



# Knowledge and Attitude of Iranian Nurses toward Pressure Ulcers: A Systematic Review and Meta-Analysis

Masoud Dayani<sup>1</sup> , Abdol-Rahim Biojmajd<sup>2</sup>, Zahra Dayani<sup>3</sup>, Naimeh Pourramezani<sup>4</sup>, Iman Nosratabadi<sup>4\*</sup> 

<sup>1</sup>Department of Nursing, Sirjan School of Medical Sciences, Sirjan, Iran

<sup>2</sup>Emam Khomeini University Hospital of Urmia, Urmia University of Medical Sciences, Urmia, Iran

<sup>3</sup>Samen Al-Hojaj Hospital of Sirjan, Sirjan School of Medical Sciences, Sirjan, Iran

<sup>4</sup>Department of Nursing, Sirjan School of Medical Sciences, Sirjan, Iran

\*Corresponding Author: Iman Nosratabadi, Email: [Nosratabadi.iman@yahoo.com](mailto:Nosratabadi.iman@yahoo.com)

## Abstract

**Background:** Pressure ulcers are major complications that increase hospitalization costs and extend the length of stay. Their occurrence is widely considered an indicator of the quality of nursing care. Given the essential role of nurses in the prevention and management of pressure ulcers, this study aimed to evaluate the knowledge and attitudes of Iranian nurses toward pressure ulcers through a systematic review and meta-analysis.

**Methods:** In this systematic review and meta-analysis, articles were retrieved from PubMed, Scopus, ScienceDirect, and Web of Science using a combination of keywords including “knowledge,” “attitude,” “pressure ulcer,” “nurse,” “Iran,” and their Persian equivalents up to the end of May 2023. Cross-sectional studies reporting the knowledge score (defined as the mean percentage of correct responses to standardized questions regarding the definition, causes, prevention, diagnosis, and management of pressure ulcers) and attitude score (defined as the mean percentage of favorable responses to standardized questions concerning the importance of prevention, responsibility, and willingness to implement prevention protocols) among Iranian nurses were included. Study quality was assessed using the Joanna Briggs Institute (JBI) checklist, and data were analyzed using a random-effects model.

**Results:** A total of 12 studies were included in the final analysis. The pooled knowledge score of Iranian nurses regarding pressure ulcers was 55% (95% CI: 40–70;  $I^2=99.8\%$ ). The pooled attitude score was 46% (95% CI: 33–59;  $I^2=96.0\%$ ). In addition, 52% of nurses (95% CI: 31–73;  $I^2=98.0\%$ ) had participated in pressure ulcer training programs. Meta-regression analysis indicated a linear association between study quality, sample size, year of publication, and the knowledge and attitude scores.

**Conclusion:** The knowledge and attitudes of Iranian nurses toward pressure ulcers are suboptimal, with approximately half lacking adequate knowledge and appropriate attitudes in this area. Therefore, implementing structured educational programs is essential to enhance nurses’ competencies in pressure ulcer prevention and management.

**Keywords:** Attitude, Knowledge, Bedsores, Pressure ulcer, Meta-analysis

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## Introduction

Pressure ulcers have long been recognized as a significant and challenging issue within healthcare systems(1). The occurrence of pressure ulcers among hospitalized patients is considered a patient safety threat (2, 3). Patients admitted to intensive care units (ICUs), due to the administration of sedative medications that reduce their level of consciousness and their dependence on medical devices, experience restricted mobility and are therefore at heightened risk for developing pressure ulcers(3, 4). The prevalence of pressure ulcers has been reported as 19% in Iran; between 11% and 14% in the United States; 25.1% in Canada; and approximately 18.1% in several European countries (2, 5). In other developing nations, such as India, the prevalence of pressure ulcers in hospitals has been reported at approximately 14.8% (6). In Brazil, this rate has

been estimated to be around 15.5% in intensive care units (7). Moreover, studies in African countries indicate that the prevalence of pressure ulcers in healthcare facilities ranges from 3.4% to 18.6% (8). These variations may be attributed to multiple factors, including the quality of healthcare services, access to resources, and the level of training among medical personnel.

