



Original Research / Orijinal Araştırma

The Effect of Rational Drug Use Education Program on Nursing Students' Self-Awareness Level for Rational Drug Use

Akılcı İlaç Kullanımı Eğitim Programının Hemşirelik Öğrencilerinin Akılcı İlaç Kullanımına Yönelik Öz farkındalık Düzeyine Etkisi

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Abstract

Purpose: This study aimed to evaluate the effectiveness of rational drug use education in enhancing nursing students' self-awareness regarding rational drug use.

Methods: A quasi-experimental design was utilized, involving a total of 176 nursing students who had not previously received education on rational drug use. The participants were divided into an experimental group (n = 88) and a control group (n = 88). Data collection tools included the Introductory Information Form and the Rational Drug Use Self-Awareness Scale. Statistical analyses were conducted using mean and percentage calculations, multi-way analysis of variance, and linear regression analysis.

Results: A statistically significant difference was observed in the mean scores of the Rational Drug Use Self-Awareness Scale between the experimental and control groups, in terms of group, time, and group*time interaction. The educational program accounted for 45% of the increase in Rational Drug Use Self-Awareness Scale scores, with education leading to a 0.552-fold increase.

Conclusion: The rational drug use education program proved to be a practical approach to enhance the self-awareness of nursing students about rational drug use. The findings contribute valuable insights to national and international nursing education literature.

Key words: Nursing student, drug utilization, awareness, nursing education

Özet

Amaç: Araştırma, hemşirelik öğrencilerinin akılcı ilaç kullanımı öz farkındalığını güçlendirmeye yönelik uygulanan akılcı ilaç kullanımı eğitiminin etkinliğini belirlemek amacıyla planlanmıştır.

Gereç-Yöntem: Araştırma hemşirelik bölümünde eğitim gören ve akılcı ilaç kullanımı konusunda herhangi bir eğitim almayan deney grubu için 88 ve kontrol grubu için 88 olmak üzere toplam 176 öğrenci ile yarı deneysel bir çalışma olarak yürütülmüştür. Veriler; Tanıtıcı Bilgi Formu ve Akılcı İlaç Kullanımı Öz farkındalık Ölçeği ile toplanmıştır. Araştırma verilerinin analizinde ortalama, yüzdelik hesaplamalar, çok yönlü varyans analizi ve doğrusal regresyon analizinden yararlanılmıştır.

Bulgular: Hemşirelik öğrencilerinin yer aldığı deney ve kontrol gruplarının Akılcı İlaç Kullanımı Öz farkındalık Ölçeği puan ortalamaları arasında grup, zaman ve grup*zaman etkileşimi açısından istatistiksel olarak anlamlı düzeyde fark olduğu belirlenmiştir. Eğitim programı Akılcı İlaç Kullanımı Öz farkındalık Ölçeği düzeyindeki artışın % 45'ini açıklarken, eğitimin katkısıyla ölçek puan ortalamalarında 0,552 kat artış sağlanmıştır.

Sonuç: Akılcı ilaç kullanımı eğitim programının hemşirelik öğrencilerinin akılcı ilaç kullanımına yönelik öz farkındalık geliştirmesinde etkili bir yöntem olduğu, ülke ve dünya literatürü ile hemşirelik eğitimine katkı sağlar nitelikte olduğu görülmüştür.

Anahtar Kelimeler: Hemşirelik öğrencisi, ilaç kullanımı, farkındalık, hemşirelik eğitimi

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Introduction

Drug use has an essential place in medical treatment practices and health services. Due to the problems caused by incorrect, unnecessary, ineffective, and high-cost drug use in the world, one of the critical agenda items of the World Health Organization (WHO) is rational drug use studies.¹ WHO delineates rational drug use as the facilitating of individuals' access to suitable medications, prescribed at optimal dosage and duration, and procured at the most economical rates, aligning with their clinical presentations and unique characteristics. WHO endeavors to cultivate widespread awareness and foster public discourse conducive to disseminating rational drug use.² In Turkey, the Ministry of Health underscores inadequate public awareness and educational initiatives that have established the prevalence of excessive and unnecessary medication consumption and stockpiling within society. Additionally, various measures are implemented to advance the rational use of medications and address associated challenges.^{3,4}

