

*Araştırma Makalesi/Research Article***Knowledge Levels of Nursing Students Regarding Latex Allergy*****Hemşirelik Öğrencilerinin Lateks Alerjisi Hakkında Bilgi Düzeyleri*****Hilal TÜRK BEN POLAT¹, Gizem Nur KATI², İbrahim ÇETİN³, İsmail REİSLİ⁴**

Abstract: Objective: The present study aims to determine the level of knowledge regarding latex allergy among nursing students. Methods: The sample of this descriptive study consists of 171 nursing students enrolled in a university. Data were collected using a Demographic Information Form and a Latex Allergy Knowledge Form. Whether the data were normally distributed was determined using the Kolmogorov-Smirnov and Shapiro-Wilk tests. In cases where the data showed normal distribution, the ANOVA test was used to compare the test scores of more than two groups. The Post Hoc Scheffe test was used to determine significant differences. The Mann-Whitney U test was used to compare the test scores of binary groups. Results: Participants' mean total score on the latex allergy knowledge form was 32.36 ± 4.20 , and considering the self-reports, 5.8% of students had a latex allergy. There was a significant difference in latex allergy knowledge scores among participants based on the classes they were attending ($p=0.022$). In the study, 85.4% of students were aware of the higher risk of allergic reactions due to wearing latex gloves among healthcare workers. The percentage of participants who that disposable gloves contain latex was 87.7%. It was found that students had misconceptions in some questions regarding latex-containing products, allergy symptoms, potential problematic foods, and treatment-prevention methods, with error rates reaching up to 75%. Conclusions: It is essential to develop educational programs to increase awareness of latex allergy in laboratory and hospital settings within the undergraduate nursing curriculum. Conducting screenings for latex allergy, particularly among first-year students, is particularly important to ensure employee safety. Faculties should take necessary measures to provide a safe learning environment for students, including those with latex allergies. Moreover, educational conditions should be adapted to accommodate students with latex allergies.

Keywords: Latex, Latex allergy, Nursing student.

Öz: Amaç: Bu araştırma, hemşirelik öğrencilerinin lateks alerjisi hakkında bilgi düzeylerinin belirlenmesi amacıyla yapılmıştır. Gereç ve yöntem: Tanımlayıcı türde olan araştırmanın örneklemini bir üniversitede öğrenim gören 171 hemşirelik öğrencisi oluşturmuştur. Verilerin normal dağılımda olup olmadığı Kolmogorov Smirnov ve Shapiro Wilks testi ile belirlenmiştir. Normal dağılım gösteren verilerde ikiden fazla sayıda grupların test puanlarının karşılaştırılmasında ANOVA testi kullanılmıştır. Anlamli farklılığın belirlenmesinde Post Hoc Scheffe testi kullanılmıştır. İkili grupların test puanlarının karşılaştırılmasında Mann Whitney U testi kullanılmıştır. Bulgular: Katılımcıların lateks alerjisi bilgi formu toplam puan ortalaması $32,36 \pm 4,20$ 'dir ve kendi öz bildirimlerine göre öğrencilerin %5,8' inin lateks alerjisi vardır. Öğrenim gördükleri sınıflara göre katılımcıların lateks alerjisi bilgi puanları arasında anlamlı farklılık vardır ($p=0,022$). Araştırmada sağlık çalışanlarında lateks eldiven giymeye bağlı alerjik reaksiyon gelişme riskinin daha yüksek olduğunu bilen öğrencilerin oranı % 85,4'tür. Tek kullanımlık eldivenlerin lateks içerdiğini bilenlerin oranı %87,7'dir. Lateks içeren ürünler, alerji belirtileri,

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potansiyel problemli gıdalar ve tedavi-korunma yöntemleri konularında öğrencilerin bazı sorularda %75'e varan oranlarda yanlış bilgilere sahip olduğu bulunmuştur. Sonuç: Hemşirelik öğrencilerinin lisans eğitimi müfredatında laboratuvar ve hastanelerde lateks alerjisi konusunda farkındalığın güçlendirilmesine yönelik eğitim programlarının oluşturulması ve çalışan güvenliği kapsamında özellikle 1. Sınıf öğrencilerine lateks alerjisine yönelik taramalar yapılması oldukça önemlidir. Fakülteler öğrenciler için güvenli uygulama deneyimini sağlayacak gerekli önlemleri almalıdır. Eğitim koşullarının lateks alerjisi olan öğrencilere uygun hale getirilmesi için gerekli önlemler alınmalıdır.

