



Assessment of Parents' Awareness of Urinary Tract Infections (UTIs) in Infants and Children and Related Demographic Factors: A Cross-sectional Study

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Abstract

Background: Urinary tract infection (UTI) is the second most common infection in children. Parents' lack of awareness and information about UTIs ultimately leads to delayed referral for treatment, which raises many concerns in parents.

Objectives: The research aimed to evaluate the parental awareness of UTIs in infants and children and related demographic factors.

Methods: In this cross-sectional analytical study, 270 parents who had a child or infant with UTIs referring to the Nephrology Clinic of Mohammad Kermanshahi Hospital in Kermanshah, Iran, in 2018 were selected by a convenience sampling method. To analyze the data, the chi-square test and Fisher's exact test were used.

Results: According to the results, the parental awareness of the symptoms of UTIs in children was moderate, and the overall score on the awareness of complications, treatment, prevention, and diagnosis of UTIs in children was high. There were statistically significant relationships between the parental age and knowledge of UTI treatment in children, between paternal education and treatment and diagnosis and the total score of knowledge on UTIs in children, and between maternal education and awareness of the symptoms and how to prevent UTIs. Further, there was a statistical relationship between the children's history of UTIs and the awareness of how to diagnose and treat UTIs in children ($P < 0.05$).

Conclusions: Given the results, educational programs must be promoted to raise parents' awareness of UTIs in infants and children, especially UTI symptoms in lower educated, elderly parents whose other children have not had any history of UTIs.

Keywords: Awareness, Urinary Tract Infection, Parents, Child, Infant

1. Background

Urinary tract infection (UTI) is one of the most common infectious diseases in childhood (1) that accounts for 7% of visits to the doctors' offices, 5 - 14% of cases referring to the emergency departments (2), 20% of all medical consultations, and 5.3% of infant visits to emergency rooms (3, 4). About 8% of girls and 2% of boys develop UTIs once around the age of 11. Almost 75% of infants less than three-months-old with bacteriuria are male compared to only 10% between the age of three and eight months (5). The wide range of symptoms and high prevalence of this disease are major causes of concern for parents, doctors, and health workers. The prevalence of UTIs varies according to age, sex, race, region, and culture (6). The disease prognosis depends on some factors, including the site of involvement, the severity of symptoms, and disease complicating

factors (7).

One of the most common types of classification is based on the site of involvement, which is divided into upper (pyelonephritis) and lower (cystitis) involved parts. The most common symptoms of UTIs in children younger than three months of age are nonspecific and include fever, nausea, restlessness, and prolonged jaundice. The symptoms may also be manifested by weight loss and malnutrition and less likely by hematuria and dysuria. Fever is one of the most common symptoms in infants older than three months. In addition, with an increase in age, some symptoms may appear, including abdominal pain, flank pain, hematuria, dysuria, and recurrent UTIs that prevent the infant from gaining weight (8).

About 20% of children with UTIs have recurrent symptoms. Recurrent UTI prevention can contribute to the sub-

sequent prevention of further important complications such as renal parenchymal scars, growth disorders, and high blood pressure. All of these factors can lead to a reduction in parental anxiety and stress (9). Indeed, not all patients with UTIs are equally important, and in some high-risk patients, such as those with congenital anomalies of the urinary tract, delayed diagnosis can lead to the development or progression of irreversible kidney damage in children. This results in more challenging management in later stages. Thus, the two most important steps in managing a child afflicted with a UTI are the proper diagnosis and timely treatment (10). Because parents are the ones in direct contact with their children and infants, it is of high significance to receive sufficient information about UTIs, and physicians should trustfully make the parents informed of the duration and symptoms of the disease (8).

When a child becomes ill, the parents become anxious. This concern affects their understanding of the illness and how to deal with it. In some cases, this concern and misunderstanding of parents about the disease can cause a rift and disagreement between the doctor and the patient's parents, and this, in turn, affects the course of treatment. Misconceptions and negative attitudes of parents towards their child's illness, often caused by their lack of awareness, can endanger their child's general health (11, 12). Studies show that parents with clearer and realistic attitudes toward their child's illness elicit more sensible reactions than parents with a less favorable attitude (12). On the other hand, the parents' knowledge of the disease can significantly facilitate and hasten child treatment, prevent the recurrence of the disease, or contribute to more facile handling of behavioral or emotional problems (13). The studies also show that whatever the parents are more informed of the nature of their child's illness, the treatment process progresses more facile (12, 14).

