

The Effectiveness of The Education Given to Nursing Students on Childhood Vaccine Applications: A Retrospective Study

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ABSTRACT

The aim of this study was to examine the effect of education on childhood vaccination practices on the knowledge levels of nursing students. In this retrospective, descriptive and cross-sectional study, the research population was comprised of 3rd grade nursing students (N=168) who attended to the Faculty of Health Sciences of a Turkish state university and who were taking the course of "Public Health Nursing". Relevant data was gathered through the usage of "Childhood Vaccine Applications Questionnaires". The study was completed after the examination of 158 forms that were filled completely/without errors. Descriptive statistics, frequency analysis and Chi-square test were used in the analysis of the collected data. In the study, the lowest correct answer rate among the general judgments of the students regarding vaccination before the education was "The last vaccine added to the vaccination calendar in Turkey is the varicella vaccine" (27.8%). Among the judgments regarding childhood vaccination, the lowest correct answer rate was the judgment that "There is no need of revaccination of children whose other vaccinations have not been completed (27.2%)". Among the judgments regarding the situations that are not considered as contraindications for vaccination; the lowest correct response rate was the judgment of "Vaccination can be done in case of non-specific allergy history (38.6%)". The difference in students' knowledge levels before and after the relevant training was found as statistically significant ($p<0.01$). It is concluded that nursing students have insufficient knowledge about childhood vaccines. The educational intervention has been effective in terms of increasing the level of knowledge.

Keywords: Knowledge, Nursing, Students, Vaccination.

Hemşirelik Öğrencilerine Çocukluk Çağı Aşı Uygulamalarına Yönelik Verilen Eğitimin Etkinliği: Retrospektif Bir Çalışma

ÖZ

Bu çalışmanın amacı çocukluk çağı aşı uygulamaları konusunda verilen eğitimin hemşirelik öğrencilerinin çocukluk çağı aşı uygulamaları bilgi düzeyine etkisini incelemektir. Retrospektif tanımlayıcı ve kesitsel türde planlanan bu araştırmanın evrenini, Türkiye'de bir devlet üniversitesinin Sağlık Bilimleri Fakültesi Hemşirelik bölümünde Halk Sağlığı Hemşireliği dersi alan 3. sınıf öğrencilerinin "Çocukluk Çağı Aşı Uygulamaları Bilgi Formları" oluşturmuştur (N=168). Örneklem seçimine gidilmemiş olup evrenin tamamına ulaşılmış hedeflenmiştir. Eksiksiz/hatasız doldurulmuş 158 (%94) formun incelenmesiyle çalışma tamamlanmıştır. Verilerin analizinde tanımlayıcı istatistikler, frekans analizi ve Ki-kare testi kullanılmıştır. Çalışmada öğrencilerin eğitim öncesinde aşılama ile ilgili genel yargılar arasında en düşük doğru cevap oranı "Türkiye'de aşı takvimine en son eklenen aşı suçiçeği aşısıdır (%27.8) yargısı, çocukluk çağı aşılmasına ilişkin yargılar arasında en düşük doğru cevap oranı "aşılara tamamlanamamış çocuklarda önceki aşı dozlarının tekrar yapılmasına gerek yoktur (%27.2)" yargısı olmuştur. Aşılama kontrendikasyon kabul edilmeyen durumlara ilişkin yargılar arasında ise en düşük doğru cevap oranı "özgül olmayan alerji öyküsü olması durumunda aşılama yapılabilir (%38.6) yargısı olmuştur. Eğitim öncesi ve sonrasındaki fark istatistiksel olarak anlamlıdır ($p<0.01$). Öğrenciler çocukluk çağı aşıları konusunda yetersiz bilgiye sahiptir. Eğitim müdahalesi bilgi düzeyini artırmada etkili olmuştur.

Anahtar kelimeler: Aşı, Bilgi, Hemşirelik, Öğrenciler.

