

The Effect of a Stress and Anxiety Coping Program on Objective Structured Clinical Examination Performance Among Nursing Students in Shiraz, Iran

Sadaf Mojarab

Shiraz University of Medical Sciences

Leila Bazrafkan (✉ bazrafkan@yahoo.com)

Shiraz University of Medical Sciences

Azita Jaber

Shiraz University of Medical Sciences

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Abstract

ABSTRACT Background: Nursing students experience a significant level of stress and anxiety prior to the objective structured clinical examination (OSCE). The present study aimed to evaluate the effect of anxiety coping program on the OSCE performance level of first-year nursing students in Shiraz, Iran. Methods: The present two-stage interventional study was conducted among 76 nursing students; control group: n=35 and intervention group: n=41. Data collection instruments included a demographic characteristic form and State-Trait Anxiety Inventory (STAI) questionnaire. The intervention group followed anxiety coping program before taking the OSCE. The STAI questionnaire was filled in before and after the OSCE and the results were compared with those of the control group. The data were analysed using SPSS software (version 22.0). $P < 0.05$ was considered statistically significant. Results: Demographic characteristics of the participants indicated an overall homogeneity within the study population. As a result of the anxiety coping program, a substantial reduction in the anxiety score (by 11.61 units) in the intervention group was observed. There was a significant difference in the pre- and post-exam anxiety scores between the control and intervention groups ($P = 0.001$). The anxiety coping program improved the examination results of nursing students in the final exam compared to the midterm results (an increase of 0.9487 units, $P = 0.001$). Conclusion: The anxiety coping program reduced the anxiety level among nursing students and improved their OSCE results. Educational planners should consider anxiety reduction strategies to help students improve their examination results. Keywords: Anxiety, Nursing Students, State-Trait Anxiety Inventory

Background

Most people experience stress when dealing with multiple competing demands, and subsequently, feel anxious in reaction to the stress. Stress and anxiety are part of being a human but can either have a positive or negative effect. On the upside, these feelings can help to overcome a challenge or a dangerous situation, and even be a motivating factor. The downside is that excessive stress and anxiety may interfere with daily life and cause social isolation. Stress and anxiety among students are common prior to and during an examination. The stress and anxiety caused as a result of a systematic academic examination or effective evaluation of nursing students increase their motivation to elevate their clinical skills. At the same time, it permits nurse educators to assess their teaching standards, as well as evaluate the effectiveness of the nursing curriculum [1]. The objective structured clinical exam (OSCE) is one of the most effective functional test methods to achieve these goals

The validity and reliability of the OSCE have been confirmed and it has been proven to be an effective measurement tool for clinical skills and attitudes of nursing and medical students [2]. The OSCE is time-limited and tailored to examine the students' skill and performance by an independent educator in accordance with a checklist. It is typically multi-stationed, through which different types of skills and performance levels can be evaluated concurrently in a comprehensive and standardized manner [3]. In addition, the OSCE allows the evaluation of non-cognitive attributes (perception, anxiety, confidence, preparedness) and clinical competence [2, 4]. Moreover, it also focuses on the areas of perceived

emotional and psychosocial motor (motor and psychosocial skills) to track the students' progress, which in turn not only increases students' performance and confidence level but also enhances teaching enthusiasm among clinical educators [5]. Currently, most of the nursing and midwifery faculties have adopted the OSCE as an official evaluation tool [6]. Since the OSCE allows a comprehensive evaluation of clinical skills and knowledge, it could even replace the usual end-of-term examinations.

Not surprisingly, nursing students and first-year students in particular experience a significant level of stress and anxiety prior to the OSCE due to their unfamiliarity with its format and sequence [7]. Several studies have addressed and discussed various aspects of psychological stress among students prior to and during an examination, referred to as anxiety [8]. Anxiety is caused by many factors, including work pressure, academic expectations, difficulty in learning, and poor time management [9]. Among the various studies conducted on the association between examination types and psychological disorders, it has been shown that taking the OSCE has caused the highest level of stress and anxiety among the students [10]. A previous study reported that medical students were unequipped and unprepared to overcome the stress and anxiety caused by the OSCE [11].

To the best of our knowledge, there have been no studies in Iran on the stress and anxiety among students associated with OSCE. Published studies have been limited to either comparing the various OSCE related stressors using traditional assessment methods [12], a comparison between the types of examination (OSCE versus oral and multiple-choice examinations) [14], or the opinion of dentistry students on the OSCE [13]. None of the above-mentioned studies have addressed OSCE related stress and anxiety as perceived by the students themselves nor was the effectiveness of an intervention program ever the subject of a study. Hence, the present study aimed to evaluate the effect of anxiety coping program on the OSCE performance level of first-year nursing students in Shiraz, Iran.

