

Research Article / Araştırma

The effect of education given to nursing students on ventrogluteal injection knowledge levels

Hemşirelik öğrencilerine verilen eğitimin ventrogluteal enjeksiyon bilgi düzeylerine etkisi

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ABSTRACT

Aim: This study aimed to evaluate the impact of education on nursing students' knowledge of ventrogluteal injections. **Materials and methods:** A quasi-experimental design with a single-group pretest-posttest model was utilized, involving 101 students from a state university between March and April 2019. Data were collected using a "Student Information Form" and "Achievement Test". Descriptive statistical methods and dependent t-tests were employed. **Findings:** The study found that 54.5% of students utilized the ventrogluteal area for injections. Reasons for not using it included lack of opportunity (21.7%), lack of exposure to ventrogluteal injections and knowledge (28.2%), and lack of confidence (8.7%). Prior to training, the mean score on Achievement Test was $\bar{X}=12.227$, which increased to $\bar{X}=16.178$ post-training ($p < 0.001$). **Conclusion:** Conducted with third and fourth-year nursing students, the study revealed that ventrogluteal injection knowledge from the first year was forgotten over time. However, students' knowledge levels improved after training. It is recommended that these training sessions occur regularly to help students retain current knowledge and skills.

ÖZ

Amaç: Bu çalışma, hemşirelik öğrencilerinin ventrogluteal enjeksiyonlar hakkındaki bilgilerine eğitimin etkisini değerlendirmeyi amaçlamıştır. **Gereç ve yöntem:** Çalışmada, Mart ve Nisan 2019 arasında bir devlet üniversitesinden 101 öğrenciyi kapsayan tek grup ön test-son test modeli ile yarı deneysel bir tasarım kullanılmıştır. Veriler "Öğrenci Bilgi Formu" ve "Başarı Testi" kullanılarak toplanmıştır. Tanımlayıcı istatistiksel yöntemler ve bağımlı t-testleri uygulanmıştır. **Bulgular:** Çalışmada öğrencilerin %54.5'inin ventrogluteal bölgeyi enjeksiyon için kullandığı bulunmuştur. Kullanılmama nedenleri arasında fırsat eksikliği (%21.7), ventrogluteal enjeksiyon yapıldığını görmeme ve bilgi eksikliği (%28.2) ile özgüven eksikliği (%8.7) yer almıştır. Eğitim öncesinde Başarı Testi'nden alınan ortalama puan $\bar{X}=12.227$ iken, eğitim sonrasında bu puan $\bar{X}=16.178$ 'e yükselmiştir ($p < 0.001$). **Sonuç:** Üçüncü ve dördüncü sınıf hemşirelik öğrencileri ile gerçekleştirilen bu çalışma, ilk yılda edinilen ventrogluteal enjeksiyon bilgilerinin zamanla unutulduğunu ortaya koymuştur. Ancak, eğitim sonrasında öğrencilerin bilgi düzeyleri artmıştır. Bu eğitim oturumlarının düzenli olarak gerçekleştirilmesi, öğrencilerin güncel bilgi ve becerilerini korumalarına yardımcı olması açısından önerilmektedir.

INTRODUCTION

The ventrogluteal (VG) area is the most reliable site recommended for intramuscular injection (Berman et al., 2015; Kaynar Şimşek and Ecevit Alpar, 2020; Potter et al., 2009; Taylor et al., 2008). Studies highlight the advantages of this region (Gülnar and Çalışkan, 2014; Kara et al., 2015; Oliveira et., 2015). The VG area has a thin layer of subcutaneous fat, allowing the needle to easily reach the muscle tissue during intramuscular injection. Additionally, the risk of contamination is low due to its distance from the rectal area. Furthermore, this region is away from major blood vessels and nerves,

resulting in less pain and higher patient satisfaction compared to the dorsogluteal area (Apaydın and Öztürk, 2021; Güneş et al., 2013; Dere Isseven and Sagkal Midilli, 2020; İnce et al., 2023; Tuğrul and Khorshid, 2014; Yılmaz et al., 2016). Similarly, the rates of bleeding and hematoma are lower in VG area injections compared to the dorsogluteal area (Apaydın and Öztürk, 2021). However, the VG area is not frequently preferred in clinical practice (Arslan and Özden, 2018; Gülnar and Çalışkan, 2014; Kaynar Şimşek and Ecevit Alpar, 2020; Legrand et al., 2019; Sarı et al., 2017; Şanlıalp Zeyrek and Kuzu Kurban, 2017).