INTRODUCTION

Vaccination is still one of the most effective preventive health services that increase the expected healthy life years and contribute positively to human health within the scope of preventive health services (Marotta et al. 2017). In 1974, the World Health Organization recommended the Extended Immunization Program (GBP) to all countries, which includes vaccination programs against leading vaccine-preventable diseases. The basic strategy in this program is to vaccinate every new-born baby in accordance with the vaccination schedule before reaching the age of one. This strategy has been one of the most important interventions to reduce childhood infectious diseases and infant mortality (Turkish Medical Association 2019).

Today, trust and belief in childhood vaccination are disappearing at an increasing rate, and the anti-vaccine movement, which is caused by unevidence-based information pollution about vaccine safety, is increasing at a frightening rate (McKee and Bohannon 2016). As a result, the possibility of increasing vaccine-preventable epidemics in the future raises concerns from a public health perspective (Signorelli et al. 2015). As a matter of fact, according to the World Health Organization's 2017 report, approximately 1.5 million children under the age of 5 still die from vaccine-preventable diseases (WHO 2019). Vaccination services are carried out with the great devotion of nurses working in primary health care services, which have a very important position in this regard (Turkish Medical Association 2019). Within the scope of preventive health services, nurses are directly involved in the planning and implementation of immunization programs. (Karaçam and Eroğlu 2019). Nurses should eliminate the anxiety and lack of knowledge of families about childhood vaccinations, and interfere with wrong attitudes and beliefs about vaccine rejection (Gür 2019; Yakşi 2020). Nurses are effective and reliable people in the decision to vaccinate (Marotta et al. 2017; Yakşi 2020). However, for this, first of all, nurses' misinformation about childhood vaccination should be corrected and their missing information should be completed. The failure of healthcare professionals to evaluate or inadequately assess the suitability or needs of applicants for vaccination, to have incomplete or incorrect information

about vaccine contraindications, and to be unable to give satisfactory answers to parents' questions due to incomplete information affects the process negatively (Turkish Medical Association, 2019). In the literature, the "key role" of nurses for an appropriate vaccination counselling for patients and the importance of current education on preventive health care have been frequently reported (Bozkurt and Erdim 2005; Costantino et al. 2016). Therefore, educating prospective nurses early in their careers is essential to increase immunization, reduce vaccine rejection, and ensure safe and uninterrupted childhood immunization (Marotta et al. 2017).

The aim of this study is to examine the effect of education on childhood vaccination practices on the level of knowledge of nursing students.

MATERIALS AND METHODS

The aim of this retrospective descriptive-cross-sectional study is to examine the effect of the education given to nursing students on childhood vaccination practices on the level of knowledge of nursing students.

In the study, "Childhood Vaccine Applications Information Forms" of 3rd year students who took Public Health Nursing course in the Health Sciences Faculty Nursing department of a state university in Turkey in the spring semester of the 2020-2021 academic year were used (N=168). In the study, no sample selection was made, it was aimed to examine the forms of all students. The forms of 3 students who were absent and 7 students who filled the form incompletely were excluded from the study, and the study was completed by examining the forms of 158 students in total.

Due to the COVID-19 pandemic, distance education has been started in Turkey as well as in the rest of the world. In this process, the Turkish Higher Education Institution stated that the field/clinical practices of the students in the departments that provide applied education (medicine, nursing, dentistry, midwifery, etc.) can be evaluated by having homework and projects done. This study was planned as a retrospective examination of the documents used for the training program, which will replace the field application of the Public Health Nursing course.

The field application of the Public Health Nursing course was carried out with a program based on the recommendation

of the Turkish Higher Education Institution. In the childhood vaccination applications training, which is a part of the 112-hour Public Health Nursing field application program lasting 14 weeks in total, the knowledge levels of the students before and after the training were examined by using the forms used in the application. In the practice, which lasted for 14 weeks in total, the groups consisting of 24 students were given 2 hours of theoretical information and 6 hours of videos showing childhood vaccination applications were watched each week. Afterwards, the students were asked to shoot a video where they demonstrated the vaccination practices. The videos were watched by the researchers and the active participation of the students was ensured by giving feedback. The subjects of education consisted of the titles of "vaccine and its history, social dimension of vaccination services, vaccine types, vaccine contents, possible side effects of vaccines, contraindications in vaccination, national vaccination calendar, childhood vaccinations and applications, storage of vaccines".

