

The Effect of Simulation Training on First-year Nursing Students' Ability on Planning Nursing Process and Their Clinical Stress Levels

Simülasyon Eğitiminin Hemşirelik Birinci Sınıf Öğrencilerinin Hemşirelik Sürecini Planlama Becerilerine ve Klinik Stres Düzeylerine Etkisi

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ABSTRACT Objective: This study aimed to determine the effect of simulation training on first-grade nursing students' ability to plan nursing process and clinical stress levels. **Material and Methods:** Pre-test and post-test quasi-experimental design with control group was used. It was conducted with first-year nursing students of a Marmara University Faculty of Health Sciences Nursing Department in İstanbul between January-June 2017. The results of the study could be affected by physical conditions and institutional differences in hospitals. Therefore, the sample included 98 nursing students who would involve in clinical applications of the same hospital. The experimental and control groups were separated by simple randomization and created by 49 students. The experimental group was trained with scenario-based high-fidelity simulation after both groups completed theoretical and laboratory training. The data were obtained through the Nursing Process Evaluation Form and Clinical Stress Questionnaire. **Results:** A statistically significant difference was found between the experimental group's pre-test (first day of clinical training) and post-test (last day of clinical training) Clinical Stress Questionnaire total mean scores. A statistically significant difference was found between the experimental and control groups' pre-test Clinical Stress Questionnaire scores. There was a statistically significant difference between the groups' mean scores on the Nursing Process Evaluation Form sections of assessment and nursing diagnosis. **Conclusion:** Simulation training has effectively reduced the nursing students' feelings such as sadness, anxiety, fear, and anger in clinical education. Also, it enabled students to be more successful in data collection and nursing diagnosis.

Keywords: High fidelity simulation training; nursing process; stress; nursing student

ÖZET Amaç: Bu çalışmanın amacı, simülasyon eğitiminin hemşirelik 1. sınıf öğrencilerinin hemşirelik sürecini planlama becerileri ve klinik stres düzeyleri üzerindeki etkisini belirlemektir. **Gereç ve Yöntemler:** Araştırmanın tasarımı, ön-test son-test randomize kontrollü deneyseldir. Çalışma, Ocak 2017 ve Haziran 2017 tarihleri arasında İstanbul'da Marmara Üniversitesi Sağlık Bilimleri Fakültesi Hemşirelik Bölümü 1. sınıf hemşirelik öğrencileriyle gerçekleştirildi. Çalışmanın sonuçları hastaneler arasındaki fiziksel durumlar ve kurumsal farklılıklardan etkilenmiş olabilir. Çalışma ve kontrol grupları, basit rastgele randomizasyon ile ayrıldı ve 49 öğrenciden oluşturuldu. Deneysel gruba, her 2 grup teorik ve laboratuvar eğitimini tamamladıktan sonra senaryo tabanlı yüksek sadakat simülasyonu ile eğitildi. Veriler, Hemşirelik Süreci Değerlendirme Formu ve Klinik Stres Anketi aracılığıyla elde edildi. **Bulgular:** Çalışma grubunun ön-test (klinik uygulamanın ilk günü) ve son-test (klinik uygulamanın son günü) Klinik Stres Anketi ortalama puanları arasında istatistiksel olarak anlamlı bir fark bulundu. Çalışma ve kontrol gruplarının, ön-test Klinik Stres Anketi puanları arasında istatistiksel olarak anlamlı bir fark bulundu. Grupların, Hemşirelik Süreci Değerlendirme Formu'nun veri toplama ve hemşirelik tanısı bölümlerindeki ortalama puanları arasında istatistiksel olarak anlamlı bir fark saptandı. **Sonuç:** Simülasyon eğitimi, hemşirelik öğrencilerinin klinik eğitimde üzüntü, kaygı, korku ve öfke gibi duygularını azaltmada etkili olmuştur. Ayrıca öğrencilerin, veri toplama ve hemşirelik tanısını koyma aşamalarında daha başarılı olmalarını sağlamıştır.

