Evaluation of Jigsaw Technique in Nursing Students Learning About Childhood Cancer

Hemşirelik Öğrencilerinin Çocukluk Çağı Kanserlerini Öğrenmelerinde Jigsaw Tekniğinin Değerlendirilmesi

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ABSTRACT

Objective: The aim of this study is to evaluate the effectiveness of the Jigsaw technique in nursing students' learning about childhood cancers.

Methods: The study was a single-group pre-test–post-test semi-experimental study. The sample of the study consisted of 59 nursing students who took the child health and diseases nursing course. To collect the data, the researchers prepared a student introductory information form, a childhood questionnaire, and an academic self-efficacy scale was used. An independent sample *t*-test was used due to the normal distribution of the data, and paired sample *t*-test was used to compare the scale and information from pre-test and post-test scores to determine the effectiveness of the Jigsaw technique.

Results: The mean age of the students participating in the study was 21.89 ± 7.69, of which 66.10% were women. Of the students, 81.36% stated that they had not received any special training for childhood cancers before. The mean scores of the students on the Academic Self-Efficacy Scale were 20.06 ± 3.96 on the pre-test and 20.52 ± 3.80 on the post-test. While the mean score of the students from the information form prepared for childhood cancers was 36.01 ± 9.81 in the pre-test, it was found to be low, while the mean score of the post-test was 80.50 ± 9.36, which was found to be at a high level. A statistically significant difference was found between pre-test and post-test mean scores ($P < .001$).

Conclusion: The Jigsaw technique is effective in teaching childhood cancers to nursing students. It is recommended to be used in nursing education, especially in specific subjects such as childhood cancer.

Keywords: Childhood cancers, Jigsaw technique, nursing education

ÖZ

Amaç: Hemşirelik öğrencilerinin çocukluk çağı kanserlerini öğrenmelerinde jigsaw tekniğinin etkinliğini değerlendirmektir.

Yöntemler: Araştırma tek grup ön test son test yarı deneysel olarak yapılmıştır. Araştırmanın örneklemini çocuk sağlığı ve hastalıkları hemşireliği dersini alan 59 hemşirelik öğrencisi oluşturdu. Verilerin toplanmasında araştırmacılar tarafından hazırlanan öğrenciyi tanıtıcı bilgi formu, çocukluk çağı ile ilgili soru formu ve akademik öz yeterlik ölçeği kullanıldı. Verilerin normal dağılıma uygunluk göstermesi nedeniyle independent sample t-test, Jigsaw tekniğinin etkililiğini belirlemek amacıyla ölçek ve bilgi formu ön-test ve son-test puanları karşılaştırılmasında ise paired sample t-testi kullanıldı.

Bulgular: Araştırmaya katılan öğrencilerin yaş ortalaması 21,89 ± 7,69 olup %66,10'u kadındır. Öğrencilerin %81,36'sı daha önce çocukluk çağı kanserlerine yönelik özel bir eğitim almadığını ifade etti. Öğrencilerin Akademik özyeterlik ölçeğinden aldıkları puan ortalamaları ön-test 20,06 ± 3,96, son-test 20,52 ± 3,80 olup orta düzeyde olduğu saptanmıştır. Öğrencilerin çocukluk çağı kanserlerine yönelik hazırlanan bilgi formundan aldıkları puan ortalamaları ön-test 36,01 ±

9,81 olup düşük düzeydeyken, son-test puan ortalaması 80,50 ± 9,36 olup yüksek düzeyde olduğu saptanmıştır. Ön-test ve son-test puan ortalamaları arasında istatistiksel olarak anlamlı bir farklılık bulunmuştur (P < ,001).

Sonuç: Araştırmanın bulgularına göre, Jigsaw tekniğinin hemşirelik bölümü öğrencilerinde çocukluk çağı kanserlerinin öğretilmesinde etkili bir teknik olduğu söylenebilir. Hemşirelik eğitiminde özellikle çocukluk çağı kanseri gibi spesifik konularda kullanılması önerilmektedir.

