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Improving Artificial Intelligence Literacy Among Student Nurses: Through Structured Education

Suganya V[1], Savita Hebbal[2], Gayathri H N[3], Naveen Kumar MR[4]

[1]Professor & HOD, Department of Child Health Nursing, Rajarajeswari College of Nursing, Bangalore, India

[2]Assistant Professor, Department of Child Health Nursing, Rajarajeswari College of Nursing, Bangalore, India

[3]Associate Professor, Department of Child Health Nursing, Rajarajeswari College of Nursing, Bangalore, India

[4]Principal, Cambridge college of nursing, Bangalore.

Abstract: ***Artificial Intelligence (AI) is rapidly transforming healthcare and nursing practice by enhancing clinical decision-making, patient care, and healthcare management. Preparing nursing students with adequate knowledge of AI is essential to ensure their readiness for technology-enabled healthcare. Structured educational interventions may improve students' understanding and acceptance of AI in nursing. To evaluate the effectiveness of a structured teaching programme on the knowledge of Artificial Intelligence among student nurses. A pre-experimental one-group pre-test–post-test study was conducted among 507 student nurses selected using a convenience sampling technique. Baseline knowledge regarding Artificial Intelligence was assessed using a structured questionnaire, followed by the implementation of a structured teaching programme. A post-test was conducted using the same instrument to evaluate the changes in knowledge. Descriptive and inferential statistics were used to summarize participants' knowledge levels before and after the intervention. In the pre-test, 84 (16.6%) participants demonstrated excellent knowledge, 64 (12.6%) had adequate knowledge, 239 (47.1%) had moderate knowledge, and 120 (23.7%) had inadequate knowledge regarding Artificial Intelligence. Following the structured teaching programme, the proportion of participants with excellent knowledge increased markedly to 333 (65.8%), while 82 (16.2%) had adequate knowledge. The proportion of participants with moderate knowledge decreased to 91 (17.9%), and those with inadequate knowledge declined to 1 (0.1%). The mean of pre-test is 16.05 and post-test is 21.83 and SD of pre-test is 5.0622 and post-test is 3.3344. The paired "t" test value is 116.086. These findings indicate a substantial improvement in knowledge after the educational intervention. Hence the structured teaching programme effectively enhanced knowledge of Artificial Intelligence among student nurses. Incorporating AI-related educational content into undergraduate nursing curricula may improve digital competence and better prepare future nurses to work in increasingly technology-driven healthcare environments.***

Keywords: Artificial Intelligence; Student Nurses; Nursing Education; Structured Teaching Programme; Knowledge; Educational Intervention.

1. Introduction

Artificial Intelligence (AI) refers to the capability of computer systems to simulate human intelligence by learning from data, recognizing patterns, reasoning, and making decisions to support healthcare professionals in delivering efficient, accurate, and evidence-based patient care[1, 2, 3]. The integration of artificial intelligence (AI) into nursing education represented a transformative shift in teaching and learning approaches. AI-based teaching strategies significantly enhanced various aspects of nursing education, including student engagement, learning outcomes, and preparation for clinical practice[4]

The literature review revealed that the use of AI in nurse education has several potential benefits, including improved student engagement, enhanced clinical reasoning skills, increased efficiency in assessment, and personalized learning experiences. However, challenges such as technological barriers, ethical considerations, and resistance to change need to be addressed for successful integration of AI into nurse education. Further research is needed to explore the long-term impact of AI on student outcomes and to develop evidence-based best practices for implementing AI technologies in nursing education[5]

At the level of individual practitioners and students, attitudes, perceptions, and literacy regarding AI are emerging as critical determinants of adoption. Early evidence suggests that nurses generally have a cautiously positive view of AI's potential, yet significant knowledge gaps and uncertainties persist[6]. Nurses' perceptions of AI appear to vary widely depending on their exposure and experience[7]. Indeed, several key barriers to AI acceptance in healthcare have been documented, including ambiguity in regulations and legal liability, lack of organizational support or training, data privacy and security concerns, and the fear that AI could depersonalize care or make flawed decisions without human oversight[8,9]. In one review, regulatory uncertainties, liability risks, and organizational resistance were identified as significant impediments to healthcare providers' uptake of AI, alongside worries that AI might replace human judgment in critical scenarios or fail to address the empathetic aspects of nursing care [10]. These barriers not only hinder the implementation of AI technologies but can also negatively impact healthcare providers' morale, job satisfaction, and willingness to engage with such innovations[11]

