Journal of Carcinogenesis
Covering Genesis to Therapeutics

Journal of Carcinogenesis, ISSN: 1477-3163
2025; Vol 24: Issue 6s, https://carcinogenesis.com/

Strengthening Maternal Awareness: A Quasi-Experimental Study on TORCH Infection Prevention Education for Pregnant Women

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ABSTRACT

Background: Infections such as Toxoplasmosis, Other agents, Rubella, Cytomegalovirus, and Herpes simplex virus, referred to as TORCH, are serious threats to maternal and fetal health during pregnancy. To reduce and avert complications and adverse outcomes, appropriate awareness along with TORCH infection preventive practices is necessary amongst antenatal mothers. The purpose of this study was to assess the knowledge level of TORCH infection prevention practices particularly during pregnancy with the antenatal mothers, assess the effectiveness of the structured teaching program, assess the post-test knowledge scores of experimental and control groups after applying the interventions and compare the scores to establish a meaningful difference, and determine the impact of selected demographic variables and post-test knowledge scores.

Methodology: A quasi-experimental design with a pre-test, post-test, and control group was utilized. The study site was maternity centreof multispecialty hospitals, where 120 antenatal mothers were recruited through convenience sampling 60 to the experimental group and 60 to the control group. The data collection instruments were a socio-demographic data sheet as well as a TORCH knowledge assessment with 30 multiple choice questions. A structured teaching program was conducted for the experimental group. The knowledge assessment scores were compared using both descriptive and inferential statistics for pre-test and post-test evaluations.

Result: In the experimental group, the mean knowledge score increased from 13.28 ± 5.53 in the pre-test to 19.93 ± 3.64 in the post-test ($t = -7.529$, $p = 0.001$). The control group also showed an increase from 12.23 ± 5.29 to 19.88 ± 3.42 ($t = -8.893$, $p = 0.001$). Pre-test scores showed that 20% of mothers had poor knowledge and 53.3% had average scores; post-test scores improved with 51.7% achieving good scores and 31.7% excellent scores. In the control group, poor scores reduced from 26.7% pre-test to 0% post-test, with good and excellent scores rising to 56.7% and 28.3%, respectively. No significant associations were found between most socio-demographic variables and knowledge scores except for occupation in the control group ($p = 0.001$).

Conclusion: The results are anticipated to show that a systematic teaching strategy improves knowledge about the prevention of TORCH infections among pregnant women. This research highlights the importance of further education and counseling integrated into standard antenatal visits to enhance both maternal and neonatal health.

Keywords: *Pregnant women, TORCH infections, systematic teaching strategy, awareness, pregnancy*

How to Cite: Nidhi Sharma, Sandhya Kumari., (2025) Strengthening Maternal Awareness: A Quasi-Experimental Study on TORCH Infection Prevention Education for Pregnant Women, *Journal of Carcinogenesis*, *Vol.24, No.6s*, 387-394.

1. INTRODUCTION

Preventable illnesses during pregnancy continue to threaten fetal and neonatal well-being, despite maternal and child health being a top priority globally[1]. The group of infections known as TORCH (Toxoplasmosis, Other Agents, Rubella, Cytomegalovirus, and Herpes simplex virus) is particularly concerning as it has the potential to cause serious congenital anomalies, miscarriages, stillbirths, and long-term developmental disabilities[2]. Despite advancements in obstetric care, TORCH infections remain frequent in many low- and middle-income countries, including India, where prenatal moms generally lack awareness[3].

Research indicates that many pregnant women are unaware of the transmission channels, symptoms, consequences, and preventive measures for TORCH infections[4]. A recent cross-sectional investigation in a tertiary care hospital in rural India found that over 55% of pregnant moms lacked awareness about TORCH infections and their prevention[3]. Insufficient understanding can lead to poor prenatal practices, delayed diagnosis, and missed opportunities for prompt interventions, resulting in irreparable repercussions for newborns.