Methods

Study design and participants

The present two-stage interventional study was conducted during October-December 2018 at Hazrat-e-Fatemeh Nursing and Midwifery Faculty, Shiraz University of Medical Sciences, Shiraz, Iran. The research goals were to quantify the levels of test anxiety associated with the OSCE among two groups of nursing students and to assess the effect of anxiety coping program on the stress levels among the intervention group. The participants were recruited among nursing students enrolled in two consecutive academic calendar years; 2017-2018 and 2018-2019. Based on a simple random sampling method, 76 nursing students were recruited and divided into two groups, namely the control group and the intervention group. The control group (n=35) included those enrolled during the academic calendar year 2017-2018. At the time of the present study, these students had completed the first-year and had already experienced the anxiety associated with the OSCE. The intervention group (n=41) included freshly enrolled nursing students during the academic calendar year 2018-2019. These students had to take the OSCE as part of their curriculum. The anxiety coping program included a full explanation of the OSCE examination and its

various stages, relaxation and soothing techniques, diaphragmatic breathing training, and progressive muscle relaxation training accompanied by light instrumental music.

Measures

Socio-demographic information

Demographic characteristics of the participants included sex, age, marital status, kind of accommodation, diploma core curriculum, the city and year of the issued diploma, high school grade, and the average score of the university entrance examination.

State-Trait Anxiety Inventory (STAI).

The self-evaluation STAI questionnaire, developed by Spielberger in 1983, includes separate scales for measuring state (S-scale) and trait (T-scale) anxiety. In the present study, we only used the S-anxiety scale (STAI Form Y-1). The questionnaire consisted of 20 items that evaluated how the participants felt at the time of responding to each item. Note that 10 items were associated with the anxiety-present (items 3, 4, 6, 7, 9, 12, 13, 14, 17, 18) and the remaining items were associated with the anxiety-absent (items 1, 2, 5, 8, 10, 11, 15, 16, 19, 20). The intensity of the participants' feelings was rated on a 4-point Likert scale: (i) not at all, (ii) somewhat, (iii) moderately so, and (iv) very much so. The anxiety-present items were scaled from 1 to 4 such that higher scores indicated the presence of a high level of anxiety. However, the anxiety-absent items were scaled in reverse from 4 to 1. The total score for the STAI Form Y-1 ranged from a minimum of 20 to a maximum of 80.

The reliability and validity of the questionnaire ranged 0.86-0.95 and 0.65-0.75, respectively. (Spielberger et al., 1983) The Persian version of the questionnaire was developed by Mahram, and its reliability for the anxiety-present and anxiety-absent (Cronbach's alpha 0.908 and 0.902, respectively) was confirmed. Additionally, they confirmed the reliability of the questionnaire by calculating the proportion of the true variance over the obtained variance (0.945). Furthermore, they confirmed the validity of the questionnaire using the concurrent validity method. Two other studies also reported 90% and 93% reliability of the questionnaire, respectively [14].

Procedure

Upon formal approval by the university authorities, a list of nursing students for the academic calendar years 2017-2018 (control group) and 2018-2019 (intervention group) was obtained. The data associated with the control group were retrieved from the university database for comparison with the intervention group. Before the study, the research goals and procedure were explained after which written informed consent was obtained from the participants in the intervention group. At the beginning of the academic term, the participants in the intervention group were requested to fill in the demographic information form and the STAI Form Y-1 questionnaire. Subsequently, they followed an anxiety coping program that included relaxation and soothing techniques, diaphragmatic breathing training, and progressive muscle relaxation training accompanied by light instrumental music.

The initial research design included a total of six intervention sessions prior to the OSCE; three sessions per week, during 2 weeks, each of 30 minutes duration. However, due to the tight syllabus schedule of the university program and objection by the education deputy of the university, only one intervention session was conducted prior to the OSCE test. Nonetheless, the quality of the session was high and the students were fully informed on the purpose of the OSCE examination and its various stages. The explanation was given by the author with the help of a slideshow and video presentation showing former students taking the OSCE. In addition, certain relaxation techniques to reduce anxiety were taught by an experienced academic psychiatric nurse. Prior to taking the OSCE, the participants of the intervention group gathered in a quiet and calm room and were requested to exercise the relaxation techniques while light instrumental music was being played. Upon completion of the test, they filled in the STAI Form Y-1 questionnaire for the second time.