The ramifications of irrational medication include decreased treatment efficacy and the manifestation of adverse drug reactions. Antibiotic resistance develops in individuals due to inappropriate antibiotic use, which is an example of irrational drug use.^{5,6} Excessive administration of medications by injections, coupled with the use of unsterile injection practices, causes complications and bloodborne diseases. This phenomenon depletes medication reserves, exacerbates the challenges in accessing essential pharmaceuticals, diminishes patient confidence in the healthcare system, and inflates drug expenditures.^{1,6} Simultaneously, the repercussions of irrational drug utilization entail supplementary financial burdens for the healthcare infrastructure. Given the adverse outcomes associated with irrational drug consumption, it is underscored that concerted endeavors to foster rational drug utilization and enhance public awareness on this matter are imperative.^{1,5,6}

Among the stakeholders that advocate for rational drug use are students pursuing health-related fields, such as nursing. These students play a pivotal role in advancing the goal of fostering healthy individuals, a core tenet of sustainable development goals, by instilling an awareness of rational drug usage through educational initiatives and counseling interventions administered to patients during their nursing practice after graduation.⁷ Certain studies have revealed a disturbing trend where nursing students and prospective healthcare professionals exhibit a significantly deficient awareness of rational drug utilization. This deficiency is attributed to their attitudes and behaviors, including the self-administration of medications without prescription and the independent adjustment of medication dosages.^{8,9} In the study of Karaman et al. (2019), it is emphasized that nursing students have inadequacies in some issues related to rational drug use (taking the drug with a prescription, time to stop using the drug, taking the drugs on time, not making changes in the drug dose other than the doctor's recommendation).⁷ Therefore, the importance of organizing informative activities to improve nursing students' self-awareness of rational drug use is emphasized.⁹

Research in the literature distinguishes between nursing students' knowledge, attitudes, and awareness regarding rational drug use.^{4,7-11} However, no research has been conducted to examine how educational programs for nursing students impact their understanding of rational drug use. Hence, this investigation aims to assess the efficacy of rational drug use education interventions in bolstering nursing students' self-awareness regarding medication utilization. It is envisaged that this study will substantively contribute to achieving the third Sustainable Development Goal, focusing on ensuring universal access to healthcare and safe and equitable distribution of medications and vaccines.

The study was planned as a quasi-experimental study to determine the effectiveness of rational drug use education applied to strengthen nursing students' self-awareness of rational drug use.

Methods

Population and Sample

The study was conducted with nursing students studying in a university's Nursing Department of the Faculty of Health Sciences. The G-Power 3.1 software was employed to determine the sample size for the study. Based on a significance level of 0.05, a power of 95%, and a medium effect size (0.5), a sample size of 88 individuals per group was planned. To comprehensively elucidate the relationship between study variables, 88 students were assigned to the experimental and control groups, totaling 176 nursing students aged 18 and over who had not previously received rational drug use education and volunteered to participate. Randomization was not utilized in participant selection.

Data Collection

Pre- and post-education data were collected using the Introductory Information Form and the Rational Drug Use Self-Awareness Scale. The students in the experimental group received a 10-session (total of ten hours) Rational Drug Use Education Program. Education was carried out by the researcher involved in the study. Data gathering instruments were used to measure the program's baseline, conclusion, and third months.