2. Need for the Study

Artificial Intelligence (AI) is transforming healthcare by significantly enhancing nursing practice, improving patient outcomes, and optimizing healthcare delivery. Advanced AI applications enable nurses to make evidence-based clinical decisions, enhance diagnostic accuracy, streamline

administrative workflows, and deliver personalized, patient-centered care. Machine learning facilitates early disease detection and predictive risk assessment, Natural language processing (NLP) improves the accuracy and efficiency of clinical documentation, while robotic technologies enhance patient safety, comfort, and operational efficiency by reducing repetitive tasks. Despite these substantial benefits, successful AI integration into nursing practice requires addressing key challenges, including data privacy and ethical concerns, integration with existing clinical workflows, methodological variability, limited AI-focused curricula, inadequate faculty expertise, insufficient technological infrastructure, and apprehensions regarding workforce displacement.

3. Problem Statement

"Structured teaching programme on knowledge of student nurses on Artificial intelligence across various colleges in Bangalore"

Objectives

1) To assess the level of knowledge regarding Artificial intelligence among student nurses before administering structured teaching programme
2) To find out the effectiveness of structured teaching programme on knowledge on Artificial intelligence among student nurses
3) To associate pre-test knowledge regarding Artificial intelligence among student nurse with their selected demographic variables.

Hypothesis

H_1: There is a significant difference between pre-test and post-test knowledge score on artificial intelligence among student nurses.

H_2: there is a significant association between pre-test level of knowledge on artificial intelligence and selected demographic variables of student nurses.

4. Methodology

Research approach: A quantitative approach was adopted.

Research design: Descriptive research design was adopted.

Population:

Target population: Target population for the present study is student nurses.

Accessible population: Accessible population for the present study is student nurses who are studying in selected colleges of Bangalore.

Sample: Student nurses

Sample size: 507 Student nurses studying in Nursing college across Bangalore

Sampling technique: Convenience sampling technique was used to collect the subject.

Criteria for sample selection:

Inclusion criteria:

- Nursing students who are studying both M.Sc or B.sc
- Those who are studying in selected nursing colleges

Exclusion criteria:

- Nursing students those who attended conference/seminar/ workshop related to AI

Variables:

Demographic variables: The demographic variables of students nurses are age, gender, educational status and sources of information.

Description of tools: The tool was developed with intensive review of journals, text books, internet etc. Structured knowledge questionnaire which consist of 25 questionnaires.

Content validity: The content validity of tool was obtained from various experts.

Reliability: The reliability of the tool was using inter-rater method. Reliability correlation and coefficient value is r= 0.84.

Pilot study: study was conducted among 50 student nurses; non-probability convenience sampling techniques was adopted to select the subject. The permission was obtained from various college principals and informed consent was obtained from participants.

Data Collection Procedure

After obtaining ethical clearance from institutional ethical committee and formal permission from nursing college principals. Informed consent was obtained from student nurses and data collection was started. 507 samples were selected by non-probability convenience sampling techniques. Confidentiality of shared information was assured. The structured knowledge questionnaire was administered to collect the data. Total 25 questions were included related to Artificial intelligence. Thirty minutes was given to each sample to complete the pre-test questionnaire. After one week The same structured knowledge questionnaire was administered to assess the post-test knowledge. The collected data was coded in master coding sheet and analyzed.

Data analysis

Data was analyzed by using descriptive and inferential statistics.

5. Results

Table 1: Frequency and percentage distribution of student nurses based on their demographic variables, (n=507)

S.No	Demographic variables	Frequency	Percentage
1	**Age in years**		
A	21-23	317	62.5
B	24-26	121	23.9
C	27-29	59	11.6
D	30 & Above	10	2
2	**Gender**		
A	Male	146	28.8
B	Female	361	71.2
3	**Educational status**		
A	M.Sc Nursing	83	16.4
B	B.Sc Nursing	424	83.6
4	**Sources of information**		

