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Evaluation of the Effectiveness of a Structured Teaching Program on Mothers' Knowledge Regarding the Prevention of Dengue Fever in Children: A Study in Pediatric Medical Wards at Shridevi Institute of Medical Sciences and Research Hospital

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Abstract

Background and objectives: *Dengue, commonly referred to as break-bone fever, is a viral infection spread to humans by mosquitoes, especially in tropical and subtropical areas. Although many people infected with dengue may show no symptoms, those who do typically exhibit symptoms such as high fever, headaches, body aches, nausea, and a rash. In most cases, individuals recover within 1–2 weeks. However, severe cases may necessitate hospital care. Home treatment is often sufficient for most cases of dengue fever. Taking preventive measures, such as wearing clothing covering most of the body, using mosquito nets (preferably treated with insect repellent) during daytime sleep, installing window screens, applying mosquito repellents (containing DEET, Picaridin, or IR3535), and utilizing coils and vaporizers, can help avoid contracting dengue.* ***Methods:*** *A pre-experimental one-group pre-test post-test design, employing a quantitative evaluative approach, was utilized in this study. A convenient sample of 60 participants was chosen from Shridevi Institute of Medical Sciences and Research Hospital, Tumkur. The data collection process included a structured interview schedule with 30 items, and the reliability of the schedule was evaluated. After conducting a pre-test, a structured teaching program was introduced, followed by a post-test administered after a 7-day gap. Data analysis involved the application of descriptive and inferential statistical methods.* ***Results:*** *The analysis of the data indicated that the average percentage of post-test knowledge scores (77.78%) surpassed the average percentage of pre-test knowledge scores (59.61%). The calculated 't' value (6.59) surpassed the tabulated value (t59=2.02, 0.05), suggesting a significant difference between the mean pre-test and post-test knowledge scores. Calculated χ^2 values showed significant associations between place of living, educational status of the father, and their post-test knowledge scores.* ***Interpretation and conclusion:*** *The research findings suggest that the implementation of a structured teaching program proved to be a successful approach in enhancing mothers' knowledge concerning the prevention of dengue fever in children.*

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INTRODUCTION

Dengue, commonly referred to as break-bone fever, is a viral infection transmitted by mosquitoes and is widespread in tropical and subtropical areas. Although many individuals infected with dengue

may not show symptoms, those who do typically present with high fever, headaches, body aches, nausea, and a rash. Most individuals recover within 1–2 weeks, but some may develop severe dengue, requiring hospital care [1].

Symptoms

Most people infected with dengue exhibit mild symptoms or remain asymptomatic, recovering within 1–2 weeks. In rare instances, dengue can be severe and lead to fatalities. Symptoms, if present, typically emerge 4–10 days after infection and persist for 2–7 days. Common symptoms may include:

- High fever (40°C/104°F)
- Severe headache
- Pain behind the eyes
- Muscle and joint pains
- Nausea
- Vomiting
- Swollen glands
- Rash

People who experience a second dengue infection face an increased risk of severe symptoms. Severe dengue manifestations often occur following the resolution of the fever:

- Severe abdominal pain
- Persistent vomiting
- Rapid breathing
- Bleeding gums or nose
- Fatigue
- Restlessness
- Blood in vomit or stool
- Being very thirsty
- Pale and cold skin
- Feeling weak

Diagnostics and Treatment

Most dengue fever cases can be treated at home using pain relief medication. The key preventive measure for dengue is to avoid mosquito bites. While there is no specific cure for dengue, the focus is on managing pain symptoms. Acetaminophen (paracetamol) is commonly used for pain relief, and non-steroidal anti-inflammatory drugs like ibuprofen and aspirin are avoided due to the elevated risk of bleeding. A vaccine named Dengvaxia is accessible for individuals who have previously had dengue and live in regions where the disease is prevalent. Severe cases of dengue may necessitate hospitalization [2].