Descriptive Information Form: This form consists of twelve questions created by the researchers as a result of the literature review, the first two questions include socio-demographic (age, gender) characteristics of the students, and the other questions include questions about rational drug use.^{1,4,5,7-11}

The Rational Drug Use Self-Awareness Scale: This scale developed by Aktaş and Selvi (2019), is a self-report instrument designed to assess individuals' awareness of rational drug utilization. Comprising 15 items categorized into three subdimensions, the scale evaluates awareness regarding correct information, correct medication access, and correct usage methodology. Specifically, items 3, 5, 6, 8, 10, 11, 14, and 15 are reverse-coded. Each item is rated on a 5-point Likert-type scale ranging from "Strongly disagree" to "Strongly agree." The total scale yields a minimum score of 15 and a maximum score of 75, with higher scores indicating greater self-awareness of rational drug use. The scale demonstrates strong internal consistency, with a Cronbach's alpha coefficient of 0.83.¹² The total Cronbach alpha value of the scale in this study was 0.81.

Rational Drug Use Education Program: The educational program, which includes information on rational drug use and was prepared by the researcher, was created because of an intensive review of literature on the subject,^{1,3,4,6-11,} and the educational program was finalized by submitting it to expert opinion and editing it according to the views received. Seven experts, including two faculty members in pharmacology, two in public health, and three in nursing, were consulted about the content of the education program. The education program consists of a 10-session program. The education program was delivered to the students in the form of one-hour education sessions using the face-to-face education model. The program includes basic information about rational drug use, principles of rational drug use, rational drug use in the world and in Turkey, rational drug use in nursing practices, safe drug applications and prevention of drug errors, basic concepts and processes related to pharmacology, rational antibiotic use, It consists of a 10-session education module including rational drug use in children, rational drug use in the elderly, rational drug use during pregnancy and breastfeeding, rational drug use in patients with chronic diseases, general principles in the treatment of acute drug poisoning, drugs according to their effects and application principles. Module contents to be used are given in Figure 1.

