Original Paper

Investigation of Anxiety Levels of Nursing Students Related to Intravenous Interventions and Factors Affecting the Anxiety

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ABSTRACT: This descriptive type study was conducted in order to determine the anxiety levels experienced by nursing students during IV intervention and the factors causing anxiety. The study was completed with a total of 260 students, 86 of whom were year-2, 72 were year-3, and 102 were year-4 students, who voluntarily participated in the study. Data were collected online with a Google survey using the Personal Information Form and the Trait Anxiety Inventory. As per the study results, a total of 80.4% of the students were found to experience anxiety during IV interventions, and their trait anxiety (45.10±8.8) levels were moderate. A statistically significant difference was found between the achievement status of the students and their mean trait anxiety score ($p<0.05$). As a conclusion of the study, the students were found to experience moderate levels of anxiety during IV interventions and their level of anxiety decreased as their achievement levels increased. This was the first study on the subject in our country and new studies are needed.

KEYWORDS: *Intravenous Interventions, Nursing Student, Anxiety.*

Introduction

Peripheral intravenous catheterization (PIC) is the procedure of inserting a short catheter into a peripheral blood vessel through the patient's skin [1].

It is a revolutionary practice among the most common medical procedures [2].

There are more than 300 million IV catheter interventions reported to be performed per year in England and the USA [3,4].

In the literature, 80% of the individuals admitted to the hospital have been reported to receive IV fluid therapy at least once during their stay in the hospital l [3].

A peripheral intravenous catheter (PVC) is applied to more than 70% of individuals to perform IV intervention [1].

PVC is often required for many medical treatments [5].

With the PVC, procedures such as IV fluid therapy, IV medication therapy, hemodynamic monitoring, and total parenteral nutrition are performed [2,6].

PVC is an important part of modern medical practices and a common nursing function used in clinical practice [7].

In addition to having cognitive-affective competence in order to provide safe patient care, nursing students are expected to have professional competence in psychomotor skills [8].

Nursing education consists of theoretical, laboratory and clinical practice components [7].

Learning in real terms for nursing students takes place during clinical practice.

Clinical practices enable students to gain competence in using their existing values, attitudes, knowledge and skills [9].

Skills training conducted in the laboratories after theoretical classes is a source of anxiety for students.

Anxiety is experienced more on more complex invasive intervention skills such as intravenous catheterization compared to basic skills such as vital signs measurement [8].

The studies in the literature show that students experience anxiety before skill practice [9,10,11,12] and that anxiety reduces students' success and performance [13,14].

In the study conducted by Bayar et al. [2009], PVC procedure was determined to be one of the skills that cause the most anxiety on nursing students during clinical practice [15].

The reasons such as the inability to carry out sufficient level of PVC procedure practices in the skills laboratories, students not considering themselves having adequate knowledge and skills, being an invasive procedure, the fear of causing harm to the patient and making a mistake were found to be the causes of this anxiety [16,17,18].

We did not come across, in the literature, any study conducted on the anxiety levels experienced by nursing students during intravenous interventions.

Therefore, this descriptive study was conducted in order to determine the anxiety levels

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experienced by nursing students during intravenous interventions and the factors that cause anxiety.

Our study is thought to be a reference for future studies on the subject.

Materials and Methods

Design

This study used a descriptive design.

Research Sample

This descriptive study was conducted with a total of 260 students from year-2, year-3 and year-4 from the nursing faculty of a public university in Turkey between October 2021 and February 2022, in order to determine the anxiety levels experienced by nursing students during intravenous interventions and the factors that cause anxiety.

The study population consisted of a total of 880 year-2, year-3 and year-4, nursing students studying in the nursing faculty of a public university located in the west of Turkey in the fall semester of the 2021-2022 academic year.

The number of students to be included in the study was determined by using the *OpenEpi program* (Figure 1).

The sample size was calculated as 287 with 80% power, 5% standard deviation and 99% confidence interval.