Nurses often perform dorsogluteal injections (Arslan and Özden, 2018; Gülnar and Özveren, 2016; Legrand et al., 2019; Sarı et al., 2017; Şanlıalp Zeyrek and Kuzu Kurban, 2017). The disadvantages of this region are explained to nursing students in their first-year fundamentals course, emphasizing that the VG area should be preferred for intramuscular injections. In fact, dorsogluteal injections are not included in current nursing fundamentals textbooks (Akbiyık, 2021). Possible complications associated with this region are discussed with students prior to clinical practice, and knowledge and skills regarding VG injections are reinforced in a laboratory environment (Göçmen Baykara et al., 2019). Unfortunately, students often do not have the opportunity to observe or practice VG injections in clinical settings due to factors such as nurses lacking sufficient knowledge about the VG area, not being accustomed to using it, and fears of harming patients (Arslan and Özden, 2018; Sarı et al., 2017; Sü and Bekmezci, 2020).

A review of the literature indicates that studies examining the effects of VG injection education on nursing students' knowledge levels are quite limited (Kaynar Şimşek et al., 2024; Su and Fırat Kılıç, 2023). Therefore, this study aims to increase awareness of VG injections among nursing students and contribute to its more widespread use. This research was conducted to assess the impact of education provided to nursing students on their knowledge levels regarding the VG area.

MATERIAL AND METHODS

Study Design and Participants

This single-group pretest-posttest quasi-experimental study was conducted between March and April 2019. The sample consisted of 101 volunteer nursing students in their third and fourth years at a state university. The study's power was calculated using the G*Power 3.1.9.7 program. The analysis revealed an effect size of 1.4174 and a post-hoc power of 0.97. No sample selection was made; all students in their third and fourth years who volunteered for participation were included. Three students who were absent were excluded from the study.

Inclusion Criteria:

- Voluntary participation
- Enrollment as a 3rd-year nursing student
- Enrollment as a 4th-year nursing student

Exclusion Criteria:

- Failure to continue in the study

Data Collection

Data collection forms were developed by the researcher based on the literature (Gülnar and Çalışkan, 2014; Gülnar and Özveren, 2016; Şanlıalp Zeyrek and Kuzu Kurban, 2017). Student Information Form: This form contained questions about the personal information of nursing students. Achievement Test: This form included questions regarding knowledge of VG injections. Participants had to choose between "correct", "incorrect" or "I don't know" for each statement. The form was developed by the researcher, and after assessing content validity, the Cronbach Alpha reliability coefficient was found to be 0.69.

Before the study, the purpose was explained to the students and informed consent was obtained from those who chose to participate. The study was conducted in three stages.

Stage 1: Prior to training, the Student Information Form and Achievement Test were collected from the nursing students.

Stage 2: Training was provided on the scheduled day, time, and location. The training consisted of a 45-minute interactive presentation followed by a 15-minute question-and-answer session. The training content was developed by the researcher based on the literature, and expert opinions were obtained for the final version. The training was conducted in a conference room for third-year students in the morning and fourth-year students in the afternoon.

Stage 3: After the training, Achievement Test was collected from the nursing students.

Data Analysis

The data obtained in the study were analyzed using the SPSS 22.0 statistical software in a computer environment. Frequency and percentage analyses were conducted to determine the descriptive characteristics of the participating students, while mean and standard deviation statistics were used to examine the Achievement Test. Kurtosis and skewness values were assessed to determine whether the research variables exhibited a normal distribution.

In the relevant literature, kurtosis and skewness values are considered normally distributed when they fall between +1.5 and -1.5 (Tabachnick et al., 2013) or +2.0 and -2.0 (George and Mallery, 2010). It was determined that the variables exhibited a normal distribution, allowing for the use of parametric methods in the data analysis (Table 1). Changes in repeated measurements within the group were analyzed using a dependent groups t-test."

Table 1. Normal distribution

	Kurtosis	Skewness
Achievement Test pretest	-0.561	0.040
Achievement Test posttest	-0.593	-0.455

RESULTS

Table 2 presents the findings regarding the descriptive characteristics of the students. The majority of students were female (75.2%), with 49.5% in the third year and 50.2% in the fourth year. Additionally, 25.7% of students felt fully prepared for the profession, while 17.8% felt unprepared, and 56.4% felt partially prepared. Further analysis revealed that 54.5% of students utilized the VG area. Reasons for not using the VG area among some students included lack of opportunities in the clinic (21.7%), insufficient exposure to VG injections (28.2%), and lack of confidence (8.7%). Regarding patient familiarity with the VG area, 55.4% of students believed that patients were not accustomed to this region, while 21.8% felt that patients were partially accustomed to it."