2. Objectives

Some effective factors, including a high prevalence of UTIs in infants and children, emergence of different symptoms in them as a critical factor in the difficulty of diagnosis, and lack of parents' sufficient knowledge of the disease can cause irreversible complications. Accordingly, the present study aimed to investigate the extent of parental awareness of UTIs in infants and children and related demographic factors.

3. Methods

A cross-sectional analytical study was conducted to investigate the factors related to the parental awareness of

UTIs in infants and children and related demographic factors. The statistical population comprised all parents with infants or children with UTIs who were referred to the Nephrology Clinic of Mohammad Kermanshahi Hospital (Kermanshah University of Medical Sciences, Iran) in 2018.

Considering the study design (cross-sectional) and parental awareness of UTIs (89%) obtained from the research performed by Owen et al. (15), as well as given a 95% confidence level and 4% accuracy, we used the formula $n = \frac{(z_{1-\frac{\alpha}{2}})^2 (p)(1-p)}{(d)^2}$, considered a dropout rate of 15%, and calculated the minimum sample size of 270 people among the parents of the afflicted children. The research sample included the parents who met the inclusion criteria, were volunteer participants and were selected by convenience method.

The inclusion criteria included the parents having an infant or child diagnosed with UTIs, not having a child with chronic physical illness and mental retardation, and signing an informed consent form to participate in the study. The exclusion criterion was a reluctance to participate in the study.

The UTI diagnosis was based on clinical signs, urinalysis results, and urine culture. Clinical symptoms in older children included dysuria, urgency, and frequency. General symptoms in infants and neonates included weight loss, restlessness, and poor feeding. Urine culture is the gold standard for the diagnosis of UTIs (3, 16, 17). In the urine samples collected by the suprapubic method and urinary catheters, if the urine culture shows a colony count of > 50,000 from a single pathogen or a symptomatic patient, the colony > 10,000 proves a UTI (16).

In the case of the bagged urine collection method applied to symptomatic patients with positive urinalysis results, urine culture with more than 100,000 single microorganisms was considered as a UTI. However, according to the American Academy of Pediatrics (AAP)/Clinical Practice Guideline (2011), the preferred method of urine collection for children younger than the toilet training age is the suprapubic method or urinary catheters (6, 15).

Determining factors in interpreting children's urinary culture include the presence of UTI symptoms, urine sample collection techniques, and reliability of microbiological techniques (16). According to another nephrology reference, if the colony count is > 1000 Colony Forming Units (CFU)/mL of positive gram cocci and any number of Gram-negative bacilli is obtained via the suprapubic method, the diagnosis of UTIs is documented with 99% probability. In a sample obtained via catheterization, a colony count of > 10⁵ CFU of a single organism/mL gives a 95% probability of UTIs. A sample obtained by clean catch, with ≥ 10⁵ CFU of a single organism/mL, gives an 80% probability of UTIs (18).

Based on the research methodology, after explaining the research objectives and obtaining written informed consent, the qualified volunteer parents participated in the study and were given sufficient time to complete the relevant form and questionnaire.

3.1. Research Tools

3.1.1. Demographic Information

Demographic information included information on parents (age, gender, marital status, education, occupation) and information about their sick child (age, gender, the child with a history of UTI, and the number of children), which was completed by asking some questions from the children parents.

3.1.2. Parental Awareness Questionnaire About Urinary Tract Infection

This questionnaire presented 35 items including symptoms (9, 11-14, 16-17), complications (18-20, 22-25), treatment (10, 15, 30-34), prevention and epidemiology (1-3, 5-8), and diagnosis (4, 21, 26-29, 35). The answer to each item was in the form of true/false, and each true answer gave a positive score, and each false answer gave a zero score.

Quality items were divided into three categories including easy (1-5-6-9-16-21-27-35), medium (2-3-4-7-10-11-12-13-14-15-18-19-20-23-24-25-26-29-30-31-33-34), and difficult (8-17-22-28-32). A true answer to each simple, medium, and difficult item led to 1, 2, and 3 positive points, respectively, and a false answer to all the items resulted in zero points (Table 1).