Socio-demographic Data Collection Form and "Childhood Vaccination Applications Information Form" (49 items) created by the researchers by scanning the literature were used to collect the data (Görak et al. 2011; Gür 2019; Marotta et al. 2017; Turkish Medical Association 2019). The form consists of 3 parts. In the first part, there are "General Judgments on Vaccination (16 items)", in the second part "Judgments on Childhood Vaccination Applications (19 items)" and in the third part, "Judgments Regarding Situations Not Accepted as Contraindications in Childhood Vaccination Applications (14 items)". All of the items in the form are correct judgments and there is no item that is evaluated negatively.

At the beginning of the academic year, the students were informed about the implementation and content of the application by the researchers. Before starting the application (26.02.2021), the information form, which was created by the researchers by scanning the literature in order to evaluate the effectiveness of the training program planned for the field application of the Public Health Nursing course and questioning the knowledge level of the students about childhood vaccination applications, was sent to the students online via Google Forms. The data obtained from these forms were used as a pre-test by the researchers.

Google Form started with a briefing on the field practice execution of the Public Health Nursing course and students were asked for their consent to participate. Students who gave consent accessed and answered the questions in the data collection form. Answering the form takes an average of 10 minutes. In the last week of the academic year (03.06.2021), the information form was sent to the students online via Google Forms after the training. It was used as a post-test by the researchers.

Statistical analysis of the data was performed in SPSS 23.0 (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.) Statistical package program. Descriptive statistics such as numbers, percentages and frequency distributions of the data in the study were obtained. Mc Nemar test was used to examine the relationship between dependent categorical variables. Statistical significance level was evaluated as $p < 0.05$.

To conduct the study, the ethics committee approval dated 30 June 2021 and numbered 2021-06/03 was obtained from the Health Sciences Research and Publication Ethics Committee of the university where the study was conducted.

RESULTS

77.2% of the students are women. 10.2% evaluated their economic situation as "poor", the general academic average of 1.3% was between 1.00-1.99 and 60.1% had received training on vaccination/immunization. The distribution of students' socio-demographic characteristics is given in Table 1.

When the answers given by the students to the general judgments about vaccination are examined, the first four judgments with the least correct answer before the education are;

1. "The latest vaccine added to the vaccination calendar in Turkey is the varicella vaccine (27.8%),
2. "The vaccines in the reconstituted vials can be used until the expiration date (37.3%)",
3. "After opening and reconstituting, BCG vaccine should be administered within 8 hours (39.2%)" and
4. It was determined that MMR vaccine should be administered within 4-8 hours (39.9%) after opening and diluting.

Table 1. Distribution of Students' Socio-Demographical Characteristics

| Characteristics | n | % |
|---|------------|--------------|
| Gender | | |
| Woman | 122 | 77.2 |
| Male | 36 | 22.8 |
| Perception of Economic Situation | | |
| Bad | 16 | 10.2 |
| Average | 120 | 75.9 |
| Good | 22 | 13.9 |
| General Academic Score | | |
| 1.00-1.99 | 2 | 1.3 |
| 2.00-2.99 | 88 | 55.7 |
| 3.00-4.00 | 68 | 43.0 |
| Status of receiving training on vaccination/immunization | | |
| Yes | 95 | 60.1 |
| No | 63 | 39.9 |
| Total | 158 | 100.0 |

When the distribution of the answers given before and after the training was examined, the difference was found to be

statistically significant ($p < 0.001$). The distribution of the answers given by the students to the general judgments regarding vaccination before and after the education is given in Table 2.

When the answers given to the judgments regarding childhood vaccination applications are examined, the first four judgments with the least correct answers before the education are;

1. "There is no need to repeat the previous vaccine doses in children whose vaccinations have not been completed (27.2%)",
2. "Multiple live and inactivated vaccines can be administered at the same time (29.7)",
3. "When the vaccine is withdrawn from the vial into the syringe, it is not necessary to change the needle (37.3)",
4. It was determined that "BCG vaccine is administered subcutaneously from the deltoid region in infants (44.9%)".

