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Effectiveness Of Planned Teaching Programme On Knowledge Regarding Hand, Foot, Mouth Disease Among Mothers Of Under-Five Children, Odisha

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Abstract

A one-group pre-test post-test pre-experimental study was conducted to evaluate the effectiveness of a Structured Teaching Programme (STP) on mothers' knowledge of Hand, Foot and Mouth Disease (HFMD) in Chakeisiani, Bhubaneswar, Odisha. Fifty mothers of under-five children were selected by non-probability purposive sampling. Data were collected using a validated closed-ended questionnaire and analysed with descriptive and inferential statistics.

Pre-test findings showed 18 % of mothers had poor knowledge and 82 % had average knowledge. Post-test results revealed 100 % of mothers attained good knowledge. The mean post-test score was

significantly higher (paired t=78.16, p≤0.05). Chi-square analysis showed significant association only with mothers' occupation. The STP was thus highly effective in improving knowledge on HFMD prevention and management.

Keywords: Hand, Foot and Mouth Disease (HFMD), Planned Teaching Programme, Structured Teaching Programme, Mothers of Under-five Children, Knowledge, Community Health Education.

INTRODUCTION

According to the paediatric infectious disease journal October (2016) indicates that it is found to be seasonal in temperate Asia with a summer peak and in subtropical Asia with spring and fall peaks, but not in tropical Asia evidence of a climatic role was identified for temperate Japan. Risk factors include hygiene, age, gender and social contacts, but most studies were underpowered to adjust rigorously for confounding variables. Both community-level and school-level transmission have been implicated, but their relative importance is inconclusive. Epidemiologic indices are, poorly understood, No supporting quantitative evidence was found for the incubation period of EV-A71 the symptomatic rate of EV-A71/Coxsackie virus A16 infection was from 10% to 71% in 4 studies while the basic reproduction number was between 1.1 and 5.5 in 3 studies. The uncertainty in these estimates inhibits their use for further analysis. [(1)]

According to International Journal of Contemporary Pediatrics (2014) Total of 27 cases were seen in our hospital during October 2013 to November 2013. All the cases were children aged between 8 months to 10 years. Among the 27 cases 15 were male and 12 were female. The main presenting symptoms of the disease were rash (100%), sore throat (66.6%), low grade fever (85.1%), cough (66.6%), abdominal pain (25.9%), diarrhoea (7.4%) and mouth ulcers (92.5%). The skin lesions were found mainly on the hand, palms, buttock, legs and soles in almost all the cases. The skin lesions were erythematous maculopapular and in few cases vesicles also present. Mouth ulcers were in palate, buccal mucosa and tongue. The illness lasted for 6 to 7 days in all the cases. In 3 cases they had contact history that is mainly through the siblings. [(2)]

Zhicheng D (2012) conducted research regarding predicting the hand, foot, and mouth disease incidence using search engine query data and climate variables: an ecological study in Guangdong, China. In that during 2011-14, 1.358 million probable cases of HFMD in Guangdong were identified from the China CDC surveillance system. The incidence rates reached a steady state at more than 6 cases per 1000 person weeks in Guangdong. The median (range) of temperature and BDI was 23.070 (8.795-29.893)°C and 3296 (516-32596) units, respectively. As expected, both time series of weekly incidence and predictors for HFMD in Guangdong showed seasonal peaks of activity with a major peak from spring to early summer followed by a smaller peak in autumn. A consistent pattern was found for the time series of incidence shows significant correlations between BDI and HFMD incidence ($r = 0.794$ $p < 0.001$) or temperature ($r = 0.376$, $p < 0.001$, and between temperature and incidence($r = 0.657$ $p < 0.001$). [(3)]

The first true epidemic of HFMD in India occurred in 2007.Although literature had shown a first reported case in Calicut in the year 2004. In 2015, 17,462 cases were reported in a short span in Thailand. The global statistics of HFMD incidence rate is 26. 81 cases per 100, 000 under five population per year. According to National statistic on HFMD spread across India over last five years, the epidemic has been continuing with an average annual incident rate about 85. 78 cases per 1,00, 000 populations per year. The most common age was less than three years old (72.85 %). The northern region of India had been reported as the highest incident rate area at 31. 05 per 100, 000 population, followed by the central region24.55 per 100,000 population. [(4)]