Global Burden

The global occurrence of dengue has experienced a significant increase in recent decades, with reported cases to WHO escalating from 505,430 in 2000 to 5.2 million in 2019. However, a considerable number of dengue cases are either asymptomatic or mild and are managed without medical intervention, leading to underreporting. Estimates from modeling suggest an annual incidence of approximately 390 million dengue virus infections, with 96 million exhibiting clinical manifestations. Another study on dengue prevalence indicates that 3.9 billion people are vulnerable to dengue virus infection. Dengue has become established in over 100 countries across WHO regions in Africa, the Americas, the Eastern Mediterranean, Southeast Asia, and the Western Pacific. The Americas, Southeast Asia, and the Western Pacific are the regions most severely affected, with Asia representing approximately 70% of the global disease burden. Dengue is expanding its reach into new regions, including Europe, with

notable outbreaks. The first instances of local transmission were documented in France and Croatia in 2010, while other European countries reported imported cases. The year 2019 saw the highest global number of reported dengue cases, affecting all regions, including the first recorded transmission in Afghanistan. In the American Region, there were 3.1 million reported cases of dengue, with over 25,000 classified as severe. Noteworthy case numbers were documented in Asian nations like Bangladesh (101,000), Malaysia (131,000), the Philippines (420,000), and Vietnam (320,000). Dengue continues to be a recurring issue in countries such as Brazil, Colombia, the Cook Islands, Fiji, India, Kenya, Paraguay, Peru, the Philippines, the Reunion Islands, and Vietnam, as of the year 2021 [3].

Transmission

Transmission through the Mosquito Bite

The transmission of the virus to humans occurs through bites from infected female mosquitoes, primarily the Aedes aegypti mosquito. While other species within the Aedes genus can also act as vectors, Aedes aegypti plays the primary role. After feeding on the blood of an individual infected with the Dengue virus (DENV), the virus undergoes replication in the mosquito's midgut and subsequently spreads to secondary tissues, including the salivary glands. The time from virus ingestion to actual transmission to a new host is known as the extrinsic incubation period (EIP), lasting around 8–12 days under ambient temperatures of 25–28°C. Various factors, such as daily temperature fluctuations, virus genotype, and initial viral concentration, can impact the duration of the extrinsic incubation period. Once infectious, the mosquito can transmit the virus throughout its lifespan [4].

Human-to-mosquito Transmission

Mosquitoes can contract the dengue virus from individuals who are viremic with DENV. This includes individuals with symptomatic dengue infections, those who are pre-symptomatic, and even those who remain asymptomatic. Transmission of the virus from humans to mosquitoes can occur up to two days before the onset of symptoms and up to two days after the fever subsides. The probability of mosquito infection is increased when the patient has high viremia and a pronounced fever. Conversely, a decreased risk of mosquito infection is linked to elevated levels of DENV-specific antibodies. Viremia typically lasts for approximately 4–5 days, although it can extend up to 12 days.

Other Transmission Modes

Infrequent instances of dengue virus transmission have been documented through blood products, organ donations, and transfusions. Additionally, the virus has been observed to transmit within mosquitoes through transovarial means.

Risk Factors

Having a previous infection with DENV increases the chances of an individual experiencing severe dengue. The transmission of dengue in urban settings, especially in areas with unstructured urbanization, is affected by a range of social and environmental factors, including population density, human movement, the availability of dependable water sources, and methods of water storage. The community's vulnerability to dengue is also contingent on the population's knowledge, attitude, and practices related to dengue, along with the consistent implementation of sustainable vector control measures. Consequently, the risks of the disease may undergo alterations and shifts in tropical and subtropical regions due to climate change, and vectors may adapt to new environmental and climatic conditions [5, 6].

Prevention and Control

Dengue-carrying mosquitoes are active during daylight hours. Minimize the risk of contracting dengue by safeguarding against mosquito bites using:

- Clothes that cover as much of your body as possible
- Mosquito nets if sleeping during the day, ideally nets sprayed with insect repellent
- Window screens

- Mosquito repellents (containing DEET, Picaridin or IR3535)
- Coils and vaporizers.

If you get dengue, it is important to:
- Rest
- Drink plenty of liquids
- Use acetaminophen (paracetamol) for pain
- Avoid non-steroidal anti-inflammatory drugs, like ibuprofen and aspirin
- Watch for severe symptoms and contact your doctor as soon as possible if you notice any.

