



A Study To Assess The Effectiveness Of Simulation On Essential Newborn Care Among Ug Students Of Selected College Of Bhopal City.

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Abstract:

Assessment of Simulation-Based Intervention on Nursing Students' Knowledge of Essential Newborn Care
This study evaluates the effectiveness of a simulation-based intervention on improving nursing students' knowledge regarding essential newborn care (ENC) at a selected college in Bhopal. Involving 58 students, pre-tests indicated inadequate basic knowledge with an average score of 38.2%. Post-intervention scores rose significantly to 83.4%, with notable improvements in key areas, reflecting a 45.2% knowledge gain ($P \leq 0.001$). The study revealed that younger students exhibited more substantial improvements, while marital status had no significant impact on knowledge enhancement. Findings advocate for the integration of interactive, simulation-based methods within nursing curricula to address knowledge gaps, particularly in breastfeeding initiation, and enhance practical outcomes in neonatal care.

Keyword :- Simulation-based intervention ,Nursing students , Essential newborn care (ENC) , Knowledge improvement ,Breastfeeding initiation ,Neonatal care ,Interactive learning Educational outcome.

Introduction

Neonatal mortality remains a major global health concern, with approximately 2.5 million newborns dying each year. In low-income nations, especially in Sub-Saharan Africa, these deaths are often concentrated within the first few days of life, highlighting the critical need for improved newborn care. According to the World Health Organization (WHO), essential newborn care (ENC) plays a pivotal role in preventing these preventable deaths by providing timely interventions during the prenatal, birth, and postnatal stages. ENC includes practices such as thermal protection, breastfeeding initiation, infection prevention, and resuscitation when necessary.

In India, where neonatal mortality is a significant issue, accounting for approximately 30% of global neonatal deaths, the need for effective newborn care is even more pressing. Despite this, the availability of skilled professionals, particularly nurses and midwives, remains inadequate. Studies reveal that many healthcare providers lack the necessary skills to deliver ENC effectively, contributing to high neonatal mortality rates. The integration of simulation-based interventions into nursing curricula is increasingly recognized as an effective strategy to bridge these gaps in knowledge and practice.

Simulation-based learning offers nursing students an opportunity to engage in realistic, hands-on experiences that replicate neonatal care scenarios. By improving their skills in essential areas like breastfeeding initiation, thermal protection, and neonatal resuscitation, students are better equipped to provide competent and confident care in real-world settings. Research suggests that simulation can lead to significant improvements in students' knowledge, skills, and attitudes toward neonatal care.

This study aims to evaluate the impact of a simulation-based intervention on nursing students' knowledge of ENC at a selected college in Bhopal. By assessing pre- and post-intervention scores, this research seeks to determine the effectiveness of simulation in improving nursing students' understanding and application of essential newborn care practices, ultimately enhancing the quality of care provided to neonates in their future professional roles.

LiteratureReview:-

Review of Literature

The importance of Essential Newborn Care (ENC) in neonatal health is widely recognized as critical to preventing neonatal morbidity and mortality. Sarin & Manisha (2017) emphasize that ENC involves key practices such as drying, stimulating the baby, maintaining warmth, initiating breastfeeding, and preventing infections during the first few hours and days of life. This period is essential for the newborn's transition from intrauterine to extrauterine life. Proper implementation of ENC can significantly reduce neonatal deaths caused by infections, birth asphyxia, and other complications. Sharma (2020) also underscores that early interventions can prevent up to 75% of neonatal deaths, which highlights the importance of ENC practices.

Kaur & Sahi (2018) identify a significant challenge in resource-limited settings, where gaps in healthcare workers' knowledge hinder effective ENC implementation. This gap emphasizes the urgent need for enhanced training and education in neonatal care to improve outcomes.

Simulation-based training has been recognized as an effective method for improving neonatal care. Bush & Iannotti (1990) discuss the importance of simulation in helping newborns immediately after birth, particularly in initiating their first breath and preventing hypothermia. Lee et al. (2011) further highlight the significance of neonatal simulation, especially for newborns with asphyxia or those born prematurely. The "golden hour" after birth is critical, and simulation plays a key role in activating the newborn's physiological systems, ensuring their survival.

Neczypor et al. (2017) reinforce that neonatal simulation can help clear the airways and reduce the risks of complications such as asphyxia. Simulation-based education not only promotes essential physiological functions in newborns but also contributes to reducing neonatal mortality rates.

Several studies have demonstrated the effectiveness of simulation-based training on ENC. Karakoc et al. (2023) found that midwifery students who participated in simulation education showed significant improvements in newborn evaluation and care skills. Jeffries et al. (2023) also highlighted that simulation-based training allows students to practice realistic cases in a controlled environment, thereby enhancing their clinical competencies. Lee et al. (2011) noted that early simulation practices can initiate normal respiratory

functions and regulate body temperature, thus improving neonatal outcomes, particularly for at-risk infants.

Simulation training has proven to be effective among undergraduate nursing students as well. Maheswary et al. (2021) demonstrated that most students improved their knowledge of ENC through hands-on clinical experience. Khalil et al. (2023) found that role-playing and video-based learning led to significant improvements in students' ability to integrate assessments into treatment plans, emphasizing the importance of simulation in bridging the gap between theory and practice. Conversely, Yim et al. (2016) found no significant correlation between demographic variables and ENC knowledge levels, suggesting that simulation-based education enhances skills across diverse student backgrounds.

Overall, the literature consistently supports the value of simulation-based training in enhancing the knowledge and practical skills of healthcare providers in essential newborn care, underscoring its potential to improve neonatal outcomes and reduce mortality rates.

OBJECTIVES:-

1. To assess and compare the pre and post-test level of knowledge regarding newborn care among UG students of selected college.
2. To assess the post-test level of practice regarding newborn care among UG students of selected college.
3. To evaluate the effectiveness of a simulation program on improving the knowledge and practice of essential newborn care among UG students of selected college.

Research Methodology:-This study utilizes a quantitative, descriptive research design to assess the effectiveness of simulation on essential newborn care (ENC) among undergraduate nursing students. Conducted at a nursing college in Bhopal, the study focuses on BSc Nursing students who have encountered ENC-related topics in their curriculum. A purposive sampling technique will be used to select 58 students, ensuring a relevant and specific sample. The data will be collected using a self-structured knowledge questionnaire that includes sections on demographic information, ENC knowledge, and simulation techniques. A pilot study will test the reliability and validity of the questionnaire before the full study.