In Xiangyang, outbreaks progressed through four stages: a sudden 2008 outbreak, annual aggravation, a sharp decline after 2012, and low-level persistence. Among 50,651 clinically or laboratory-confirmed cases, 637 (1.26%) were severe and 38 (0.075%) were fatal. Most cases (91.14%) occurred in children ≤5

years, with 74.3% in those ≤3 years. EV71 and CA16 accounted for 58.86% and 16.18% of cases and 94.73% and 2.63% of deaths, respectively. Peak EV71 positivity reached 83.7% in 2011 and 81.6% in 2012. Severe cases had a male-to-female ratio of 1.21:1 and a median age of 1.97 years (range: 28 days–9 years). EV71 was the dominant virus, with two annual incidence peaks: March–August and October–December. [(5)]

An eight-year surveillance study (2008–2015) in China reported 398,010 children with recurrent hand, foot, and mouth disease (HFMD), totaling 820,000 episodes; 1,767 recurrences were laboratory-confirmed. Recurrence occurred within 0–38.8 months of the first episode, with a 4% probability by 38.8 months. Reinfection with a different enter virus serotype was more common than with the same serotype, and severity was not linked to recurrence or interval between episodes. Most recurrences followed primary EV-A71 or CV-A16 infections. The study highlights a high burden of HFMD recurrence and calls for further research on virology confirmation, immune protection, cross-immunity, and the potential impact of recurrence on disease severity. [(6)]

On December 3, 2015, China approved the first inactivated Enter virus 71 (EV71) vaccine to prevent severe hand, foot, and mouth disease (HFMD). This vaccine, a major achievement for children's health, offers hope for global HFMD control. However, challenges remain, including effectiveness against diverse EV71 strains, international production and quality standards, harmonized pathogen monitoring methods, and affordability in other countries. Although commercially available, widespread protection against severe HFMD will require continued efforts to address these issues. [(7)]

A quantitative meta-analysis of 32 studies involving 781,903 hand, foot, and mouth disease (HFMD) cases identified key clinical signs, lab findings, and risk factors for severe illness and death. Severe cases showed hypersomnia (OR 21.97), convulsion (OR 16.18), limb shaking (OR 47.96), and breathlessness (OR 7.48), along with elevated interleukin-6 (SMD 1.57), higher neutrophil ratio (SMD 0.55), lower CD4+ (SMD –1.38), and reduced lymphocyte ratio (SMD –0.48). Risk factors for death included cyanosis (OR 5.82), tachycardia (OR 3.22), vomiting (OR 2.70), and increased WBC count (SMD 0.60). [(8)]

A study at MGMCRI, Puducherry, compared HFMD knowledge in 30 mothers of under-five children and 30 pediatric nurses. Mothers showed 50% inadequate, 40% moderate, and 10% adequate knowledge, while nurses showed 16.7% inadequate, 73.3% moderate, and 10% adequate knowledge. Mean scores were 9.33 for mothers and 12.63 for nurses, a significant difference ($p < 0.001$). Nurses' knowledge correlated with clinical experience and posting, whereas mothers' knowledge showed no demographic association. [(9)]

A cross-sectional study at Al-Kindy Teaching Hospital examined 100 cases of hand, foot, and mouth disease (HFMD) from December 1 to November 30, 2017. The mean patient age was 29.99 months; 65% were male. Common symptoms included skin lesion tenderness, malaise, decreased appetite, and fever (81%). Infections peaked in winter, with most patients seeking care two days after symptom onset. Home contact was the main source of transmission. Palms and soles were universally affected, and groin involvement occurred in 67% of cases ($p = 0.015$). [(10)]