WHO Response

WHO responds to dengue in the following ways:

The organization assists nations in verifying outbreaks using its network of laboratories working together. It provides technical support and advice to countries for the effective handling of dengue outbreaks. Furthermore, it helps countries improve their reporting systems to precisely document the actual impact of the disease. The organization provides training on clinical management, diagnosis, and vector control at both national and regional levels through several collaborating centers [7–10].

It develops evidence-based strategies and policies, and assists countries in formulating strategies for dengue prevention and control while endorsing the adoption of the Global Vector Control Response (2017–2030). Additionally, the organization evaluates and suggests the creation of new tools, such as insecticide products and application technologies. It gathers official reports of dengue and severe dengue from more than 100 member states and issues guidelines and manuals on surveillance, case management, diagnosis, and prevention and control of dengue for member states.

OBJECTIVES OF THE STUDY

1. To evaluate mothers' knowledge concerning dengue fever prevention
2. To evaluate the influence of mothers' knowledge about dengue fever prevention following the implementation of a structured teaching program
3. To compare mothers' knowledge scores on dengue fever prevention before and after the teaching program
4. To determine any association between post-test knowledge and selected socio-demographic variables

HYPOTHESIS OF THE STUDY

H_1: The average post-test knowledge score of mothers regarding dengue fever prevention, as assessed by a modified knowledge questionnaire, is expected to show a significant increase compared to the average pre-test knowledge score.

H_2: There will be a notable correlation between post-test knowledge and their chosen demographic variables.

RESULTS

Section I: Analysis of Pre-test Knowledge Scores of Respondents

Analysis of pre-test Knowledge Scores of Mothers Regarding Prevention of Dengue Fever in Children

Table 1 and Figure 1 show the aspect-wise mean, median, SD, mean % and coefficient of variation (CV) of pre-test knowledge scores of respondents in various aspects of structured interview schedule. The highest (60.3%) mean percentage of knowledge scores of respondents was found in the aspect of 'knowledge regarding medical, home management and preventive measures,' and followed by 55.53% in the aspect of 'knowledge about dengue fever'. The overall mean percentage of knowledge scores of pre-test was 59.61%.

Table 1. Aspect-wise pre-test mean, median, SD, mean % and CV of mothers regarding prevention of dengue fever in children (N=60).

S.N.	Knowledge aspects	Statements	Max score	Respondents' knowledge				
				Mean	*Median*	*SD*	*Mean %*	*CV*
1.	Knowledge about dengue fever	19	19	10.55	9.50	3.42	55.53	32.39
2.	Knowledge regarding medical, home management, and preventive measures	11	11	6.63	6	2.01	60.30	30.27
3.	Combined	30	30	17.88	18	4.22	59.61	23.59