Anahtar Kelimeler: Yüksek gerçekli simülasyon eğitimi; hemşirelik süreci; stres; hemşirelik öğrencisi

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Nursing education aims to provide students with cognitive, psychomotor, and attitudinal behaviors. Nursing students are expected to put the theoretical knowledge gained in the classroom environment and the basic professional skills gained in the skill laboratory into practice in the clinical setting. Therefore, clinical practice is an important part of nursing education that provides students with professional competence.¹ However, clinical practice is also a source of stress, especially for first-year nursing students.¹⁻⁵ Studies report that the factors causing stress in nursing students are worries of being in an unknown environment, making mistakes and harming patients, perception of having inadequate professional knowledge and skills for medical interventions, communication problems with patients and clinical staff, and fear of being evaluated by instructors.^{2,4,6,7}

First-year nursing students should have the following skills during clinical practice; to initiate and maintain communication with healthy/sick individuals and their families, to verify patient identity, to wash hands before and after the procedure, to measure and evaluate vital signs, to collect comprehensive data for a nursing care plan, to plan and implement the nursing process, and to apply other basic nursing skills. The clinical learning experience is an integral and necessary part of nursing education as it enables nursing students to learn the necessary professional knowledge and skills. In addition to its contribution to professional skill acquisition, clinical learning is among the most common causes of anxiety and stress in students.^{4,8,9} Students have to cope with many situations that cause anxiety and stress during their nursing education at various stages, especially in clinical practice. Anxiety and stress are important factors affecting students' academic performance during education.⁹ Besides, the stress experienced in clinical education may also affect nursing students' clinical performance. In particular, nursing students need to communicate effectively with patients and their relatives to plan and implement a good nursing process. However, contacting strangers (patients and their relatives), asking them personal questions, and evaluating them can be frightening and stressful for first-year nursing students who participate in clinical practice for the first time.¹⁰

Providing nursing students with an opportunity to have these experiences in realistic clinical settings before being involved in clinical practice can reduce their fear, stress, or anxiety during clinical practice. Simulation is defined as a method in which trainees gain artificial or virtual experience using a scenario with real-life conditions and risking no real cases.¹¹ Simulation training provides nursing students with an opportunity to develop professional skills without risking and learning experience in a safe and controlled environment.^{12,13} It also develops critical thinking, clinical decision-making, problem-solving, and good communication skills.^{10,14-16}

In summary, clinical practice is an important process to prepare nursing students for professional life. Nursing students are expected to plan and implement a good nursing process during clinical practice and apply basic nursing skills. This requires high cognitive skills, such as critical thinking, clinical decision-making, problem-solving, and good communication skills. Simulation training can provide students with clinical experiences in realistic settings, reduce their stress in clinical practice, and identify patients via an effective communication process and create an appropriate nursing care plan. This study aimed to determine the effect of simulation training on first-grade nursing students' ability to plan nursing process and clinical stress levels.

MATERIAL AND METHODS

STUDY DESIGN, SETTING, AND SAMPLE

Pre-test and post-test quasi-experimental design with control group was used. It was conducted with first-year nursing students of a Marmara University Faculty of Health Sciences Nursing Department in Istanbul between January-June 2017. The results of the study could be affected by physical conditions and institutional differences in hospitals. Therefore, the sample included 98 nursing students who would involve in clinical applications of the same hospital. Nursing students included in the study were randomly divided into two groups using the random sampling method. The first 49 subjects were determined as the control group, and the second 49 as the invention group by assigning numbers to the students

and selecting them from the table of random numbers.

DATA COLLECTION TOOLS

Nursing Process Evaluation Form: This form, created by the researchers, was based on five stages of the nursing process (assessment, nursing diagnosis, planning, implementation, and evaluation).¹⁷⁻¹⁹ This form was designed using 12 activities of the life activities theory (maintaining a safe environment, communication, breathing, eating and drinking, elimination, washing and dressing, controlling temperature, mobilization, working and playing, sexuality, sleeping, death).¹⁹ Nursing Process Evaluation Form (NPEF) was evaluated by rubric evaluation over 100 points (*assessment=25 points, nursing diagnosis=10 points, planning=20 points, implementation=30 points, and evaluation=15 points*), and the score obtained from the form is between 0 and 100. A rubric was used to assess NPEF (for each section, “never filled” 0 points; “completed but missing/incorrect” half-point; “fit/fully completed” full points). For content validity, expert opinion was obtained from three nurse academicians. The necessary revisions were made in line with expert opinions.