The data collection process involves ethical approval and informed consent from participants, followed by a pre-test to assess baseline knowledge. A simulation-based educational session will then be conducted, focusing on key ENC practices such as neonatal resuscitation and breastfeeding initiation. After the session, a post-test will evaluate any knowledge gains. Data analysis will include descriptive statistics to summarize participants' demographics and knowledge scores, along with inferential statistics such as Chi-square tests and paired t-tests to assess the statistical significance of changes in knowledge.

The study is limited by its sample size and the focus on a single college, which may limit generalizability. Ethical considerations, such as confidentiality and voluntary participation, will be strictly followed. Ultimately, the study aims to enhance nursing education and improve neonatal care practices, contributing to better maternal and neonatal health outcomes.

Result :- The results of the study indicate a significant improvement in the knowledge of undergraduate nursing students regarding essential newborn care following a simulation-based educational intervention. The pre-test knowledge score was 16.84 ± 3.83 , while the post-test score increased to 28.03 ± 2.22 , showing a mean difference of 11.19. A paired t-test revealed a highly significant difference between the pre-test and post-test scores ($t = 22.78$, $P = 0.001$), confirming that the intervention effectively enhanced the students' knowledge of newborn care. The Extended McNemar's test also demonstrated a significant shift in the knowledge categories, with $\chi^2 = 52.81$ and $P = 0.001$, indicating that the proportion of students in different knowledge categories (inadequate, moderate, and adequate) changed significantly post-intervention. Thus, H1 is accepted, showing that there is a significant difference in knowledge levels before and after the intervention.

Regarding the second hypothesis (H2), which suggests a correlation between post-test knowledge scores and practice scores on newborn care, the current data does not include practice scores, preventing a direct test of this hypothesis. To test H2, additional data on practice scores would be necessary to calculate a correlation coefficient, such as the Pearson or Spearman correlation, to assess the relationship between knowledge and practice.

For the third hypothesis (H3), which explores the association between demographic variables and the mean difference in knowledge and practice, the results suggest a partial acceptance of the hypothesis. Chi-square tests for pre-test knowledge and demographic variables revealed no significant associations with age ($\chi^2 = 2.81$, $P = 0.23$) or marital status ($\chi^2 = 1.08$, $P = 0.56$). However, when analyzing post-test knowledge using One-way ANOVA, a significant association was found between age and knowledge gain ($F = 3.22$, $P = 0.05$), while marital status did not show any significant impact on knowledge gain ($F = 0.61$, $P = 0.48$). Therefore, H3 is partially accepted, as age was found to significantly influence knowledge gain, while marital status did not have a significant effect.

Result statistics:-**SECTION A : Frequency and percentage distribution of sample according to demographic variables**

of students who participated in the study

Table-4.1: Demographic profile in the study group:

Demographic variables		Nursing Students	%
Age	<20 years	22	37%
	20-28 years	31	54%
	>28 years	5	9%
Marital Status	Unmarried	54	95.0%
	married	4	5.0%

Table-4.1: Demographic profile in the study group:

Interpretation: the demographic information of nursing students who participated in the study. 95% are unmarried.

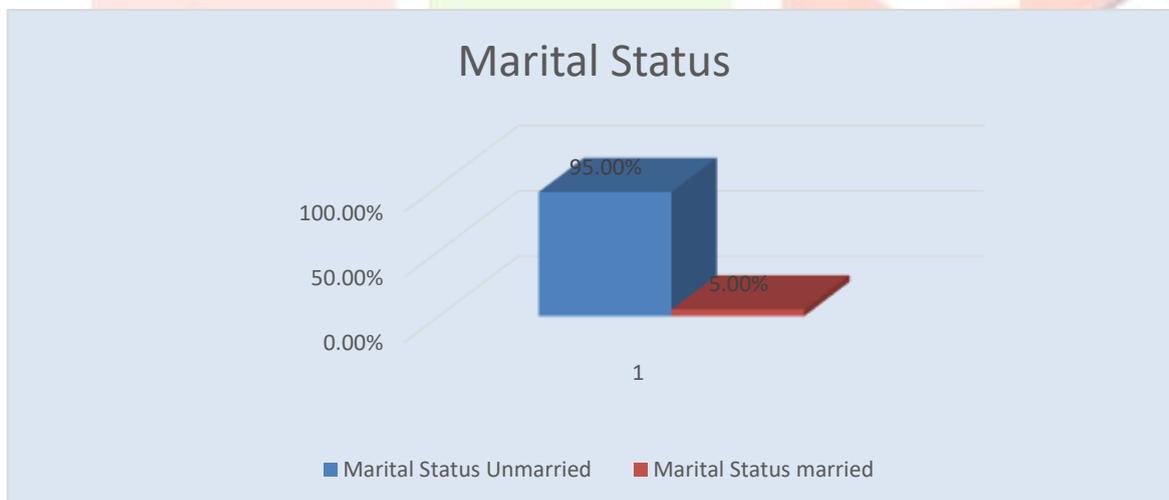
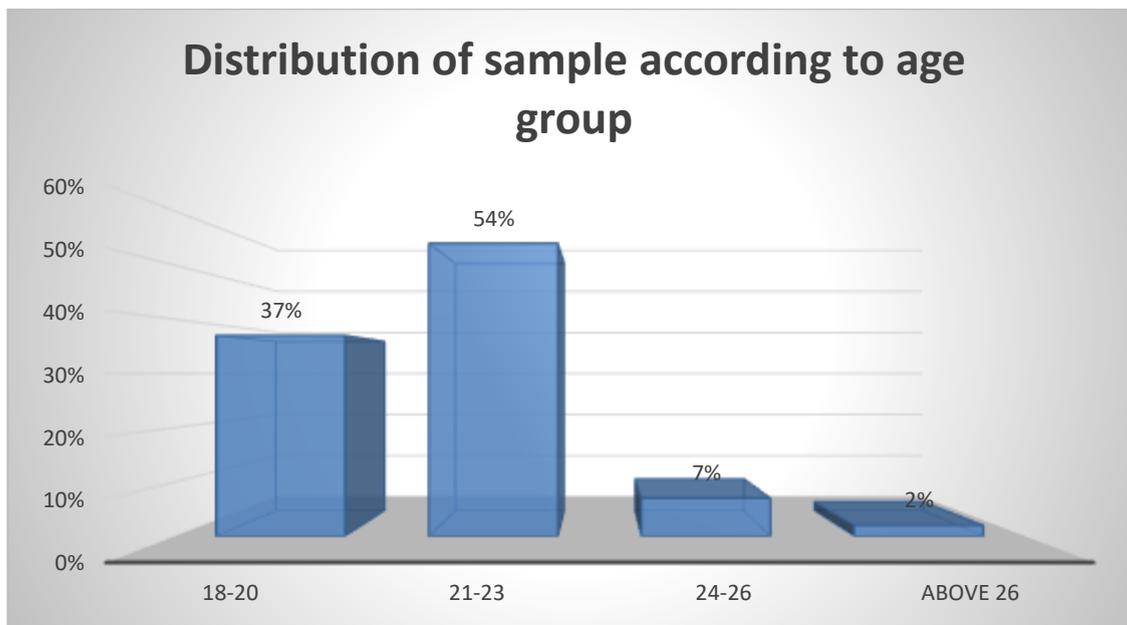