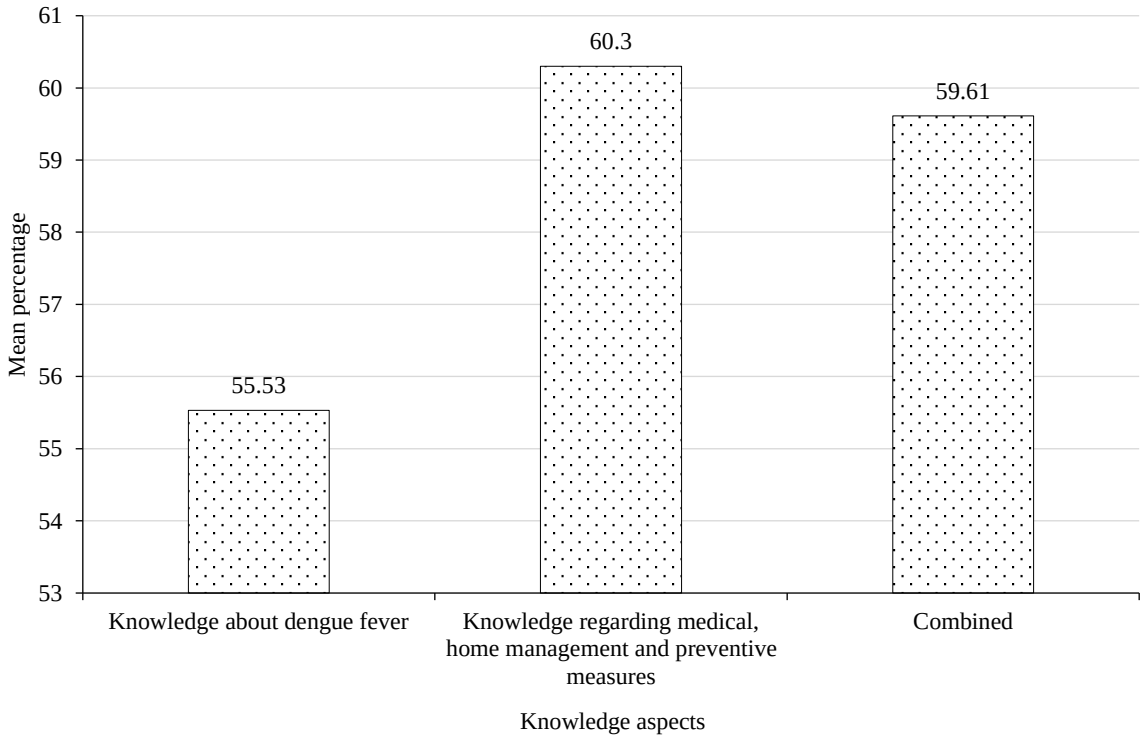

Figure 1. Aspect-wise pre-test mean % of knowledge scores of respondents on prevention of dengue fever in children.

Section II: Analysis of Post-test Knowledge Scores of Respondents

Analysis of Post-test Knowledge Scores of Mothers Regarding Prevention of Dengue Fever in Children

Table 2 and Figure 2 show the aspect-wise mean, median, SD, mean %, and CV of post-test knowledge scores of respondents in different aspects of structured interview schedule. The highest (75.88%) mean percentage of knowledge scores of respondents was found in the aspect of 'knowledge about dengue fever', and followed by 74.39% in the aspect of 'Knowledge regarding medical, home management, and preventive measures'. The overall mean percentage of knowledge scores of pre-test was 77.78%.

Section III: Comparison of Pre-test and Post-test Knowledge of Mothers Regarding Prevention of Dengue Fever in Children and Evaluation of the Impact of Structured Teaching Program

For hypotheses testing, the following null hypothesis was stated.

H_1: The average post-test knowledge score of mothers concerning dengue fever prevention will show a significant increase compared to the average pre-test knowledge score, as assessed by the modified knowledge questionnaire.

Table 3 and Figure 3 revealed the mean % and CV of pre-test, post-test, and enhancement knowledge scores and calculated 't' value in relation to different aspects of knowledge among COPD patients. The highest (20.35%) enhancement of mean % of knowledge score occurred in the aspect of 'Knowledge about dengue fever' with pre-test mean % of 55.53% and post-test mean % of 75.88% and calculated 't' value was 4.45.

14.09% of enhancement of mean % of knowledge score was found in the aspect of 'knowledge regarding medical, home management and preventive measures.' with pre-test mean % of 60.30 and post-test mean % of 74.39 and the calculated 't' value was 2.02.

Calculated 't' value regarding all the knowledge aspects were greater than the table value (t=2.02, P=0.05, df=59). Hence, in relation to all three dimensions of knowledge, the null hypothesis H_{01} was disproven, and the research hypothesis H_1 was validated. It was concluded that STP was effective in enhancing the knowledge in all the three aspects regarding prevention of dengue fever in children.

Table 2. Aspect-wise post-test mean, median, SD, mean % and CV of knowledge scores of mothers regarding prevention of dengue fever in children (N=60).