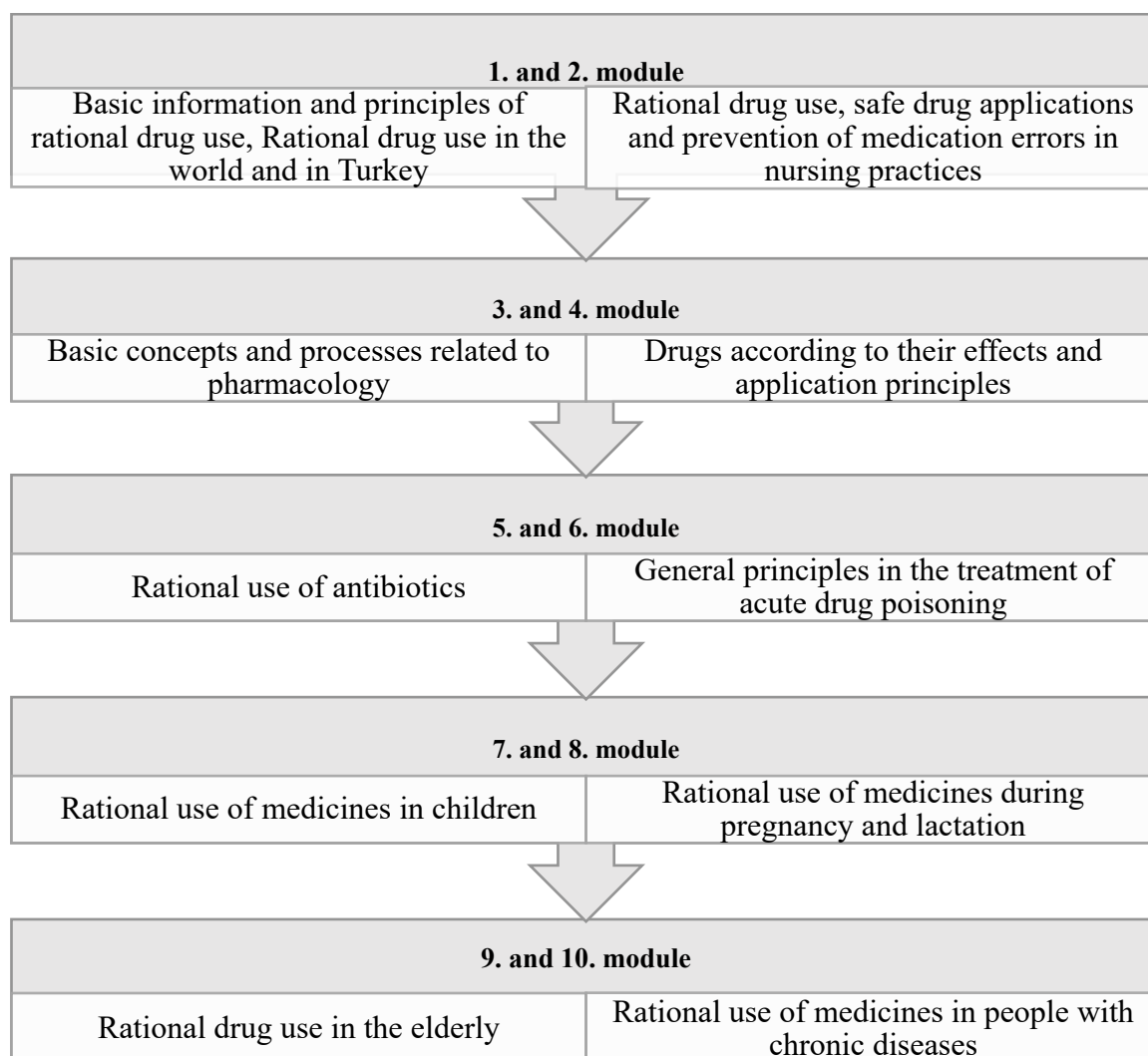


Figure I. Education Modules and Contents

Execution of the Education Program

The education program comprises ten modules spanning one hour, emphasizing interactive educational techniques to foster student engagement. In-class group discussions were facilitated to encourage active participation. Case scenarios about rational antibiotic utilization, pediatric and geriatric drug management, medication use during pregnancy and lactation, management of chronic diseases, and principles of acute drug poisoning treatment were presented to students. Nursing care plans were developed for these scenarios and deliberated through group discussions. Additionally, resources on rational drug utilization were distributed to students through the QR code method.

Data Analysis

Descriptive data were assessed using mean and percentage calculations. Repeated measures multivariate analysis of variance was used to compare mean scores on the Rational Drug Use Self-Awareness Scale between groups, time intervals, and their interaction. Linear regression analysis was used to gauge the degree to which educational interventions predicted changes in self-awareness levels of rational drug use. The multicollinearity between educational attainment and the Rational Drug Use Self-Awareness Scale was evaluated using tolerance and variance inflation factor (VIF) values, with VIF values below 10, tolerance values exceeding 0.2, and condition index values below 15, indicating suitability for inclusion in regression analysis. Power and effect size calculations were derived from the regression analysis. Statistical significance was determined at a confidence level of 95%, with a significance threshold set at $p < 0.05$.

Ethical Considerations

Written permission was obtained from the Dean's Office of the Faculty of Health Sciences of the university to conduct the study. In addition, permission was obtained from the owner of the Rational Drug Use Self-Awareness Scale via e-mail. In addition, written and verbal permissions were obtained by interviewing the participants and informing them about the purpose of the study. Ethics committee permission was obtained from a university's Scientific Research and Publication Ethics Committee (decision dated 05.12.2023 and numbered 8/18).

Results

The mean age of the students participating in the study was 21.40 ± 2.14 years in the experimental group and 21.60 ± 2.21 in the control group. 56.8% of the students in the experimental group and 57.9% of the students in the control group were female. All descriptive characteristics of nursing students are presented in Table 1.