A	Media	84	16.6
B	Internet	138	27.2
C	Journal	145	28.6
D	Friends	140	27.6

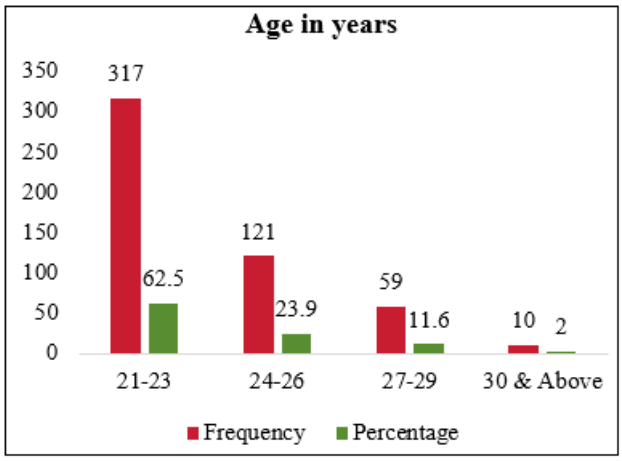

Figure 1: Frequency and percentage distribution based on age

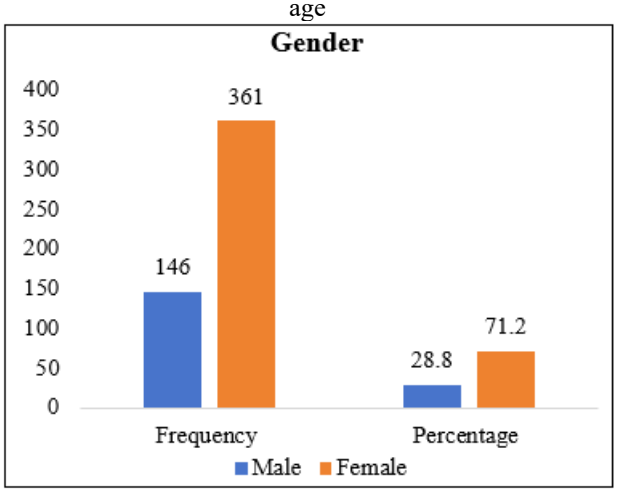

Figure 2: Frequency and percentage distribution based on gender

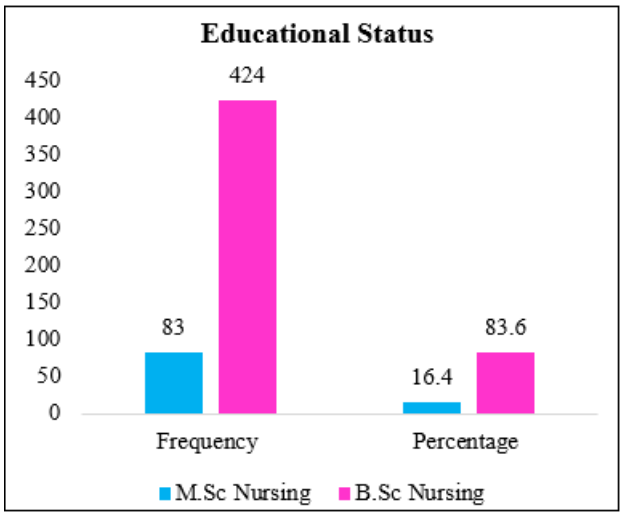

Figure 3: Frequency and percentage distribution based on educational status

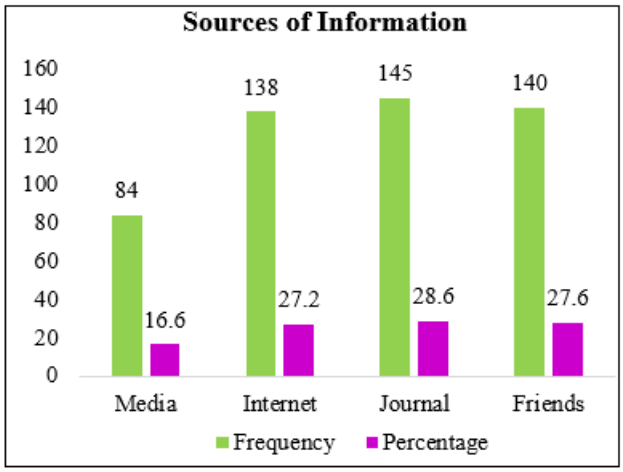

Figure 3: Frequency and percentage distribution based on Sources of information

Table 2: Frequency and percentage distribution of student nurses based on level of knowledge (n=507)