Clinical Stress Questionnaire: It was developed by Pagana to assess the appraisal of stress in nursing students’ clinical experience as threatening or challenging.²⁰ Its Turkish validity and reliability study was conducted by Sendir and Acaroglu.⁵ It consists of a total of 20 items assessing nursing students’ feelings of “threat, fight, benefit” before clinical experience. This is a 5-point Likert-type scale, and the total score ranges from 0 to 80. A higher score indicates a higher clinical stress level.^{5,20} The Cronbach’s alpha coefficient was 0.70 in the Turkish validity and reliability study of the scale.⁵ The Cronbach’s alpha coefficient was found to be 0.77 in the present study. The Cronbach’s alpha coefficient was found to be 0.65, 0.78, 0.70, and 0.71 for the subscales of threat, fight, damage, and benefit, respectively.

PROCEDURES

In the nursing school where the research was conducted, the students start clinical practice within the nursing fundamentals course scope in the spring term.

The theoretical lectures included proper communication (2 h), patient safety (2 h) measurement and evaluation of vital signs (5 h), hand hygiene (2 h), and nursing process (5 h). After the theoretical course, the students practiced the skill laboratory about measurement vital signs (5 h) and hand hygiene (2 h) skills. The main skills expected from first-year students during their first clinical practice periods can be listed as follows; to start and maintain communication with healthy/sick individual and their family, to verify the identity of the patient, to wash hands before and after the procedure, to measure and evaluate vital signs, to collect comprehensive data for the nursing care plan, and to plan and implement the nursing process.

Nursing students were divided into two groups by random randomization formed the control and intervention groups. Before the clinical practice, the intervention group received scenario-based simulation training with a high-fidelity simulation model in the skill laboratory. The simulation training was managed by the researcher GKO who received simulation training on design, facilitation, scenario writing, and debriefing. In addition, the simulation scenario was written by GKO and revised with expert opinion.^{21,22}

Ten sub-groups were formed from the intervention group. The simulation was performed once again for each sub-group. The prebriefed simulation step lasted 10 min, the simulation step 15 min, and the debriefed step 35 min. The scenario included a 69-year-old patient who was diagnosed with food poisoning. The scenario’s goals were determined as follows; to initiate and maintain communication with the patient and her relatives, to hand hygiene before and after the procedure, verify patient identity, and measure and evaluate vital signs. The facilitator guided the students towards achieving the simulation objectives. In the 15-minute scenario, one person got into the clinical nurse’s role, one person as a student nurse, and one person as a patient relative. Two people were appointed as observers. Observers took notes on their peers’ performances. At the end of the script, they gave feedback about their peers’ performances. Debriefing was performed with a semi-structured interview form containing predetermined questions for simulation. Each session lasted one hour.

After the training, the intervention and control groups started clinical practice on the same day. The clinical practice lasted a total of 14 weeks, one day a week. The Clinical Stress Questionnaire (CSQ) was applied to both groups on the first and last days of clinical practice. The intervention and control groups collected data of a patient they selected on each day of the clinical practice and made a nursing care plan for the patient. During this process, they received feedback from the same instructors during clinical practice. At the end of the clinical practice, each student submitted the completed nursing care plans to the instructor. The nursing care plans prepared by the students were evaluated using the NPEF. The mean scores of the intervention and control group students obtained from the NPEF were compared (See Figure 1 study design-flowchart).

DATA ANALYSIS

Data analysis was performed using SPSS 18.0 (Statistical Package for the Social Sciences, Chicago, Illinois, USA). Data were assessed using the Mann-Whitney U test, Wilcoxon signed ranks test and descriptive statistics including percentage, frequency, mean and standard deviation. All results were evaluated at 95% confidence interval and $p < 0.05$ significance level.

ETHICAL CONSIDERATIONS

This study was approved by the Marmara University Faculty of Medicine Ethical Review Board (approval No: 09.2017.160, date: 3/02/2017). Informed consent form was read to all participants and their written consent was obtained. The study was carried out following the Helsinki Declaration principles.