Achievement Test showed a significant increase from the pretest score to the posttest score ($t=-13.439$; $p < 0.001$) (Table 3).

Table 4 presents the correct response rates of students on Achievement Test regarding VG injection. Before training, the mean correct score was 12.227 ± 2.921 , which improved to 16.178 ± 1.883 after training. Prior to training, the item with the highest correct response from participants was, 'The patient is informed about the application before the injection is administered in the VG area' (96.0%), while the item with the highest incorrect response was, 'The VG area includes the gluteus medius, rectus femoris, and gluteus minimus muscles' (20.8%). After training, the item with the highest correct response remained the same, at 'The patient is informed

Table 2. Descriptive characteristics (N=101)

Groups	n	%
Gender		
Female	76	75.2
Male	25	24.8
Class		
Third-year	50	49.5
Fourth-year	51	50.5
Do you feel ready for the profession?		
Yes	26	25.7
No	18	17.8
Partly	57	56.4
VG area usage status		
Yes	55	54.5
No	46	45.5
Reason for not using VG area		
No response	19	41.3
As a student, I was not given the opportunity to practice in the clinic.	10	21.7
I have never seen VG injections performed; I have no knowledge about them	13	28.2
I did not feel ready for VG injections; I lacked confidence.	4	8.7
Patients' familiarity with the VG area		
Yes	23	22.8
No	56	55.4
Partly	22	21.8
n= Frequency, % = Percentage		

Table 3. Knowledge of nursing students before and after training

	Pretest X±Sd	Posttest X±Sd	N	t	p
Achievement Test	12.227±2.921	16.178±1.883	101	t=-13.439	p < 0.001
* t= t-test in dependent groups (Paired samples t-test), X= Mean, Sd= Standard deviation					

Table 4. Correct responses of students on achievement test

Achievement Test 2		Pretest		Posttest	
		n	%	n	%
1.	After the VG injection, the area is massaged.	76	75.2	92	91.1
2.	The rate of drug administration is not important when injecting into the VG site.	90	89.1	93	92.1
3.	Blood is checked before injection into the VG area.	89	88.1	99	98.0
4.	The dorsogluteal area is identified using imaginary lines, while the VG area is identified by palpating the bony structures.	89	88.1	94	93.1
5.	For injection into the VG area, the tissue is entered at a 45- to 90-degree angle.	23	22.8	40	39.6
6.	Injection into the VG area is suitable for children under 3 years of age.	64	63.4	88	87.1
7.	The risk of fecal contamination is less than in the dorsogluteal area.	66	65.3	95	94.1
8.	In the VG area, fibrosis, tissue necrosis, abscess, and nerve damage are less common after injection compared to other IM injection sites.	72	71.3	88	87.1
9.	A maximum of 4ml of medication can be administered when injecting into the VG area.	55	54.5	98	97.0
10.	The patient is informed about the application before the injection is administered in the VG area.	97	96.0	100	99.0
11.	The most common complication of VG injection is sciatic nerve injury.	48	47.5	60	59.4
12.	Injection into the VG area increases the risk of acute pain.	30	29.7	79	78.2
13.	The VG area includes the gluteus medius, rectus femoris and gluteus minimus muscles.	21	20.8	33	32.7
14.	During the injection into the VG area, the patient is placed in a prone position.	54	53.5	46	45.5
15.	Injection is applied to the VG area after the antiseptic solution has dried.	79	78.2	80	79.2
16.	V technique and G technique are used when injecting into the VG area.	59	58.4	96	95.0
17.	The muscle volume of the VG area is large and its depth is greater than other injection areas.	66	65.3	76	75.2
18.	The most reliable intramuscular injection site is the VG area.	66	65.3	92	91.1
19.	The VG area is easy to locate.	55	54.5	90	89.1
20.	The maximum amount of medication that can be administered via a VG injection is 3-4 ml.	36	35.6	95	94.1
Before training: Mean correct score X±Sd= 12.227±2.921 (Min- Max= 6- 19)					
After training: Mean correct score X±Sd= 16.178±1.883 (Min- Max= 12- 19)					
X: Mean; Sd: Standard deviation, n= Frequency, % = Percentage					

about the application before the injection is administered in the VG area' (99.0%), whereas the item with the highest incorrect response changed slightly to, 'The VG area includes the gluteus medius, rectus femoris, and gluteus minimus muscles' (32.7%).