The development of pressure ulcers in hospitalized patients is a complex and multifactorial complication, and identifying individuals at risk is critical for preventing such adverse events(9). Mortality among patients who develop pressure ulcers is reported to be two to six times higher than in those without them (10). Nurses’ knowledge and awareness regarding pressure ulcer prevention play a vital role in the management of this condition within clinical settings. Insufficient knowledge or limited awareness



among nurses can negatively affect their performance (11). The nursing team is primarily responsible for maintaining patients' skin integrity and implementing appropriate preventative measures against pressure ulcer development. Nurses' attitudes and knowledge regarding pressure ulcers are closely associated with their clinical performance and adherence to recommended preventive practices(12).

Inadequate knowledge regarding pressure ulcer prevention has been observed among nurses(13). Studies show mixed findings: some report satisfactory knowledge levels, while others indicate inadequate understanding. A study conducted by Farzi et al. in Isfahan demonstrated that insufficient knowledge and negative attitudes adversely affected nurses' performance(14). Similarly, in Turkey, nurses working in intensive care units were reported to have inadequate knowledge of pressure ulcer prevention (15). Educational interventions aimed at enhancing nurses' knowledge of pressure ulcer prevention methods have been shown to significantly reduce the incidence of these ulcers and improve the quality of care provided (16, 17).

This systematic review and meta-analysis aimed to evaluate the knowledge and attitudes of Iranian nurses regarding pressure ulcers, to propose practical strategies to improve the management of this complication within the Iranian healthcare system.

## Materials and Methods

This study aimed to evaluate the knowledge and attitudes

of Iranian nurses regarding pressure ulcers through a systematic review and meta-analysis of articles published in national and international journals up to May 2023. The study was designed in accordance with the PRISMA checklist (18) (Figure 1). In this study, the knowledge score was defined as the mean percentage of correct responses provided by nurses to questions related to the definition, causes, prevention, diagnosis, and management of pressure ulcers, as measured by standardized knowledge assessment tools. The attitude score was defined as the mean percentage of positive or desirable responses by nurses to questions regarding the importance of prevention, responsibility in care, and willingness to implement pressure ulcer prevention protocols, as assessed by standardized attitude measurement instruments.

Four electronic databases (PubMed, Scopus, Web of Science, and ScienceDirect) and one search engine (Google Scholar) were systematically searched. Due to the non-systematic structure of Google Scholar, only the first 25 pages were reviewed (19). Database searches were conducted using both Persian and English equivalents of keywords such as "knowledge," "attitude," "pressure ulcer," "nurse," "Iran," and other related terms. Moreover, the reference lists of included articles were examined to identify further relevant studies.

The inclusion criteria were as follows: studies published in Persian or English; cross-sectional design; and reporting knowledge scores, attitude scores, or both. The exclusion criteria were studies published in languages other than Persian or English; studies focusing specifically on

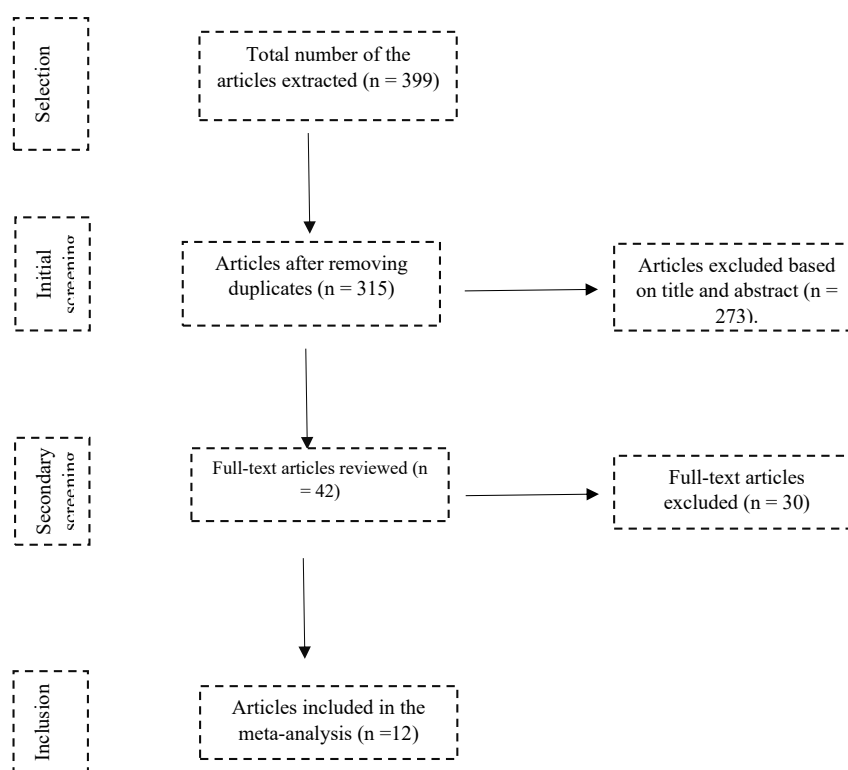


Figure 1. Study Selection Process for Inclusion in the Review

students or other healthcare personnel; articles for which the full text was unavailable; qualitative, review, and case-control studies; and studies lacking data on knowledge or attitudes toward pressure ulcers.