Yang T (2011) conducted a frequency-matched case-control study in Ningbo (Jan 2010–Jun 2011) to identify risk factors for severe HFMD. Data from 89 severe cases and 267 mild controls were collected via records and parent interviews. Palm rashes (OR = 0.004, 95% CI 0–0.039, $p < 0.001$) and oral ulcers/herpes (OR = 0.001, 95% CI 0–0.009, $p < 0.001$) were strongly protective against severe disease. [(11)]

A retrospective analysis in Kota Kinabalu, Sabah, Malaysia, reviewed 3,327 HFMD cases from 2013–2018. Incidence peaked in 2018 with 2,200 cases, making Kota Kinabalu the most affected district. Males and Sabah indigenous groups showed the highest incidence. Chi-square testing revealed that severe

HFMD was significantly associated with patient age and ethnicity, highlighting important demographic risk factors for public health planning. [12]

A systematic review of HFMD outbreaks in Asia-Pacific childcare facilities (1980–2012) highlighted the need for better detection tools and preventive measures, as current EV71 vaccines lack cross-protection. Sixteen studies from China showed outbreaks lasting 4–46 days, with attack rates of 0.97–28.18%, especially when notification to local CDCs was delayed beyond 24 hours. Timely reporting and rapid control measures significantly reduced outbreak size and duration. The review recommends improved stakeholder communication, prompt CDC notification, and training infection-control specialists in childcare facilities to enhance early response and containment. [13]

METHODOLOGY

Study Design

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

Study Setting

Community area of Chakeisiani, Bhubaneswar, Odisha.

Population

Mothers who have five years old children in the selected setting..

Sampling Method

In this study non-probability purposive sampling technique is used.

Sample size

A total of 50 prime 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 Mothers having at least one child below five years, Residents of Chakeisiani who consented to participate, Able to understand Odia or English.

Mothers who had already attended similar HFMD awareness programmes, Mothers not available during data collection period were excluded.

Description of the tools

Data were collected using three tools:

Tool-1: Self-structured socio-demographic questionnaire (age, religion, education, occupation, monthly family income, type of family, number of children, type of house, and previous exposure to HFMD information).

Tool-2: Knowledge Questionnaire, Multiple-choice questions covering key areas of HFMD. Introduction and causes, modes of transmission, signs and symptoms, treatment and home care, prevention and control measures, each correct answer carried one mark, total possible score reflected overall knowledge level.

Scoring categories:

Good knowledge – high score, Average knowledge – moderate score, Poor knowledge – low score

Tool validation

Content validity: Reviewed by 5 experts (1 medical professionalism, 4 nursing professionalism). Reliability tested using test-retest method; correlation coefficient = 0.86, indicating high reliability. Pre-testing (tryout) done in hospital for clarity, ambiguity, and timing.

Study variables

Demographic variables: Age, education, occupation, income, type of family, number of children, type of house, previous knowledge.

Independent variables: Planned Teaching Programme on HFMD.

Dependent variables: Mothers' knowledge scores

Data collection procedure

Pre-test: Administered the structured questionnaire to assess baseline knowledge.

Intervention: Delivered a Planned Teaching Programme using charts, posters, flipcharts, and hand-outs.

Post-test: Same questionnaire administered after the programme to assess knowledge gain.

Ethical considerations

Approval obtained from Institutional Ethics Committee of Lord Jagannath Mission's College of Nursing. Written informed consent from participants. Assurance of confidentiality and right to withdraw.

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 was based on Ludwig von Bertalanffy's General System Theory (1968), which views any process as an interacting system of input, throughput, output, and feedback. This framework guided the assessment and evaluation of the Planned Teaching Programme (PTP) on knowledge regarding Hand, Foot and Mouth Disease (HFMD) among mothers of under-five children.

Input: Resources & Information: Mothers' demographic details (age, education, occupation, income, family type, number of children, previous knowledge).

Knowledge Baseline: Pre-test assessment of existing knowledge on HFMD using the structured questionnaire.

Throughput (Process)

Implementation of the Planned Teaching Programme: Educational session on HFMD causes transmission, signs/symptoms, treatment, and prevention. Teaching aids included posters, charts, flip charts, and hand-outs. Conducted in the community setting.