DISCUSSION

This quasi-experimental study, conducted using a single-group pretest-posttest model, aimed to determine the effect of education on nursing students' knowledge levels regarding VG injection at a state university. A total of 101 students participated in the study; of these students,

75.2% were female, 49.5% were in their third year, and 50.5% were in their fourth year.

More than half of the students (54.5%) reported having performed VG injections (Table 2). In contrast, a study by Su and Fırat Kılıç (2023) found that 90% of students had performed VG injections. Additionally, another study discovered that 77.9% of nursing students knew how to detect the VG site; however, only 18.6% had actually performed VG injections in a clinical setting (Özveren et al., 2018). A study conducted by Biyik Bayram et al. (2024) revealed that students' knowledge about VG injections and their preferences for this

injection site increased after receiving education through mobile learning. Similarly, Ulaş Karaahmetoğlu (2019) examined the intramuscular injection knowledge levels of nursing students and found that 55.5% of them utilized the VG site.

The moderate use of the VG site by students may stem from various factors. Many nurses may lack sufficient knowledge about the VG region, may not be accustomed to using this site, and may not have had opportunities to observe or administer VG injections to patients due to concerns about causing harm. Among students who reported not using the VG region, reasons included not being given the opportunity in the clinic (21.7%), lack of exposure to VG injections (28.2%), and feeling unprepared or lacking confidence for VG injections (8.7%). Furthermore, students believed that patients were unfamiliar (55.4%) or only partially accustomed (21.8%) to the VG region, which led them to prefer the dorsogluteal region for injections due to its familiarity (Özveren et al., 2018). Additionally, Sönmez et al. (2022) found that nursing students' knowledge of intramuscular injection was not at a sufficient level, indicating areas that require improvement.

As shown in Table 3, although nursing students initially had limited knowledge of VG injection, their knowledge levels significantly improved after training. This finding aligns with a study conducted by Su and Fırat Kılıç (2023), which found increased knowledge levels among senior nursing students following training. The limited knowledge levels of students in this study may be attributed to the fact that VG injection was taught in the first year as part of the nursing fundamentals course, suggesting that students were unable to reinforce their knowledge and skills related to the VG region in clinical settings later on. Additionally, those who learned about it in the first year may have forgotten this information. Similar results were noted in the study by Su and Fırat Kılıç (2023), which also focused on senior nursing students. Furthermore, studies on nurses have demonstrated that education positively impacts VG knowledge levels (Gülner and Özveren, 2016; Şanlıalp Zeyrek and Kuzu Kurban, 2017).

In this study, the percentage of students who stated they could detect the VG region before training was 54.5%, which increased to 89.1% after training. This underscores the importance of providing comprehensive information on how to utilize the VG region effectively. A study conducted by Zaybak et al. (2017) assessing the knowledge of senior nursing students regarding drug administration found that students considered their knowledge of drugs and their applications to be insufficient. In another study, 90% of students reported not knowing how to locate the VG before training, but

this rate decreased to 86.7% afterward (Su and Fırat Kılıç, 2023). Additionally, research by Kaynar Şimşek et. (2024) found that structured education enhanced nurses' knowledge and skills regarding VG injections and increased the use of the VG site. Özaras Öz and Ordu (2021) also noted that web-based education and Kahoot had a positive impact on nursing students' knowledge and skills regarding intramuscular injections. Different techniques can be employed in teaching nursing skills; for instance, a study by Suh et al. (2022) found that a game-based mobile application increased students' knowledge levels and motivated them in skills training. Moreover, Kurt and Öztürk (2021) discovered that a mobile augmented reality application positively affected nursing students' knowledge and skill levels while also reducing their fears.

CONCLUSION

In this study involving third and fourth-year nursing students, it was observed that the knowledge and skills related to the VG area that students acquired during their first year in the nursing fundamentals course had diminished over time. However, the additional training provided resulted in a significant increase in their knowledge levels. Therefore, it is recommended that these training sessions be conducted regularly to ensure that students' knowledge and skills remain current.

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