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Knowledge Regarding Prevention of Worm Infestation Among Mothers of Under-Five Children in an Urban Area of Surat, Gujarat, India: A Descriptive Cross-Sectional Study

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Abstract

Background: Soil-transmitted helminth (STH) infection is a common preventable cause of malnutrition and anaemia in young children. Mothers are the primary caregivers of under-five children, so their knowledge of prevention is central to control at the household level.

Objectives: To assess knowledge regarding prevention of worm infestation among mothers of under-five children in an urban area of Surat, to examine the association between knowledge and selected demographic variables, and to develop an informative booklet on prevention of worm infestation.

Methods: A descriptive cross-sectional survey was conducted among 60 mothers of children aged 1 to 5 years, selected by non-probability purposive sampling. Data were collected using a demographic preform and a 30-item multiple-choice knowledge questionnaire (maximum score 30) in English and Gujarati, validated by subject experts. Scores of 0–10, 11–20 and 21–30 were classified as poor, average and good knowledge. Descriptive statistics and the chi-square test were used.

Results: The mean knowledge score was 17.35 ± 4.69 (range 6–26). Seven mothers (11.7%) had poor, 39 (65.0%) average and 14 (23.3%) good knowledge. Educational status was significantly associated with knowledge level ($\chi^2 = 29.05$, df = 4, $p < 0.001$): illiterate mothers scored markedly lower (mean 11.6) than mothers with primary (18.4) or secondary education (19.5). No significant association was found with age, religion, occupation, family type, number of children or age of the child.

Conclusion: Most mothers had only average knowledge of worm infestation prevention, and no mother with primary or secondary education had poor knowledge while more than half of illiterate mothers did. Health education that is simple, visual and suited to low-literacy mothers should be prioritised. The informative booklet developed in this study can support such education, and its effectiveness should be tested in an interventional study.

Keywords: worm infestation; soil-transmitted helminth; knowledge; mothers; under-five children; informative booklet; Surat

1. Introduction

Worm infestation, mainly by soil-transmitted helminths (STH) such as *Ascaris lumbricoides* (roundworm), *Trichuris trichiura* (whipworm) and hookworms, remains one of the most common infections of childhood in low- and middle-income countries. The World Health Organization (WHO) estimates that about 1.5 billion people, roughly 24% of the world's population, are infected with STH, with the greatest burden among communities that lack safe water, sanitation and hygiene [1]. In children, heavy infection is associated with malnutrition, iron-deficiency anaemia, impaired growth and reduced learning capacity [1,2].

India accounts for a large share of the global burden. The Government of India launched the National Deworming Day (NDD) programme in 2015, providing a single dose of albendazole twice a year through schools and Anganwadi centres to children and adolescents aged 1–19 years, together with messages on handwashing, toilet use, footwear and safe water [3]. Periodic deworming reduces worm load, but reinfection is common unless hygiene and sanitation behaviours at home also change .

Under-five children are particularly vulnerable because of crawling and hand-to-mouth behaviour, immature hygiene practice and frequent contact with contaminated soil. Their daily care, including food preparation, handwashing, nail care, footwear and the decision to seek treatment, is largely the responsibility of the mother. Urban areas have better health services than rural areas, but crowded, low-income neighbourhoods may still have inadequate sanitation, waste disposal and drinking-water safety. Surat is a large industrial city with many such neighbourhoods.

Before designing health education, planners need to know what mothers already know. Few studies from Surat have assessed maternal knowledge of worm infestation prevention. This study therefore aimed to (i) assess the level of knowledge among mothers of under-five children in an urban area of Surat, (ii) determine the association between knowledge and selected demographic variables, and (iii) develop an informative booklet based on the identified needs.

2. Methods

2.1 Study design and setting

A descriptive cross-sectional survey was carried out in a selected urban community of Surat city, Gujarat (Singanpor Urban area). Formal permission for the study was obtained from the concerned municipal and health authorities.

2.2 Participants and sampling

The target population was mothers of under-five children residing in the study area. Sixty mothers were recruited by non-probability purposive sampling. Inclusion criteria were: having at least one child under five years; residing in the study area; willingness to participate; availability during data collection; and ability to understand Gujarati. Mothers who were unavailable, who had attended a formal health education programme on worm infestation in the previous six months, or who were too ill to respond were excluded.

2.3 Instruments

Demographic proforma. Age of the mother, religion, educational status, occupation, type of family, number of children and age of the index child.