Output: Post-test knowledge scores of the mothers. Expected result was an increase in the knowledge level (from poor/average to good).

Feedback: Comparison of pre- and post-test scores (using paired t-test) to evaluate effectiveness. Findings used to refine future community teaching programmes and guide public health education strategies.

Rationale for Using General System Theory

This theory emphasizes a dynamic process where a system receives inputs, transforms them, and produces outputs while constantly adapting through feedback. It was suitable because the study involved: Assessing mothers' initial knowledge (input), Delivering an educational intervention (throughput), Measuring knowledge gain (output), and Using the results for continuous improvement (feedback).

RESULTS

Table-1: Distribution of subjects based on sociodemographic variables.

Age 56% of mothers were ≥36 years, 24% were 28–35 years, and 20% were 21–27 years. Religion: 82% Hindu, 18% Muslim, none Christian. Education: 54% had higher secondary education, 20% secondary, 18% primary, 8% graduation or above. Occupation: 80% housewives, 20% working. Family Income: 40% earned 9,232–27,468; 28% <9,226; 22% 27,654–46,089; 10% >46,095. Family Type: 74% nuclear, 24% joint, 2% extended. Number of Children: 54% had two children, 36% more than two, 10% one child. Housing: 84% lived in pucca houses, 16% kutcha, 6% semi-pucca. Previous Knowledge: 60% had no prior HFMD knowledge; 40% had knowledge via multimedia.

Table- 2: Frequency & percentage wise distribution on level of knowledge of pre-test & post -test knowledge score of mothers regarding hand, foot, mouth disease under five children.

N =50

Level of knowledge	Pre test		Post test	
	Number	Percentage	Number	Percentage
Poor	9	18%	-	-
Average	41	82%	-	-
Good	-	-	50	100%

The data presented in table-2 revealed that the pre-test score shoes that9 (18%) of mothers have poor knowledge, 41 (82%) of mothers have average knowledge and none of them have good knowledge. The post-test score shows that no mothers have poor and average knowledge, 50 (100%) of mothers has good knowledge.

Table- 3: Area wise distribution of mean, standard deviation, mean percentage of pre-test post-test knowledge scores of mothers regarding hand, foot, mouth disease.

N =50

Sl. No.	Area	Pre-test			Post test			Effectiveness (y-x)
		Mean	SD	Mean % (x)	Mean	SD	Mean % (y)	
1	Introduction	0.56	0.6	18.66	2.3	0.43	76.66	58
2	Causes of hand, foot, mouth disease	0.58	0.7	29	1.66	0.46	83	54
3	Sign & symptoms of hand, foot, mouth disease	0.9	0.66	12.65	6.54	0.56	93.42	80.77
4	Treatment hand, foot, mouth disease	1.22	0.83	13.55	8.62	0.47	95.77	82.22
5	Prevention of hand, foot, mouth disease	0.96	0.68	10.66	8.64	0.5	96	85.34
6	Over all	4.18	1.74	13.93	27.78	1.06	92.6	78.67

Pre-test knowledge among mothers averaged 4.18 ± 1.74 (13.93%), rising to 27.7 ± 1.06 (92.6%) post-test, showing a 78.67% improvement. The highest post-test score was in “Prevention” (8.64 ± 0.5; 96%), confirming the structured teaching program’s strong effectiveness.

Table- 4: pre-test &post test knowledge scores for correct response on introduction regarding hand, foot, mouth disease among mothers of fewer than five children.

N =50

Sl. No.	Item	Pre-test correct response		Post-test correct response		Effectiveness
		Frequency	% (X)	Frequency	% (Y)	E=(Y-X)%
1	Hand, foot and mouth disease caused by contagious viral infection	15	30%	49	98%	58%
2	Under five age group of children is vulnerable for hand, foot and mouth disease	9	18%	39	78%	60%
3	Summer season is responsible for the high out-break of Hand, foot and mouth disease	4	8%	27	54%	46%

Post-test results showed 98% of mothers correctly identified HFMD as a viral infection (58% effectiveness), while 54% recognized summer as a high-risk season (46% effectiveness). The highest effectiveness (60%) was for knowing that children under five are most vulnerable, confirming the structured teaching program's overall effectiveness.