Anahtar Kelimeler: Çocukluk çağı kanserleri, Jigsaw tekniği, hemşirelik eğitimi

INTRODUCTION

Cancer is an important public health problem that can be seen in all age groups, including newborns. Childhood cancer refers to cancer seen in children aged 0-19 years and is the leading cause of death in childhood. Each year, an estimated more than 400.000 children and adolescents under the age of 20 are diagnosed with cancer.[1,2] Cancer is less common in children than adults. In our country, childhood cancers constitute 2% of all cancers, and an average of 3500 children are diagnosed with cancer each year.[3] Childhood cancers, when left untreated, rapidly metastasize to different parts of the body, resulting in death. Timely diagnosis and correct treatments provide recovery. More than 8 out of 10 children who receive the best available care and treatment are recovering. The cause of childhood cancer is largely unknown.[3-5] The number of children who died from cancer in 2019 is estimated to be 100.000.[6] The probability of surviving a diagnosis of childhood cancer varies according to the region of residence. While the cure rate is more than 80% in high-income countries, this rate drops to 20% in low- and middle-income countries.[1,7] Childhood cancer management requires high-quality clinical services, timely and robust referral processes, and a strong public health program approach.[1-8]

The organization of learning environments is important in terms of providing students with new experiences. Cooperative learning, which is a student-centered approach to education in the learning process, is one of the active teaching methods. Cooperative learning involves the approach of students being divided into small structured groups and helping each other to achieve learning goals together while performing a given task. As a result, , it is based on the collection of data by the groups on the subject studied, contributing to the production of the group by combining the individual studies and interpreting them by discussing them together.[9] With the cooperative learning method, a problem-solving, discussion, and reconciliation environment is provided in the educational environment, while the permanence of the acquired knowledge increases.[10] This learning method positively affects the communication and relations within the group, increases the motivation and success of the students, and gives the students critical thinking and problem-solving skills. It has been determined that cooperative learning methods are more effective than traditional methods in the success of students at all educational levels.[11] One of the cooperative learning methods is the "Jigsaw Technique-JT" which was first described by Eliot Aronson (1978).[12] In this technique, concepts such as "Joining" , "Separation and Merging", and "Puzzle" are included.[9] In the Jigsaw technique, two different groups are formed, the main group and the separation group. First of all, the main group of students is formed and each member is assigned to a specific subject. Afterward, the students assigned to the main groups are divided into pieces like a puzzle, and the students working on the same subject in all groups unite to form a split-up group called "expertise groups." The members of this merger group formed work as a team until they learn the subjects assigned to them to study the same subject and specialize in these subjects. Students who leave and return to their original group after mastering the relevant subject in the reunification group pass on the knowledge they have acquired to the team members in their original group.[9,11] Since students are at the center of this technique and the learning process is based on peer communication, students learn to take responsibility, work as a team, and learning becomes permanent in this active learning environment. This technique can be applied in different courses and subjects.[11]

The main purpose of nursing education is to train competent nurses who have the necessary knowledge, attitudes, and skills to protect and improve public health. Clinical decision-making in nursing students requires using different educational methods to develop continuous and student-centered learning capacities.[13] In the literature, there are studies in which the Jigsaw technique is used and effective in education and especially in nursing education.[14-20] In studies with nursing students, the use of the Jigsaw technique has been effective in improving learning outcomes including self-regulation, academic motivation, and knowledge and attitude toward the subject,[18] improving psychomotor skill levels, and increasing their academic achievement and retention of knowledge.[19] In addition, it has been reported that it is effective in terms of the frequency and quality of communication of students with their group mates and the class and providing preparation for the lesson.[20] The Jigsaw technique is recommended to be used for theoretical nursing courses as well as clinical skills training.[13] Although the Jigsaw technique has been proven to be effective in education, there is limited research on the use of this technique in theoretical matters related to nursing education.[11] There is no research in the literature on childhood cancers and nursing care within the scope of child health and diseases nursing using the Jigsaw technique.

Aim
This study aims to evaluate the effectiveness of the Jigsaw technique in nursing students' learning about childhood cancers.

Research Hypotheses
H_0: The Jigsaw technique is not effective for nursing students to learn about childhood cancers.

H_1: The Jigsaw technique is effective for nursing students to learn about childhood cancers.

METHODS

Type of Research
This research is in the pretest–posttest semi-experimental design.