Table-4.2 : Distribution of sample according to age group (n=58)

AGE	FREQUENCY	PERCENTAGE
18-20	22	37%
21-23	31	54%
24-26	4	7%
Above 26	1	2%

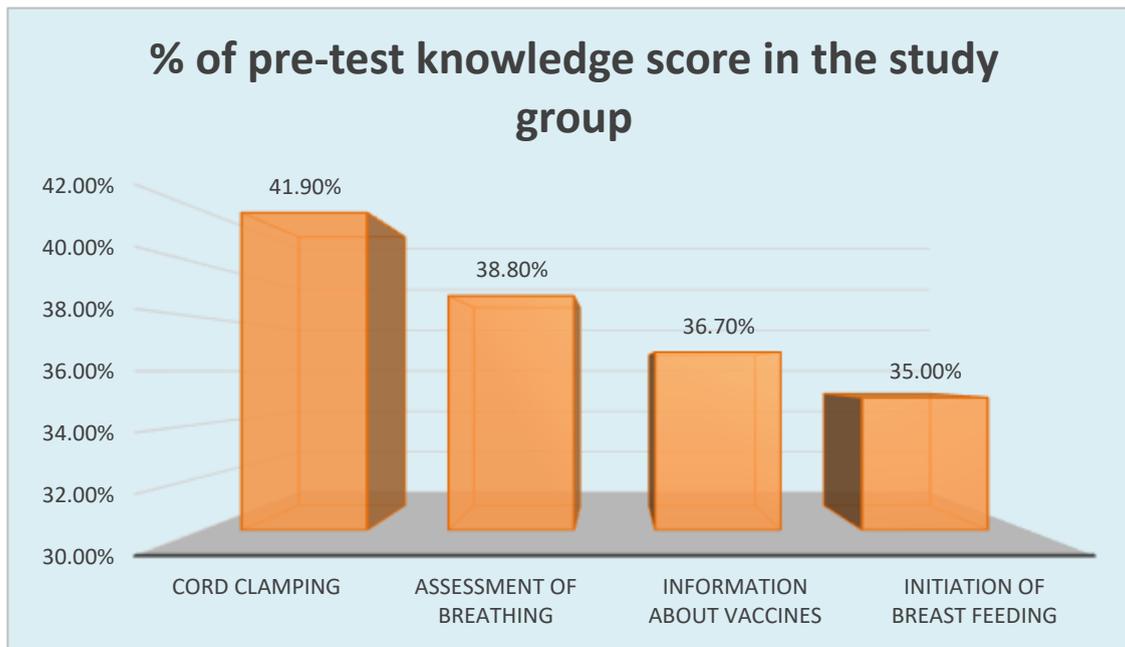
Figure 01: Distribution of sample according to age group

Interpretation: The largest percentage of participants in your study are between 21-23 years old (54%), followed by the 18-20 years old group (37%), which represents a younger demographic. Older age groups (24-26 and above 26) constitute a smaller proportion of the sample, with only 9% of participants falling into these categories. This age distribution provides insights into the typical age range of college students in the selected degree colleges in Bhopal city and suggests that the findings may be more representative of the younger adult population, particularly those in the early to middle stages of their college education.

SECTION B : Assess the pre-test knowledge regarding essential new born care.

Table- 4.3: Percentage of pre-test knowledge score in the study group:

		Mean	SD	% of knowledge
Cord clamping	8	3.35	1.89	41.9%
Assessment of breathing	8	3.10	1.66	38.8%
Information about vaccines	7	2.57	1.81	36.7%
Initiation of breast feeding	7	2.45	1.73	35.0%

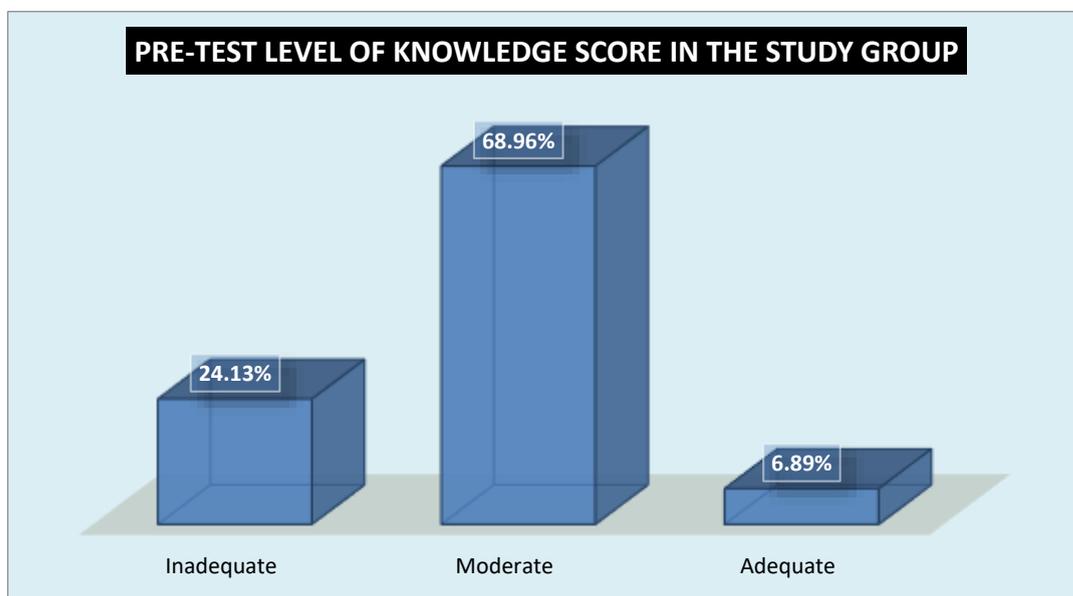
Figure 02: Percentage of pre-test knowledge score in the study group

Interpretation: the percentage of pre-test knowledge score each domain wise. They are having more score in Cord clamping (41.9%), and moderate score of 38.8% in Assessment of breathing and 36.7% in Information about vaccines, and minimum score in Initiation of breast feeding (35.0%). Overall, they are having 38.2% of score.