The score of the awareness of prevention and epidemiology ranges from 0 to 12, the score of symptoms from 0 to 13, the score of complications from 0 to 15, the score of diagnosis from 0 to 12, and the score of treatment from 0 to 15. The total awareness score varies from 0 to 67. Overall, the total awareness score is divided into three categories: 0 - 22 (poor awareness), 23 - 45 (medium awareness), and 46 - 67 (acceptable awareness).

To determine the reliability of the questionnaire, 60 questionnaires were completed and evaluated by the randomly selected study population. Six questionnaires were excluded due to incompleteness, and 54 questionnaires were used to determine the validity and reliability.

Since the items had two choice options, the Kuder-Richardson (KR20) method was used to

determine reliability using the below formula.

$$r_2 = \frac{n}{n-1} \left[1 - \frac{\sum pq}{S^2} \right]$$

$$= \frac{35}{34} \left(1 - \frac{16801}{43.412} \right)$$

$$= 0.704$$

This method evaluates the internal consistency, i.e., the degree of interference of all items in terms of measuring the common feature of awareness. Here, k is the number of the items in the questionnaire, p_i is the ratio of true answers to item i , and q_i is the ratio of false answers to item i , and S^2 is the variance of the total awareness index, which was calculated according to software analysis equal to 43.412. Further, the content validity and scientific significance of the questionnaire were confirmed by the relevant experts.

The Research Council and the Ethics Committee of Kermanshah University of Medical Sciences, Iran, approved the study (registration No. IR.KUMS.REC.1395, 740, February 22, 2017; grant number 96243). This research was performed in compliance with the ethical principles laid down in the seventh and current edition (2013) of the Declaration of Helsinki. All participants were volunteers who signed written informed consent.

To determine the distribution of parental age, gender, marital status, parental education, parental occupation, affected child age and gender, history of UTIs, number of children, parental awareness of symptoms, complications, treatment, prevention and epidemiology, diagnosis, and parental general knowledge of UTIs in infants and children, we used descriptive statistics including the frequency and percentage. To determine the gender, the average age of parents and afflicted children, and the number of afflicted children, descriptive statistics were used, including the number, minimum, maximum, mean, average, and standard deviation. Finally, the Chi-square and Fisher's exact tests were used to evaluate the relationship of age, gender, parental education, and UTI history of the child with parental awareness of symptoms, complications, treatment, prevention and epidemiology, and diagnosis, as well as the overall parental awareness of UTIs in children and infants. All analyses were performed using SPSS 20 at a 5% error level.

4. Results

Of the 270 parents surveyed that had a UTI-afflicted child, 135 parents were fathers, and 135 were mothers. Besides, 129 parents were 20 - 30 years of age (47.8%), 118 parents were 31 - 40 (43.7%), and 23 parents were 41 - 50 (8.5%). Most parents had an education level of lower than high school; most fathers were self-employed, and mothers were housewives. Moreover, 91.1% of parents were married, and 55.6% had a child with a history of UTIs, 80 of whom were girls and 40 were boys. Most parents had two children (Table 2).

The parental awareness of symptoms, complications, treatment, prevention, and diagnosis of UTIs in children