The study sample consisted of a total of 260 students, 86 from year-2, 72 from year-3 and 102 from year-4, who took the "Basic Principles and Practices in Nursing" course and voluntarily accepted to participate in the study.

Population size(for finite population correction factor or fpc)(*N*): 880
Hypothesized % frequency of outcome factor in the population (*p*): 50%+/-5
Confidence limits as % of 100(absolute +/- %)(*d*): 5%
Design effect (for cluster surveys-*DEFF*): 1

Sample Size(*n*) for Various Confidence Levels

ConfidenceLevel(%)	Sample Size
95%	268
80%	139
90%	208
97%	307
99%	379
99.9%	486
99.99%	557

Equation

Sample size $n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$

Results from OpenEpi, Version 3, open source calculator--SSPropor
Print from the browser with ctrl-P
or select text to copy and paste to other programs.

Figure 1. Sample size for frequency in a population.

Data Collection Tools

"Personal Information Form" which was created by the researchers in line with the literature and "Trait Anxiety Scale" were the data collection tools.

Personal Information Form

The form created by the researchers in line with the literature [9,10,11,12] consisted of a total of 13 questions, which are five questions about sociodemographic characteristics, four questions about educational characteristics, one question to determine the factors of anxiety caused by students, one question to determine the factors of anxiety caused by the instructors, one question to determine the factors of anxiety due to intravenous intervention practices and one question on factors due to the clinical practice setting.

Trait Anxiety Inventory

The "Trait Anxiety Inventory" was developed by Spielberger et al. and was adapted into Turkish after the validity and reliability studies by Öner and Le Compte [19].

There are 20 statements on the scale that individuals can use to express their feelings.

Items from 1 to 20 of the scale measure the trait anxiety level of the individual.

Trait anxiety is how an individual feels him/herself, regardless of the situation and circumstances in which he/she is in.

Each of the statements on the scale is scored through four options.

These are: (1) not at all, (2) somewhat, (3) moderately so, (4) very much so.

There are seven reversed statements on the trait anxiety inventory which are 1., 6., 7., 13., 16., 19. numbered items.

The trait anxiety level of the individual is determined by subtracting the total score of the reversed statements from the total score of the direct statements and adding 35, which is the constant value of the trait anxiety inventory [19].

The total score value that can be obtained from the scale varies between 20 and 80.

While a high score indicates a high level of anxiety, a low score indicates a low level of anxiety [19].

Data Collection

Secure online survey creation links were reviewed by researchers in collecting study data.

In order to protect the confidentiality of the data, it was decided to create the questionnaire sent to the students via the 'Google Survey' URL.

The data were collected via the online survey link, created by the researchers using the 'Google Survey' URL address, and WhatsApp groups of nursing students.

Ethical Aspects

Approval (decision number: 2021/526) from the Non-Interventional Scientific Research Ethics

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Committee of the university and the permission (E-10342988-302.08.81-370631) from the institution where the study was conducted was obtained before the study and it was carried out in accordance with the Declaration of Helsinki.

Participants first read the informed consent text explaining the purpose and rationale of the study in the link posted online.

After they received all the information about the study, they answered the question of 'Would you like to participate in the study voluntarily?' at the end of the text either with a "Yes" or "No".

Volunteers who chose the answer of "Yes" were allowed to complete the questionnaire.

They were also informed that they could end their participation in the study without giving any reason.

Statistical Analysis of the Data

The SPSS 28.0 package program was used for the data analysis.

Descriptive statistics such as number, percentage, mean and standard deviation were used in the evaluation of the study data.

Shapiro Wilk test was used to determine whether the continuous data showed normal distribution and it was interpreted that the variables with a significance level of $p<0.05$ did not show normal distribution.

The Kruskal Wallis and Mann Whitney U analyses were used for non-parametric data.

The significance level was considered as $p<0.05$.

Results

While 47.3% of the students were in the 19-21 age group, 84.2% were female, 39.2% were year-4 and 83.8% graduated from Anatolian High Schools.