Research indicates that structured teaching programs with clear objectives, culturally relevant information, and interactive approaches might improve maternal knowledge, encourage preventive measures, and reduce infection-related problems during pregnancy[6]. Sharma et al.[7] found that structured teaching interventions on TORCH infections significantly improved post-test knowledge levels among expectant women, compared to those who did not get such educational input. Education-based interventions are crucial for meeting global public health targets, such as the United Nations Sustainable Development Goal 3, which aims to reduce maternal and newborn mortality and promote healthy lifestyles for all ages.

Despite the known benefits of health education, there is a paucity of appropriately developed and validated organized teaching programs targeting TORCH infection prevention in many healthcare settings[9]. In India, where antenatal care services are increasingly focused on improving maternal health literacy, implementing evidence-based teaching interventions can bridge the existing knowledge gap and empower expectant mothers to adopt safe practices. As a result, the purpose of this study was to assess the efficacy of a structured education program on TORCH infection prevention knowledge among pregnant moms attending a specific hospital in Vadodara. The findings are expected to inform nursing practice and help policymakers and educators strengthen antenatal education services in order to improve maternal and neonatal health outcomes.

2. METHODOLOGY

A quasi-experimental design with a pre-test, post-test, and control group was employed to evaluate the effectiveness of a structured teaching program on knowledge regarding TORCH infections among antenatal mothers. The study was conducted at the maternity centre of selected multispecialty hospitals. A total of 120 antenatal mothers were recruited using a convenience sampling technique, with 60 participants assigned to the experimental group and 60 to the control group. Inclusion criteria specified that participants be in their second trimester, able to read and understand the local language, and willing to provide informed consent.

Data collection instruments consisted of a socio-demographic data sheet to capture baseline characteristics and a validated TORCH knowledge assessment tool comprising 30 multiple-choice questions designed to measure participants' awareness of TORCH infections, modes of transmission, prevention, and management. Both groups completed a pre-test using the knowledge assessment tool. Subsequently, the experimental group received a structured teaching program, which included interactive sessions, audiovisual aids, and printed handouts covering comprehensive information on TORCH infections. The control group did not receive any structured intervention during the study period. After a predetermined period, both groups completed the post-test using the same knowledge assessment questionnaire to measure changes in knowledge levels.

Prior to data collection, ethical clearance was obtained from the Institutional Ethics Committee of Parul University. Written informed consent was secured from all participants after explaining the study's objectives, procedures, potential risks, and benefits in their local language. Participants were assured of confidentiality, anonymity, and their right to withdraw from the study at any point without affecting their ongoing care. All collected data were de-identified and stored securely for analysis.

Collected data were reviewed for accuracy and completeness before entry into Microsoft Excel and analyzed using the **Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize socio-demographic variables and knowledge scores. Paired t-tests were performed to compare pre-test and post-test scores within each group, while independent t-tests were used to compare mean score differences between the experimental and control groups. Additionally, the chi-square test was applied to identify associations between selected socio-demographic variables and knowledge scores. All statistical tests were two-tailed, and significance was determined at $p< 0.05$.

3. RESULT

Table 1: Frequency and Percentage Distribution of the Socio-Demographic Variables of the Antenatal Mothers among Torch Infection during Pregnancy.

Demographic Variables	Category	Experimental Group		Control Group	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Age of the Mother	Below 20 Years	10	16.7	14	23.3
	21 – 25 Years	26	43.3	24	40.
	26-30 Years	18	30.0	14	23.3
	Above 30 Years	8	10.0	8	13.3
Educational Status	Illiterate	13	21.7	5	8.3
	Primary	22	36.7	27	45.0
	Secondary	15	13.3	14	23.3
	Higher Secondary & Above	10	25.0	14	23.3
Occupation	Housewife	15	25.0	15	25.0
	Private employee	22	36.7	21	35.0
	Government Employee	8	13.3	13	21.7
	Self-Employed	15	25.0	11	18.3
Monthly Family Income	Below ₹10,000	4	6.7	5	8.3
	₹10,001 – ₹30,000	22	36.7	19	31.7
	₹30,001 – ₹50,000	15	25.0	20	33.3
	Above ₹50,000	19	31.7	16	26.7
Types of family	Nuclear	22	36.7	10	16.7
	Joint	32	53.3	38	63.3
	Extended	6	10.0	12	20.0
Residential Area	Urban	33	55.0	23	38.3
	Rural	27	45.0	37	61.7
Gestational age	Frist Trimester	25	41.7	19	31.7
	Second Trimester	25	41.7	27	45.0
	Third trimester	10	16.7	14	23.3
Previous History of Miscarriage	Yes	12	20.0	20	33.3
	No	48	80.0	40	66.7