Table 1. Parental Awareness Questionnaire About Urinary Tract Infections

n	Questions	Incorrect Answer (%)	Correct Answer (%)
1 ^e	Urinary tract infections are more important in children and infants than in adults.	8.5	91.5
2 ^e	Urinary tract infections are more common in girls than in boys.	11.1	88.9
3 ^e	Urinating before bed has no role in preventing urinary tract infections	25.6	74.4
4 ^d	The time interval between taking a urine sample and performing the test does not matter	20.0	80.0
5 ^e	It is not important to have a history of urinary tract infections in parents or siblings	38.1	61.9
6 ^e	Hygiene has no role in controlling urinary tract infections	11.5	88.5
7 ^e	Urinary tract infections are less important at an early age	10.4	89.6
8 ^e	The prevalence of urinary tract infections is the same in all races	58.9	41.1
9 ^s	Restlessness is a symptom of a urinary tract infection	34.4	65.6
10 ^t	There is no need to follow up urinary tract infections after starting the medication and stopping the fever	14.4	85.6
11 ^s	Diarrhea and vomiting may not be the symptoms of a urinary tract infection	54.4	45.6
12 ^s	Inability to control urination is one of the symptoms of a urinary tract infection	31.1	68.9
13 ^s	Enuresis is a symptom of a urinary tract infection	58.1	41.9
14 ^s	Abdominal pain is not a symptom of a urinary tract infection	34.8	65.2
15 ^t	If the doctor prescribes antibiotics, the course of treatment should be completed even after the fever has stopped	6.3	93.7
16 ^s	The urinary discoloration is due to a urinary tract infection	26.3	73.7
17 ^s	Urinary tract infections can cause blood to stain the urine	22.2	77.8
18 ^c	Urinary tract infections that are not completely cured are likely to recur	12.2	87.8
19 ^c	Untreated or recurrent urinary tract infections may cause kidney damage	11.9	88.1
20 ^c	Failure to circumcise is involved in the recurrence of a urinary tract infection	28.9	71.1
21 ^d	Diagnosis of a urinary tract infection can only be made by a doctor	35.9	64.1
22 ^c	Constipation plays a role in controlling urinary tract infections	63.7	36.3
23 ^c	Urinary retention and refusal to urinate play a role in controlling urinary tract infections	20.4	79.6
24 ^c	Urinary tract infections are one of the causes of growth disorders	40.7	59.3
25 ^c	Excessive fluid intake during the day prevents the recurrence of a urinary tract infection and its side effects	18.9	81.1
26 ^d	A urine bag is a good way to collect urine	26.7	73.3
27 ^d	Diagnosis of a urinary tract infection is possible by a urine test	7.4	92.6
28 ^d	In any prolonged fever (more than three days), a urinary tract infection should be suspected	27.0	73.0
29 ^d	Delays in delivering a urine sample to a laboratory can cause a false urinary tract infection	19.3	80.7
30 ^t	If necessary, the urine sample should be collected by a urinary catheter at the beginning of treatment	39.3	60.7
31 ^t	If your doctor prescribes antibiotics, you will not need to continue taking the medicine after the fever has stopped	27.8	72.2
32 ^t	Non-pharmacological (non-antibiotic) treatments play an important role in the treatment of urinary tract infections	51.9	48.1
33 ^t	If you have a history of urination, you can take the same medicine every time you have a fever without seeing a doctor	14.1	85.9
34 ^t	Controlling gastrointestinal disorders such as constipation has no role in the treatment of urinary tract infections	39.3	60.7
35 ^d	Fever is one of the most common symptoms of a urinary tract infection	19.6	80.4

^as, symptoms; c, complications; t, treatment; e, prevention and epidemiology; d, diagnosis.

^bSymptoms: 0 - 4 (low), 5 - 9 (moderate), 10 - 13 (high); Complications: 0 - 5 (low), 6 - 10 (moderate), 11 - 15 (high); Treatment: 0 - 5 (low), 6 - 10 (moderate), 11 - 15 (high); Prevention: 0 - 4 (low), 5 - 8 (moderate), 9 - 12 (high); Diagnosis: 0 - 4 (low), 5 - 8 (moderate), 9 - 12 (high); total awareness: 0 - 22 (low), 23 - 45 (moderate), 46 - 67 (high).

Table 2. Frequency and Percentage of Demographic Characteristics of Parents and Their Sick Children

Variables	Frequency (%)
Parent	
Father	135 (50)
Mother	135 (50)
Age (y)	
20 - 30	129 (47.8)
31 - 40	118 (43.7)
41 - 50	23 (8.5)
Education (father)	
< High school	110 (40.7)
High school or diploma	94 (34.8)
University	66 (24.4)
Education (mother)	
< High school	121 (44.8)
High school or diploma	102 (37.8)
University	47 (17.4)
Occupation (father)	
Employed (governmental)	68 (25.2)
Self-employed	174 (64.4)
Retired	10 (3.7)
Farmer	16 (5.9)
Occupation (mother)	
Housewife	249 (92.2)
Employed (governmental)	13 (4.8)
Self-employed	8 (3.0)
Marital status	
Married	246 (91.1)
Divorced	22 (8.1)
Widowed	2 (0.7)
History of UTIs in children	
Yes	120 (44.4)
No	150 (55.6)
Gender of the sick child of the family	
Girl	80 (29.6)
Boy	40 (14.8)
No sick child	150 (55.6)
Number of children	
1	107 (39.6)
2	130 (48.1)
3	21 (7.8)
4	12 (4.4)

was reported at three levels: low, medium, and high. Accordingly, this awareness was observed in the maximum number of study participants at high, medium, and low levels, respectively. However, in the case of symptoms of UTIs, the average parental awareness had the highest frequency. On the other hand, for all the concepts studied, the level of poor awareness had the lowest frequency (Table 3).