Statistical analysis

The data were analysed with the SPSS software (version 22.0) using descriptive and inferential statistics. Descriptive data were expressed as mean, standard deviation, number, and percentage. To compare the homogeneity of variables between the two groups, the Chi-square test and independent t-test were used. To compare the anxiety level in both groups pre- and post-intervention, the paired sample t-test and independent t-test were used. $P < 0.05$ was considered statistically significant.

Results

Demographic characteristics of the participants (Table 1) indicated an overall homogeneity within the study population.

The results showed high participation of female nursing students in both the control (54.3%) and the intervention (53.7%) groups. There was no significant difference between male and female participants ($P = 0.956$). In terms of marital status, most of the participants were single; 85.7% and 95.1% in the control and intervention group, respectively. There was a significant difference between the married and unmarried participants ($P = 0.157$).

The majority of the participants obtained their high school diploma in natural sciences; 88.6% and 85.4% in the control and intervention group, respectively. In terms of the academic discipline, there was no significant difference between the groups ($P = 0.803$). Furthermore, the high school grade obtained by the participants was mainly at the excellent level (> 18 out of a maximum of 20) in the control (80.0%) and intervention (82.9%) group. There was no significant difference between the groups ($P = 0.527$). The results also showed that most participants obtained their diploma from a high school outside Shiraz, but within the Fars province; 60.0% and 39.0% in the control and intervention group, respectively. There was no significant difference between the groups in terms of the diploma issuing authorities ($P = 0.165$). These results supported the conclusion that most participants lived in a university rather than private accommodation since their move to Shiraz was for study purposes only. The results showed that 77.1% and 68.3% of the participants in the control and intervention group, respectively, lived in a university

dormitory. There was no significant difference between the groups as to the type of accommodation ($P=0.390$).

A good proportion of the participants obtained excellent ranks in the nationwide university entry examination. This highly competitive examination is ranked based on the total number of students wishing to enter university; those with a lower ranking have a higher chance of being accepted. The results showed that 42.9% and 48.8% of the participants in the control and intervention group, respectively, obtained a rank in the category <3000 . Such excellent performance is not only indicative of their academic skills, but it also illustrated their resilience to anxiety. There was no significant difference between the groups in terms of the university entry ranks ($P=0.201$).

The result of the SATI score and the effect of the anxiety coping program are shown in table 2. The mean age of the participants in the control and intervention group was 21.9 ± 3.55 and 19.98 ± 2.04 , respectively. There was no significant difference in the mean age between the groups ($P=0.710$).

The pre- and post-exam anxiety scores showed the positive effect of the intervention. The results showed an increased anxiety score (8.31 unit) in the control group after the OSCE. The results of the paired t-test showed a significant difference ($P=0.001$) in the pre- and post-exam scores in the control group. However, in the intervention group, a substantial reduction in the anxiety score (11.61 unit) was observed. The results of the paired t-test showed a significant difference in the pre- and post-exam scores between the groups ($P=0.001$). A comparison between the control and intervention group, using the independent t-test, showed a significant difference in the anxiety score between the groups in the pre-exam (an increase of 5.75 units, $P=0.016$) and post-exam (a decrease of 14.12 units, $P=0.001$) stages. These results confirmed the effectiveness of the anxiety coping program.

Based on the paired t-test, the final examination results obtained by the participants in the control group showed a slight reduction (a decrease of 0.308 units, $P=0.001$) compared to the midterm results. However, in the intervention group, the positive effect of the anxiety coping program resulted in an improvement in the final exam results compared to the midterm results (an increase of 0.9487 units, $P=0.001$). The results of the independent t-test between the groups showed improved final examination results (an increase of 0.396, $P=0.087$) in the intervention group.

Discussion

The present study aimed to determine the effect of anxiety coping program on nursing students' performance in an objective structured clinical exam in Shiraz, Iran. The anxiety score was measured pre- and post-examination in both the control and intervention groups.