Population and Sample of the Research
The universe of the research consisted of third year (N=78) students who took the Child Health and Diseases Nursing course in the nursing department of a state university. The sample of the study consisted of all students (n=59) who attended the course on the planned date of the study and agreed to participate in the study (the rate of participation in the study was 75%). Ethics committee approval was obtained for the study from the Non-Interventional Clinical Research Ethics Committee of a state university (Date: January 12, 2022, decision no: 480). Written informed consent was obtained from the participants who volunteered to participate in the study. After obtaining all the necessary permissions, the study was carried out by following the steps below.
- In accordance with the learning objectives of the course, 6 subjects of equal intensity were determined.

Subjects:

1. Childhood cancers, differences from adult cancers, incidence, and etiology
2. Leukemia and nursing care in children
3. Lymphoma and nursing care in children
4. Central nervous system tumors and nursing care in children
5. Wilms tumor in children and nursing care
6. Bone tumors and nursing care in children

- **Creating Main Groups:** In the research, 6 main topics were discussed, and 6 groups were formed. The average number of students in the groups is 9, and the method of counting students was chosen randomly. The groups were asked to come up with a name for their group.
- **Briefly Explaining the Subject:** The importance of the subject was explained to the students by the researcher.
- **Establishment of Expert Groups:** Expert groups were formed by randomly taking 1 student from each group.
- **Conducting and Studying the Expertise Group Exam:** After explaining to the students, the "Student Information Form," "Academic Self-Efficacy Scale," and "Childhood Cancer Information Form" were administered as a pre-test. The pre-test period was planned to be 25 minutes. At this stage, the students were generally informed about the subject. The general briefing took 30 minutes. After being informed, a subject was given to the expert groups. It was ensured that the students discussed their subjects in a sitting position (40 minutes). During the expert group study, the researcher was constantly present in the classroom to answer all the questions.
- **Returning Students to Their Main Groups:** At this stage, the students returned to their original groups and each student explained his/her expertise to the rest of the group.
- **Studying and Examining the Main Groups:** At this stage, the groups explained their subjects in the expert groups to their other friends and answered their questions (40 minutes). During the peer group study, the researcher was constantly present in the classroom to answer all the questions. At the end of this study, the "Academic Self-efficacy Scale" and "Childhood Cancer Information Form" were re-administered to all students as a post-test.
- **Measurement and Evaluation:** According to the students' post-test scores, the missing or incorrect parts were corrected by the researcher and the subject was explained again.

The criteria for inclusion in the study were being a nursing student, taking the Child Health and Diseases Nursing course, and agreeing to participate in the research.

The criteria for not being included in the study were refusal to participate in the study and absence on the day of the application.

Data Collection Tools

Student Information Form
There are questions about nicknames, gender, age, and whether they have received training on the subject before.

Childhood Cancer Information Form
This form was used as a pre-test and post-test, with 20 multiple-choice (5-choice) questions to evaluate the knowledge of students about childhood cancers, which were created by the researchers by examining the literature.[2,5,21] In order to create this form, expert opinion was obtained from three experts from the Department of Child Health and Diseases Nursing and Oncology Nursing using the Davis technique. As a result of the expert's opinions, the form was revised and the final version was created, taking into account the suggestions of the faculty members. Item Difficulty and Item Discrimination Index Values of the Questionnaire used in the research were analyzed with the IBM Statistical Package for the Social Sciences (SPSS) 26.0 program. According to the analysis results, distinctive questions with a moderate item difficulty index were selected (Table 1).

Academic Self-Efficacy Scale
This scale consists of 7 items that were developed by Jerusalem and Schwarzer[22] to evaluate students' academic self-efficacy and show a meaningful structure for 1-dimensional academic self-efficacy. The Turkish validity and reliability of the scale were performed by Yılmaz et al[23] in 2007. The items in the scale are in the form of a "4-point Likert-Type Scale" ("fits me completely," "fits me," "slightly fits me," and "does not fit me at all"). The Turkish validity and reliability study was conducted by Yılmaz et al by

Table 1. Item Difficulty and Discrimination Index Values of Childhood Cancer Information Form

Item	Number of Correct	Difficulty Index	Discrimination Index
1	56	0.94	0.38
2	57	0.96	0.61
3	59	1.00	0.21
4	18	0.30	0.60
5	57	0.96	0.21
6	31	0.52	0.36
7	53	0.89	0.32
8	16	0.27	0.57
9	56	0.94	0.22
10	50	0.84	0.32
11	40	0.67	0.18
12	12	0.21	0.46
13	58	0.98	0.21
14	56	0.94	0.46
15	57	0.96	0.36
16	55	0.93	0.26
17	49	0.83	0.53
18	55	0.93	0.26
19	57	0.96	0.41
20	59	1.00	0.40