Level of knowledge		Pre-test		Post-test	
		Frequency	Percentage	Frequency	Percentage
A	Inadequate	120	23.7	1	0.1
B	Moderate	239	47.1	91	17.9
C	Adequate	64	12.6	82	16.2
D	Excellent	84	16.6	333	65.8
Total		507	100	507	100

In pretest, 120(23.7%) had inadequate knowledge, 239 (47.1%) had moderate knowledge, 64 (12.6%) had adequate knowledge and 84 (16.6%) had excellent knowledge on Artificial Intelligence. In post-test, 1(0.1%) had inadequate knowledge, 91 (17.9%) had moderate knowledge, 82 (16.2%) had adequate knowledge and 333 (65.8%) had excellent knowledge on Artificial Intelligence.

Table 3: Effectiveness of structured teaching programme on Artificial Intelligence among student nurses, (n=507)

Test	Mean	Mean %	SD	Paired 't' test value
Pre-test	16.05	64.21	5.0622	CV-116.0860 TV-3.390, Df-507 S***, P=0.001
Post-test	21.83	87.35	3.3344	

The pre-test mean knowledge score is 16.05 and post-test mean is 21.83. pre-test SD is 5.0622 and post- test SD is 3.3344. The paired 't' test calculated value is 116.086 which is more than the table value at P=0.001 level. Hence the structured teaching programme is considered as effective. Hence the structured teaching programme is considered as effective. The hypothesis **"there is a significant difference between pre-test and post-test knowledge score on artificial intelligence among student nurses" is accepted.**

Table 4: Association between pre-test level of knowledge on AI and the selected demographic variables of student nurses. (n=507)

S.NO	Demographic data	Inadequate		Moderate		Adequate		Excellent		CHI Square Value
		F	%	F	%	F	%	F	%	
1	Age in years									CV-28.174, TV-21.666, Df-9, S**, P=0.01
A	21-23	70	13.8	136	26.8	50	9.7	61	12	
B	24-26	29	5.7	67	13.2	7	1.4	18	3.6	
C	27-29	14	2.8	34	6.7	6	1.2	5	1	
D	30 & Above	7	1.4	2	0.4	1	0.3	0	0	
2	Gender									CV-1.5438 TV-9.488, Df-4, NS, P=0.05
A	Male	31	6.1	67	13.2	21	4.1	27	5.3	
B	Female	89	17.6	172	33.9	43	8.5	57	11.3	
3	Educational status									CV-1.4351, TV-9.488, Df-4, NS, P=0.05
A	M.Sc Nursing	23	4.5	39	7.7	8	1.6	13	2.7	
B	B.Sc Nursing	97	19.1	200	39.4	56	11	71	14	
4	Sources of information									CV-9.7638, TV-16.919, Df-9, NS P=0.05
A	Media	22	4.3	39	7.7	12	2.4	11	2.2	
B	Internet	32	6.3	71	14	17	3.4	18	3.6	
C	Journal	26	5.1	74	14.6	18	3.6	27	5.3	
D	Friends	40	7.9	55	10.8	17	3.4	28	5.4	

Table.4, shows that, the association between pre-test level of knowledge on Artificial Intelligence and selected demographic variables of student nurses. Age of the student nurse have a significant association between level of knowledge on Artificial intelligence.

6. Discussion:

Objective I: To assess the level of knowledge regarding Artificial intelligence among student nurses before administering structured teaching programme

In pretest, 120(23.7%) had inadequate knowledge, 239 (47.1%) had moderate knowledge, 64 (12.6%) had adequate knowledge and 84 (16.6%) had excellent knowledge on Artificial Intelligence.

A study on knowledge and attitude regarding artificial intelligence into health care education and practice. A cross sectional quantitative study was conducted among 250 nursing students and the result revealed that the mean knowledge score is 14.2/20 which indicate moderate knowledge among student nurses. For attitude domine perceived benefit mean score is 3.8. [14]

Objective II: To find out the effectiveness of structured teaching programme on level of knowledge on Artificial intelligence among student nurses

In pretest, 120(23.7%) had inadequate knowledge, 239 (47.1%) had moderate knowledge, 64 (12.6%) had adequate knowledge and 84 (16.6%) had excellent knowledge on Artificial Intelligence. In post-test, 1(0.1%) had inadequate knowledge, 91 (17.9%) had moderate knowledge, 82 (16.2%) had adequate knowledge and 333 (65.8%) had excellent knowledge on Artificial Intelligence.