Anahtar Kelimeler: Lateks, Lateks alerjisi, Hemşirelik öğrencisi.

Introduction

Latex is a natural liquid produced from the sap of rubber trees, “*Hevea Brasiliensis*,” grown in Africa and Southeast Asia (Jacob et al., 1993). Some proteins in this liquid have allergenic properties. Latex is used in various medical materials, such as single-use gloves, catheters, syringes, endotracheal tubes, and oxygen masks in hospitals (Nguyen and Kohli, 2023). Exposure to latex occurs when it comes into contact with the skin, when latex proteins adhere to dust in gloves, or when it becomes airborne and is inhaled. Environmental allergies, a history of asthma, specific food allergies such as avocado, banana, and kiwi, and repeated exposure to latex increase the likelihood of developing latex allergy (Latex Allergy, 2024).

Latex allergy is generally categorized into Type IV and Type I. Type IV manifests as contact dermatitis, a hypersensitivity reaction to rubber material. Acute Type I allergic reactions, which are IgE-mediated, are less common but can result in anaphylactic reactions (West and Sharip, 2022). The increasing use of powdered gloves has led to latex allergy becoming a significant health issue and it has been identified as an occupational disease (Sarıcaoğlu et al., 2013; Terzioğlu et al., 2021). Healthcare workers with frequent exposure to latex-containing products have twice the risk of developing latex allergy when compared to the general population (Nucera et al., 2020). In a study carried out in Turkey, the prevalence of latex allergy among healthcare workers is 26.4% (Öztürk et al., 2021). Moreover, exposure to latex from an early age is a risk factor for developing allergic symptoms (Çoşkun Beyan et al., 2019).

Starting laboratory and hospital practices from the first year and nursing students' frequent contact with latex-containing products may increase the risk of developing latex allergy. Effective risk assessment, screening tests, and education on latex allergy for employees are recommended for managing latex allergy (Çoşkun Beyan et al., 2019). It was reported that 57.5% of students in the healthcare field are knowledgeable about the prevention and treatment of latex allergy (Kartal et al., 2015). Awareness of latex allergy among nursing students during their education will be a significant benefit in controlling potential allergies that may arise. Assessing students' knowledge levels and adjusting educational content accordingly will

facilitate achieving this goal. The aim of this study is to determine the knowledge levels of nursing students regarding latex allergy.

Methods

Research Design

The present study is a descriptive study.

Population and Sample

The population of this study consisted of 281 nursing students enrolled in the Health Science Faculty Nursing Department. The sample of the study consisted of students who agreed to participate, completed the survey forms accurately, were enrolled in the nursing department during the study period, and could use smartphones. The Raosoft sample size program was utilized to determine the sample size, which was calculated to be at least 163 with a 95% confidence level and a 5% margin of error (Raosoft, 2004). The research was completed with 171 students. Students who did not fill out forms completely and those under 18 years old were excluded.

Research Instruments and Processes

The data were collected from nursing students who agreed to participate in the study on March 20-25, 2024, using online forms. The forms were sent to students via social media applications. Consent forms were opened before the survey, and the surveys proceeded if participants provided consent. Before starting the study, expert opinions were obtained from a minimum of 10 faculty members who were competent in the field for the prepared information form.

The data were collected by using an online survey method by the researchers. The data were collected using the Demographic Information Form and the Latex Allergy Information Form.

Demographic Information Form: It consists of questions addressing age, gender, current academic year, latex allergy status, previous education on latex allergy, allergy to any product, allergy to any food, and the presence of individuals with allergies in their families.

Latex Allergy Information Form: This form, developed by the researchers, consisted of 43 questions under subheadings such as individuals at higher risk of latex allergy development, what latex is, which products contain latex, which products contain natural rubber latex, symptoms of latex allergy, potential problematic foods for individuals with latex allergy, diagnosis of latex allergy, and treatment of latex allergy (Latex Allergy, 2024). Participants

were asked to respond to each statement as true or false. The scores that can be obtained from the Latex Allergy Information Form vary between 0-43.