Table 1 presents the frequency and percentage distribution of socio-demographic variables of antenatal mothers in both the experimental and control groups. The majority in both groups were young adults aged 21–25 years (43.3% experimental; 40% control), with most others aged 26–30 years or below 20 years.

In terms of education, the largest segment in both groups had primary education (36.7% experimental; 45% control). A notable proportion in the experimental group were illiterate (21.7%) compared to the control group (8.3%).Regarding occupation, most mothers were private employees (36.7% experimental; 35% control), with housewives and self-employed mothers making up significant portions.

Most families reported monthly incomes between ₹10,001–₹30,000 or higher, with only a small proportion below ₹10,000 in both groups. Over half in both groups belonged to joint families (53.3% experimental; 63.3% control).Urban residence was more common in the experimental group (55%), while rural residence dominated in the control group (61.7%).

Gestational age distribution was similar, with most mothers in the first or second trimester. A majority in both groups reported no history of miscarriage (80% experimental; 66.7% control).

Figure 1: Pre-test and Post-test Frequency and Percentage distribution of the knowledge score in the Antenatal Mothers among Torch Infection during Pregnancy in the Experimental Group.

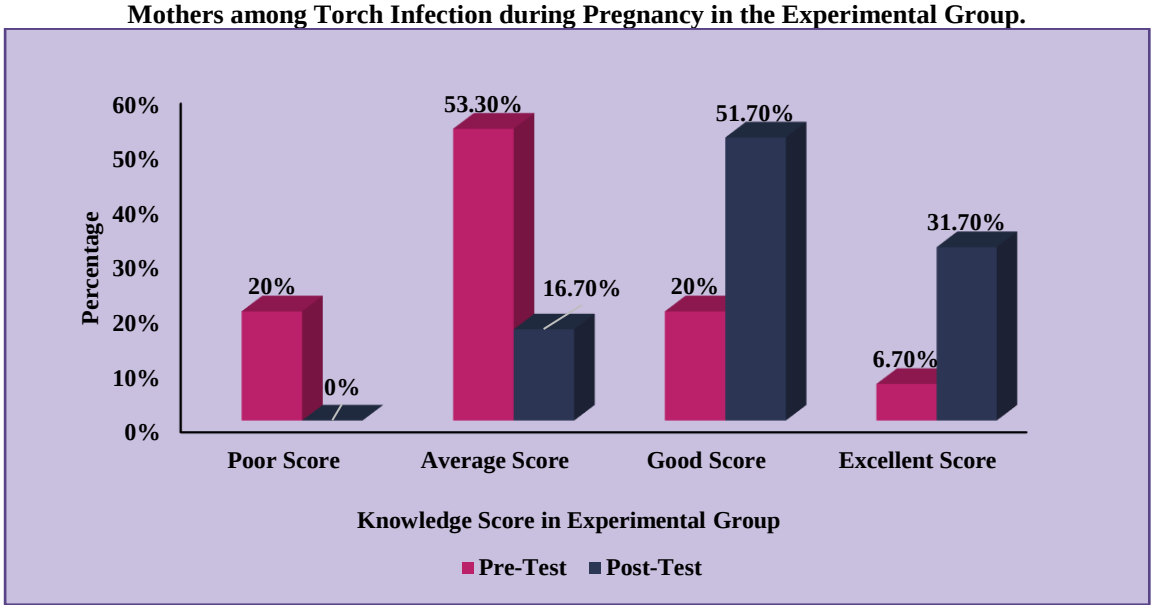

Figure 1 present the distribution of antenatal mothers' knowledge scores regarding TORCH infections in the experimental group before and after the structured teaching program.