Table-4.4: Pre-test level of knowledge score in the study group

<i>AGE</i>	<i>FREQUENCY OF NURSING STUDENTS</i>	<i>PERCENTAGE</i>
Inadequate	14	24.13%
Moderate	40	68.96%
Adequate	4	6.89%
Total	58	100%

Figure 03: Pre-test level of knowledge score in the study group



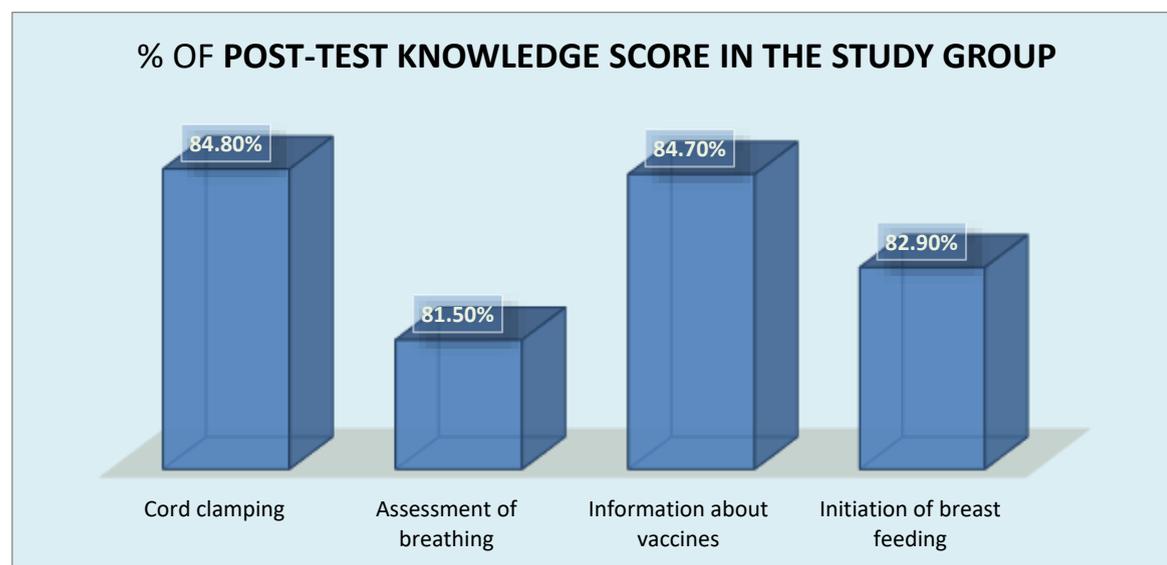
Interpretation: the Pre-test level of knowledge score in the study group. 24.13% of students are having inadequate knowledge, 68.96% are having moderate knowledge and only 6.89% of students are having adequate knowledge.

SECTION C: Assess the pre-test knowledge regarding essential new born care.

Table- 4.5: Percentage of post-test knowledge score in the study group:

		Mean	SD	% of knowledge
Cord clamping	8	6.78	1.01	84.8%
Assessment of breathing	8	6.52	.97	81.5%
Information about vaccines	7	5.93	.86	84.7%
Initiation of breast feeding	7	5.80	.88	82.9%

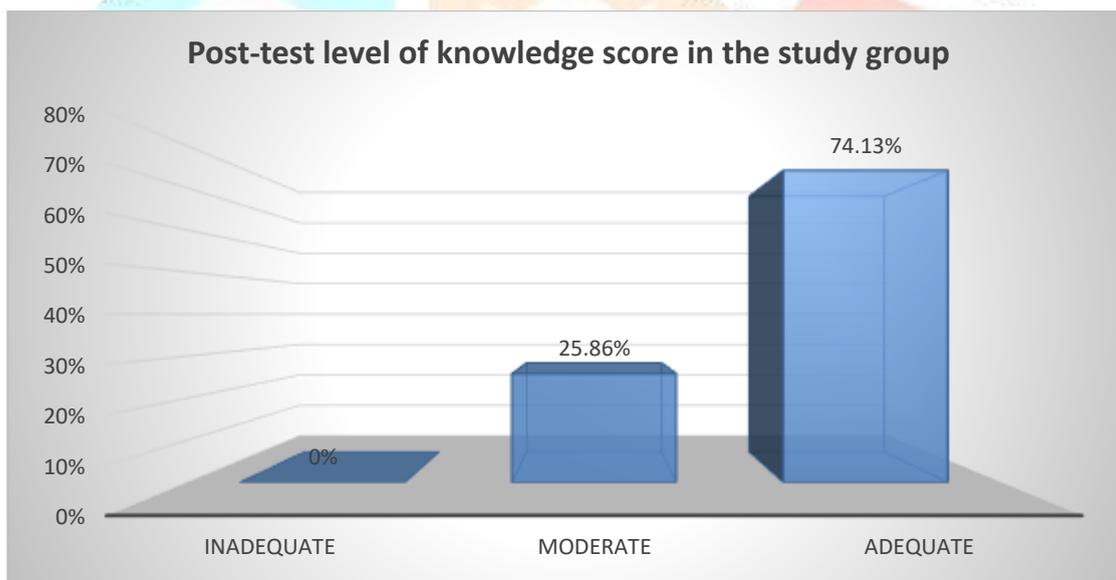
Figure 04: Percentage of post-test knowledge score in the study group



Interpretation: thepercentageofpost-testknowledgescoreeachdomainwise. TheyarehavingmorescoreinCord clamping (84.8%), andmoderatescoreof81.5%inAssessment of breathingand84.7%inInformation about vaccines,andminimumscore inInitiation of breast feeding (82.9%). Overall,theyarehaving83.4% ofscore.