Initially, all identified articles were imported into EndNote, and duplicates were removed. Two researchers independently screened titles and abstracts according to the inclusion criteria. Discrepancies were resolved by consultation with a third researcher. Subsequently, the full texts of eligible studies were reviewed, and relevant data, including author, publication year, knowledge score, attitude score, gender, and training regarding pressure ulcers, were extracted.

The quality of all included studies was assessed using the Joanna Briggs Institute (JBI) checklist for cross-sectional studies, which evaluates nine domains. An overall score above 7 indicates high quality, 4–6 indicates moderate quality, and below 3 indicates low quality. Two researchers independently conducted the quality assessment, and disagreements were resolved by a third reviewer.

Weighted means were used to synthesize data, with weights assigned to each study inversely proportional to its variance. Data heterogeneity was assessed using the  $I^2$  statistic and classified as follows:  $I^2 < 25%$  (low heterogeneity),  $I^2 = 25\text{--}75%$  (moderate heterogeneity), and  $I^2 > 75%$  (high heterogeneity). Given that the  $I^2$  index exceeded 75%, a random-effects model was used for data analysis. Statistical analyses were performed using Stata software (version 16), and forest and funnel plots were generated with this software. To evaluate the effects of publication year, study quality, and sample size on the pooled scores, meta-regression analyses were conducted. Publication bias was assessed using Egger’s test.

**Results**

Initially, a total of 399 articles were identified through database searches. After removing 84 duplicates, 315 articles remained. Following title and abstract screening, 42 articles were deemed relevant to the study topic. Subsequently, 30 articles were excluded for not meeting the inclusion criteria, resulting in 12 studies being included in the systematic review and meta-analysis (Figure 2).

Ultimately, 12 articles were analyzed, of which 5 studies focused on knowledge, 2 studies on attitude, and 5 studies examined both constructs (Table 1). Knowledge was defined in these studies as the mean percentage of correct responses by nurses to standardized questions regarding the definition, causes, prevention, diagnosis, and management of pressure ulcers. Attitude was defined as the mean percentage of positive or desirable responses to standardized questions regarding the importance of prevention, accountability in care, and willingness to implement pressure ulcer prevention protocols. However, the instruments used across these studies differed in terms of the number of items and scoring scales, which was recognized as a source of heterogeneity in the results. The total sample included 1,865 nurses (mean = 155.4 nurses per study), of whom 1,501 (80.4%) were female, and 364 (19.6%) were male (Table 1).

The standardized knowledge scores of nurses regarding pressure ulcers ranged from 0.2 in the study by Pasandideh et al. (16) to 75.7 in the study by Saifollahi et al. (22). Based on the random-effects model, the pooled knowledge score of Iranian nurses regarding pressure ulcers was 55% (95% CI: 40, 70;  $I^2 = 99.8%$ ) (Figure 2). The observed high heterogeneity ( $I^2 = 99.8%$ ) indicates substantial differences across studies, which may be attributed to variations