In the pre-test, 20% of the mothers demonstrated a poor score, 53.3% fell into the average score category, 20% achieved a good score, and only 6.7% attained an excellent score.

After implementation of the structured teaching program (post-test), there was a marked shift in knowledge levels. The proportion of mothers with a poor score decreased to 0%, showing complete elimination of the lowest knowledge category. The percentage of mothers with an average score also reduced to 16.7%, while the proportion achieving a good score increased substantially to 51.7%. Notably, 31.7% of mothers attained an excellent score in the post-test, compared to only 6.7% at baseline.

Figure 2: Pre-test and Post-test Frequency and Percentage distribution of the knowledge score in the Antenatal Mothers among Torch Infection during Pregnancy in the Control Group.

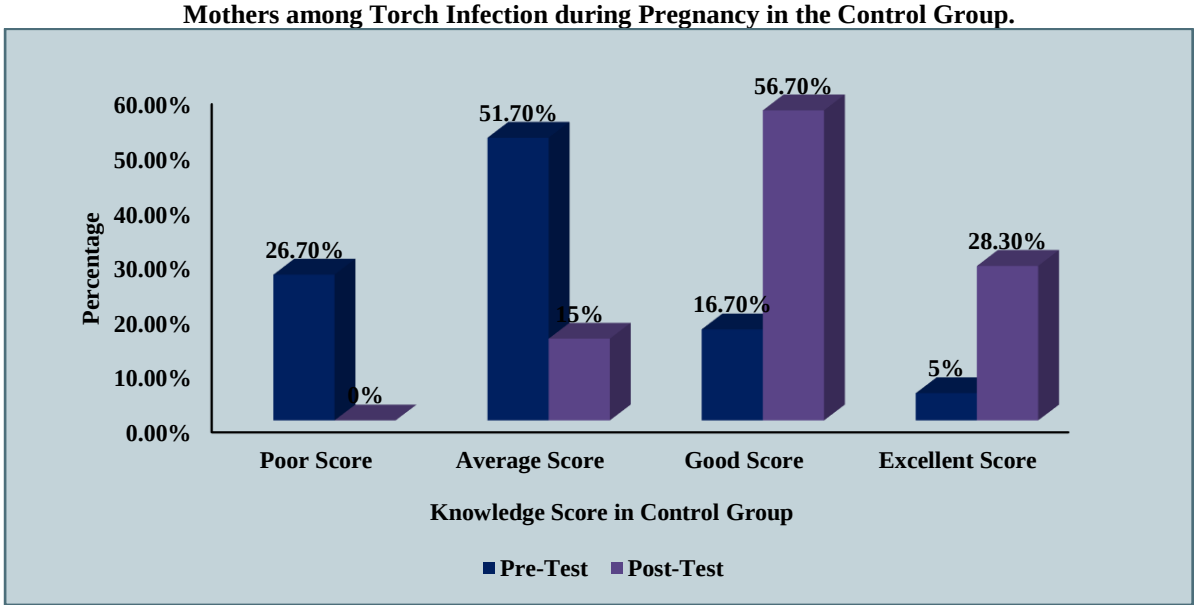

Figure 2 depict the frequency and percentage distribution of antenatal mothers' knowledge scores regarding TORCH infections in the control group before and after the study period.

In the pre-test, 26.7% of mothers had a poor score, 51.7% demonstrated an average score, 16.7% achieved a good score,

and only 5% obtained an excellent score.

In the post-test, a positive shift in knowledge scores was observed even though no structured teaching program was administered to the control group. The proportion of mothers with a poor score dropped to 0%, and the percentage of mothers with an average score decreased markedly to 15%. Meanwhile, the percentage of mothers attaining a good score increased to 56.7%, and 28.3% of mothers reached an excellent score in the post-test.

Table 2: Mean, Standard Deviation, Minimum, and Maximum of the Pre-test and Post-test of knowledge score in the Experimental Group and Control Group.