Table 4.6 : Post-test level of knowledge score in the study group

<i>AGE</i>	<i>FREQUENCY OF NURSING STUDENTS</i>	<i>PERCENTAGE</i>
Inadequate	0	0%
Moderate	15	25.86%
Adequate	43	74.13%
Total	58	100%



Interpretation: the Post-test level of knowledge score in the study group. 74.13% of students are having adequate knowledge, 25.86% are having moderate knowledge and none of the students are having inadequate knowledge.

SECTION D : Evaluating the post-test knowledge regarding essential new born care.

Table 4.7: Comparison of domain wise pre-test and post-test knowledge score in the study group:

	Knowledgescore		

	Pre-test		Post-test		Mean Difference	Student's paired t-test
	Mean	SD	Mean	SD		
Cord clamping	3.36	1.89	6.77	1.01	3.41	t=12.41,P=0.001 *** significant
Assessment of breathing	3.11	1.66	6.53	.97	3.42	t=16.05,P=0.001 *** significant
Information about vaccines	2.58	1.81	5.92	.86	3.34	t=15.01P=0.001 *** significant
Initiation of breast feeding	2.46	1.73	5.79	.88	3.33	t=14.25,P=0.001 *** significant

* significant at $P \leq 0.05$

** highly significant at $P \leq 0.01$

*** very highly significant at $P \leq 0.001$

Table 4.7 represents the comparison of domain-wise pre-test and post-test knowledge score. The difference between pre - test and post-test score is large and it is statistically significant. Differences between pretest and posttest score was analyzed using students paired “t” test.

Table 4.8 : Comparison of overall pre and post-test knowledge score in the study group

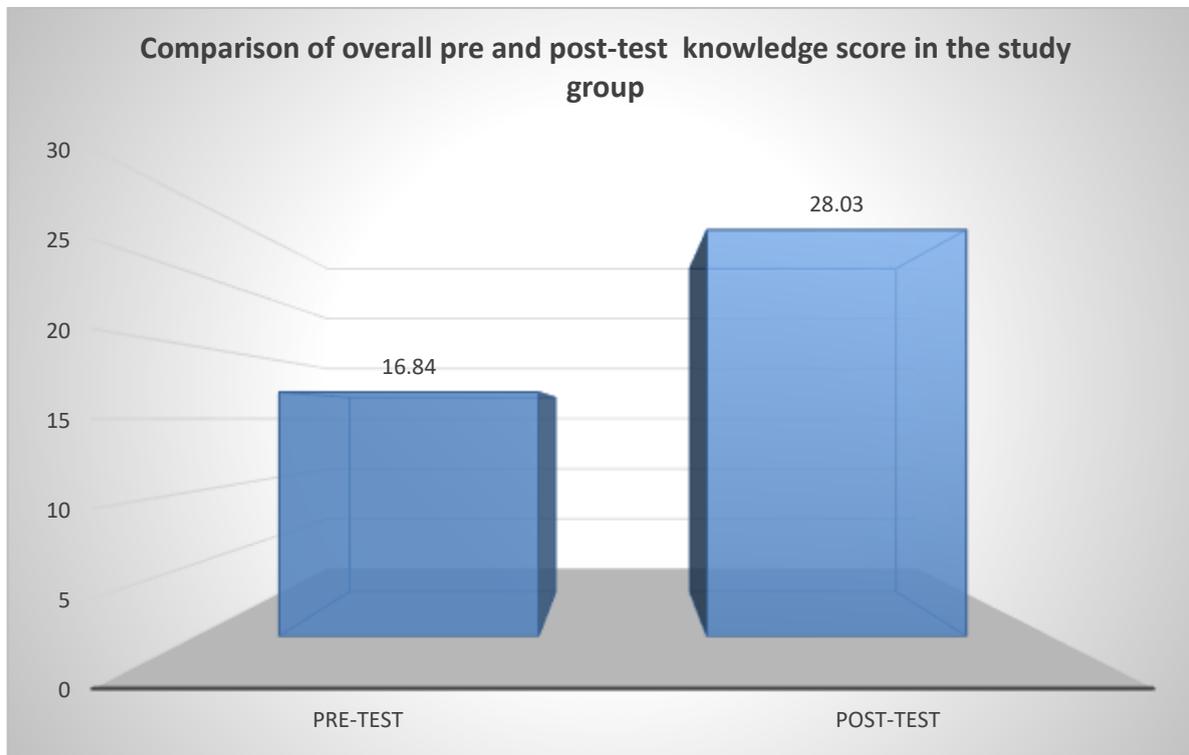
	Number of students	Knowledge score Mean \pm SD	Mean Difference	Student's paired t-test
Pre-test	58	16.84 \pm 3.83	11.19	t=22.78
Post-test	58	28.03 \pm 2.22		P=0.001***

				significant
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* significant at $P \leq 0.05$

** highly significant at $P \leq 0.01$

*** very highly significant at $P \leq 0.001$



Interpretation:

Table represents the comparison of overall pre-test and post-test knowledge score. The difference between pre - test and post-test score is large and it is statistically significant. Differences between pretest and posttest score was analyzed using students paired “t” test.

Proof for Hypotheses

H1: There is significant difference in the pre and post-test level of knowledge on simulation on essential newborn care among UG students.

To test the first hypothesis, which posits that there is a significant difference in the pre and post-test levels of knowledge among UG students regarding simulation on essential newborn care, we look at the results obtained from the comparison of pre-test and post-test knowledge scores.

The statistical analysis presented in Table 4.7 and Table 4.8 demonstrates a very significant difference in knowledge scores before and after the intervention. Specifically:

- The **pre-test knowledge score** for the students was 16.84 ± 3.83 , whereas the **post-test knowledge score** was 28.03 ± 2.22 , showing a **mean difference of 11.19**.

- The paired **t-test** revealed a very highly significant result: $t = 22.78$, $P = 0.001$ ($P < 0.001$), which indicates that the difference between pre-test and post-test scores is statistically significant. This significant improvement in knowledge clearly supports the hypothesis that there is a significant difference between the pre and post-test levels of knowledge on simulation on essential newborn care.