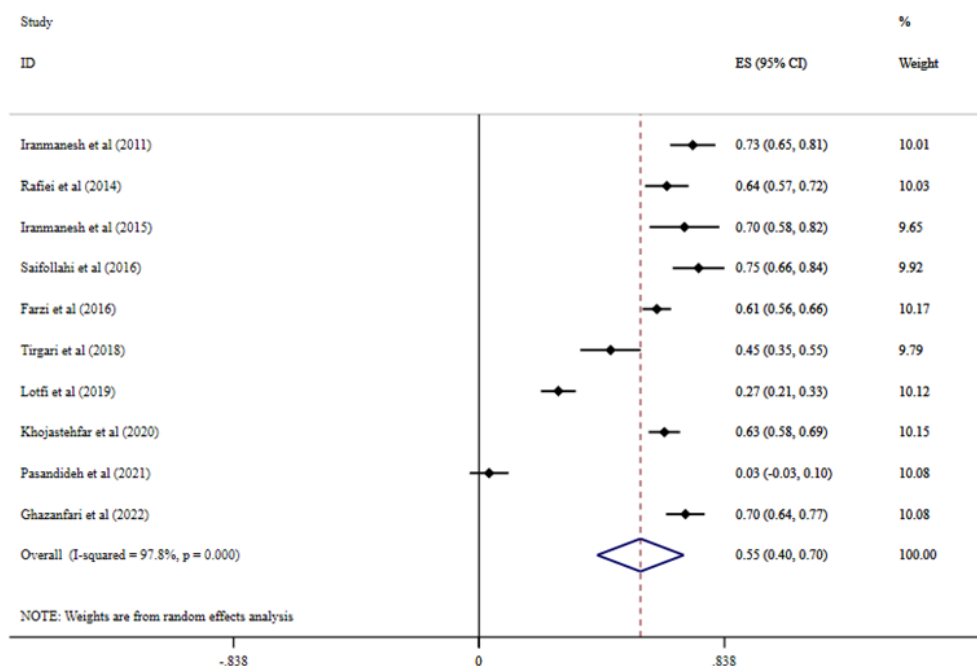


Figure 2. Knowledge scores of Iranian nurses regarding pressure ulcers

**Table 1.** Characteristics of studies examining Iranian nurses' knowledge and attitudes toward pressure ulcers

Author	Year	Sample Size	Female/ Male	Knowledge Score (Standardized)	Knowledge Questionnaire	Attitude Score (Standardized)	Attitude Questionnaire	Publication Language	Study Quality	Province/ Region
Tirgari (20)	2018	89	65/24	44.6	PUKT	57.6	APUP	English	Moderate	Sistan & Baluchestan
Khojastehfar (21)	2020	308	257/51	63.4	PUKT	39.4	APUP	English	Good	Tehran
Saifollahi (22)	2016	92	82/10	75.7	PUKT	–	–	Persian	Moderate	Tehran
Lotfi (23)	2019	214	189/25	27.2	PPURT	38.5	APUP	English	Good	East Azerbaijan
Tayebi (24)	2020	110	103/7	–	–	36.13	Moore & Price	English	Moderate	Qazvin
Ghazanfari (25)	2022	183	103/80	70.5	PPUKT	52.8	APUP	English	Moderate	Mazandaran
Pasandideh (16)	2021	29	28/1	0.2	PUKT	–	–	Persian	Poor	Bojnord
Farzi (14)	2016	382	299/83	60.9	PUKT	61.4	Researcher-made questionnaire	Persian	Good	Isfahan
Iranmanesh (3)	2011	126	111/15	73.41	PUKT	–	–	English	Good	Kerman-Sistan & Baluchestan
Azimian (26)	2018	116	97/19	–	–	50.1	Moore & Price	English	Moderate	Qazvin
Iranmanesh (27)	2013	57	39/18	70.1	PUKT	–	–	English	Moderate	Shahr-e-Kord/ Kerman
Tayebi (24)	2014	159	128/31	64.6	PUKT	–	–	English	Moderate	Shahr-e-Kord/ Kerman
Overall	–	1865	1501/364	55.2	–	45.9				

in measurement tools, sample sizes, study quality, or characteristics of the study populations. Meta-regression analyses revealed a declining trend in knowledge scores over time; however, larger sample sizes and higher-quality studies were associated with increased knowledge scores (Table 2).

The standardized attitude scores of nurses toward pressure ulcers ranged from 36.1 in the study by Tayebi (24) to 61.4 in the study by Farzi et al. (14). Using the random-effects model, the pooled attitude score of Iranian nurses toward pressure ulcers was 46% (95% CI: 33, 59;  $I^2=96.0\%$ ) (Figure 3). The high observed heterogeneity ( $I^2=96.0\%$ ) in attitude scores was attributed to differences in measurement instruments, sampling methods, and regional or educational characteristics of the nurses. Meta-regression analyses showed an increasing trend in attitude scores over time, whereas larger sample sizes and higher-quality studies were associated with a decrease in attitude scores (Table 2).