The difference between the distributions of the answers given to the judgments before and after the training was statistically significant ($p < 0.05$). The distribution of the answers given by the students to the judgments regarding the childhood vaccination practices before and after the education is given in Table 3.

Table 2. Distribution of Students' Responses to General Judgments Regarding Vaccination Before and After Education

| General Judgments on Vaccination | Pre-training n (%) | | After training n (%) | | Statistical Analysis |
|--|-----------------------|------------|-------------------------|-----------|-------------------------|
| | T | F | T | F | |
| The most basic criterion in recommending a vaccine to the general public is "vaccine effectiveness". | 134 (84.8) | 24 (15.2) | 155 (98.1) | 3 (1.9) | 6.290; 0.000 |
| Vaccines are administered intramuscularly, subcutaneously, intradermally and orally. | 119 (75.3) | 39 (24.7) | 147 (93.0) | 11 (7.0) | 2.744; 0.000 |
| No vaccine is 100% protective. | 119 (75.3) | 39 (24.7) | 131 (82.9) | 27 (17.1) | 6.290; 0.000 |
| Vaccines to be recommended to the general population should be at least 90% effective. | 110 (69.6) | 48 (30.4) | 145 (91.8) | 13 (8.2) | 0.357; 0.000 |
| Vaccines should be stored in vaccine refrigerators at 2-8 degrees Celsius. | 137 (86.7) | 21 (13.3) | 150 (94.9) | 8 (5.1) | 1.002; 0.015 |
| Vaccines should not be stored in the vaccine refrigerators of healthcare institutions for more than one month. | 79 (50.0) | 79 (50.0) | 116 (73.4) | 42 (26.6) | 6.356; 0.000 |
| Vaccines should not be placed on the cover of the vaccine refrigerator. | 145 (91.8) | 13 (8.2) | 145 (91.8) | 13 (8.2) | 17.148; 1.000 |
| Nothing other than the vaccine (food, drink, medicine) should be placed in the vaccine refrigerator. | 149 (94.3) | 9 (5.7) | 156 (98.7) | 2 (1.3) | 7.402; 0.039 |
| More than one vaccine should not be opened at the same time for use. | 128 (81.0) | 30 (19.0) | 138 (87.3) | 20 (12.7) | 3.817; 0.132 |
| There should be a label on the vaccine vial indicating when it was first opened and reconstituted. | 153 (96.8) | 5 (3.2) | 155 (98.1) | 3 (1.9) | 0.100; 0.727 |
| After opening and reconstituting, varicella vaccine should be administered within 30 minutes. | 75 (47.5) | 83 (52.5) | 118 (74.7) | 40 (25.3) | 2.134; 0.000 |
| After opening and diluting, MMR vaccine should be administered within 4-8 hours. | 63 (39.9) | 95 (60.1) | 121 (76.6) | 37 (23.4) | 4.872; 0.000 |
| Once opened and reconstituted, the BCG vaccine should be administered within 8 hours. | 62 (39.2) | 96 (60.8) | 114 (72.2) | 44 (27.8) | 9.027; 0.000 |
| The latest vaccine added to the vaccination calendar in Turkey is the varicella vaccine. | 44 (27.8) | 114 (72.2) | 111 (70.3) | 47 (29.7) | 0.658; 0.000 |
| The cold chain is the transportation of vaccines under suitable conditions from the place where they are produced to the place where they are consumed, so that an effective vaccination can be carried out. | 144 (91.1) | 14 (8.9) | 156 (98.7) | 2 (1.3) | 20.835; 0.000 |
| Vaccines in reconstituted vials can be used until the expiration date. | 59 (37.3) | 99 (62.7) | 86 (54.4) | 72 (45.6) | 3.778; 0.000 |