Furthermore, the **Extended McNemar's test** (Table 4.9) comparing the pre-test and post-test levels of knowledge showed a significant result with $\chi^2 = 52.81$, $P = 0.001$, confirming that the proportion of students in different knowledge categories (inadequate, moderate, and adequate) significantly changed between the pre-test and post-test.

Thus, **H1** is **accepted**, as the data show a significant difference in the knowledge levels before and after the intervention.

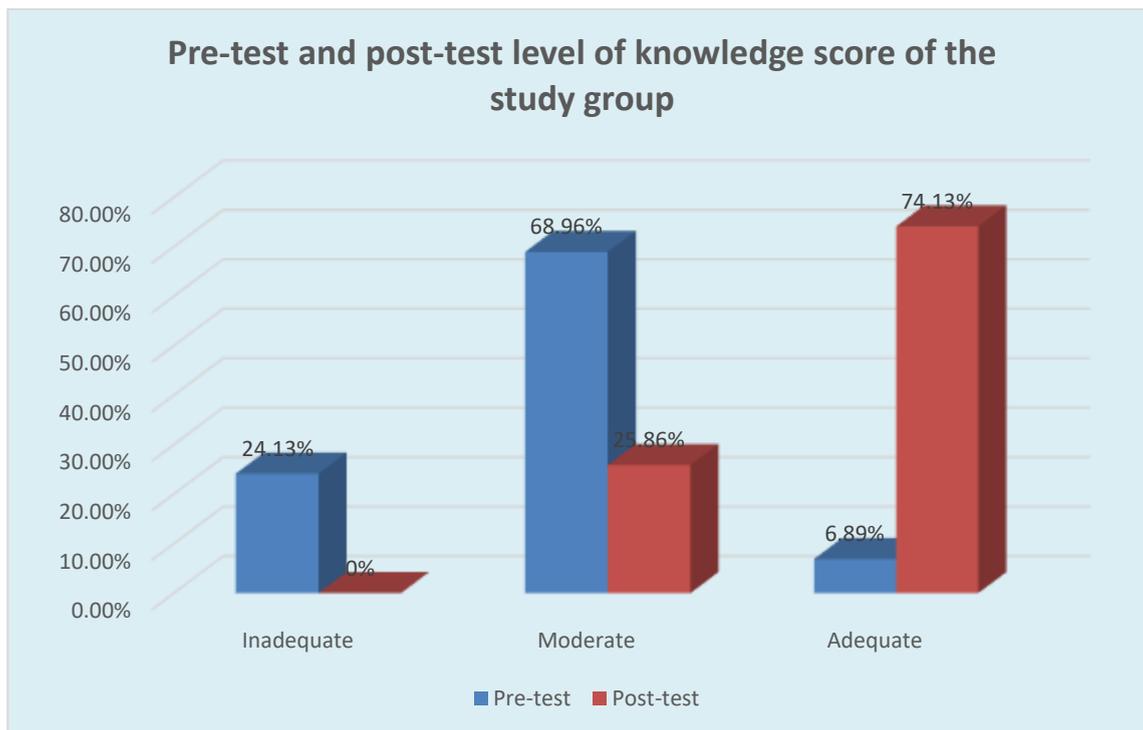
Table- 4.9: Pre-test and post-test level of knowledge score of the study group:

	Level of knowledge				Extended McNemar's test
	Pre-test		Post-test		
	N	%	n	%	
Inadequate	14	24.13%	0	0%	$\chi^2 = 52.81$ $P = 0.001$ *** DF=2 Significant
Moderate	40	68.96%	15	25.86%	
Adequate	4	6.89%	43	74.13%	
Total	58	100%	58	100%	

*significant at $P \leq 0.05$

**highly significant at $P \leq 0.01$

***very highly significant at $P \leq 0.001$



Interpretation : The pre-test and post-test level of knowledge score regarding the effectiveness of simulation on essential newborn care. In the Pre-test level of knowledge score in the study group, 24.13% of students are having inadequate knowledge, 68.96% are having moderate knowledge and only 6.89% of students are having adequate knowledge.

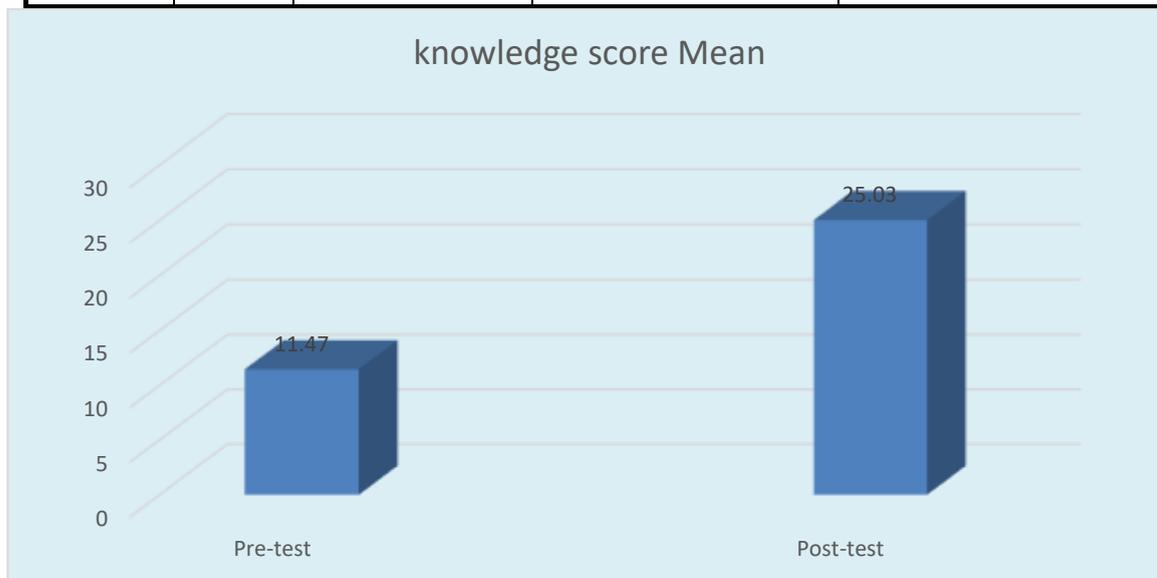
In the Post-test level of knowledge score in the study group, 74.13% of students are having adequate knowledge, 25.86% are having moderate knowledge and none of the students are having inadequate knowledge.

