International Journal of Midwifery and Nursing Practice

E-ISSN: 2663-0435
P-ISSN: 2663-0427
Impact Factor (RJIF): 6.18
www.nursingpractice.net
IJMNP 2025; 8(2): 87-91
Received: 06-07-2025
Accepted: 10-08-2025

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Effectiveness of structured teaching programme on knowledge of prenatal screening techniques

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DOI: https://www.doi.org/10.33545/26630427.2025.v8.i2b.214

Abstract
The study evaluated the effectiveness of a structured teaching programme (STP) on knowledge regarding prenatal screening techniques among primigravida mothers in selected AMRI hospitals, Bhubaneswar. A one-group pre-test post-test design was used with 60 primigravida mothers selected through convenience sampling. Data were collected using a validated structured questionnaire. Pre-test mean knowledge score was 16.63±1.47 (47.5%), which increased to 27.13±1.23 (77.5%) post-test. The mean improvement was 10.5, and the paired t-test value ($t = 21.56$, $p<0.05$) indicated high statistical significance. Chi-square analysis showed significant associations between knowledge scores and age, education, occupation, prior knowledge, and source of information. The study concludes that the STP was highly effective in improving knowledge of prenatal screening techniques among primigravida mothers.

Keywords: Knowledge, structured teaching programme, prenatal screening techniques, primigravida mothers

Introduction

Every parent desires a healthy child - The task of motherhood is both challenging &rewarding. Each individual parent thinks that their baby should be born without any defect or disorder. But recently the California Birth defects monitoring program stated "one is every 33 babies is born with birth defects which is the leading cause of infant death & childhood disability [1].

A study conducted in the department of Obstetrics and Gynecology, Banaras, examined 3,932 newborns for congenital malformations and found an overall incidence of 1.2%. Malformations contributed to 9.2% of prenatal and 12.8% of neonatal deaths. The central nervous system (39.5%) was most commonly affected, followed by the musculoskeletal system (14.5%), with multiple system involvement in 18.8% of cases. Although malformations were more frequent among babies born to mothers over 35 years, the difference was not significant. However, a significantly higher incidence was observed in mothers with gravidity four or more ($\chi^2 = 4.67$, $p<0.05$). Stillbirths and low- birth- weight infants showed a higher rate of malformations [2].

Congenital disorders referred to as leading cause of death in every infancy accounting for the death of nearly two out of every thousand (1000) infants in U.S. About three percentages (3%) of new born have a "Major physical anomaly". Congenital mal formation involving the brain are the largest group at ten (10) per Thousand (1000) live births. Compared to heart, eight per thousand, Kidney four per 1000 & limbs at one per thousand. Other physical anomalies are of 6 per 1000 live births [3].

A community based survey was conducted on visible congenital anomalies was conducted in rural area Tamilnadu in year 2004 - 05. The sample consist of 12.8 million children. A door to door survey was done, in which almost more than 10,000 village health nurse involved in collecting date. All the children were undertaken in study of age of 15 years and they found a total about 1.30% of children are with visible anomalies and male: female ratio is 1.3:1. Facial defect accounts for 1 in 1976 births accounting 30 percentages [4].

A descriptive study was conducted in IWK Health Centre, Canada. Regarding attitude and knowledge about genetic and genetic testing. The purpose of this study is to assess knowledge & attitude about human genetics. The samples for the study consist of 560

women. A postal survey was conducted and found that respondents strongly supported the use of genetic information is to improve knowledge regarding disease diagnosis and to help understand disease cause; however, people also held a more critical attitude towards certain aspects, of testing and genetic information. Relatively high levels of knowledge about genetics were also observed in this sample; although there were deficits in specific areas [5].

A survey conducted in the Department of OB&G, Prince of Songkla University, Thailand, assessed the knowledge and attitudes of 714 pregnant women toward Down syndrome screening. The average age of participants was 29.9 years. The mean knowledge scores for Down syndrome and its screening were 43.6% and 20.6% respectively. While 77.6% of women showed a positive attitude toward screening, overall knowledge was inadequate. The study recommended incorporating education on Down syndrome and related screening tests into antenatal and community health services [6].