Table 1. *Descriptive Characteristics of Nursing Students*

Descriptive Characteristics		Experimental Group (n=88)		Control Group (n=88)				
		Mean	SD	Mean	SD			
Age		21.40	2.14	21.60	2.21			
		n	%	n	%	X²	df	P
Gender	Woman	50	56.8	51	57.9	1.620	1	0.629
	Man	38	43.2	37	42.1			
Presence of chronic disease	Yes	10	11.3	12	13.6	1.530	1	0.532
	No	78	88.7	76	86.4			
Taking medications on time	Yes	60	68.1	64	72.7	1.567	1	0.388
	No	28	31.9	24	27.3			
Behavior when forgetting to take the medicine on time	Please don't use it as soon as you notice	30	34.1	20	22.7	0.058	1	0.662
	Waiting for the next medication time	10	11.3	18	20.5			
	Do nothing	48	54.6	50	56.8			
Being careful not to take medicines with foods that may interact with them	Yes	24	27.3	20	22.7	1.331	1	0.332
	No	64	72.7	68	77.3			
Medication use in the last month	Yes	46	52.3	40	45.5	1.464	1	0.519
	No	42	47.7	48	54.5			
If yes, the prescription status of the medication used in the last month	Yes	12		10		1.732	1	0.432
	No	76		78				
Reading the package insert of the medicines used	Yes	25	13.6	26	29.5	1.462	1	0.328
	No	63	86.4	62	70.5			
Use of medication other than doctor's recommendation	Yes	58	65.9	50	56.8	0.168	1	0.592
	No	30	34.1	38	43.2			
Utilization of surplus medicines	Refrigerator storage	25	28.4	31	35.2	1.390	1	0.348
	Do not throw in the trash	43	48.8	39	44.3			
	Giving to family health center	10	11.4	10	11.4			
	Other	10	11.4	8	9.1			
Behavior when the medication has side effects	Applying for a doctor	31	35.2	32	36.4	1.520	1	0.769
	Do nothing.	22	25.0	19	21.6			
	Trying to cope on your own	35	39.8	37	42.0			

SD: Standard deviation

It was investigated if the mean scores of the first, second, and third subdimensions differed from the total scores of the experimental and control groups, which included nursing students, on the rational drug use self-awareness scale. It was determined that there was a statistically significant difference between the mean scores in terms of group interaction, time, and group * time and group*time interaction ($p < 0.05$; Table 2). A significant difference was identified in the scale mean score of nursing students in the experimental group before and after the education, with a statistically significant increase in mean scores post-training compared to pre-education. On the contrary, no change was observed in the mean score of the scale of the control group before and after the education.

Table 2. Comparison of the Experimental and Control Groups' Total Consciousness Scale Towards Rational Drug Use Means

Time Group		Pre-test X±SD	Post-test 1 X±SD	Post-test 2 X±SD	F		p	Partial Eta ²	Observed Power
Rational Drug Use Self-Awareness Scale Awareness of being informed correctly score	Control Group	18.22 ± 1.62	18.14 ± 1.58	18.16 ± 1.60	Group*Time	26.145	0.000	0.286	0.965
	Experimental Group	18.04 ± 1.61	36.44 ± 3.25	36.28 ± 3.02		24.400	0.000	0.327	1.000
Rational Drug Use Self-Awareness Scale	Control Group	9.18 ± 0.89	9.17 ± 0.82	9.18 ± 0.88	Group*Time	10.897	0.001	0.125	0.985
	Experimental Group	9.19 ± 0.87	17.41 ± 1.98	16.89 ± 1.75		19.145	0.000	0.278	0.962
Correct Medication Awareness Score	Control Group	5.20 ± 0.46	5.21 ± 0.49	5.19 ± 0.44	Group*Time	18.500	0.000	0.324	1.000
	Experimental Group	5.44 ± 0.45	12.94 ± 1.66	12.48 ± 1.52		10.267	0.001	0.122	0.980
Rational Drug Use Self-Awareness Scale	Control Group	32.60 ± 2.97	32.52 ± 2.89	32.53 ± 2.92	Group*Time	15.145	0.000	0.288	0.960
	Experimental Group	32.67 ± 2.93	66.79 ± 6.89	65.65 ± 6.29		14.600	0.000	0.325	1.000
						10.162	0.001	0.124	0.982
						32.145	0.000	0.290	0.970
						30.600	0.000	0.328	1.000
						15.176	0.001	0.130	0.990

SD: Standard deviation

The education program investigated the rate of change in the level of the rational drug use self-awareness scale among nursing students (Table 3). The findings revealed that the education program represented 45% of the variance ($R^2=0.455$) in the observed increase in the level of the rational drug use self-awareness scale. Moreover, participation in education was associated with a 0.552 coefficient increase in the Rational Drug Use Self-Awareness Scale score.