The results showed a statistically significant relation-

ship between paternal education and knowledge about treatment and diagnosis and also the overall score of his knowledge on UTIs in children ($P < 0.05$). There is also a statistically significant relationship between the maternal education level and the awareness of the symptoms and how to prevent UTIs ($P < 0.05$) (Table 4).

According to Table 5, the results indicated a statistically significant relationship between the history of UTIs in children and the parents' level of awareness of how to prevent and diagnose UTIs in children ($P < 0.05$) (Table 5).

5. Discussion

The present study aimed to investigate the parents' awareness of infants and children with UTIs and related demographic factors. The results showed that the awareness score was medium among 37% of the parents and desirable among 63%. Based on the answers to the awareness items, most parents were sufficiently informed of the underlying causes of UTIs and symptoms, and the awareness of complications, treatment, prevention, and diagnosis of UTIs was high. In the research performed by Baghiani Moghadam et al. (19) the awareness of UTI symptoms was acceptable among 2.9% of the mothers and moderate among 96.4%. In a study carried out by Owen et al. (15), the parental awareness of UTIs was low, and 85.6% of the parents required more information about the disease and how to identify it. In a study by Harmsen et al. (20), the parents could not continuously detect UTIs in their children and remained often uninformed of their possible consequences and thus, the parental awareness was low.

An increase in the parental awareness of UTIs can lead to timely diagnosis and preventive measures taken by parents, which can reduce irreversible kidney damage. Therefore, it is recommended to hold general education classes for parents, distribute information in the form of brochures and posters, and provide appropriate educational materials in kindergartens, children's health centers, and schools on symptoms, diagnosis, and prevention of UTIs in infants and children. The results showed a significant negative relationship between the parents' age and the level of knowledge about how to treat UTIs in infants and children, indicating that with the increasing age of parents, their level of knowledge about how to treat UTIs in children diminishes. To justify this research finding, it can be said that with increasing age, parents have less ability to access and follow updated instructive content and sources due to increasing routine troubles and preoccupations. Another reason can be their diminished proclivity to this process compared to younger parents. The results also showed a significant positive relationship between the fathers' level of education and their level of knowledge about

Table 3. Descriptive Statistics of Parental Awareness About UTIs in Children and Relationship Between Parents' Age and Parental Awareness About UTIs

Variables Level ^a	Frequency (%)	Maen ± SD	Parents' age, Frequency (%)				χ^2	P Value
			20 - 30	31 - 40	41 - 50	Total		
Symptoms		8.15 ± 2.73					5.05	0.28
Low (0 - 4)	29 (10.7)		13 (44.8)	12 (41.4)	4 (13.8)	29 (10.7)		
Moderate (5 - 10)	153 (56.7)		81 (52.9)	61 (39.9)	11 (7.2)	153 (56.7)		
High (10 - 13)	88 (32.6)		35 (39.8)	45 (51.1)	8 (9.1)	3.54		
Complications		10.43 ± 2.79					3.54	0.47
Low (0 - 5)	13 (4.8)		5 (38.5)	6 (46.2)	2 (15.4)	13 (4.8)		
Moderate (6 - 10)	123 (45.6)		53 (43.1)	59 (48.0)	11 (8.9)	123 (45.6)		
High (11 - 15)	134 (49.6)		71 (53.0)	53 (39.6)	10 (7.5)	13.28		
Treatment		10.62 ± 2.58					13.28	0.01
Low (0 - 5)	6 (2.2)		0 (0.0)	4 (66.7)	2 (33.3)	6 (2.2)		
Moderate (6 - 10)	118 (43.7)		62 (52.5)	43 (36.4)	13 (11.0)	118 (43.7)		
High (11 - 15)	146 (54.1)		67 (45.9)	71 (48.6)	8 (5.5)	3.08		
Prevention		8.71 ± 2.26					3.08	0.54
Low (0 - 4)	11 (4.1)		5 (45.5)	6 (54.5)	0 (0.0)	11 (4.1)		
Moderate (5 - 8)	103 (38.1)		49 (47.6)	42 (40.8)	12 (11.7)	103 (38.1)		
High (9 - 12)	156 (57.8)		75 (48.1)	70 (44.9)	11 (7.1)	9.25		
Diagnosis		9.24 ± 2.37					9.25	0.55
Low (0 - 4)	14 (5.2)		7 (50.0)	7 (50.0)	0 (0.0)	14 (5.2)		
Moderate (5 - 8)	82 (30.4)		49 (59.8)	29 (35.4)	4 (4.9)	82 (30.4)		
High (9 - 12)	174 (64.4)		73 (42.0)	82 (47.1)	19 (10.9)	2.60		
Total score		47.16 ± 7.60					2.60	0.27
Moderate (23 - 45)	100 (37.0)		42 (42.0)	50 (50.0)	8 (8.0)	100 (37.0)		
High (46 - 67)	170 (63.0)		87 (51.2)	68 (40.0)	15 (8.8)	170 (63.0)		