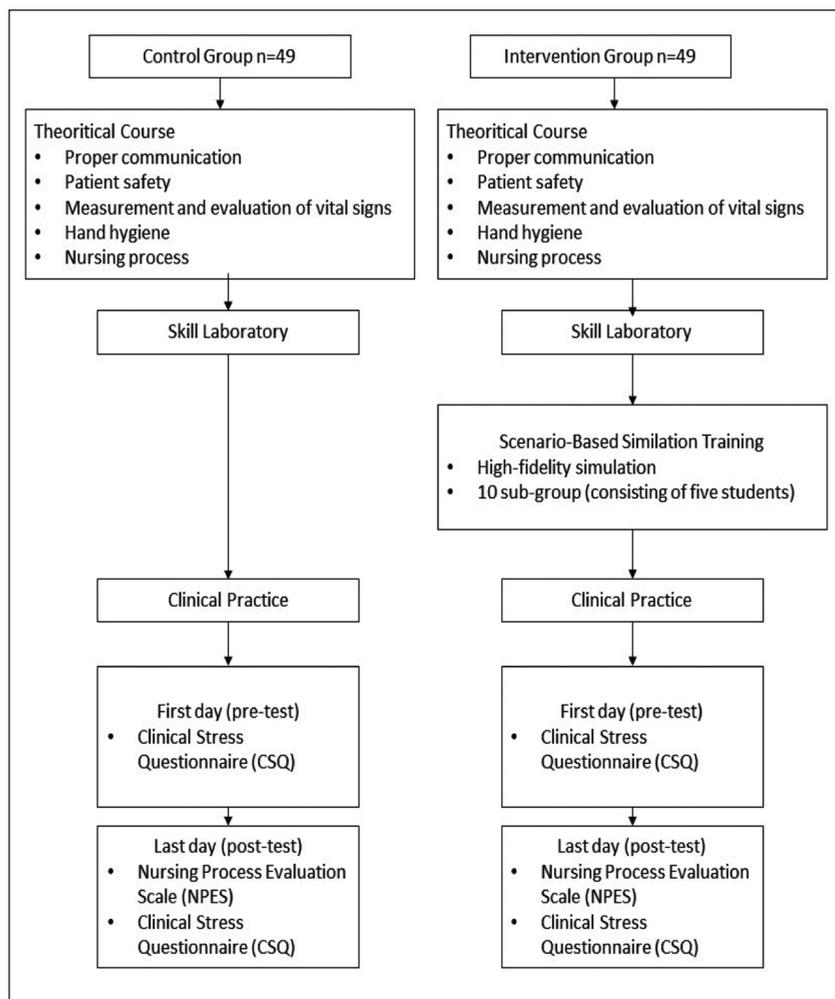


FIGURE 1: Study design flowchart.

RESULTS

The experimental group's mean age was 18.85 (minimum=17, maximum=20), and 71.4% of them were female. The control group's mean age was 19.10 (minimum=18, maximum=22), and 73.5% of them were female. The majority of the experimental group (59.2%) and of the control group (63.3%) reported feeling ready for clinical practice (Table 1).

A statistically significant difference was found between the experimental and control groups' pre-test CSQ total mean scores ($p=0.001$). Also, there was a significant difference between the groups' pre-test mean scores on the CSQ subscales of threat ($p=0.006$) and damage ($p=0.001$); however, there was no statistically significant difference between their pre-test mean scores on the CSQ subscales of fight and benefit ($p>0.05$) (Table 2). On the other hand, no statistically significant difference was found between the groups' both post-test CSQ total mean scores and post-test mean scores on all CSQ subscales ($p>0.05$) (Table 2).

A statistically significant difference was found between the experimental group's pre-and post-test CSQ total mean scores ($p<0.001$). Also, there was a statistically significant difference between the group's pre-and post-test mean scores on the CSQ subscales of threat ($p=0.026$) and damage ($p<0.001$); however, there was no statistically significant difference between the group's pre-and post-test mean scores on the CSQ subscales of fight and benefit ($p>0.05$) (Table 3). On the other hand, a statistically significant difference was found between the control group's pre-and post-test CSQ total mean scores ($p=0.015$). Also, there was a statistically significant difference between the group's pre-and post-test mean scores on the fight's CSQ subscale ($p=0.032$). However, no statistically significant difference was found between the group's pre-and post-test mean scores on the CSQ subscales of threat, damage, and benefit ($p>0.05$) (Table 3).

No statistically significant difference was found between the groups' NPEF mean scores ($p=0.133$). On the other hand, there was a statistically significant

TABLE 1: Socio-demographic data of the experimental and control groups.

		Experimental group (n=49)		Control group (n=49)	
		%	n	%	n
Age	Mean (minimum-maximum)	18.85±(17-20)		19.10±(18-22)	
Gender	Female	71.4	35	73.5	36
	Male	28.6	14	26.5	13
Feel ready for clinical practice	No	8.2	4	18.4	9
	Undecided	32.7	16	18.4	9
	Yes	59.2	29	63.3	31

TABLE 2: Comparisons of clinical stress of the experimental and control groups on the pre-test and post-test CSQ mean score (n=98).