Knowledge questionnaire. A structured questionnaire of 30 multiple-choice items, each with four options and one correct answer, covering the causes and transmission of worm infestation, signs and symptoms, complications, personal and environmental hygiene, safe water and food, deworming and care-seeking. Each correct answer scored 1 and each incorrect answer 0 (maximum 30). Scores were categorised as poor (0–10, up to 33%), average (11–20, 34–66%) or good (21–30, 67–100%). The questionnaire was prepared in English and translated into Gujarati.

2.4 Development, validity and reliability of the tools

The questionnaire and booklet were developed from textbooks, journal articles and national guidelines. Content validity was established by experts in community health nursing, child health nursing and medical-surgical nursing, whose suggestions were incorporated before use. Reliability was checked in a pilot study on mothers who met the inclusion criteria and were not part of the main sample [reliability coefficient and content validity index to be inserted].

2.5 Data collection

After explaining the purpose of the study and obtaining written informed consent, the investigators administered the questionnaire to each mother. Mothers were then given the informative booklet as a health education resource. The booklet covers causes, modes of transmission, signs and symptoms, complications, prevention, personal hygiene, environmental sanitation, hand washing, safe water, food hygiene and deworming. Knowledge was measured once, before the booklet was given; the effect of the booklet was not evaluated in this study.

2.6 Statistical analysis

Frequencies, percentages, mean and standard deviation described the demographic variables and knowledge scores. The chi-square test of association examined the relationship between knowledge level (poor, average, and good) and each demographic variable. Because many cells had small expected counts, the finding for education was further checked by collapsing categories (illiterate versus literate) and with the

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Kruskal–Wallis test on raw scores. A p-value below 0.05 was considered significant.

2.7 Ethical considerations

The study was approved by the institutional authorities of T. & T.V. Institute of Nursing. Participation was voluntary, written informed consent was obtained, participants could withdraw at any time, and confidentiality and anonymity were maintained.

3. Results

3.1 Characteristics of the participants

Most mothers were aged 26–35 years (53.3%), Hindu (70.0%) and homemakers (76.7%). Over a fifth (21.7%) was illiterate, 40.0% had primary and 38.3% secondary education, and none was a graduate. Almost half lived in joint families (50.9%), and 46.7% had two children. The index children were most commonly aged 3–4 years (31.7%) and 2–3 years (33.3%) (Table 1).

Table 1. Demographic characteristics of the mothers (N = 60)

Variable	Category	n	%
Age of mother (years)	18–25	11	18.3
	26–35	32	53.3
	36–45	12	20.0
	Above 45	5	8.3
Religion	Hindu	42	70.0
	Muslim	13	21.7
	Christian	5	8.3
Education	Illiterate	13	21.7
	Primary	24	40.0
	Secondary	23	38.3
	Graduate	0	0.0
Occupation	Homemaker	46	76.7
	Daily wage worker	6	10.0
	Government employee	2	3.3
	Private employee	6	10.0
Type of family (n = 57)*	Nuclear	17	29.8
	Joint	29	50.9
	Extended	10	17.5
	Single-parent	1	1.8
Number of children	One	9	15.0
	Two	28	46.7
	Three	20	33.3
	Four or more	3	5.0
Age of index child (years)	1–2	12	20.0
	2–3	20	33.3
	3–4	19	31.7
	4–5	9	15.0

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**Family type was not recorded for three mothers.*

3.2 Level of knowledge

The mean total knowledge score was 17.35 ± 4.69 (median 18; range 6–26), i.e. 57.8% of the maximum. Seven mothers (11.7%) had poor knowledge, 39 (65.0%) average knowledge and 14 (23.3%) good knowledge (Table 2). No mother answered all items correctly.

Table 2. Distribution of knowledge level (N = 60)

Knowledge level	Score	n	%
Poor	0–10	7	11.7
Average	11–20	39	65.0
Good	21–30	14	23.3

3.3 Association between knowledge and demographic variables

Educational status was the only variable significantly associated with knowledge level (Table 3). All seven mothers with poor knowledge were illiterate, whereas no mother with primary or secondary education had poor knowledge. Mean scores rose from 11.6 ± 5.3 in illiterate mothers to 18.4 ± 3.3 in mothers with primary and 19.5 ± 2.7 in mothers with secondary education (Kruskal–Wallis H = 19.34, $p < 0.001$). Collapsing education into illiterate versus literate gave the same result ($\chi^2 = 28.85$, df = 2, $p < 0.001$; Fisher's exact test for poor versus not-poor knowledge, $p < 0.001$). No significant association was found with age of the mother, religion, occupation, type of family, number of children or age of the index child.