Moreover, the frequency of nurses who had participated in pressure ulcer training programs was examined. The pooled proportion of nurses who had received training in pressure ulcer prevention was 52% (95% CI: 31, 73;  $I^2=98.0\%$ ) (Figure 4). The high heterogeneity observed ( $I^2=98.0\%$ ) in this analysis was attributed to differences in the definition of training, duration of training programs, and reporting methods across studies.

Publication bias for nurses' knowledge and attitude scores regarding pressure ulcers was assessed using funnel

**Table 2.** Meta-regression of knowledge and attitudes toward pressure ulcers among Iranian nurses

Variable		Coefficients	Std. Error	P value
Knowledge	Sample Size	0.0194706	0.0944474	0.842
	Year of Publication	-0.1723478	0.1921484	0.400
	Study Quality	0.1345365	0.1128391	0.267
Attitude	Sample Size	-0.0817763	0.0806948	0.357
	Year of Publication	0.1384467	0.1638716	0.437
	Study Quality	-0.0986987	0.1158053	0.433

plots, which demonstrated features indicative of symmetry (Figures 5 and 6). Consequently, Egger's tests were conducted to evaluate potential publication bias. Based on Egger's test results, the publication bias for nurses' knowledge was  $P > |t| = 0.213$  and for nurses' attitude was  $P > |t| = 0.188$  (Table 3). These findings showed no evidence of publication bias for either knowledge or attitude scores among nurses regarding pressure ulcers.

## Discussion

The findings from this study revealed that the average knowledge score of Iranian nurses regarding pressure ulcers was 55% (95% CI: 40, 70;  $I^2=99.8\%$ ) and their average attitude score was 46% (95% CI: 33, 59;  $I^2=96.0\%$ ), both of which are at suboptimal levels. These results underscore the urgent need to enhance nurse education and improve attitudes to effectively prevent pressure ulcers.