CSQ		Experimental groups (n=49)	Control groups (n=49)	U	p value
		Median (Q1-Q3)	Median (Q1-Q3)		
Pre-test	Threat subscale	6 (4-8)	8 (5-11)	815.00	0.006*
	Fight subscale	11 (9-16)	13 (9.5-16.5)	1035.50	0.240
	Damage subscale	2 (5-3)	4 (1.5-6)	740.50	0.001*
	Benefit Subscales	4 (2-5)	4 (2.5-5.5)	1104.00	0.489
	Total scale	22 (17-25)	26 (22-32)	733.00	0.001*
Post-test	Threat subscale	8 (5-11)	7 (5-9)	1115.00	0.542
	Fight subscale	14 (9-16.5)	14 (11.5-18.5)	1000.50	0.154
	Damage subscale	5 (2-6.5)	4 (2-6)	1002.00	0.156
	Benefit subscale	3 (2-5)	4 (3-5.5)	1010.50	0.170
	Total scale	29 (24-35)	30 (26.5-34.5)	-0.462	0.644

CSQ: Clinical Stress Questionnaire; Mann-Whitney U test was used; * $p<0.01$.

TABLE 3: Comparisons of between the pre-test and post-test CSQ scores of the experimental and control groups.

		Pre-test CSQ scores		Post-test CSQ scores	
		Median (Q1-Q3)	Median (Q1-Q3)	Z	p value
Experimental group (n=49)	Threat subscale	6 (4-8)	8 (5-11)	-2.230	0.026*
	Fight subscale	11 (9-16)	14 (9-16.5)	-1.814	0.070
	Damage subscale	2 (5-3)	5 (2-6.5)	-4.582	0.000*
	Benefit subscale	4 (2-5)	3 (2-5)	-0.711	0.477
	Total scale	22 (17-25)	29 (24-35)	-4.575	0.000*
Control group (n=49)	Threat subscale	8 (5-11)	7 (5-9)	-1.171	0.241
	Fight subscale	13 (9.5-16.5)	14 (11.5-18.5)	-2.140	0.032
	Damage subscale	4 (1.5-6)	4 (2-6)	-0.067	0.946
	Benefit subscale	4 (2.5-5.5)	4 (3-5.5)	-0.366	0.714
	Total scale	26 (22-32)	30 (26.5-34.5)	-2.434	0.015*

CSQ: Clinical Stress Questionnaire; Wilcoxon Signed Ranks Test was used; *p<0.05.

TABLE 4: Comparison of Nursing Process Evaluation Form scores of experimental and control groups.

	Experimental group	Control group	U	p value
	(n=49)	(n=49)		
	Median (Q1-Q3)	Median (Q1-Q3)		
Assessment	18 (16-20)	16 (15-18)	880.00	0.021*
Nursing diagnosis	9 (8-10)	8 (8-9)	912.50	0.031*
Planning	19 (17-20)	18 (16-20)	985.50	0.113
Implementation	27 (24.5-29)	27 (24-30)	1182.00	0.894
Evaluation	15 (11.5-15)	13 (12-15)	1085.50	0.381
Total score	90 (85-96)	88 (80-94.5)	989.50	0.133

Mann-Whitney U test was used; *p<0.05.

difference between the groups' mean scores on the NPEF subscales of assessment ($p=0.021$) and nursing diagnosis ($p=0.031$). However, there was no statistically significant difference between the groups' mean scores on the NPEF subscales of planning, implementation, and evaluation ($p>0.05$) (Table 4).

DISCUSSION

Clinical practice is unequivocally a major component of nursing education and the profession. Clinical experiences serve as a bridge between theoretical knowledge and practice, supporting psychomotor skills in nursing students. Besides, many studies have shown that clinical applications cause stress in nursing students.^{6,20,23} Nurse educators must prepare students for ever-changing environments and more acute clinical issues. Studies report that simulation training improves students' knowledge and skills, reduces their anxiety levels, increases their self-confidence,

and provides them with opportunities for clinical decision-making in a safe environment.^{24,25} Many studies have shown that simulation-based training positively affects student performance and leads to critical thinking and decision-making skills.^{11,26-29} But, Karabacak et al. and Karabacak et al. showed that nurses' self-efficacy was high in the first application but decreased after the second.^{3,30}