S.N.	Knowledge aspects	Statements	Max score	Respondents' knowledge				
				Mean	*Median*	*SD*	*Mean %*	*CV*
1.	Knowledge about dengue fever	19	19	14.42	15.00	2.81	75.88	19.46
2.	Knowledge regarding medical, home management, and preventive measures	11	11	8.18	8	1.58	74.39	19.29
3.	Combined	30	30	23.33	24	3.19	77.78	13.68

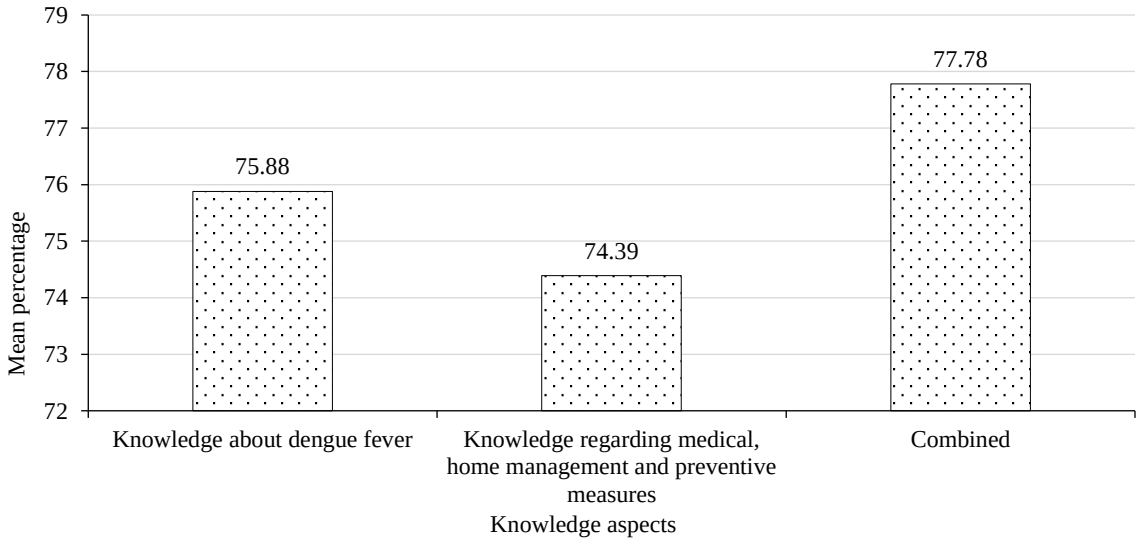

Figure 2. Aspect-wise post-test mean % of knowledge scores of respondents on prevention of dengue fever in children.

Table 3. Aspect-wise mean%, CV of pre-test, post-test, and enhancement knowledge scores on prevention of dengue fever in children and calculated paired 't' test values (N=60).

S. N.	Knowledge aspects	Respondents' knowledge (%)						Paired 't' test
		Pre-test		*Post-test*		*Enhancement*		
		Mean%	*CV*	*Mean%*	*CV*	*Mean%*	*CV*	
1.	Knowledge about dengue fever	55.53	32.39	75.88	19.46	20.35	102.59	4.45*
2.	Knowledge regarding medical, home management, and preventive measures.	60.30	30.27	74.39	19.29	14.09	163.22	2.02*

(t = 2.02, P=0.05, df = 59)

