 groups of students about COPD was the same before the implementation of the research. But after implementing the specific interventions of each group, a significant difference was observed in the comparison of the average post-test scores of the two groups. During which the students of TBL group, compared

Table 2 The average scores and their standard deviations were assessed before and after the interventions.

Groups	Number	Scores of the knowledge		Result (Wilcoxon signed rank test)
		Before $M \pm SD$ ^a	After $M \pm SD$	
Team-based learning	30	8.00 \pm 1.84	13.075 \pm 1.89	$p < .001$
Seminar-based learning	30	7.85 \pm 2.35	16.60 \pm 2.50	$p < .001$
Result (Mann-Whitney <i>U</i> test)		$p = .64$	$p = .04$	–

^a Standard deviation.

to SBL group, gained better knowledge in the test of learning to care for patients with COPD. However, regarding the re-post-test, although the seminar resulted in a better learning period, no significant difference was observed.

Since improving grades can be a criterion for increasing learning in students, the obtained result shows that using the TBL method compared to the SBL method will lead to a greater improvement in students' learning in the post-test stage. In the post-test stage, there was no significant difference, and the 2 methods had a similar effect on the students' learning in the long term. Since these 2 learning methods are both student-centered and active learning methods, there are few studies in this regard. An important point is that active teaching methods are widely accepted and used worldwide as meaningful and consistent learning methods.²³

Conclusion

The results demonstrate that the TBL method was more effective than SBL in improving nursing students' short-term knowledge on COPD care. TBL involves students receiving materials in advance, completing individual and team assessments, and actively participating. This approach was more effective in the short-term compared to the SBL method, which focuses on seminars. However, both methods had similar effects on long-term learning, suggesting they are equally effective in consolidating COPD care knowledge. These findings highlight the importance of incorporating active learning methodologies, like TBL, in nursing education to improve short-term learning on key clinical topics, while both TBL and SBL are effective for long-term learning.

Ethical approval

The Ethics Committee of Kerman Islamic Azad University approved this study (Ethics No. IR.IAU.URMIA.REC.1401.032).

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Consent

Written informed consent was obtained from the patient for publication of this study and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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