Data Analysis

Statistical analyses were conducted by using SPSS 22 software (IBM Corp., Armonk, NY, USA). Descriptive statistics were summarized as numbers, percentages, means, and standard deviations. Whether the data were normally distributed was determined using the Kolmogorov-Smirnov and Shapiro-Wilk tests. In cases where the data showed normal distribution, the ANOVA test was used to compare the test scores of more than two groups. The Post Hoc Scheffe test was used to determine significant differences. The Mann-Whitney U test was used to compare the test scores of binary groups. A score of 1 point was given for each correctly answered question, and 0 points were given for incorrectly answered questions in calculating the total latex knowledge score. A statistical significance value of $p < 0.05$ was considered in all analyses.

Ethic

Approval was obtained from the Necmettin Erbakan University's Health Sciences Scientific Research Ethics Board (Date: 06.03.2024, Number: 2024/692). Permission to conduct the research was obtained from the Dean's Office (Date: 19.03.2024, Number: E-33205045-100-486495). Online consent was obtained from all participants. There were no conflicts of interest among the authors in the research.

Results

Participants' latex allergy knowledge form total score average is 32.36 ± 4.20 , with an age average of 20.87 ± 1.87 . 31.6% are in the 3rd year of education. According to participants' self-reports, 5.8% have latex allergy, 99.4% have not received education on latex allergy before, 86.0% have no allergy to any product, 91.8% have no allergy to any food, and 73.1% have no family members with allergies. There is a significant difference in latex allergy knowledge scores among participants based on the classes they attend ($p=0.022$). The mean latex allergy test knowledge scores of students in the 2nd year of education are statistically significantly higher than those in the 3rd year (Table 1).

Table 1: Descriptive Characteristics and Allergy Statuses of Nursing Students

	X+SD	Min-Max		
Age	20.87±1.87	18-31		
Latex allergy knowledge form total score	32.36±4.20	17-41		
	n	%	X+SD	Test/p
Grade				
1 ^a	49	28.7	33.10±4.11	F=3.293
2 ^b	40	23.4	33.40±4.08	p=0.022
3 ^c	54	31.6	31.01±4.18	b>c
4 ^d	28	16.4	32.21±4.07	
Med (Min-Max)				
Status of having latex energy				
Yes	10	5.8	32(24-38)	U=668.5
No	161	94.2	33(17-41)	p=0.367
History of having training on latex allergy				
Yes	1	0.6	-	U=58.5
No	170	99.4	33(17-41)	p=0.590
Allergic to any product				
Yes	24	14.0	31(24-39)	U=1462.5
No	147	86.0	33(17-41)	p=0.178
Allergic to any food				
Yes	14	8.2	31.5(26-38)	U=1076.0
No	157	91.8	33(17-41)	p=0.896
Having a family member who has an allergy				
Yes	46	26.9	32.5(24-40)	U=2829.5
No	125	73.1	33(17-41)	p=0.874

X– Mean, SD– Standart Deviation, Min– Minimum, Max – Maximum, F – One Way Anova, U= Mann Whitney U

Table 2 presents the accuracy of the responses provided by nursing students to the statements in the Latex Allergy Information Form.

Table 2: Nursing Students' Level of Knowledge on Latex Allergy

	T	%	F	%
Individuals with a high risk of developing latex allergy				
Individuals undergoing multiple surgeries have a lower risk of developing latex allergy. *	142	83.0	29	17.0
Individuals with other allergies, such as allergic rhinitis or specific food allergies, are at a higher risk of developing latex allergy.	147	86.0	24	14.0
Healthcare workers and individuals frequently wearing latex gloves are at a higher risk of developing latex allergy.	146	85.4	25	14.6
Individuals frequently exposed to natural rubber latex, including rubber industry workers, are at a higher risk of developing latex allergy.	148	86.5	23	13.5
What is latex? Which products contain latex?				
Natural rubber latex comes from the latex of the rubber tree found in Africa and Southeast Asia.	159	93.0	12	7.0
“Latex” synthetic rubber products, including household paints, are not made from natural latex and do not cause allergic reactions in individuals allergic to products made from natural rubber latex.	63	36.8	108	63.2