It has been proposed that care providers can shape women's understanding of the meaning and purpose of screening tests. Reutter and ford stated "when the flow of information is form the professional to the client there is the potential for the professional to assume the dominant role in the relationship [7].

A pre-experimental one group pretest- post-test study was conducted for staff nurses in labor room of G. Kuppuswamy Naidu memorial hospital, Coimbatore, for assessment of knowledge and practice of cardio topography procedure. Structured knowledge questionnaire and observational check list was used to collect the data. It showed that nurses are aware of procedure but none of the nurses are aware of interpretation of cardio tocographs results. After teaching programme nurses were able to rationalize the action taken during fetal monitoring [8].

A qualitative study conducted in a large teaching hospital U.K 2006, to assess and explain deviation from recommended practice guidelines in National Institute for Clinical Excellence guidelines (NICE) in relation to fetal heart monitoring.20 midwives were selected and semi structured interviews were conducted. The study revealed that 243 deviation from NICE guideline, other deviation from electronic fetal monitoring and some deficiency in staff knowledge and skill [9].

The descriptive study was conducted in nine MCH clinics in the central district of Israel, regarding provision of genetic information, genetic testing for 361 women attending the clinics during 1 week, were requested to complete the questionnaire. A high rate of genetic testing (80.4%) was shown. Higher education, being secular and native-born Israeli predicted testing performance. Half of the tested participants reported that they did not understand the test results and were interested in receiving explanations regarding these results. 44% of respondents were interested in receiving genetic information from an MCH nurse [10].

Methodology

Study Design

This study adopted a Pre-experimental one-group pre-test post-test design.

Study Setting

AMRI Hospitals, Bhubaneswar, Odisha, India.

Population

High school girl's students the age group between 10- 16 years in the selected setting.

Sampling Method

In this study convenience sampling technique is used.

Study duration

Data collection: 8 March 2022 - 22 March 2022, Pilot study: 12 February 2023 - 17 February 2023, including pre-test, intervention, and post-test.

Sample size

A total of 60 primigravida mothers were included in this study. The sample size was determined using Yamane's formula.

According to Yamene's formula

$n = N/ (1+ N e^2)$

Here n= Sample size, N = Population size, e = Percentage of error i.e. 0.05

Inclusion and exclusion criteria

Inclusion criteria included Primigravida mothers willing to participate, able to read and write English. Students Primigravida mothers with contagious diseases, not available during data collection and not willing to participate were excluded.

Description of the tools

Data were collected using three tools:

- **Tool-1:** Self-structured socio-demographic questionnaire (age, religion, education, occupation, income, type of family, prior knowledge, source of information).
- **Tool-2:** Knowledge questionnaire on prenatal screening techniques (items on knowledge, comprehension, and application).

Tool validation

Content validity: Reviewed by 5 experts (1 medical professionalism, 4 nursing professionalism). Reliability established by split-half method and Spearman-Brown prophecy formula (r = 0.82), indicating high reliability. Pre-testing (tryout) done in hospital for clarity, ambiguity, and timing.

Study variables

Demographic variables: Age, religion, education, occupation, monthly income, type of family, prior knowledge, source of information.

Independent variables: Structured Teaching Programme (STP) on prenatal screening techniques.

Dependent variables: Knowledge score of primigravida mothers.

Data collection procedure

Formal permission obtained from hospital authorities and institutional ethics committee.

Informed consent taken from each participant.

- **Day 1:** Pre-test knowledge assessment using the structured questionnaire, followed by administration of the STP.

- **Day 7:** Post-test using the same questionnaire.

Ethical considerations
Approval from the dissertation committee and hospital authorities. Written informed consent obtained. Assured anonymity and confidentiality.