The pre-test mean knowledge score is 16.05 and post-test mean is 21.83. pre-test SD is 5.0622 and post- test SD is 3.3344. The paired 't' test calculated value is 116.086 which is more than the table value at P=0.001 level. Hence the structured teaching programme is considered as effective. The hypothesis **"there is a significant difference between pre-test and post-test knowledge score on artificial intelligence among student nurses" is accepted.**

Artificial intelligence (AI) is playing an increasingly important role in transforming healthcare by improving diagnostic precision, enhancing clinical decision-making, and optimizing patient care processes. This study aimed to evaluate the effectiveness of a structured teaching program in enhancing nursing students' knowledge of AI applications in healthcare at a selected college in Coimbatore. A quantitative pre-experimental research design employing a one-group pretest–posttest approach was adopted. Seventy nursing students were recruited using a non-probability convenience sampling technique. Knowledge levels were assessed using a structured questionnaire administered before and after the educational intervention. The collected data were analyzed using descriptive and inferential statistical methods. The findings demonstrated a statistically significant increase in post-test knowledge scores, with a calculated *t*-value of 5.40 ($p < 0.05$), indicating that the teaching program effectively improved participants' understanding of AI in healthcare. The results emphasize the value of structured educational interventions in preparing future nurses to integrate AI technologies into clinical practice. Strengthening AI-related knowledge during nursing education is essential for equipping graduates with the competencies required to adapt to rapidly evolving healthcare technologies, promote evidence-based practice, and contribute to safe, efficient, and innovative patient care.[15]

Objective 3: To associate pre-test level of knowledge on Artificial intelligence among student nurse with their selected demographic variables.

The association between pre-test level of knowledge on Artificial intelligence and selected demographic variables of student nurses. Age of the student nurse have a significant association between the level of knowledge on Artificial intelligence.

Artificial intelligence is rapidly permeating health system, one group pre-test post-test quasi experimental study was conducted to assess AI knowledge acceptance among nursing students. Knowledge increased from 15.01 to 30.33 and acceptance from 67.02 to 122.33. There is no significant difference between education, sex and residence with knowledge level.[16] These findings suggest that gender differences may influence AI acceptance and engagement among nursing students[16]. The hypothesis **"there is a significant association between pre-test level of knowledge on artificial intelligence and selected demographic variables of student nurses" is accepted.**

7. Recommendation

Recommendation for future studies

- Longitudinal studies to evaluate the long-term retention of knowledge and sustained attitudes toward artificial intelligence among nursing students following a structured teaching programme.
- Investigate the relationship between nursing students' knowledge, attitudes, readiness, and actual utilization of AI technologies in clinical practice.
- Randomized controlled trials to determine the effectiveness of structured teaching programmes compared with conventional teaching methods.
- The impact of integrating AI-related content into undergraduate nursing curricula on students' digital competence, clinical decision-making, and readiness for technology-enabled healthcare.
- Examine nursing educators' knowledge, attitudes, and preparedness to teach AI concepts, and evaluate faculty development programmes designed to enhance AI education.
- Investigate the effectiveness of educational interventions in improving nursing students' understanding of ethical, legal, privacy, and professional issues related to AI in healthcare.

8. Conclusion

Artificial intelligence (AI) has the potential to significantly enhance healthcare delivery by improving diagnostic accuracy, supporting clinical decision-making, and promoting personalized, patient-centered care, ultimately leading to better patient outcomes. Despite these advantages, the effective implementation of AI is challenged by concerns related to data privacy, ethical issues, and the limited AI knowledge and competencies of nursing professionals. Insufficient awareness and training among staff nurses may hinder the optimal utilization of AI technologies and restrict the realization of their full benefits in clinical practice. Therefore, integrating AI concepts into nursing curricula and organizing regular continuing education programs, workshops, and hands-on training sessions are essential to strengthen nurses' knowledge, skills, and confidence in using AI. Such initiatives will facilitate the effective and ethical adoption of AI in healthcare, improve the quality and safety of patient care, and prepare the nursing workforce to meet the demands of an increasingly technology-driven healthcare system.

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