The results showed an increased anxiety score among the nursing students in the control group after the OSCE. A similar study conducted by Yalcin in Turkey [15] also reported a higher anxiety score among medical students after taking part in the OSCE. Although nursing and medical students are different target populations, studying different subjects, the anxiety caused by the OSCE is however similar in both

groups. Yalcin showed that the anxiety level in the intervention group was reduced while it had increased in the control group; indicating the importance of anxiety coping program among medical students before OSCE. In line with the study by Yalcin, we also found a significant positive effect of the anxiety coping program in the intervention group pre- and post-examination. Moreover, it was shown that such coping program could reduce anxiety among students immediately after the intervention, on the day of an OSCE, and 3 months after the test. In another study, Dunne and colleagues [16] stated that anxiety coping program before an OSCE could effectively control the anxiety level among nursing students. Other researchers have also indicated the positive effect of psychological intervention in reducing the anxiety level, demotivation, and mental stress among students [17]. While OSCE is an excellent opportunity for students to enhance their professional skills, it involves many challenges and issues such as anxiety [18]. Therefore, interventions to prepare the students to study and preparedness for an OSCE could reduce the level of anxiety before the examination [19]. Such coping programs could help the students to manage their anxiety and experience less stress.

The results of the present study showed that the anxiety coping program led to an improvement of average examination results of the nursing students. In line with a study by Yusefzadeh [19], we found that the intervention group obtained significantly better exam results compared to the control group. It has been shown that the anxiety associated with an OSCE could negatively affect the thinking process and subsequently negatively affect the performance of students. Also, essential parameters that enhance performance (knowledge, attitude, and psychomotor) could be impaired by anxiety [20]. It has been reported that even a brief social intervention improved the performance of medical students [21]. A study in Thailand among nursing students at various universities reported the effectiveness of meditation in reducing the anxiety level among students during clinical examinations [22]. They also described that such anxiety coping program allows the students to effectively demonstrate their knowledge, attitude, and psychomotor skills during an OSCE, and subsequently improve their examination results.

We found that the anxiety coping program had a positive effect on the average anxiety score of nursing students during the OSCE. The results showed that following the intervention program, the students experienced a lower anxiety level and the anxiety score had reduced significantly compared to pre-intervention. Kalantari and colleagues [23, 24] conducted a study on anxiety among dentistry students in Kerman (Iran). They evaluated students' anxiety levels during four different types of dentistry assessment formats, one of which was the OSCE. They reported that the OSCE caused more anxiety compared to the other assessment formats. They indicated that high levels of anxiety undermined students' performance during an examination due to temporary impairment of intellectual functioning and a panic-stricken state of mind. However, other studies have also indicated that a certain level of anxiety can improve the performance of an individual, with the limitation that excessive anxiety impaired proper functioning [25, 26]. In agreement with these findings, the results of the present study showed that the intervention group obtained better examination results compared to the control group.

A study conducted on the anxiety among cosmetic surgery students during their OSCE reported that anxiety had a negative effect on their performance [27]. Another study investigated factors that caused

anxiety during an OSCE [28]. Among different factors, it was reported that students attending lectures with a negative attitude were more prone to anxiety during the OSCE. Effective learning strategies and test-taking skills were proposed to reduce the level of anxiety. In addition, familiarization with the OSCE process and simulated mock OSCE were also proposed as effective methods to increase students' self-confidence and consequently reduce anxiety during the actual OSCE test [29, 30].

Considering that an OSCE is a formal practical examination, it is natural to anticipate high levels of anxiety among students taking the test. As reported by Kalantari [24], an OSCE caused more anxiety compared to any other assessment format. Such high levels of anxiety could be due to the fact that the students are individually and visibly under scrutiny, and the test at each OSCE station is done once, is irreversible, and there is no second opportunity for corrective actions. In the present study, before the actual OSCE, efforts were made to familiarize the participants with the OSCE process through slideshow and video presentations.

Comparison of demographic characteristics

The majority of the participants in the present study were female nursing students, aged between 19.98 and 21.9 years. Other studies on different aspects of an OSCE included a higher percentage of female participants as well but in a higher age range. Note that our participants were first-year nursing students and subsequently had a lower average age compared to other studies. Nonetheless, our findings were in line with those of other studies.

Application of research findings

The main objective of the present study was to reduce the anxiety of nursing students before taking the OSCE in order to empower them to better recognize anxiety and utilize their skills in managing it. The anxiety coping program included relaxation and soothing techniques, diaphragmatic breathing training, and progressive muscle relaxation training accompanied by light instrumental music. Since an OSCE is used in various medical disciplines to assess the clinical skill performance and competence of students, the findings of the present study are applicable in the fields of clinical practice, management, and education.