Table 2. Sociodemographic Characteristics of the Participants

Specifications	N	%	Academic Self-Efficacy Scale Pre-Test $\bar{X} \pm SD$	Academic Self-Efficacy Scale Post-Test $\bar{X} \pm SD$	Childhood Cancer Information Form Pre-Test $\bar{X} \pm SD$	Childhood Cancer Information Form Post-Test $\bar{X} \pm SD$
Gender						
Female	39	66.10	20.51 ± 4.24	21.17 ± 3.86	37.17 ± 10.86	82.05 ± 9.84
Male	20	33.90	19.20 ± 3.30	19.25 ± 3.41	33.75 ± 7.04	77.50 ± 7.69
P			.232	.65	.150	.77
Status of receiving education about childhood cancers						
Yes	11	18.64	20.63 ± 4.56	20.90 ± 4.22	41.81 ± 11.88	77.72 ± 11.48
No	48	81.36	19.93 ± 3.86	20.43 ± 3.74	34.68 ± 8.89	81.14 ± 8.82
P			.603	.646	.028	.279
Total	59	100				

SD, standard deviation; X, mean.

applying it to 672 university students in 2007. According to the results of the analysis, the number of items, which was 7 in the original scale, was also preserved in the Turkish scale. According to the results of the factor analysis, it was determined that the Turkish scale was also 1-dimensional like the original scale. The Cronbach alpha reliability value of the original scale was stated as 0.87. The Cronbach alpha reliability value of the Turkish scale was determined as 0.79.[23] In this study, the Cronbach Alpha reliability value was found to be 0.79.

Statistical Analysis
The SPSS 26.0 package program was used to evaluate the data. The data obtained were evaluated by 2 researchers according to the determined criteria. Descriptive statistics was used in the analysis of data; number, percentage, mean, and standard deviation were calculated. An independent sample *t*-test was used due to the normal distribution of the data, and paired sample *t*-test was used to compare the scale and Childhood Cancer Information Form pre-test and post-test scores to determine the effectiveness of the Jigsaw technique. The significance level in the study was accepted as .05.

RESULTS

The mean age of the students participating in the study was 21.89 ± 7.69, and 66.10% of them were women. Of the students, 81.36% stated that they had not received any special training for childhood cancers before. There was no statistically significant increase in the average scores obtained from the Academic Self-Efficacy Scale and the information form prepared for childhood cancers according to the gender of the students and their previous education about childhood cancers (Table 2).

The mean scores of the students on the Academic Self-Efficacy Scale were 20.06 ± 3.96 on the pre-test and 20.52 ± 3.80 on the post-test. There was no statistically significant difference between pre-test and post-test mean scores (*P* = .041) (Table 3).

When the childhood cancer information form was examined, it was found that the item difficulty indexes were between 0.21 and 1.00, and the item discrimination indexes were between 0.18 and 0.61. Since these findings showed that the discriminative power of the questions in the Questionnaire was 0.15 and above, they were used without removing the item from the form. After it was

decided that the item difficulty and item discrimination levels of the questionnaire were acceptable, it was administered to the group as a pre-test and post-test (Table 1).

While the mean score of the students from the information form prepared for childhood cancers was 36.01 ± 9.81 in the pre-test, it was found to be low, while the mean score of the post-test was 80.50 ± 9.36, which was found to be high. A statistically significant difference was found between the pre-test and post-test mean scores (*P* < .001) (Table 4) (Figure 1).

DISCUSSION

In this study, the effectiveness of the Jigsaw technique in nursing students' learning about childhood cancers was evaluated. It was

Table 3. Comparison of Participants' Academic Self-Efficacy Scale Pre-Test–Post-Test Scores

|	N	$\bar{X} \pm SD$	Med (Min-Max)	*t*	*df*	*P*
Academic Self-Efficacy Scale Pre-test	59	20.06 ± 3.96	20 (13-28)	−2.086	58	.041
Academic Self-Efficacy Scale Post-test	59	20.52 ± 3.80	20 (13-28)			

Max, maximum; Med, median; min, minimum; SD, standard deviation; X, mean.