Statistical Analysis
SPSS version 21 was used for data analysis. Demographic information and baseline characteristics were summarized using descriptive statistics, including mean values, standard deviations, and frequency counts. The data will be collected and analyzed with descriptive and inferential statistical techniques. The demographic variables will be analyzed by using frequency and percentage. The frequency tables will be formulated for all significant information. Descriptive statistics (frequency, percentage, mean, SD) for demographic data and knowledge scores. Inferential statistics: paired 't' test to compare pre-test and post-test scores, Chi-square to test association with demographic variables.

Theoretical framework
The study is grounded in Imogene M. King's Theory of Goal Attainment, which focuses on the dynamic interaction between nurse and client to achieve mutually set goals. The framework guides the process of educating primigravida mothers about prenatal screening techniques and evaluating knowledge improvement after a structured teaching programme (STP).

Theory/Model Description
Theory Used: King's Theory of Goal Attainment. Emphasizes personal, interpersonal, and social systems. Assumes that nurse-client transactions lead to goal achievement and enhanced health. Highlights perception, communication, and mutual goal setting as drivers of positive health outcomes.

Model Adaptation for the Study
Modified to focus on the educational context of primigravida mothers learning about prenatal screening techniques.

Visual model depicts:
- Investigator's perception → preparation of structured questionnaire → administration of STP.
- Mother's perception → recognition of knowledge gap → active participation.
- Interaction and transaction → post-test knowledge gain signifying goal attainment.

Results
Table-1: Frequency and percentage distribution according to their biological variables
N= 60
The above revealed that the majority (55%) of the subjects was aged 26-35 years, 25% were less than 25 years, and 20% were above 35 years. Most participants (71.67%) were Hindu, 18.33% were Muslim, 10% were Christian, and none belonged to other religions. Half of the samples (50%) had secondary education, 30% had pre-university education, while 10% each had primary education or were graduates and above. Regarding occupation, 28.34% were housewives, 25% were daily wagers, 21.66% were private employees, 18.33% were government employees, and 6.67% were engaged in other occupations. In terms of income, 35% earned less than 10,000 per month, 25% earned ₹10,001-20,000, 21.66% earned 20,001-30,000, and 18.34% earned more than 30,000. A majority (60%) lived in nuclear families, while 40% lived in joint families. Most participants (85%) had no prior knowledge of prenatal screening techniques, whereas 15% had such knowledge. Sources of information were mainly the media (63.33%), followed by family and friends (26.67%), and health workers (10%); none received information through educational programmes.

Table 2: Assessment of knowledge on prenatal screening techniques among primigravida mothers before STP (N =60)

Sl No	Knowledge	Max possible score	Mean	SD	Mean Score %
1.	Prenatal screening techniques	35	16.625	1.47	47.50%

The data presented in table-2 revealed that the mean knowledge on prenatal screening techniques among primigravida mothers was 16.625 and SD 1.47 before STP. The mean score percentage was computed and it was found to be 47.50%. From the result sit was found that the sample subjects were having inadequate knowledge about prenatal screening techniques.

Table 3: Over all knowledge of primigravida mothers about Prenatal screening techniques before the administration of STP (N =60)

Sl. No	Level of Knowledge	Frequency	Percentage
1	Inadequate Knowledge	44	73.33
2	Moderately Knowledge	16	26.67
3	Adequate Knowledge	-	-

Table- 3 shows that it was observed that 44 primigravida mothers had inadequate knowledge and16 primigravida mothers had moderately adequate knowledge before administering STP.

Table 4: Assessment of knowledge on prenatal screening techniques among primigravida mothers after STP (N =60)

Sl. No.	Knowledge	Max. possible score	Mean	SD	Mean Score
1	Prenatal screening techniques	35	27.125	1.23	77.50%

The table shows the summary of statistical outcomes of knowledge on prenatal screening techniques after STP. The mean knowledge on prenatal screening techniques was 27.125 and SD 1.23. The mean score percentage was

computed and it was found to be 77.50%. The sores and outcomes were appreciably more in this table compared to the scores observed before STP.