Table 3. *The predictive power of the education program on Consciousness Scale Towards Rational Drug Use change according to the self-evaluations of nursing students*

Variable	Consciousness Scale Towards Rational Drug Use						
	B	SE	β	t	p	95% Confidence interval	
						Lower	Upper
Study*	0.882	0.455	0.552	2.346	0.000	1.264	2.635
R	0.427						
R ²	0.455						
Adjusted R ²	0.382						
F	6.876						
P	0.001						
DW	1.909						

*When coding the study program, the intervention group was coded as "1" and the control group as "0."

DW: Durbin Watson; B: Unstandardized Beta; SE: Standard Error; β : Standardized Beta β ; R: Correlation; R²: Correlation Coefficient (Explained Variance Rate); F: Model Statistic; p: Significance Level

The power and effect size of the study were evaluated according to regression analysis. For the Rational Drug Use Self-Awareness Scale, the power was 0.99 and the effect size (f^2) was 0.960.

Discussion

The experimental group's post-test 1 and 2 mean scores were higher than the pre-test mean scores in this study, even though the control group's pre-test and post-test mean scores on the rational drug use self-awareness scale's first subdimension, second subdimension, third subdimension, and total scale were comparable. In the existing literature, numerous studies focus on the rational use of drugs among nursing students, frequently employing descriptive methods to assess the current state of rational drug use or correlational approaches to examine the relationships with different variables. It was determined that studies that examined the effect of rational drug use education on the level of rational drug use knowledge were limited.¹³⁻¹⁵ No studies investigating the impact of rational drug use education on the level of self-awareness of rational drug use were located. However, within the literature exploring educational interventions and their influence on the rational drug use levels among nursing students, Mutlu et al. (2023) emphasize the efficacy of a two-stage rational drug use peer education program, comprising sessions lasting 50 and 30 minutes, augmenting the rational drug use knowledge of senior nursing students.¹³ In another study, senior nursing students were given education on rational drug use, but the results of the education were discussed within the framework of patient safety.¹⁶ In the study of Özbaş et al. (2024), web-based rational drug use education was applied to nursing students and it was determined that the education program increased the knowledge level of rational drug use.¹⁵ Similar to our study, various interactive learning methods were employed in these investigations, albeit with the primary objective of enhancing nursing students' knowledge regarding rational drug use. However, our study uniquely concluded that the incorporation of the correlation between rational drug use and self-awareness into the educational program content resulted in a notable increase in students' self-awareness levels.

Studies focusing on rational drug use among students in health-related fields underscore the importance of increasing both knowledge and awareness levels about this topic. Furthermore, they advocate for future

investigations to be meticulously designed, incorporating diverse variables and methodologies within specific cohorts such as nursing, midwifery, and other relevant disciplines.^{4,7,9,11,14} This study posits that implementing a program that prominently highlights self-awareness in rational drug use, employing interactive educational methodologies, engaging in the nursing care plan development process with case discussions, and facilitating group discussions to address students' queries were instrumental in enhancing the mean scores of the experimental group post-training. Within nursing education, it is contended that interactive educational models such as group discussions, nursing care plan creation, case-based sessions, and video presentations serve to fortify learning outcomes and play a pivotal role in augmenting students' knowledge and clinical competencies.¹⁷