Table 3. Association between knowledge level and demographic variables

Variable	Poor / Average / Good by category	χ^2	df	p	Result
Age of mother	18–25: 1/7/3; 26–35: 2/23/7; 36–45: 4/6/2; >45: 0/3/2	7.88	6	0.247	NS
Religion	Hindu: 6/25/11; Muslim: 0/11/2; Christian: 1/3/1	3.57	4	0.468	NS
Education	Illiterate: 7/5/1; Primary: 0/18/6; Secondary: 0/16/7	29.05	4	<0.001	S
Occupation	Homemaker: 6/28/12; Daily wage: 1/5/0; Government: 0/1/1; Private: 0/5/1	4.22	6	0.647	NS
Type of family (n = 57)	Nuclear: 1/13/3; Joint: 4/19/6; Extended: 2/4/4; Single-parent: 0/1/0	4.51	6	0.609	NS
Number of children	One: 1/4/4; Two: 2/20/6; Three: 3/13/4; Four or more: 1/2/0	5.21	6	0.517	NS
Age of index child	1–2: 2/5/5; 2–3: 2/13/5; 3–4: 2/15/2; 4–5: 1/6/2	5.00	6	0.544	NS

S = significant at $p < 0.05$; NS = not significant. Most cells had expected counts below 5, so results other than education should be interpreted cautiously.

4. Discussion

This study found that most mothers of under-five children in the study area (65.0%) had only average knowledge of worm infestation prevention, about one in nine (11.7%) had poor knowledge, and less than a quarter (23.3%) had good knowledge. The mean score of 57.8% of the maximum indicates considerable room for improvement even though the questionnaire covered basic content such as hand washing, safe water, nail care, washing of produce and deworming. Similar findings of predominantly inadequate or moderate maternal knowledge have been reported from other Indian communities, which supports the need for continuing health education alongside deworming programmes .

The clearest finding was the association with maternal education. Poor knowledge was confined to illiterate mothers, and their mean score was about seven points lower than that of literate mothers. This agrees with the general observation that maternal literacy is related to health knowledge and hygiene behaviour, and it indicates that written material alone may not reach the mothers who need it most. Booklets for this group should be heavily pictorial, use simple Gujarati, and be accompanied by verbal demonstration, for example during Anganwadi visits, immunisation sessions or home visits by community health workers.

The absence of significant associations with age, religion, occupation, family type, number of children and child age should be read with caution. With only 60 participants, most of whom were homemakers, Hindu and aged 26–35, the study had little power to detect modest differences, and the sparse cells make the chi-square approximation unreliable. A larger, more varied sample would be needed to show whether these characteristics matter.

The study also produced an informative booklet that covers the causes, transmission, symptoms, complications and prevention of worm infestation in plain language. Because knowledge was measured only once, before the booklet was provided, this study cannot show that the booklet improves knowledge. The finding that knowledge gaps cluster among low-literacy mothers, however, offers a clear target for the booklet and for future testing.

4.1 Implications

Nursing practice: community and school health nurses can use brief screening of maternal knowledge to identify mothers, particularly illiterate mothers, who need individual counselling on hand washing, footwear, nail hygiene, safe water, food hygiene and the timing of deworming.

Nursing education: students should be trained to adapt health education to the literacy level of the audience, using demonstration and pictorial aids.

Nursing research: studies are needed to test the booklet in a pre-test/post-test or controlled design and to measure practices and, where feasible, infection prevalence rather than knowledge alone.

4.2 Limitations

The sample was small, drawn from a single urban area by purposive sampling, so findings cannot be generalised to all mothers in Surat or elsewhere. The design was cross-sectional and measured knowledge only, not practices or actual infection. Several demographic categories contained very few mothers, and the questionnaire was self-reported. Family type was missing for three participants. The booklet was not evaluated.

5. Conclusion

Most mothers of under-five children in the study area had average knowledge of prevention of worm infestation, and illiteracy was strongly associated with poor knowledge. Health education that is simple, visual and supported by demonstration should be directed first at mothers with little or no schooling. The informative booklet developed in this study is ready for evaluation in an interventional study with a larger and more diverse sample.

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