Table- 5: Item wise comparison of pre-test &post test knowledge scores for correct response on causes of hand, foot and mouth disease among mothers of under five children.

N= 50

Sl. No.	Item	Pre-test		Post test		Effectiveness
		Frequency	% (X)	Frequency	% (Y)	E=(Y-X)%
1	Coxsackievirus responsible for hand, foot and mouth disease	13	26%	40	80%	54%
2	Faecal oral route is the mode of transmission of hand, foot and mouth disease	16	32%	43	86%	54%

Post-test results showed 86% of mothers correctly identified the fecal–oral transmission route (54% effectiveness) and 80% recognized coxsackie virus as the cause (54% effectiveness), indicating the structured teaching program was effective for all items on HFMD causes.

Table- 6: Item wise comparison of pre-test & post-test knowledge scores for correct response on sign and symptoms of hand foot and mouth disease.

N= 50

Sl. No.	Item	Pre-test		Post test		ectiveness
		f	%(X)	f	% (Y)	E=(Y-X) %
6	The incubation period of hand, foot, mouth disease is 3 to 6 days.	10	20%	48	96%	76%
7	The main symptoms are found in hand, foot and mouth disease are fever, malaise, red rash, blisters	7	14%	47	94%	80%
8	The blister usually develop one- or two-days fever starts.	6	12%	45	90%	78%
9	The body, the lesion mainly seen in hand/feet.	5	10%	48	96%	86%
10	The doubt full signals of hand, foot and mouth disease are fever, raised red spots on palms, soles.	6	12%	46	92%	80%

11	The virus last in 7- 10 days in the affected person body.	5	10%	48	96%	86%
12	Blood test is the main diagnostic investigation of hand, foot and mouth diseases.	6	12%	45	90%	78%

Post-test results showed 96% of mothers correctly identified the 3–6 day incubation period, hand/foot lesions, and 7–10 day virus duration, with effectiveness of 76%, 86%, and 86% respectively. The lowest post-test score was 90% for blister onset and blood test diagnosis (78% effectiveness). Overall, the structured teaching program was effective for all signs and symptoms of HFMD.

Table- 7: Item wise comparison of pre-test &post test knowledge scores for correct response on treatment of hand foot and mouth diseases.

N= 50

Sl. No.	Item	Pre-test		Post test		ctiveness
		f	% (X)	f	%(Y)	E=(Y-X) %
1	Fluid therapy, rest is the initial treatment for children with hand, foot and mouth diseases.	11	22%	47	94%	72%
2	Wash your hands with soap and water to reduce the risk of hand, foot and mouth disease.	8	16%	47	94%	78%
3	Calamine lotion treats the blisters.	7	14%	49	98%	84%
4	Proper hand washing protects your children from hand foot and disease.	10	20%	49	98%	78%
5	The chest pain, shortness of breath. The care giver seeks medical care for hand foot and mouth disease.	6	12%	48	96%	84%
6	Fluid foods diet prescribed during the illness.	7	14%	49	98%	84%
7	Plenty of fluids / rest prevent the dehydration of hand, foot, mouth disease.	3	6%	50	100%	94 %
8	Salty and spicy foods to be avoided during illness.	5	10%	50	100%	90%
9	7-10 days the lesion takes up to get dry.	4	8%	47	94%	86%

Post-test results showed 100% of mothers correctly identified giving plenty of fluids/rest (94% effectiveness) and avoiding salty, spicy foods (90% effectiveness). The lowest post-test score was 94% for items on fluid therapy, hand washing, and lesion healing (effectiveness 72%, 78%, and 86%). Overall, the structured teaching program was effective for all treatment-related items.

Table- 8: Comparison between overall knowledge scores of pre test and post of the mothers regarding hand, foot, mouth disease.