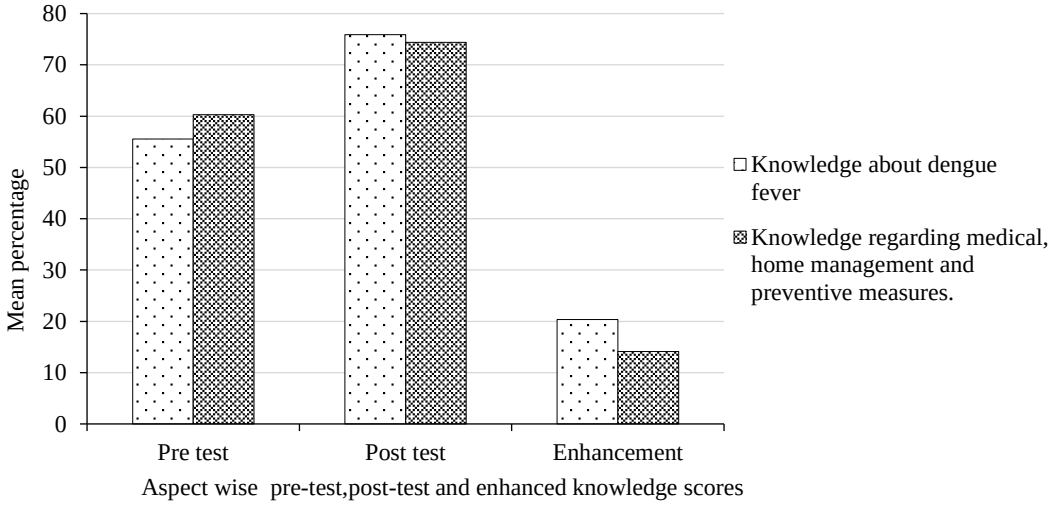

Figure 3. Aspect-wise comparison between pre-test and post-test mean % knowledge scores on prevention of dengue fever in children.

Table 4. Comparison of overall mean, median, SD, mean % and CV of pre-test and post-test knowledge scores on prevention of dengue fever in children and calculated paired 't' test values (N=60).

Aspects	Max score	Respondents' knowledge					Paired t-test
		Mean	*Median*	*SD*	*Mean %*	*CV*	
Pre-test	30	17.88	18	4.22	59.61	23.59	6.59*
Post-test	30	23.33	24	3.19	77.78	13.68	
Enhancement	30	5.45	5	4.53	18.00	83.12	

(t = 2.02, P=0.05, df = 59)

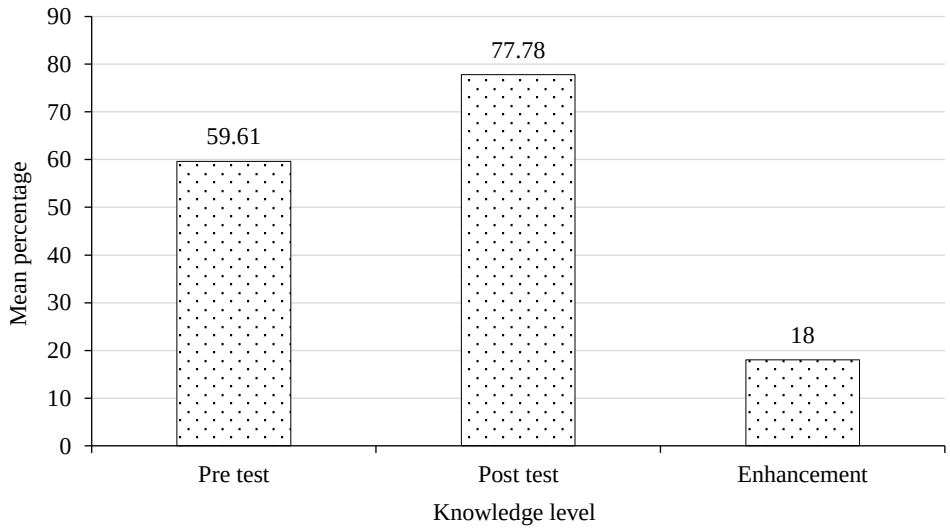

Figure 4. Comparison of overall pre-test and post-test mean % of knowledge scores on prevention of dengue fever in children.

Table 4 and Figure 4 show that the overall pre-test mean percentage of knowledge scores of respondents on ' prevention of dengue fever in children' was 59.61% and post-test mean % was 77.78% with an enhancement of 18%. The calculated paired 't' test value is 6.59, which is greater than the table value (t=2.02, P=0.05, df=59). Hence, the stated null hypothesis H_{01} is rejected and stated research hypothesis is accepted. The conclusion drawn is that the structured teaching program proved effective in enhancing the overall knowledge of mothers concerning the prevention of dengue fever in children.

Section IV: Analysis of Association Between Demographic Variables with Post-test Knowledge Scores

χ^2 values were calculated to test the hypothesis related to association. The null hypothesis is stated as follows:

H_2: There will be a significant association between post-test knowledge and the selected demographic variables.

Table 5. Association between demographic variables and post-test knowledge level of mothers regarding prevention of dengue fever in children (N=60).