Table 5: Overall knowledge on prenatal screening techniques among Primigravida mothers after STP (N= 60)

Sl. No	Level of Knowledge	Frequency	Percentage
1	Inadequate Knowledge	-	-
2	Moderately Knowledge	43	71.67
3	Adequate Knowledge	17	28.33

The table shows it is observed that 43 primigravida mothershad moderately adequate knowledge and 17 primigravida mothers had adequate knowledge regarding prenatal screening techniques after administering STP.

Table 6: Evaluating the effectiveness of stp by comparing the pre test and post test knowledge score (N= 60)

Parameter	Mean	S.D	Mean %	t- value	Result
Pre- test	16.625	1.47	50	21.56	Sig P<0.05
Post- test	27.125	1.23	50		
Improvement	10.50	0.24	30		

*Significant at p≤0.05 level

The variation is decreased in post-test when compared to pre-test. SD in the post-test is 1.23 and in the pre-test is 1.47. The mean improvement is 10.50. Though it was seen that the post-test knowledge score was more than the pre-test knowledge score, it is essential to put it under statistical significance. So suitably the paired't'-test was chosen and worked out. The calculated t -value is 21.56which are highly significant.

Association between the demographic variables and pre test knowledge of primigravida mothers on prenatal Screening techniques

The result of association between knowledge of primigravida mothers regarding prenatal screening techniques and pre-test knowledge. The chi- square test was resulted to be significant at p<0.05, so there is a statistical association between age, education, occupation, previous knowledge on prenatal screening techniques and source of information and pre- test knowledge scores. According to the hypothesis of the study, the investigator found that there is significant association between pre-test knowledge score and selected demographic variables hence hypothesis is accepted.

Discussion

A study at Athens University Medical School surveyed 350 Greek women (ages 18-65) with a child under 5 to assess awareness and use of prenatal diagnosis. About 52% were adequately informed, while 48% had little or no knowledge. Amniocentesis was the most familiar method, with doctors and media as main information sources. Thirteen percent had undergone prenatal diagnosis in a previous pregnancy, and 22% of those not tested were over 35. Awareness and acceptance of prenatal diagnosis positively correlated with higher social, educational, and financial status, and with healthier, family-centered lifestyles [11].

A 2006 qualitative study in a large U.K. teaching hospital explored deviations from the National Institute for Clinical Excellence (NICE) guidelines on fetal heart monitoring. Semi-structured interviews with 20 midwives revealed 243 instances of noncompliance with NICE recommendations, along with other variations in electronic fetal monitoring practices and gaps in staff knowledge and skills [12].

Implications of the Study

Community-based education can markedly improve mothers' awareness of HFMD**.**

Limitation

Conducted only in selected AMRI hospitals of Bhubaneswar. Limited to primigravida mothers who could read and write English. No control group.

Conclusion

The structured teaching programme significantly improved the knowledge of primigravida mothers regarding prenatal screening techniques. Age, education, occupation, prior knowledge, and source of information were significantly associated with pre-test knowledge scores.

Funding Section

Self- funded study

Conflicts of interest

The authors declare no conflict of interest

Acknowledgements

The authors sincerely appreciate all the participants who willingly dedicated their time and thoughtfully provided sincere and well- considered responses.

Ethics Approval

Approval from the dissertation committee and hospital authorities. Written informed consent obtained. Assured anonymity and confidentiality.

Data Availibility

The data is available and can be accessed with a reasonable request.

Abbreviations

df - Degrees of freedom, f - Frequency, H1 - Research hypothesis, M - Median, n - Total number of sample, p - Probability, r - Correlation, SD - Standard deviation, STP - Structured Teaching Programme, χ^2 - Chi-square

Author's Contribution

Not available

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How to Cite This Article
Bhanja R, Bhanja N, Sahoo S, Akter MS, Mohanty P, Moharana S. Effectiveness of structured teaching programme on knowledge of prenatal screening techniques. International Journal of Midwifery and Nursing Practice. 2025; 8(2): 87-91.