X²: Mc namer test, T:True, F: False

Table 3. Distribution of Students' Responses to Judgments regarding Childhood Vaccine Practices Before and After Education

| Judgments regarding Childhood Vaccine Practices | Pre-training n (%) | | After training n (%) | | Statistical Analysis |
|---|-----------------------|------------|-------------------------|-----------|-------------------------|
| | T | F | T | F | |
| Previous vaccination doses do not need to be re-administered in children whose vaccinations have not been completed. | 43 (27.2) | 115 (72.8) | 102 (64.6) | 56 (35.4) | 1.466; 0.000 |
| In children who have never been vaccinated, vaccinations that should be made up to that age are applied in an expedited manner. | 73 (46.2) | 85 (53.8) | 128 (81.0) | 30 (19.0) | 2.467; 0.000 |
| Vaccinations should be given in the doses specified in the application directive. | 152 (96.2) | 6 (3.8) | 155 (98.1) | 3 (1.9) | 0.121; 0.508 |
| After watering lyophilized vaccines, it should be checked for any particles in them. | 117 (74.1) | 41 (25.9) | 146 (92.4) | 12 (7.6) | 11.204; 0.000 |
| When the vaccine is pulled from the flange to the injector, it is not necessary to change the needle tip. | 59 (37.3) | 99 (62.7) | 66 (41.8) | 92 (58.2) | 29.746; 0.041 |
| It is recommended to use different regions when multiple vaccines need to be administered at the same time. | 147 (93.0) | 11 (7.0) | 147 (93.0) | 11 (7.0) | 0.038; 1.000 |
| Multiple live and inactive vaccines can be performed at the same time. | 47 (29.7) | 111 (70.3) | 73 (46.2) | 85 (53.8) | 8.363; 0.001 |
| Intramuscular vaccines should be applied at a 90-degree angle into the thigh or deltoid muscle. | 145 (91.8) | 13 (8.2) | 147 (93.0) | 11 (7.0) | 12.395; 0.804 |
| Intramuscular vaccines are recommended to be given to the front of the thigh (vastus letaralis muscle-laterofemoral region) from birth to the 24th month of birth in children. | 147 (93.0) | 11 (7.0) | 148 (93.7) | 10 (6.3) | 2.802; 1.000 |
| When blood comes into the injector while performing bleeding control in a vaccine administered intramuscular/subcutaneously, the needle tip is changed and applied to different region. | 126 (79.7) | 32 (20.3) | 144 (91.1) | 14 (8.9) | 12.943; 0.001 |
| Subcutaneous vaccines are administered at a 45-degree angle to the thigh anterolateral area in infants. | 110 (69.6) | 48 (30.4) | 132 (83.5) | 26 (16.5) | 10.976; 0.001 |
| BCG vaccine is performed under the skin from the deltoid region in infants. | 71 (44.9) | 87 (55.1) | 105 (66.5) | 53 (33.5) | 13.425; 0.000 |
| The gluteal zone is not used for routine vaccination. | 100 (63.3) | 58 (36.7) | 133 (84.2) | 25 (15.8) | 15.921; 0.000 |
| For intramuscular vaccination in children older than 24 months, the thickest part of the deltoid muscle, the area between the axilla and the acromion, is used. | 107 (67.7) | 51 (32.3) | 130 (82.3) | 28 (17.7) | 7.058; 0.001 |
| Different injectors should be used for each vaccination. | 153 (96.8) | 5 (3.2) | 56 (98.7) | 2 (1.3) | 0.66; 0.453 |
| After vaccination, the area where the application is performed should not be rubbed. | 151 (95.6) | 7 (4.4) | 156 (98.7) | 2 (1.3) | 1.006; 0.791 |
| Vaccines other than the DaBT-IPA-Hib five-mixed vaccine are not mixed in the same injector. | 100 (63.3) | 58 (36.7) | 127 (80.4) | 31 (19.6) | 10.030; 0.000 |
| The use of gloves when preparing a vaccine is not necessary except in case of open wound on the hand. | 23 (14.6) | 135 (85.4) | 60 (38.0) | 98 (62.0) | 3.931; 0.000 |
| If different vaccines from the same extremity are mandatory, there should be a distance of at least 2 cm between the application zone of the two vaccines. | 113 (71.5) | 45 (28.5) | 146 (92.4) | 12 (7.6) | 9.296; 0.000 |

X²: Mc namer test, T: True, F: False

When the answers given by the students before the education to the judgments regarding the situations that are not considered contraindications in childhood vaccination applications are examined, the first four answers with the least correct answers are:

1. "In case of non-specific allergy history, vaccination can be done (38.6%),
2. "In case of low-dose corticosteroid or topical steroid use, vaccination can be done (41.1%)",
3. "In case of antibiotic use, vaccination can be done (42.4%)",
4. It was determined that "all vaccines can be administered in case of diarrhoea (44.3%)".