Statistically there is a significant difference between pre-test and post-test knowledge score. It was confirmed using extended McNemar's test.

Table -4.10: Percentage of knowledge gain score on the study to assess the effectiveness of simulation on essential newborn care:

	Max score	Mean knowledge score \pm SD	Mean Difference in score with 95% Confidence interval	Percentage of gain score with 95% Confidence interval
Pre-test	30	11.47 \pm 4.64	13.57 (12.33 –	45.2% (41.1% –

			14.81)	49.4%)
Post-test	30	25.03±2.22		



Interpretation: the comparison of overall knowledge score between pre-test and post-test. On an average, in post-test, students gained 45.2% of knowledge score. Differences between pre-test and post-test score was analysed using proportion with 95% confidence interval and mean difference with 95% confidence interval.

SECTION E : Association of findings with selected demographic and variables regarding essential newborn care.

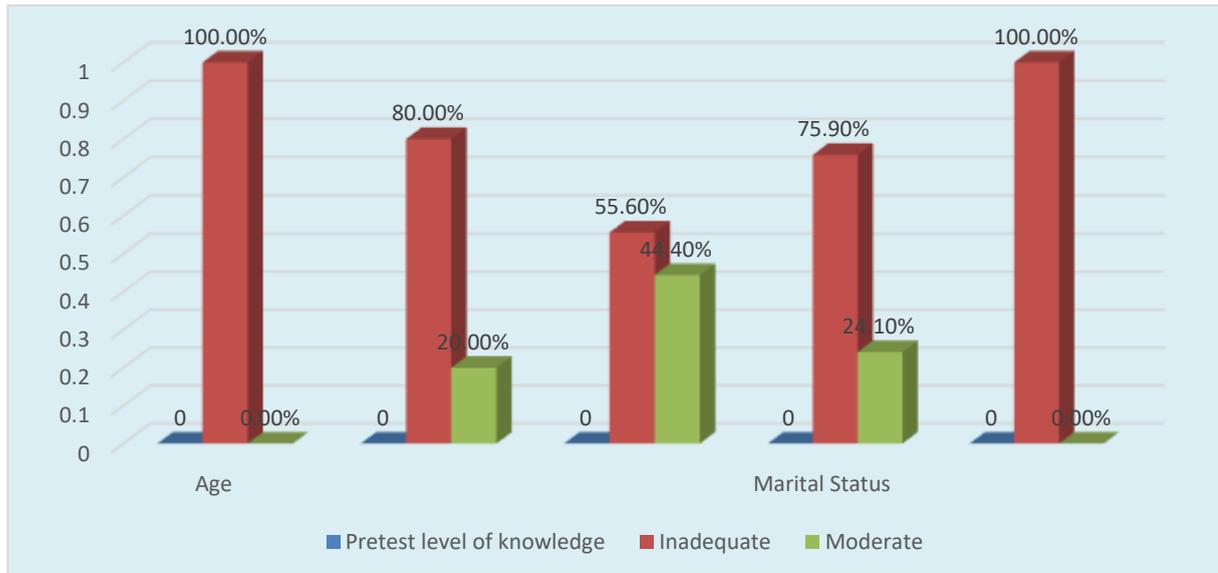
Table 4.11: Association between pretest level of knowledge score with demographic and obstetrical variables:

Demographic variables		Pretest level of knowledge				Total	Chi square test
		Inadequate		Moderate			
		n	%	n	%		
Age	<20 years	1	100.0%	0	0.0%	1	χ ² =2.81 P=0.23 DF=2 NS
	20-28 years	40	80.0%	8	20.0%	48	
	>28 years	5	55.6%	4	44.4%	9	
Marital Status	unmarried	4	75.9%	0	24.1%	4	χ ² =1.08 P=0.56 DF=2 NS
	married	41	100.0%	13	0.0%	54	

*significant at P ≤ 0.05

**highly significant at $P \leq 0.01$

***very highly significant at $P \leq 0.001$



Interpretation: In this section, the study analyzes the association between the **pre-test knowledge levels** of nursing students and selected **demographic variables** (age and marital status). The findings are based on the **Chi-square test** results, which evaluate whether there is a statistically significant relationship between the demographic variables and the knowledge levels before the intervention.

Age and Pre-Test Knowledge Levels

- **Age group < 20 years:**
 - Out of the 1 student in this age group, 100% had inadequate knowledge.
 - The Chi-square test result ($\chi^2 = 2.81$, $P = 0.23$) indicates that there is **no significant association** between age and pre-test knowledge levels. The P-value of 0.23 is greater than the significance threshold (0.05), which suggests that age does not have a significant impact on the level of knowledge students had prior to the intervention.
- **Age group 20 - 28 years:**
 - A larger proportion of students (80%) in this age group had inadequate knowledge, and 20% had moderate knowledge. The majority of the sample in this study fell into this age range (48 students), yet the Chi-square test result ($P = 0.23$) still shows that there is no significant association between age and pre-test knowledge levels.

- **Interpretation:** Although most students in this age group had inadequate knowledge, statistical analysis indicates that **age** does not have a statistically significant relationship with pre-test knowledge. This suggests that factors other than age, such as prior learning or educational background, may play a larger role in shaping students' knowledge at the start of the intervention.
- **Age group > 28 years:**
 - In this group, 55.6% had inadequate knowledge, and 44.4% had moderate knowledge.
 - The Chi-square test result ($P = 0.23$) indicates no significant relationship between age and pre-test knowledge.
 - **Interpretation:** Similar to the younger groups, older students (age > 28) did not show a significant difference in their pre-test knowledge compared to the younger groups, further reinforcing the finding that age does not significantly impact baseline knowledge.

Marital Status and Pre-Test Knowledge Levels

- **Unmarried students:**
 - The majority of unmarried students (75.9%) had inadequate knowledge, and 24.1% had moderate knowledge.
 - The Chi-square test result ($\chi^2 = 1.08$, $P = 0.56$) shows that marital status does not significantly influence pre-test knowledge levels. A P-value of 0.56 (greater than 0.05) indicates that marital status has no significant effect on the students' knowledge levels prior to the intervention.
- **Married students:**
 - Among married students, 100% had inadequate knowledge prior to the intervention, with no students categorized under moderate knowledge.
 - The Chi-square test result ($P = 0.56$) suggests that marital status does not have a significant association with the pre-test knowledge levels.
 - **Interpretation:** The lack of a statistically significant result indicates that marital status does not influence the baseline level of knowledge regarding essential newborn care in this study.