Among the students, 47.3% of them were found to prefer the nursing department due to higher chances of finding a job, 87.7% had a Grade Point Average (GPA) between 3.1-4.0 and 80.4% experienced anxiety during intravenous interventions.

The mean trait anxiety score of the students was determined to be 45.10±8.8.

When the distribution of mean trait anxiety scores of the students according to their personal characteristics was examined, the mean trait anxiety score of the students with a GPA of 2.1-3.0 (48.03±9.3) was found to be higher than those with a GPA of 3.1-4.0 (44.71±8, 7), and the difference between the groups was determined to be statistically significant ($p<0.05$).

Furthermore, the mean trait anxiety score of those who said "yes" to experiencing anxiety during intravenous interventions (46.01±8.2) was found to be higher than those who said "no" (41.39±10.2), and the difference between the groups was statistically significant ($p<0.05$).

On the other hand, the difference between the mean trait anxiety score and all other education and nursing profession-related characteristics was not statistically significant ($p>0.05$) (Table 1).

Table 1. Distribution of Students' Socio-Demographic Characteristics and Mean Trait Anxiety Scores (n=260)

	Variables	n	%	TAI±SD	Test*	p
Gender	Female	219	84.2	45.23±8.8	U=-.645	p=.519
	Male	41	15.8	44.41±9.2		
Year	Year 2	86	33.1	45.87±8.2	KW= 1.419	p= .492
	Year 3	72	27.7	45.11±8.6		
	Year 4	102	39.2	44.45±9.5		
Age Group	18-21 years	123	47.3	44.40±9.4	KW= 1.487	p= .475
	22-23 years	114	43.9	45.98±8.4		
	24 years or above	23	8.8	44.52±1.5		
High school	Anatolian High School	218	83.8	44.70±8.7	KW= 3.351	p= .187
	Regular High School	32	12.3	47.97±8.4		
	Vocational School of Health Services	10	3.8	44.70±11.9		
The Reason for Preference	Higher chances of finding a job	45	17.3	45.60±8.5	KW= 7.195	p= .066
	University entrance exam score	80	30.8	45.73±8.5		
	Interest in the nursing profession	123	47.3	43.35±9.3		
	Random selection	12	4.6	49.33±8.3		
Grade Point Average (GPA)	2.1-3.0	32	11.9	47.91±9.2	U=-1.983	p= .047
	3.1-4.0	228	87.7	44.71±8.7		
Status of experiencing anxiety during intravenous interventions	Yes	209	80.4	46.01±8.2	U=-3.025	p= .002
	No	51	19.6	41.39±10.2		
Total		260	100	45.10±8.8		

Note: *KW= Kruskal-Wallis test, U= Mann-Whitney U test, n: frequency, %: percentage

When the factors originating from self that caused the students to experience anxiety during IV interventions were examined, no statistically significant difference was found between all the factors and the mean trait anxiety score (p>0.05).

No statistically significant difference was found between groups for the mean trait anxiety scores according to the factors originating from the instructors that cause anxiety during IV interventions (p>0.05).

There was also no statistically significant difference found between groups for the mean trait anxiety scores according to the factors originating from the clinical practice setting (p>0.05).

The mean trait anxiety score (46.1±8.5) of those who said "yes" to the fear of diseases transmitted by blood and blood components was found to be higher than those who said "no" (45.1±0.0), and the difference between the mean scores of trait anxiety and all the factors was not statistically significant (p> 0.05) (Table 2).

Table 2. Distribution of Factors Causing Anxiety during IV Interventions and Mean Trait Anxiety Scores.