The difference between the distributions of the answers given before and after the training was statistically significant

($p < 0.001$). The distribution of the answers given by the students to the judgments regarding the situations that are not considered contraindications in childhood vaccination application in Table 4.

DISCUSSION

This study aimed to examine the effect of educational intervention on the knowledge level of nursing students about childhood vaccination practices.

In the study, it was found that the educational intervention was effective in increasing the knowledge level of students about childhood vaccination applications. In a study, it was reported that the education program applied to students studying in health-related departments was effective in increasing the level of knowledge about childhood vaccination applications

Table 4. Distribution of Students' Responses Judgments regarding Situations That Are Not Accepted as Contraindications in Childhood Vaccine Applications

| Judgments regarding Situations That Are Not Accepted as Contraindications in Childhood Vaccine Applications | Pre-training n (%) | | After training n (%) | | Statistical Analysis |
|--|-----------------------|-----------|-------------------------|-----------|-------------------------|
| | T | F | T | F | |
| Breast milk intake in oral vaccines such as OPV does not pose an obstacle to vaccination. | 92 (58.2) | 66 (41.8) | 148 (93.7) | 10 (6.3) | 0.297; 0.000 |
| If the child spits early, does not swallow or vomits within 10 minutes when given the OPV vaccine, the vaccine should be repeated. | 93 (58.9) | 65 (41.1) | 140 (88.6) | 18 (11.4) | 14.936; 0.000 |
| It is ok to give the child with diarrhea an OPV vaccine. | 76 (48.1) | 82 (51.9) | 135 (85.4) | 23 (24.6) | 5.226; 0.000 |
| Live (attenuated) vaccines are not applied to immunosuppressive babies/children. | 105 (66.5) | 53 (33.5) | 146 (92.4) | 12 (7.6) | 6.391; 0.000 |
| In case of diarrhea, all vaccinations can be made. | 70 (44.3) | 88 (55.7) | 126 (79.7) | 32 (20.3) | 0.220; 0.000 |
| In case of high temperature, if the axilla temperature is 38.5°, the vaccine can be made. | 79 (50.0) | 79 (50.0) | 132 (83.5) | 26 (16.5) | 6.629; 0.000 |
| Vaccination can be done in premature and low birth weight babies. | 88 (55.7) | 70 (44.3) | 129 (81.6) | 29 (18.4) | 6.478; 0.000 |
| Vaccination can be carried out in case of antibiotic use. | 67 (42.4) | 91 (57.6) | 124 (78.5) | 34 (21.5) | 8.443; 0.000 |
| Vaccination can be done in case of low dose corticosteroid or topical steroid use. | 65 (41.1) | 93 (58.9) | 123 (77.8) | 35 (22.2) | 8.297; 0.000 |
| Vaccination can be done in case of Upper Respiratory Tract Infection. | 75 (47.5) | 83 (52.5) | 128 (81.0) | 30 (19.0) | 2.967; 0.000 |
| Vaccination can be done in case of a history of non-specific allergies. | 61 (38.6) | 97 (61.4) | 112 (60.9) | 46 (29.1) | 1.829; 0.000 |
| Vaccination can be carried out in case of growth and development retardation. Immunization can be done in children with stable neurological diseases such as cerebral palsy and down syndrome. | 99 (62.7) | 59 (37.3) | 114 (72.2) | 44 (27.8) | 0.025; 0.096 |
| Live (attenuated) vaccinations are not given to those who take cortisone at least one week at a dose of 2 mg/kg/day and at least one month at a dose of 1 mg/kg/day, either orally rectally. | 109 (69.0) | 49 (31.0) | 134 (84.8) | 24 (15.2) | 0.071; 0.001 |
| | 73 (46.2) | 85 (53.8) | 120 (75.9) | 38 (24.1) | 7.961; 0.000 |