	Experimental Group		**Control Group**	
	Pre-Trest	**Post-Test**	**Pre-Trest**	**Post-Test**
Mean	13.28	19.93	12.23	19.88
SD	5.527	3.649	5.286	3.415
Minimum	5	12	6	12
Maximum	23	26	23	24

Table 4 presents the descriptive statistics for the pre-test and post-test knowledge scores regarding TORCH infections among antenatal mothers in both the experimental and control groups. In the experimental group, the mean pre-test knowledge score was 13.28 (SD = 5.527), which increased to 19.93 (SD = 3.649) following the structured teaching program. The minimum and maximum scores for the pre-test ranged from 5 to 23, while the post-test scores ranged from 12 to 26.

In the control group, the mean pre-test score was 12.23 (SD = 5.286), which also showed an increase to 19.88 (SD = 3.415) in the post-test. The minimum and maximum scores in the control group ranged from 6 to 23 for the pre-test and 12 to 24 for the post-test. These results indicate that knowledge levels improved in both groups, although the structured teaching program was administered only to the experimental group.

Table 3Association of knowledge scores in Experimental Group

Demographic Variables	**Category**	**Frequency (f)**	**χ^2Value**	**Level of Significance (P Value)**
Age of the Mother	Below 20 Years	10	14.052	0.120
	21 – 25 Years	26		
	26-30 Years	18		
	Above 30 Years	8		
Educational Status	Illiterate	13	6.534	0.685
	Primary	22		
	Secondary	15		
	Higher Secondary & Above	10		
Occupation	Housewife	15	16.447	0.058
	Private employee	22		
	Government Employee	8		
	Self-Employed	15		
Monthly Family Income	Below ₹10,000	4	9.912	0.358
	₹10,001 – ₹30,000	22		
	₹30,001 – ₹50,000	15		
	Above ₹50,000	19		
Types of family	Nuclear	22	9.135	0.166
	Joint	32		
	Extended	6		
Residential Area	Urban	33	1.877	0.598
	Rural	27		
Gestational age	Frist Trimester	25	5.500	0.481
	Second Trimester	25		
	Third trimester	10		
Previous History of Miscarriage	Yes	12	3.424	0.331
	No	48		

f = Frequency; χ^2 = Chi-square value; *p*-value = Level of significance

In the experimental group data mentioned in the Table 7, , the chi-square test showed that there was **no statistically significant association** between the knowledge scores and the variables **age of the mother** ($\chi^2 = 14.052$, $df = 9$, $p = 0.120$), **educational status** ($\chi^2 = 6.534$, $df = 9$, $p = 0.685$), **monthly family income** ($\chi^2 = 9.912$, $df = 9$, $p = 0.358$), **types of family** ($\chi^2 = 9.135$, $df = 6$, $p = 0.166$), **residential area** ($\chi^2 = 1.877$, $df = 3$, $p = 0.598$), **gestational age** ($\chi^2 = 5.500$, $df = 6$, $p = 0.481$), and **previous history of miscarriage** ($\chi^2 = 3.424$, $df = 3$, $p = 0.331$). The variable **occupation** showed a marginally non-significant association with knowledge scores ($\chi^2 = 16.447$, $df = 9$, $p = 0.058$).

Table 4Association of knowledge scores incontrol Group

Demographic Variables	**Category**	**Frequency (f)**	**χ^2Value**	**Level of Significance (P Value)**
Age of the Mother	Below 20 Years	14	4.369	0.885
	21 – 25 Years	24		
	26-30 Years	14		
	Above 30 Years	8		
Educational Status	Illiterate	5	15.848	0.70
	Primary	27		
	Secondary	14		
	Higher Secondary & Above	14		
Occupation	Housewife	15	31.518	0.001
	Private employee	21		
	Government Employee	13		
	Self-Employed	11		
Monthly Family Income	Below ₹10,000	5	9.593	0.384
	₹10,001 – ₹30,000	19		
	₹30,001 – ₹50,000	20		
	Above ₹50,000	16		
Types of family	Nuclear	10	2.351	0.885
	Joint	38		
	Extended	12		
Residential Area	Urban	23	5.802	0.122
	Rural	37		
Gestational age	Frist Trimester	19	8.937	0.177
	Second Trimester	27		
	Third trimester	14		
Previous History of Miscarriage	Yes	20	1.989	0.0575
	No	40		