Factors Originating from Self	n	%	X±sD	Test
Inadequate theoretical knowledge about IV interventions				
Yes	41	15.8	46.34±8.8	U=4199.0
No	219	84.2	44.87±8.8	p= .511
Experiencing anxiety in applying the IV intervention procedure steps				
Yes	105	40.4	45.24±9.4	U=8100.5
No	155	59.6	45.01±8.5	p= .950
Inability to authenticate the patient who will undergo IV intervention				
Yes	11	4.2	45.18±11.1	U=1325.5
No	249	95.8	45.10±8.7	p= .857
Having anxiety in determining the vein the IV would be performed				
Yes	143	55.0	45.36±8.5	U=7942.0
No	117	45.0	44.79±9.2	p= .482
Experiencing anxiety about choosing the appropriate size catheter for the vein				
Yes	55	21.2	44.80±8.4	U=5309.0
No	205	78.8	45.19±8.9	p= .507
Inability to adjust the tourniquet area suitable for the vein to be operated on				
Yes	10	3.8	44.80±10.0	U=1142.5
No	250	96.2	45.12±8.8	p= .645
Lack of knowledge about the right technique for IV interventions				
Yes	28	10.8	42.96±9.0	U=2578.5
No	232	89.2	45.36±8.8	p= .075
Insufficient practice skills regarding IV interventions				
Yes	110	42.3	45.19±8.8	U=8154.0
No	150	57.7	45.04±8.8	p= .873
Inability to do securement of the IV catheter				
Yes	51	19.6	44.53±8.5	U=4878.5
No	209	80.4	45.24±8.9	p= .349
Inability to properly dispose of used items				
Yes	7	2.7	45.43±10.0	U=830.5
No	253	97.3	45.09±8.8	p= .779
Insufficient knowledge about complications that may occur during IV intervention				
Yes	32	12.3	44.13±10.0	U=3365.5
No	228	87.7	45.24±8.7	p= .478
Not performing any IV intervention before				
Yes	147	56.5	44.50±8.8	U=7378.5
No	113	43.5	45.88±8.8	p= .123
Anxiety related to grading				
Yes	47	18.1	42.89±9.7	U=4098.0
No	213	81.9	45.59±8.5	p=.052
The effect of performing an intervention on a living individual				
Yes	176	66.7	45.03±8.8	U=7202.5
No	84	32.3	45.25±9.0	p= .738
Factors originating from the instructors				
The attitude of the instructors during intravenous (IV) interventions				
Yes	86	33.1	45.16±8.1	U=7373.5

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No	174	66.9	45.07±9.2	p= .849
Factors Originating from the Setting of Clinical Practice				
Fear of diseases transmitted by blood and blood components				
Yes	77	27.7	46.10±8.5	U=6539.0
No	188	72.3	45.12±9.0	p= .673
Fear of making mistakes				
Yes	194	74.6	44.52±8.7	U=5485.0
No	66	25.4	46.82±9.0	p= .082
Patient's reactions during IV intervention				
Yes	159	61.2	44.97±9.1	U=7634.0
No	101	38.8	45.31±8.4	p= .503

Note: *U=Mann Whitney U test, n: frequency, %: percentage

Discussion

In this study examining the anxiety levels of nursing students during IV interventions, the majority of nursing students were found to experience anxiety during IV interventions and their anxiety scores were at moderate levels.

Other studies conducted in our country also found that nursing students have moderate levels of anxiety, which supports our results [9,10,11].

Contrary to our findings, a low level of stress was found in nursing students in the study of Açıksöz et al. [20].

In their study with nursing students in three different countries, Labrague et al. [21] found a high level of stress in students and the highest level was found in nursing students studying in the Philippines.

These results might be due to the differences in the nursing education curriculum or practices in different countries or the evaluation criteria used, and the lack of studies measuring anxiety related to IV intervention.

When the anxiety levels of nursing students during the IV intervention were analyzed by gender, female students were found to experience higher anxiety than male students.

Ocak and Güler [22] reported that being female is associated with an increase in perceived stress symptoms, which women tend to report more stress symptoms rather than experiencing more stress, while men tend to avoid admitting their weaknesses due to their gender roles and report the stress less.

Savcı and Aysan [23] reported that gender is an effective factor in the stress perceived by university students and that the perceived stress level of female students was higher than that of male students.

Although there is no study in the literature examining the level of anxiety experienced by nursing students during IV intervention, there are studies [9,24,25] stating that female students have a higher stress level than male students in clinical practice, similar to our study results, as well as studies [11,26,27,28] stating that gender is not effective on stress.