X²: Mc namer test, T: True, F: False

(Marotta et al. 2017). In our study, 37% of the correct answers were given to the statement "The vaccines in the diluted vials can be used until the expiration date" before the training, and this rate increased to 54.4% after the training, and the difference was found to be statistically significant. In a similar study by Çöl Araz et al. (2010) with nursing students, this rate was reported as 99.3%. In this study, 39.2% of the students gave the correct answer to the statement "The BCG vaccine should be administered within 8 hours after opening and diluting" before the training, and the percentage of correct answers given after the training increased to 72.2%, and this change is statistically significant. In a descriptive study in which the administration procedure and protocol of the BCG vaccine was questioned, this rate was reported as 58.3% (Chaitra and Yashoda 2014). The students gave the correct answer with a rate of 39.9% before the education to the statement that "Multicultural protection vaccine should be administered within 4-8 hours after opening and diluting", this rate increased to 76.6% after the education and the difference was statistically significant. In a study, 42.9% of the students answered the measles vaccine application procedure correctly (Açık and Polat 2002). The diversity in the results of the study shows that there are significant differences between

the knowledge levels of students in different faculties about childhood vaccination and that there is a need for a standard education on childhood vaccination applications.

The knowledge of nurses about childhood vaccines and vaccine applications is very important in terms of using the right region and technique in vaccination applications and ensuring adequate immune effect (Turkish Medical Association 2019; Yakşi 2020). In our study, when the answers given by the students to the judgments regarding childhood vaccination applications were examined, the statement "When the vaccine is withdrawn from the vial to the syringe, it is not necessary to change the needle tip" was answered correctly by 37% before the education, while this rate increased to 41.3% after the education, and the difference was statistically significant. In another study, the correct response rate for this statement was reported as 91.2% (Çöl Araz et al. 2010). It is thought that the significant difference between the two studies is caused by the difference between the education curriculum and practices. While the correct response rate of the students to the statement "BCG vaccine is administered subcutaneously from the deltoid region in babies" before the education was 44.9%, this rate increased to 66.5% after the

education, and the difference was statistically significant. In a study, 52.4% of the students correctly answered the way the BCG vaccine was administered (Açık and Polat 2002). In a study conducted on health personnel working in maternal and child health centers and examining the level of knowledge of the application technique of vaccines, it was reported that the vaccine with the highest accuracy of the application technique was the BCG vaccine (97.9%) (Karataş and Çimen 2011).

The knowledge of health personnel about vaccine contraindications is an important factor in the success of childhood vaccination applications (Karataş and Çimen 2011). In one study, the students stated that contraindications for vaccination were "mild upper respiratory tract infection with or without fever (28.8%), diarrhoea (19.7%), antibiotic therapy (18.6%), growth retardation (17.0%), mild local reactions from previous vaccination (15.9%)" (Çöl Araz et al. 2010). Considering the time difference between the two studies, it can be said that nursing students still have a low level of knowledge about situations that are not considered contraindications for vaccination. In a study, it was reported that 77.3% of nurses and 85% of family physicians considered upper respiratory tract infection a contraindication for vaccination. (Petousis-Harris et al. 2005).

CONCLUSION

In our study, we found that students had insufficient knowledge about childhood vaccines and their applications. Educational intervention has been effective in increasing the level of knowledge on the subject. Since there is a gap in the literature on the subject, it is recommended to develop a measurement tool for nursing students' childhood vaccinations and applications for future studies.

Limitations: The results of this study cannot be generalized to all nursing students as they represent Public Health Nursing students of the faculty where the study was conducted. This is the limitation of the study.

AUTHOR CONTRIBUTION

Conceptualization: CYK, AÖ; Methodology: CYK, AÖ; Formal analysis: CYK; Investigation: CYK; Data creation: CYK; Writing-original draft preparation: CYK, AÖ; Writing-review and editing:

CYK, AÖ. All authors have read and agreed to the published version of the manuscript.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

FINANCIAL DISCLOSURE

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