Table 2 (Continue): Nursing Students' Level of Knowledge on Latex Allergy

What products contain natural rubber latex?				
Disposable gloves	150	87.7	21	12.3
Endotracheal tubes	87	50.9	84	49.1
Syringes	70	42.1	101	57.9
Intravenous catheters	74	43.2	97	56.8
Dressing products	91	53.2	80	46.8
Condoms	116	67.8	55	32.2
Soap*	122	71.3	49	28.7
Balloons	140	81.9	31	18.1
Underwear cuffs and waistbands	100	58.5	71	41.5
Bottles and pacifiers	121	70.8	50	29.2
Symptoms of latex allergy				
Sudden itching, redness, and swelling of the skin	168	98.3	3	1.8
Nasal congestion	86	50.3	85	49.7
Runny nose	85	49.7	86	50.3
Wheezing	78	45.6	93	54.4
Nausea/Vomiting	106	62.0	65	38.0
Dyspnea (difficulty breathing)	125	73.1	46	26.9
Decrease in blood pressure (shock) and anaphylaxis	101	57.9	70	42.1
When do the symptoms of latex allergy begin?				
Several minutes after exposure to products containing latex	143	83.6	28	16.4
Which foods pose potential problems for people with latex allergy?				
Apple	56	32.7	115	67.3
Avocado	88	51.5	83	48.5
Banana	81	47.4	90	52.6
Carror	42	24.6	129	75.4
Celery	87	50.9	84	49.1
Chestnut	92	53.8	79	46.2
Lettuce *	136	79.5	35	20.5
Kiwi	87	50.9	84	49.1
Malon	70	40.9	101	59.1
Raw potato	100	58.5	71	41.5
Tomato	56	32.7	115	67.3
How is latex allergy diagnosed?				
Latex allergy is diagnosed by using allergy blood test	104	60.8	67	39.2
How is latex allergy treated?				
Healthcare workers with a history of latex sensitivity who need to wear gloves should discontinue using latex gloves.	142	83.0	29	17.0
Colleagues of individuals with latex allergies should also refrain from using latex gloves.	52	30.4	119	69.6
Individuals with latex allergies do not need to wear medical alert identification. *	109	63.7	62	36.3
Individuals with latex allergies should carry auto-injectors containing Epinephrine (adrenaline) for emergencies.	101	59.1	70	49.9
Individuals with latex allergies should avoid direct contact with all latex-containing products and devices.	159	93.0	12	7.0
Individuals with latex allergies should also avoid foods that trigger allergic reactions.	161	94.2	10	5.8
Individuals with latex allergies should inform healthcare providers before treatment or procedures.	166	97.1	5	2.9

*It contains erroneous statements. T: True, F: False

Discussion

Despite numerous studies in the literature on latex allergy among healthcare workers, limited studies were conducted, particularly with nursing students. Nurses, by the nature of their duties, are the group most frequently exposed to latex products among healthcare workers. Therefore, reactions related to latex allergy are relatively more common among nurses (Kartal et al., 2020; Parisi et al., 2021). The importance of health problems related to existing or subsequently developing latex allergy reactions before starting nursing education and the extent of the difficulties they may cause can be more easily understood considering that there are over 200,000 nurses and approximately 70,000 nursing students in Turkey (Arslan Yürümezoğlu and Kocaman, 2024).