In the study conducted by Watson et al. [29] with Pakistani nursing students, the stress level of male students was observed to be higher.

When the students' anxiety levels during IV intervention were analyzed according to their year of education, the Year 2 students were found to experience higher levels of stress than the Year 3 and 4 students.

The students begin their clinical practice in the second year in the institution where the study was conducted.

It is not surprising that students beginning clinical practice for the first time have higher stress than those with previous clinical practice experience.

There are studies in the literature reporting that students experience stress during their first clinical experience [9,10,25,28].

As per the results of this study, the difference between the students' academic success and the mean trait anxiety score was found to be statistically significant ($p<0.05$).

Labrague [21] reported the lack of occupational knowledge and skills as the major source of stress for nursing students.

In the study of Sheu et al., the most stressful situation was reported to be caused by a lack of professional knowledge and skills [30].

It was concluded in our study that as the academic success of the students decreases, in line with the literature, their anxiety increases.

During practice in skill laboratories of nursing education, manikins are widely used to gain many skills such as peripheral intravenous catheterization, bladder catheterization, and parenteral medication administration [7].

It is known that practicing with manikins that are very similar to the human body accelerates learning, creates a safe environment for students who will practice for the first time since no availability of real patients, contributes to reducing preclinical anxiety, improving

communication skills, and increasing exam success [8].

In our study, according to the Factors Originating from Self that caused the students to experience anxiety during IV interventions, more than half of them stated that they experience anxiety on performing an intervention on a living individual, performing IV intervention for the first time and in determining the vein to perform the IV.

Also, in the study of Beck and Srivastava, clinical experience was reported to be the most stressful part of nursing education.

There was no statistically significant difference found between the attitude of the instructors during intravenous interventions and the anxiety levels of the students.

In the study of Taşdelen and Zaybak, it was stated that clinical nurses and instructors were reported to cause the most stress on the nursing students, contrary to our study findings [28].

In the study conducted by Mankan et al. [31] with 446-year 1 nursing students to determine the initial clinical stress levels of nursing students and the factors affecting them, nursing students reported the instructors (24.40±10.10) as the reason for them to have stress in the clinical setting.

In the study of Yılmaz [12] with 109-year 1 nursing students, being criticized by the instructor (56.0%) in clinical settings was reported to be the source of stress.

When the factors originating from the setting of clinical practice that caused anxiety during IV interventions were examined, more than half of the students stated that they experienced anxiety due to the fear of making mistakes and the patient's reactions during the procedure.

In a study conducted by Coven et al. [16] with 96 nursing students to determine the causes of anxiety experienced by students in clinical training, 63.5% of the students were found to experience fear and anxiety with the thought of making a mistake [16].

In similar studies, nursing and midwifery students were found to have the fear of harming the patient and applying the procedure wrongly in their clinical practices [17,18].

Conclusion

In conclusion, the majority of nursing students in this study were found to experience anxiety during IV interventions and their mean trait anxiety score was at a moderate level.

As the academic success of the students increased, their anxiety levels decreased.

Among the factors that cause the students to experience anxiety during IV interventions, not performing IV intervention before (56.5%) was a factor originating from self, the attitude of the instructors during IV interventions was a factor originating from the instructor (33.1%), and the fear of making mistakes was a factor due to the clinical practice setting.

In line with the results of this study, considering that students may experience anxiety during IV interventions in the clinical practice settings and determining the sources of this anxiety by making observations well, conducting practical training and meetings with the instructors and clinical nurses to eliminate the fear of nursing students making mistakes in the clinical practice setting during IV intervention practices, developing occupational training and skills in laboratories with realistic scenarios and simulation practices before starting the clinic practices, supporting students to participate in IV intervention practices in the clinical practice settings, supporting the approaches of instructors that reduce students' anxiety and positively affect instructor-student interaction, and planning educational programs to increase the academic success of students are recommended.

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