- Clinical practice: The positive effect of the coping program to reduce anxiety and improve exam result has been demonstrated. Our findings can be utilized to better evaluate clinical activities in different medical and paramedical groups.
- Management: The findings can be used by policy-makers and educational planners to make efficient use of the OSCE by including coping programs to help students to overcome anxiety-related issues.
- Education: Considering the positive effect of the coping program and the improved examination results, educators can implement such coping programs prior to evaluations in order to effectively assess the knowledge, attitude, and performance of the students.

Recommendations for future studies

To complement the findings of the present study, it is recommended to conduct the following assessment studies.

- The effect of anxiety coping program on the anxiety level in paramedical students and on their OSCE examination results.
- The effect of anxiety coping program on the educational motivation, learning satisfaction, and academic performance of nursing students after an OSCE.
- The effect of mock OSCE tests on anxiety and examination results of nursing students.
- Identification of anxiety predictive factors in nursing students.

Study limitations

The main limitation of the present study was the participation of students from a single university and medical discipline (nursing), which limits the generalizability of our findings. Furthermore, the anxiety coping program was performed during a short time and there was no follow-up on the state of anxiety among students. It is recommended that future studies include different medical disciplines across different universities and to extend the duration of the intervention as well as the number of follow-up visits.

Conclusions

The findings of the present study indicated that anxiety coping program reduced the anxiety level among nursing students and improved their OSCE results. Educational planners should consider offering an anti-anxiety curriculum to help students to improve their examination results. It is recommended to conduct future studies of a longer duration and with follow-up of the students' academic performance.

Abbreviations

OSCE: Objective Structured Clinical Examination, STAI: State-Trait Anxiety Inventory,

Declarations

Ethics approval and consent to participate

The present study was approved by the Ethics Committee of Shiraz University of Medical Sciences, Shiraz, Iran (code: IR.SUMS.REC.1389.014). Approval from the Dean of Hazrat-e-Fatemeh Nursing and Midwifery Faculty was obtained to access the relevant data of the enrolled nursing students. The participants were informed about the research goals and procedures. Also, the confidentiality of any disclosed information was guaranteed and voluntary participation was emphasized. Written informed consent was obtained from the participants.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and analysed during the current study are not publicly available due to confidentiality of the identity of the participants. However, such information is available from the corresponding author on reasonable request.

Competing interests

The authors (Sadaf Mojarrab, Leila Bazrafkan, Azita Jaber) declare that they have no conflict of interest.

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Authors' contributions

Sadaf Mojarrab participated in the design of the study, acquisition, analysis, and interpretation of data; manuscript drafting, and final approval of the version to be published. Leila Bazrafkan supervised the study and participated in the design of the study, analysis, and interpretation of data; and proofreading the manuscript. Azita Jaber was involved in the design of the study, analysis, and interpretation of data; and proofreading the manuscript. All authors have read and approved the final manuscript.

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Tables

Table 1: Socio-demographic characteristics of participants

Variables		Control group		Intervention group		P value*
		N	%	N	%	
Sex	Women	19	54.3	22	53.7	0.956
	Men	16	45.7	19	46.3	
Marital status	Single	30	85.7	39	95.1	0.157
	Married	5	14.3	2	4.9	
Diploma core curriculum	Natural sciences	31	88.6	35	85.4	0.803
	Nursing assistant	2	5.7	4	9.8	
	Others	2	5.7	2	4.9	
High school grade	>18	28	80.0	34	82.9	0.527
	16-18	3	8.6	5	12.2	
	<16	4	11.4	2	4.9	
Diploma place of issue	Shiraz	8	22.9	12	29.3	0.165
	Fars province	21	60.0	16	39.0	
	Others	6	17.1	13	31.7	
University exam score	<3000	15	42.9	20	48.8	0.201
	3000-5000	8	22.9	14	34.1	
	>5000	12	34.3	7	17.1	
Accommodation	University dormitory	27	77.1	28	68.3	0.390
	Private	8	22.9	13	31.7	

*Chi-square test

Table 2: The effect of the intervention program on the anxiety score and examination results.

Variables		Control group	Intervention group	P value*
		Mean±SD		
Age		21.9±3.55	19.98±2.04	0.710
Anxiety score	Pre-exam	42.03±9.618	47.78±10.492	0.016
	Post-exam	50.349±9.459	36.17±12.595	0.001
	P value**	0.001	0.001	
Exam result	Midterm	8.0694±0.68179	7.2093±1.05615	0.001
	Final	7.7614±0.89470	8.1580±1.07190	0.087
	P value**	0.001	0.001	

*Independent t-test, **Paired t-test