Table 4. Comparison of the Participants' Childhood Cancer Knowledge Scores Pre-Test–Post-Test Mean Scores

	N	$\bar{X} \pm SD$	Med (Min-Max)	*t*	*df*	*P*
Childhood Cancer Information Form Pre-test	59	36.01 ± 9.81	35 (15-60)	−26.244	58	<.001
Childhood Cancer Information Form Post-test	59	80.50 ± 9.36	80 (50-100)			

Max, maximum; Med, median; min, minimum; SD, standard deviation; X, mean.

Childhood Cancer Knowledge Score
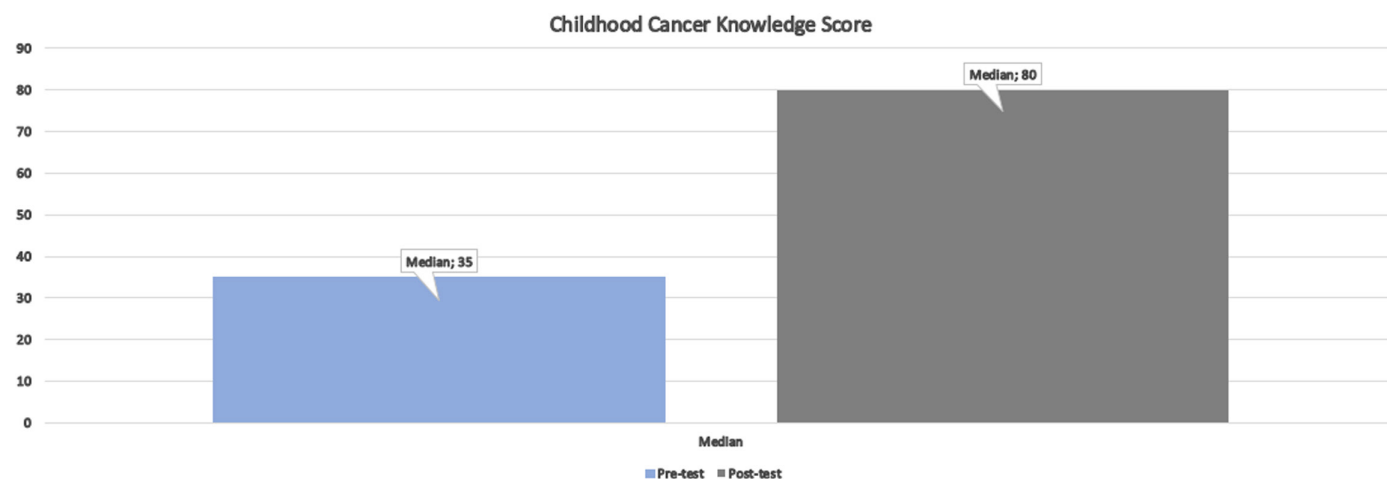
Figure 1. Childhood Cancer Knowledge Scores pre-test–post-test scores of the participants.

determined that the ages of the nursing students participating in the study were close to each other and more than half of them were women. In the study by Seo and Park,[24] in which they used the Jigsaw technique, it was stated that 109 of 129 nursing students were female and their mean age was 23.8 ± 3.9. It can be said that our sample group in the study is compatible with the literature.

The fact that almost all of the nursing students in the study did not receive any special training on childhood cancers can be interpreted as the group's lack of readiness for the subject. In addition, the pre-test score averages obtained from the information form prepared for the childhood cancers of the nursing students also support the homogeneity of the group. In the study of Seo and Park,[24] it was determined that the students were homogeneous in terms of their knowledge levels before applying the Jigsaw technique. The low level of knowledge of the students on the subject provides a better prediction of the effectiveness of the applied Jigsaw technique.

Academic self-efficacy is defined as the student's belief that he or she can complete an academic task.[25] It is stated that academic self-efficacy beliefs affect academic achievement.[26] The Academic Self-Efficacy Scale, which measures students' academic self-efficacy, provides subjective data.[23] In our study, although the scores of nursing students from the Academic Self-Efficacy Scale increased in the post-test, no significant difference was found when compared with the pre-test. In addition, although it was determined that nursing students have moderate academic self-efficacy, the high post-test scores of the Childhood Cancer Information Form, which is objective data, is a striking finding. This situation can be interpreted as the fact that students cannot develop an awareness of their perceptions of academic self-efficacy and the concrete situation. A student who thinks that his/her belief in academic self-efficacy is not sufficient indicates that this will negatively affect his/her work to be successful in the exams.[23] It is thought that it is important to establish a real link between the real academic situation of the student and the perception of academic self-efficacy.