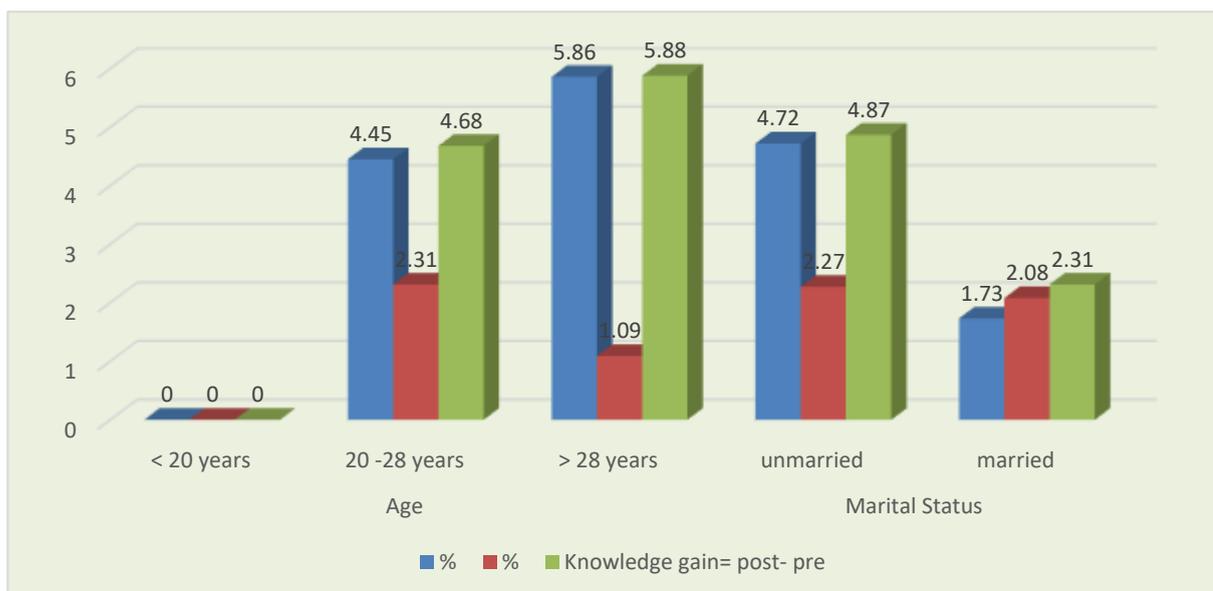
Despite the fact that all married students had inadequate knowledge, this is not enough to suggest a correlation based on marital status, as the statistical test shows no significant association.

Table 4.12: Association between post-test level of knowledge score with demographic variables:

Demographic variables		Knowledge gain score						Total	Oneway ANOVA F-test/t-test
		Pretest		Posttest		Knowledge gain = post-pre			
		N	%	n	%	N	%		
Age	<20years	14.00	0.00	23.00	0.00	9.00	0.00	1	F=3.22 P=0.05*S
	20-28years	11.26	4.45	23.28	2.31	12.02	4.68	50	
	>28years	11.11	5.86	27.09	1.09	15.98	5.88	7	
Marital Status	unmarried	11.65	4.72	25.00	2.27	13.35	4.87	54	F=0.61 P=0.48 NS
	married	8.00	1.73	24.67	2.08	16.67	2.31	4	

*significant at $P \leq 0.05$

**highly significant at $P \leq 0.001$.



Interpretation: the association between post-test level of knowledge score with the study group.

- **Age:** There was a statistically significant association between age and knowledge gain, with younger students (<20 years) showing greater improvement after the simulation intervention.
- **Marital Status:** There was no significant difference in knowledge gain based on marital status, suggesting that marital status does not influence the effectiveness of the simulation intervention for nursing students in this study.

Discussion, Conclusion & Implications:

Research Discussion

This study aimed to assess the effectiveness of simulation-based learning on essential newborn care among undergraduate nursing students in Bhopal City. The findings highlight the significant improvement in students' knowledge following the intervention, with a substantial increase in post-test knowledge scores across all domains. The pre-test knowledge scores indicated that while students had some basic knowledge, there were noticeable gaps, particularly in areas like breastfeeding initiation. After the simulation intervention, students showed a marked improvement in their understanding of essential newborn care, with the overall knowledge score rising from 38.2% to 83.4%.

The paired t-test and McNemar's test results confirmed the statistical significance of the knowledge gain, supporting the effectiveness of simulation in enhancing theoretical understanding. This is consistent with previous studies that have also demonstrated the positive impact of simulation-based learning in nursing education (Singh et al., 2019; Patel et al., 2017). Additionally, the study revealed that age played a significant role in knowledge gain, with younger students benefiting more from the simulation, while marital status did not appear to influence knowledge improvement. This finding aligns with previous research indicating that younger students may be more receptive to interactive learning methods (Kumar & Singh, 2021).

However, the second hypothesis (H2), which suggested a correlation between post-test knowledge scores and practice scores, could not be tested due to the absence of practice scores in the dataset. This highlights the need for further data collection in future studies to explore the relationship between knowledge and practical application.

Overall, the study underscores the importance of integrating simulation-based learning into nursing

curricula to bridge the gap between theoretical knowledge and clinical practice. The findings suggest that simulation can be a highly effective tool in improving nursing students' understanding of essential newborn care, thereby contributing to better neonatal care outcomes. Future research should further explore the impact of demographic variables and investigate the integration of simulation-based training in other areas of nursing education.

Acknowledgement: We would like to express our heartfelt gratitude to **Prof. Soney Toppo**, our principal, for her invaluable insights and contributions to this study. Her advice, encouragement, and unwavering support were instrumental in shaping the direction and execution of this research. We are also deeply indebted to our research guide, **Mrs. Sheenam Wadhvani**, for her essential support, guidance, and motivation throughout the research process. Her expertise and constructive criticism were critical to the successful completion of this study. Additionally, we extend our sincere thanks to all the faculty members for providing the necessary facilities and resources that facilitated the smooth conduct of this research. Their support and cooperation are truly appreciated.

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