According to our research findings, the mean latex allergy knowledge score of the students was 32.36 ± 4.20 . It can be said that students have an important level of knowledge about latex allergy. The fact that there is educational content about latex allergy in the courses given in the nursing curriculum may be related to these results. At the same time, occupational health and safety training may have increased the knowledge level of the students. In the present study, the self-reported prevalence of latex allergy was determined to be 5.8%. This rate is consistent with results reported in similar studies. Previous studies on nursing students in Türkiye reported latex allergy rates ranging from 1.1% to 12.2% (Kartal et al., 2015, Çakar et al., 2019). The prevalence of latex allergy among students in health sciences, including dentistry, medicine, and nursing, was reported within a wider range of 1.1% to 25% (Bakiri et al., 2017; Çakar et al., 2019; Erkeköl et al., 2008; Kartal et al., 2015). In a study on health risks encountered in clinical practice, students ranked latex gloves last among chemical exposure factors posing health risks in hospital settings, with a rate of 2.7%. However, among students, 50% of medical diagnoses made due to chemical exposure in clinics were identified as latex allergy (Çakar et al., 2019). Various factors, such as the frequency and duration of exposure to latex-containing products, contribute to these varying results. Students in their second year of education had higher average scores in latex allergy knowledge tests when compared to those in their third year. Although it would be expected for knowledge scores to increase with the duration of education, our findings did not support this.

In our study, among all participants, the proportion of students who were aware that healthcare workers have a higher risk of developing allergic reactions due to wearing latex gloves was 85.4%. Similarly, the proportion of those aware that single-use gloves contain latex was high (87.7%). However, the proportion of those aware that products commonly used in

clinics, such as syringes, intravenous catheters, intubation tubes, and wound care materials contain latex, was lower (42.1%, 43.2%, 50.9%, and 53.2%, respectively). In a study carried out on nurses, the participants were asked to rank the top three medical materials that could cause latex allergy, and single-use gloves ranked first with a rate of 73%, while the rate for syringes remained at 11.1% (Çoşkun Beyan et al., 2019). It is essential to provide education about latex-containing products in the curriculum and clinical settings.

As can be seen in Table 2, it was observed that students have misinformation rates of up to 75% on topics such as latex-containing products, allergy symptoms, potential problematic foods, and treatment-prevention methods. Moreover, the rate of students who were previously educated about latex allergy is only 0.6%. Providing education to healthcare professionals beginning from their student years facilitates the adoption of appropriate protective measures and increases awareness of latex allergy. Thus, the frequency of latex allergies among healthcare professionals can be reduced. Only 9.8% of healthcare workers considered themselves adequately informed about latex allergy, while the remaining 90.2% defined their knowledge as partially or poorly informed (Terzioğlu et al., 2021). Another study examining physicians, nurses, and healthcare technicians revealed that latex allergy awareness among healthcare workers is lower than the desired level. Inadequate knowledge also negatively affects the clinical practice behaviors and anxiety levels of workers. Therefore, education that is sufficient and continuous is very important (Kartal et al., 2020). The present study's authors suggest that the misinformation rates regarding latex allergy, as revealed in the present study, corroborate with the results reported in these two research studies.

Students gave incorrect answers in large proportions regarding potential problematic foods for individuals with latex allergy. Latex allergy includes sensitivity to various protein components, including various plant-based foods. Thus, patients sensitive to latex may develop allergic reactions in a cross-reactive manner to foods such as avocado, banana, celery, apple, melon, and chestnut, which contain various protein contents. Knowing these types of foods will facilitate the early diagnosis of latex allergy. In the treatment section of latex allergy, 69.6% of students provided incorrect answers to the statement, "Colleagues of individuals with latex allergy should not use latex gloves." Colleagues of individuals with latex allergies should take care not to produce dust when removing gloves.

Conclusion

The risk of allergy associated with commonly used latex-containing products, especially disposable gloves, was reported in the literature. However, foods, and clinical materials that

could potentially cause allergic responses in individuals sensitive to latex and precautions that can be taken are not sufficiently known by students. It is necessary to develop educational programs to increase awareness of latex allergy in laboratory and hospital settings within the undergraduate nursing curriculum. Screening for latex allergy, particularly among first-year students, is important for employee safety. Faculties should take necessary measures to provide students with a safe learning environment conducive to practical experience, including of implementing safety protocols for students with latex allergies. In addition to curriculum adjustments, measures should be taken to accommodate students with latex allergies within the educational environment.

Limitations

The limitation of the study was that it was conducted only with nursing students enrolled in a single university.

Ethical Statement: Approval was obtained from the Necmettin Erbakan University's Health Sciences Scientific Research Ethics Board (Date: 06.03.2024, Number: 2024/692). Permission to conduct the research was obtained from the Dean's Office (Date: 19.03.2024, Number: E-33205045-100-486495).

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