A significant difference was determined when the pre-test and post-test mean scores obtained from the information form on childhood cancers of the nursing students in the study were compared. This finding shows that the Jigsaw technique is effective in teaching childhood cancers. Although the Jigsaw technique does not have a significant effect on students' academic self-efficacy perceptions, it can be said that it is effective in increasing students' knowledge levels. In the study of Renganathan,[27] the Jigsaw technique was used in the child health and adult health course and it was determined that the academic success of nursing students increased. In another study, it is stated that the Jigsaw technique, which is used to increase the knowledge of nursing students about national health programs, significantly increases the knowledge levels of the students.[28] It is emphasized that the Jigsaw technique in nursing education has a positive effect on students' cooperative self-efficacy perceptions, development of communication skills and problem-solving skills, and increases their academic success.[14,29,30]

In the study of Kürtüncü et al.[31] it was determined that the knowledge of nursing students about the approach to children with cancer and their families was insufficient. In our study, it was shown that the Jigsaw technique caused an increase in the knowledge score averages about childhood cancers. In this direction, it has been revealed that the Jigsaw technique can be used in teaching information about childhood cancers.

Study Limitations

The most important limitation of the research is that it is a single-group pre-test and post-test design. Therefore, the results of the study cannot be generalized to other groups. Another limitation is that the Jigsaw technique was only applied for a short time on one subject area.

As a result of the study, it was found that the Jigsaw technique was effective in learning about childhood cancers of nursing students. While there was a significant increase in the knowledge levels of nursing students about childhood cancers, there was no significant difference, although there was an increase in their academic self-efficacy perceptions. To develop the academic self-efficacy perceptions of nursing students, it is recommended to carry out reflection studies, where students can connect with their real academic situations and create insight. It is recommended to use the Jigsaw technique as a teaching method in the courses on childhood cancers in nursing education. In future studies, it is recommended to use the Jigsaw technique in different subject

areas of nursing education and control group research designs, but there is a need to plan activities that will increase students' academic self-efficacy perceptions and share the results.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of İzmir Bakırçay University (Date: January 12, 2022, Number: 480).

Informed Consent: Written consent was obtained from the participants participating in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – Ş.B.Y., H.S.; Design – Ş.B.Y., H.S.; Supervision – Ş.B.Y., HS.; Resources – Ş.B.Y., H.S., S.B.; Materials – Ş.B.Y., H.S., S.B.; Data Collection and/or Processing – Ş.B.Y., H.S.; Analysis and/or Interpretation – Ş.B.Y., H.S.; Literature Search – Ş.B.Y., H.S., S.B.; Writing Manuscript – Ş.B.Y., H.S., S.B.; Critical Review – Ş.B.Y., H.S., S.B.; Other – Ş.B.Y., H.S., S.B.

Declaration of Interests: The authors have no conflicts of interest to declare.

Funding: The authors declared that this study has received no financial support.

Etik Komite Onayı: Bu çalışma için etik komite onayı İzmir Bakırçay Üniversitesi'nden (Tarih: 12 Ocak 2022, Sayı: 480) alınmıştır.

Hasta Onamı: Çalışmaya katılan katılımcılardan yazılı onam alındı.

Hakem Değerlendirmesi: Dış bağımsız.

Yazar Katkıları: Fikir – Ş.B.Y., H.S.; Tasarım – Ş.B.Y., H.S.; Denetleme – Ş.B.Y., H.S.; Kaynaklar – Ş.B.Y., H.S., S.B.; Malzemeler – Ş.B.Y., H.S., S.B.; Veri Toplanması ve/veya İşlemesi – Ş.B.Y., H.S.; Analiz ve/veya Yorum – Ş.B.Y., H.S.; Literatür Taraması – Ş.B.Y., H.S., S.B.; Yazıyı Yazan – Ş.B.Y., H.S., S.B.; Eleştirel İnceleme – Ş.B.Y., H.S., S.B.; Diğer - Ş.B.Y., H.S., S.B.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

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