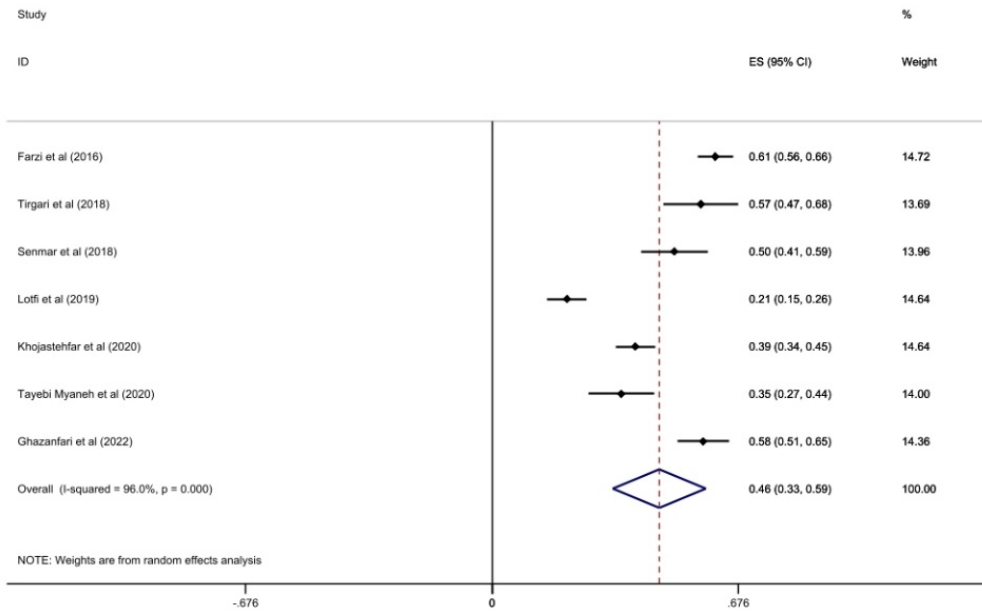


Figure 3. Attitude scores of Iranian nurses regarding pressure ulcers

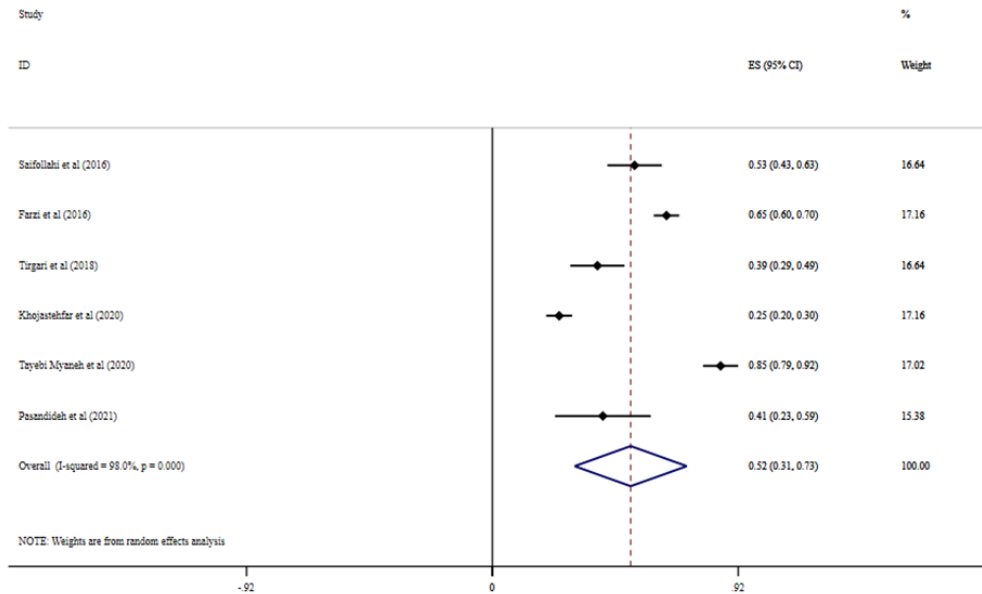


Figure 4. Frequency of Iranian nurses who participated in pressure ulcer training courses

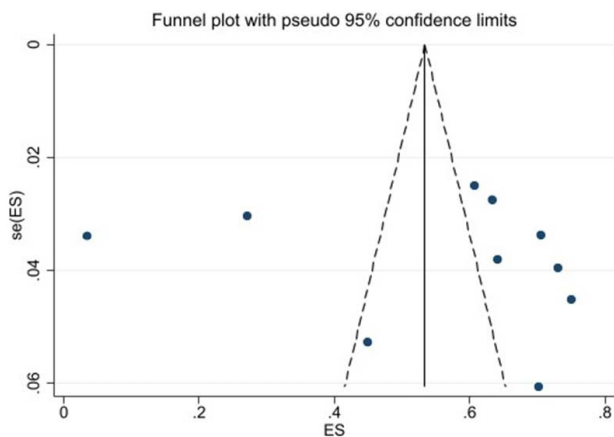


Figure 5. Funnel plot assessing publication bias for nurses' knowledge regarding pressure ulcers

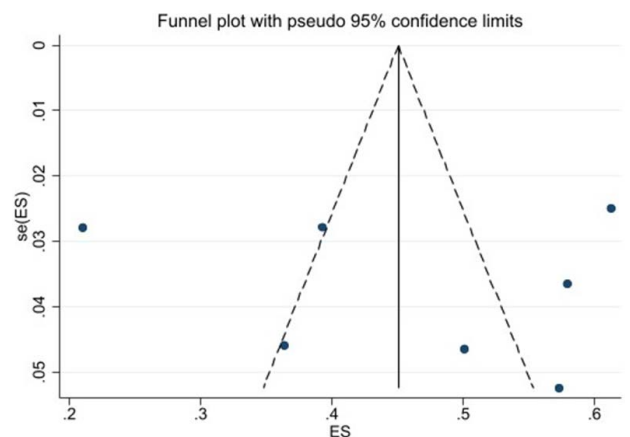


Figure 6. Funnel plot assessing publication bias for nurses' attitudes regarding pressure ulcers

**Table 3.** Publication bias tests for knowledge and attitudes toward pressure ulcers among Iranian nurses

Variable	Test	P value
Knowledge	Egger	0.213
	Begg	0.858
Attitude	Egger	0.188
	Begg	0.881

These findings are consistent with studies conducted by Farzi et al. in Iran (14), Chianca in Brazil (28), Enein et al. in Egypt (2), and Beeckman et al. in Belgium (29), indicating that insufficient knowledge among nurses about pressure ulcers necessitates continuous education, evaluation, and follow-up. Furthermore, the data from the present study suggest that the knowledge level of Iranian nurses is lower than that reported in studies by Strand et al. (30) in Sweden and Tweed et al. (1) in New Zealand. This discrepancy may arise from multiple factors, including access to continuous education, differences in health system standards, variations in assessment instruments, or the greater emphasis in developed countries on adherence to pressure ulcer prevention protocols. For example, in developed countries such as Sweden, standardized and regular educational programs, along with stricter nursing care standards, may contribute to higher knowledge levels (31). Although an average knowledge score of 55% may appear acceptable, given the critical importance of pressure ulcer prevention and its impact on patient safety, this level of knowledge is considered inadequate. International standards, such as the NICE guidelines, recommend knowledge levels exceeding 70% for effective care (32). Thus, the 55% knowledge level among Iranian nurses indicates a significant gap from recommended standards, necessitating urgent attention.