Demographic variables	**Category**	**Knowledge level**				**df**	**χ^2 value**	**P-value**
		≤ Median		***> Median***				
		N	%	N	%			
Age of the mother (in years)	21–25	15	25	8	13	3	0.156	P>0.05
	26–30	10	17	5	8			
	31–35	9	15	5	8			
	>36	5	8	3	5.00			
Age group of the child	Toddler	10	0.17	6	10	3	0.33	P>0.05
	Pre-schooler	16	27	7	11.67			
	Schooler	13	21.67	8	13			
Place of living	Rural	10	16.67	11	18.33	2	4.89*	P>0.05
	Urban	29	48.33	10	16.67			
Educational status of mother	Uneducated	6	10	4	6.67	3	1.13	P>0.05
	Primary education	14	23.33	8	13			
	Degree	10	16.67	6	10			
	Postgraduate	9	15.00	3	5.00			
Educational status of father	Uneducated	3	5.00	1	2	3	5.52*	P>0.05
	Primary education	9	15	11	18.33			
	Degree	20	33.33	4	6.67			
	Postgraduate	7	11.67	5	8.33			
Occupation of the mother	Government job	0	0	1	1.67	3	0.188	P>0.05
	Private job	16	26.67	10	17			
	Daily wages	5	8.33	2	3.33			
	Unemployed	18	30	8	13.33			
Occupation of the father	Government job	0	0	1	2	3	0.15	P>0.05
	Private job	17	28	10	16.67			
	Daily wages	16	26.67	8	13.33			
	Unemployed	6	10	2	3.33			
Family monthly income (in ₹)	≤ 10,000	15	25	10	16.67	3	0.27	P>0.05
	10,001–20,000	16	26.67	8	13.33			
	20,001–30,000	4	7	2	3.33			
	≥ 30,001	4	6.67	1	1.67			
Type of family	Nuclear family	18	30	10	17	2	0.98	P>0.05
	Joint family	17	28.33	11	18			
	Divorced	4	6.67	0	0%			
Whether any of your family members affected with dengue fever before?	Yes	20	33.33	9	15	1	0.38	P>0.05
	No	19	31.67	12	20			
Previous source of information about dengue fever	Health professionals	8	13.33	6	10	3	1.48	P>0.05
	T.V, radio, posters	18	30	6	10			
	Friends	10	16.67	5	8			
	Don't know	3	5	4	7			

* Significant, NS: Non-significant

Table 5 presents the correlation between post-test knowledge scores of participants and certain demographic factors. A connection was identified between the place of residence, educational status of the father, and the post-test knowledge level of participants regarding the prevention of dengue fever in children. Consequently, the initially proposed null hypothesis H_{02} is dismissed, and the research hypothesis H_2 is affirmed for these variables. There is no significant association found between these variables such as, age of the mother, age of the child, educational status of mother, occupation of the mother, occupation of the father, family monthly income, type of family, previous source of information about dengue fever, and post-test knowledge level of mothers. Therefore, the null hypothesis H_{02} is acknowledged, and the research hypothesis H_2 is refuted for these variables.

CONCLUSION

The research findings suggest that the implementation of a structured teaching program proved to be a successful approach in enhancing mothers' knowledge concerning the prevention of dengue fever in children.

Implications

The findings of the study provide valuable insights with implications for nursing education, nursing practice, nursing administration, and nursing research.

Nursing Practice

Many mothers lack awareness about preventing dengue fever in children. Therefore, the knowledge enhancement offered through the structured teaching program on preventing dengue fever in children aids them in acquiring the necessary knowledge, which they can then apply in their everyday lives.

Nursing Education

The results of this study support the utilization of structured teaching programs in nursing education for public education. Nursing students can make the use of structured teaching program to educate the patients admitted in hospital as well as in the community who are suffering from dengue. The structured teaching program stimulates interest and motivates patients towards learning.

Nursing Research

A teaching program of similar nature can be developed to deliver education on dengue prevention and can be assessed for its efficacy. A more comprehensive and thorough investigation in this field can be undertaken, employing diverse teaching methods, settings, samples, and sampling techniques.

Nursing Administration

The nurse administrator can take initiative to plan and implement health education program with the help of structured teaching program on various health aspects to improve the knowledge of the general population towards prevention of diseases and promotion of health.

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