N= 50

GROUPS	MEAN	SD	MEAN DIFFERENCE	't' VALUE	TABLE VALUE (P≤ 0.05)
Pre test	4.18	1.74	23.6	78.16	2.02
Post test	27.78	1.06			

Post-test knowledge scores (mean 27.78) were significantly higher than pre-test scores (mean 4.18), with a mean difference of 23.6 and a paired t-value of 78.16 ($p < 0.05$). The null hypothesis was rejected, confirming that the structured teaching program significantly improved mothers' knowledge of HFMD.

Table- 9: Association between post-test knowledge scores of mothers regarding hand, foot, mouth disease.

Demographic variables	Chi-square value	Df	Table value
Age of the mother in year	0.92	2	5.991
Religion	0.1	2	5.99
Education of the mother	4.57	3	7.82
Occupation	4.15	1	3.84
Family Income	0.498	3	7.82
Type of family	3.22	2	7.82
No of child	1.24	2	5.991
Type of house	2.98	1	3.84
Previous knowledge	0.0013	1	3.84

(P ≤ 0.05)

Chi-square analysis showed a significant association between mothers' post-test knowledge scores and their occupation ($p < 0.05$), while no significant association was found with age, religion, education, income, family type, number of children, housing type, or prior knowledge. Thus, only occupation was significantly linked to post-test knowledge.

DISCUSSION

Statistical modeling of HFMD in East and Southeast Asia to estimate the asymptomatic EV-A71 infection rate. Singapore case notifications, where mandatory reporting ensures near-complete. Asymptomatic infection rate estimated at 71.4% (68.3–74.3%) for children aged 1–4 years. Incidence (6–14% at age 1) is 3–5 times higher than China despite lower EV-A71 seropositivity. High asymptomatic rate lowers infection parameter estimates in models assuming all cases are symptomatic and affects basic reproduction number calculations. Modeling Concern: Common assumption that all school populations are fully susceptible before outbreaks may be inaccurate.[14]

Meta-analysis of 32 articles including 781,903 HFMD cases. Hypersomnia (OR 21.97), convulsion (OR 16.18), limb shaking (OR 47.96), breathlessness (OR 7.48). Increased IL-6 (SMD 1.57), higher neutrophil

ratio (SMD 0.55), lower CD4+ (SMD –1.38), reduced lymphocyte ratio (SMD –0.48). Cyanosis (OR 5.82), tachycardia (OR 3.22), vomiting (OR 2.70), increased WBC count (SMD 0.60). [15]

A cluster-randomized trial in Shenzhen, China, evaluated the "Clean Hands, Happy Life" intervention among 8,275 kindergarten children. The intervention, delivered in kindergartens and families, significantly reduced HFMD incidence (IRR 0.30–0.39) and shortened sickness-related absences (B = 0.34–0.58 days) compared to controls. It also decreased respiratory, skin, and eye infection episodes, demonstrating effectiveness in improving child health and attendance. [16]

IMPLICATIONS OF THE STUDY:

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

LIMITATION:

Conducted in a single community with a small non-random sample; limits generalisability. Only immediate post-test knowledge measured; long-term retention not assessed.

CONCLUSION:

The Planned Teaching Programme significantly improved mothers' knowledge regarding HFMD, demonstrating the value of structured community education in preventing infectious diseases among under-five children. Expansion of such programmes to other communities is recommended for broader public health impact.

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Conflicts of interest

There are no conflicts of interest for the writers.

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Ethics Approval

Permissions were also secured from the medical superintendent, the head of the department, and relevant staff. Approved by Research Committee. Formal permission obtained from Superintendent, Capital Hospital. Informed consent taken from participants.

DATA AVAILIBILITY

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

ABBREVIATIONS

HFMD – Hand, Foot, Mouth Disease, EV – Enterovirus, CV – Coxsackievirus, PTP – Planned Teaching Programme, CVA16 – Coxsackievirus A16, EV71 – Enterovirus 71, t – Paired t test value, χ^2 – Chi-square, SD – Standard Deviation

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