The mean attitude score of Iranian nurses toward pressure ulcers was 46%, reflecting a suboptimal level of attitude that could negatively impact the quality of care and prevention practices. These findings are aligned with studies conducted by Etafa et al. in Ethiopia (33), Khojastehfar et al. in Iran (21), and Kaddourah et al. in Saudi Arabia (34). Conversely, nurses' attitudes toward pressure ulcers reported in studies by Liu et al. in the UK (35) and Farzi et al. in Iran (14) were higher than in the present study. These differences may be attributed to variations in study year, measurement tools, and the populations examined. For instance, in the UK, an emphasis on professional accountability culture and evidence-based training may have fostered more positive attitudes. These discrepancies highlight the necessity of further examining cultural, educational, and organizational factors influencing nurses' attitudes (36).

The findings further indicated that only 52% (95% CI: 31, 73;  $I^2=98.0\%$ ) of Iranian nurses had participated in educational courses on pressure ulcers. This limited

participation may be one of the main reasons for the inadequate knowledge and attitudes observed among nurses. Attendance in educational programs enhances nurses' knowledge and skills in the prevention and management of pressure ulcers and can positively influence their attitudes toward the importance of this condition (37,38). Such courses, by introducing evidence-based and contemporary practices, enable nurses to move beyond reliance on personal experience and improve the quality of care.

The limitations of the present study may affect the interpretation of the findings. First, this study was limited to Iranian articles and did not include direct comparisons with other countries, which restricted a more comprehensive analysis of global differences. Second, the lack of detailed demographic information (such as age, work experience, or education level) in the included studies hindered subgroup analyses that could have clarified factors influencing nurses' knowledge and attitudes. Third, the study focused exclusively on nurses, limiting the generalizability of the findings to other healthcare professional groups. The high observed heterogeneity ( $I^2 > 96\%$ ) also reflects differences in assessment tools, sampling methods, or study quality, which may affect the precision of the results. Accordingly, future studies need to employ standardized and uniform instruments for evaluating knowledge and attitudes, report more detailed demographic information, and prioritize ongoing educational programs for nurses to improve their competence in pressure ulcer prevention and management.

### Conclusion

The findings from the present study indicated that only approximately half of Iranian nurses possess adequate knowledge and attitudes regarding pressure ulcers. Given the impact of pressure ulcers on hospital length of stay and healthcare costs, it can be anticipated that the incidence of these ulcers will decrease when nurses' knowledge and attitudes improve. Health administrators in Iran should, therefore, implement appropriate planning, provide educational courses, and support early-career nurses to enhance their knowledge and attitudes toward pressure ulcer prevention and management.

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### Authors' Contribution

Conceptualization and design: Naimeh Pourramezani, Iman Nosratabadi.

Data Curation: Masoud Dayani, Abdol-Rahim Biojmajd, Zahra Dayani, Naimeh Pourramezani, Iman Nosratabadi.

Formal analysis: Masoud Dayani, Abdol-Rahim Biojmajd, Zahra Dayani.

Investigation: Masoud Dayani, Abdol-Rahim Biojmajd, Zahra

Dayani, Naimeh Pourramezani, Iman Nosratabadi.  
Methodology: Masoud Dayani, Abdol-Rahim Biojmajd, Zahra Dayani.

Project administration: Iman Nosratabadi.

Supervision: Iman Nosratabadi.

Writing—original draft: Masoud Dayani, Abdol-Rahim Biojmajd.

Writing—review & editing: Masoud Dayani, Abdol-Rahim Biojmajd, Zahra Dayani, Naimeh Pourramezani, Iman Nosratabadi.

### Competing Interests

The authors declared no conflict of interest regarding the publication of this article.

### Ethical Approval

Not applicable.

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