f = Frequency; χ^2 = Chi-square value; *p*-value = Level of significance

In the control group data mentioned in table no 7,, similar findings were observed for most variables. There was no significant association between knowledge scores and age of the mother ($\chi^2 = 4.369$, $df = 9$, $p = 0.885$), educational status ($\chi^2 = 15.848$, $df = 9$, $p = 0.070$), monthly family income ($\chi^2 = 9.593$, $df = 9$, $p = 0.384$), types of family ($\chi^2 = 2.351$, $df = 6$, $p = 0.885$), residential area ($\chi^2 = 5.802$, $df = 3$, $p = 0.122$), gestational age ($\chi^2 = 8.937$, $df = 6$, $p = 0.177$), and previous history of miscarriage ($\chi^2 = 1.989$, $df = 3$, $p = 0.0575$).

4. DISCUSSION

The present study assessed the effectiveness of a structured teaching program on the knowledge of antenatal mothers regarding TORCH infections during pregnancy. The results revealed a substantial improvement in knowledge levels among mothers who received the structured teaching intervention compared to their baseline scores. Specifically, the mean knowledge score in the experimental group increased from **13.28 ± 5.53** pre-test to **19.93 ± 3.64** post-test ($p = 0.001$). This finding is consistent with a quasi-experimental study by Sharma et al., who observed a significant increase in antenatal mothers' knowledge about TORCH infections after an educational session in a community setting in India.[11]

Similarly, the present study aligns with findings by Singh et al., who demonstrated that a structured teaching program significantly enhanced knowledge among pregnant women about the prevention of intrauterine infections.[12] The increase

in good and excellent knowledge scores post-intervention in this study mirrors the results of Mathew and Thomas, who found that interactive education sessions substantially improved awareness of perinatal infections among antenatal women attending urban health centers.[13]

In the control group, knowledge scores also showed a significant improvement from pre-test (**12.23 ± 5.29**) to post-test (**19.88 ± 3.42**) (p = 0.001), despite no structured intervention. This incidental increase may be due to informal peer discussions, exposure to health talks during routine antenatal visits, or other educational materials accessed independently. Similar incidental gains were reported by Khan et al., who noted that general antenatal counselling and exposure to health information during routine visits can moderately improve maternal knowledge even without a targeted intervention.[14]

The present study's finding that socio-demographic variables such as age, education, income, family type, residence, and gestational age showed no significant association with knowledge gain in the experimental group is consistent with Joseph et al., who found no strong link between basic demographics and knowledge improvement when mothers received focused teaching.[15] However, the significant association between occupation and knowledge gain in the control group (p = 0.001) indicates that working mothers may have additional access to informal information channels, echoing the findings of Bhat et al., who reported that employed women often have better exposure to health-related awareness through workplaces and social interactions.[16]

Overall, these findings reinforce the critical role of structured teaching programs in enhancing maternal knowledge about TORCH infections, which are preventable yet continue to pose serious risks to maternal and fetal health if unaddressed. Strengthening health education through systematic antenatal interventions can therefore play a vital role in promoting safer pregnancies and reducing the burden of congenital infections.

5. CONCLUSION

The findings of this study demonstrate that a structured teaching program is effective in significantly improving the knowledge of antenatal mothers regarding TORCH infections during pregnancy. The substantial increase in post-test knowledge scores among mothers in the experimental group confirms the value of targeted health education in addressing preventable maternal and fetal health risks. While incidental learning was noted in the control group, the structured approach proved to deliver more consistent and measurable knowledge gains.

Acknowledgment: The authors express their sincere gratitude to the management and staff of the maternity centres of the multispecialty hospitals for their kind cooperation and support during data collection.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Consideration

Ethical approval for the study was granted by the Parul Institute Ethics Committee (PIEC), Vadodara, Gujarat. Participants were fully informed about the study objectives, and informed consent was obtained from all before data collection commenced.

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