In this study, the education program explained 45% of the increase in the level of self-awareness of rational drug use, and receiving education increased the level of self-awareness of rational drug use of students 0.552 times (Table 3). No literature was found delineating the proportion of change in rational drug use self-awareness levels influenced by rational drug use education programs. Although scholarly attention has not been directed toward quantifying this percentage, the literature is abounding with numerous studies investigating the determinants that affect rational drug use.^{7-9,11,14} Within the literature, there is a consensus on the efficacy of rational drug use education methods in enhancing student self-awareness. In particular, interactive approaches such as case sessions, video presentations, and group discussions used during education have been underscored for their role in fostering enduring educational retention.^{13,15} Furthermore, the literature reveals a wide range of factors, including sociodemographic variables, rational drug use education status, living environment, drug use habits, healthy lifestyle behaviors, and health responsibility, that exert influence on the level of self-awareness of rational drug use.^{4,9,18-20} Therefore, the observed 45% increase in nursing students' level of self-awareness level of rational drug use through the education program underscores a commendable outcome, given the multifaceted nature of variables influencing this domain, attesting to the effectiveness of the study. The efficacy of the education program can be attributed to its targeted focus on a specific cohort of nursing students actively involved in medication administration, comprehensive coverage of all pertinent topics related to rational drug use, and the use of interactive pedagogical methods such as group discussions, case analysis, and the development of nursing care plans. Furthermore, Chaturvedi et al.'s (2012) study underscores pivotal themes integral to rational drug use education programs, including fostering rational drug use behavior, elucidating drug classifications and application principles, delineating rational drug use across diverse populations, and promoting self-management strategies.²¹ These foundational issues are also underscored in the World Health Organization's publications concerning the rational use of medicines.^{2,22} In this study, it is thought that including the basic topics recommended by the literature increases the effectiveness of education.

According to the power and effect size analysis, this study focused on health literacy and healthy lifestyle. Power indicates the statistical significance of the study. The effect size gives information about the application/clinical significance^{23,24} and (f2) $0.02 \leq f2 < 0.15$ is classified as a small effect, $0.15 \leq f2 < 0.35$ is classified as a medium effect, and $0.35 \geq$ is classified as a significant effect. Given these findings, the effect size for the self-awareness variable of rational drug use in this study exceeds 0.80, denoting a robust effect size with substantial clinical significance. In particular, there is a shortage of literature specifying the power and effect size of health literacy education programs. These outcomes affirm the feasibility and efficacy of the study.

Limitations

The absence of a randomized controlled methodology, attributed to the single-center nature of the study, decreases its generalizability to all populations of nursing students. Furthermore, since this investigation exclusively involved undergraduate nursing students, extrapolating findings to their graduate-level counterparts would be inappropriate.

Contribution to Nursing Practice

In this study, the rational drug use education program effectively elevated the self-awareness level of nursing students. However, continuous online education initiatives are crucial to mitigate the potential for long-term knowledge decline. Sustaining such programs can enhance student awareness and promote safe drug use practices. Additionally, it is advisable to institute guidance and counseling programs aimed at enhancing rational drug use behaviors among nursing students. Assigning students roles and responsibilities in projects geared towards public awareness campaigns on this issue can further bolster initiatives. Moreover, concerted efforts should be made to heighten public awareness regarding rational drug use through various media platforms. Given the substantial impact of rational drug use on healthcare quality and patient safety, integration of this topic into quality assurance and accreditation endeavors within our country is recommended.

Conclusion

Conclusively, the rational drug use education program emerged as an effective means for nursing students to cultivate self-awareness regarding rational drug use, thus contributing to the scholarly discourse within the country and globally, as well as nursing education. Addressing the pressing public health concern of irrational drug use requires the competence of nurses and nursing students. The findings of this study underscore the potential of the educational regimen employed in improving the self-awareness of nursing students, key agents in the provision of healthcare services, as educators, counselors, and leaders in rational drug use practices. Therefore, it is advocated that rational drug use education be integrated into nursing undergraduate curricula as a specialized course, employing interactive educational models. Future research efforts should prioritize randomized controlled trials of high methodological quality, exploring various educational methodologies, and encompassing larger sample sizes to facilitate more precise elucidation of results.

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