The present study evaluated the effectiveness of scenario-based simulation training on first-year nursing students' clinical stress levels on the first day of clinical practice. On the first day of clinical practice, the experimental group had a significantly lower CSQ total mean score than the control group. This result suggests that simulation training reduces the first day clinical stress levels of nursing students who participate in clinical practice for the first time. Similarly, Bremner et al. found that simulation training reduced nursing students' clinical stress.²⁵ However, the present study found that

both groups had similar clinical stress levels on the last day of clinical practice. This may be because the simulation training may have reduced the students' negative feelings in the experimental group regarding the uncertainty that may occur on the first day of clinical practice by providing them with an opportunity to experience the clinical practice. Also, the control group students may have had higher negative emotions because they did not know what they would encounter on the first day of clinical practice.

The perceived level of clinical stress, threat, and damage in the experimental group, which was low on the first day of clinical practice, increased on the last day. However, the perceived level of clinical stress, threat, and damage in the control group, which was high on the first day of clinical practice, decreased on the last day. Both groups had similar clinical stress levels on the last day of clinical practice. These results suggest that simulation training provides nursing students with positive emotions for the first day of clinical practice. However, the increase in the experimental group's negative emotions on the last day of clinical practice can be attributed to the practices they have experienced and encountered in the clinical practice setting, which was a dynamic environment. Besides, fear of making mistakes in real practice areas can put students in a passive position. Simulation-based training provides students the opportunity to practice in a safe learning environment.^{3,31} On the other hand, the students' negative emotions in the control group decreased on the last day of clinical practice compared to those on the first day. In fact, spending a certain period of time in the real clinical practice setting caused both groups to have similar clinical stress levels.

The perceived fight in the control group, which was high on the first day of clinical practice, significantly decreased on the last day. The inability to predict what to encounter and deal with in the clinical setting may have increased the level of perceived fight in this group on the first day of clinical practice.

The experimental group had significantly higher mean scores on the NPEF subscales of assessment and nursing diagnosis. The assessment stage forms the basis of the nursing process and is important in planning effective nursing care and selecting the right nursing di-

agnosis. A comprehensive assessment can only be achieved through effective communication between the nurse and the patient. It will be difficult for first-year nursing students who have high clinical stress levels to communicate effectively with patients and their relatives and collect sufficient data. Therefore, reducing the clinical stress of nursing students will help them initiate and maintain effective communication with both patients and relatives and help them plan correct and effective nursing care. Studies report that using the simulation method in nursing education contributes to the evaluation of clinical issues and planning nursing care in the most realistic environments.³² Defenbaugh and Chikotas stated that simulation training helped raise awareness of communication skills and improve patient-nurse communication.¹¹ Kameg et al. observed that high fidelity human simulation enhanced communication skills.¹⁶ Yoo and Yoo found that simulation training with the standardized patient method was more effective than the traditional method in helping nursing students deal with nursing problems and determine appropriate nursing care for patients.³³ Karadag et al. reported that the experimental group with simulation training made a higher number of nursing diagnosis than the control group.³²

LIMITATIONS

The study population was restricted to nursing department students of one state university in Turkey. Therefore, it may limit the generalizability of the study.

CONCLUSION

Simulation training effectively reduced the feelings of sadness, anxiety, fear, and anger of nursing students who took clinical training for the first time. In addition, simulation training enabled nursing students to be more successful in the nursing process's data collection and nursing diagnosis stages.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Gülten Karahan Okuroğlu; **Design:** Gülten Karahan Okuroğlu, Nuray Şahin Orak, Şükriye Şahin, Şule Ecevit Alpar;

Control/Supervision: Şule Ecevit Alpar; Gülten Karahan Okuroğlu; **Data Collection and/or Processing:** Gülten Karahan Okuroğlu, Nuray Şahin Orak, Şükriye Şahin; **Analysis and/or Interpretation:** Gülten Karahan Okuroğlu, Nuray Şahin Orak; **Literature Review:** Gülten Karahan Okuroğlu, Nuray Şahin Orak, Şükriye Şahin; **Writing the Article:** Gülten Karahan Okuroğlu, Nuray Şahin Orak, Şükriye Şahin, Şule Ecevit Alpar; **Critical Review:** Şule Ecevit Alpar; **References and Findings:** Gülten Karahan Okuroğlu, Şule Ecevit Alpar.

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