^aComponents of parental knowledge of UTIs in children

treatment and diagnosis and the overall score of knowledge about UTIs in children. Accordingly, as the fathers' level of education increases, there are increases in their awareness of how to treat and diagnose UTIs and the overall score of UTIs in children. There was a statistically significant relationship between maternal education and awareness of symptoms and how to prevent UTIs in children such that with an increase in maternal education, the awareness level of symptoms and how to prevent UTIs in children increased significantly. These results suggest that parental education affects the parental awareness of UTIs. Based on the results, there was a statistically significant relation-

ship between the history of UTIs in other family children and knowledge about how to prevent and diagnose UTIs in children, and parents whose other children had a history of UTIs benefited from a high level of awareness on how to prevent and diagnose UTIs in children. The sample of the present study included only parents with children or infants diagnosed with UTIs who were referred to the Nephrology Clinic of Mohammad Kermanshahi Hospital in Kermanshah. Thus, caution should be taken in generalizing the findings to other geographical areas.

Based on the findings obtained from the present research, the general awareness level and the parental aware-

Table 4. Results of Relationship Between Parents' Education and Parental Knowledge About UTIs^a

Variables Level	Fathers' education, Frequency (%)				χ^2	P Value
	< High School	High School or Diploma	University	Total		
Symptoms					6.55	0.162
Low (0 - 4)	14 (48.3)	13 (44.8)	2 (6.9)	29 (10.7)		
Moderate (5 - 10)	58 (37.9)	55 (35.9)	40 (26.1)	153 (56.7)		
High (10 -13)	38 (43.2)	26 (29.5)	24 (27.3)	88 (32.6)		
Complications					4.02	0.40
Low (0 - 5)	4 (30.8)	4 (30.8)	5 (38.5)	13 (4.8)		
Moderate (6 - 10)	46 (37.4)	49 (39.8)	28 (22.8)	123 (45.6)		
High (11 - 15)	60 (44.8)	41 (30.6)	33 (24.6)	134 (49.6)		
Treatment					10.92	0.027
Low (0 - 5)	6 (100.0)	0 (0.0)	0 (0.0)	6 (2.2)		
Moderate (6 - 10)	52 (44.1)	38 (32.2)	28 (23.7)	118 (43.7)		
High (11 - 15)	52 (35.6)	56 (38.4)	38 (26.0)	146 (54.1)		
Prevention					9.004	0.061
Low (0 - 4)	9 (81.8)	2 (18.2)	0 (0.0)	11 (4.1)		
Moderate (5 - 8)	41 (39.8)	34 (33.0)	28 (27.2)	103 (38.1)		
High (9 - 12)	60 (38.5)	58 (37.2)	38 (24.4)	156 (57.8)		
Diagnosis					20.75	<0.0001
Low (0 - 4)	9 (64.3)	2 (14.3)	3 (21.4)	14 (5.2)		
Moderate (5 - 8)	39 (47.6)	36 (43.9)	7 (8.5)	82 (30.4)		
High (9 - 12)	62 (35.6)	56 (32.2)	56 (32.2)	174 (64.4)		
Total Score					8.006	0.018
Moderate (23 - 45)	50 (50.0)	34 (34.0)	16 (16.0)	100 (37.0)		
High (46 - 67)	60 (35.3)	60 (35.3)	50 (29.4)	170 (63.0)		
	Mothers' Education, Frequency (%)					
Symptoms					9.70	0.046
Low (0 - 4)	15 (51.7)	12 (41.4)	2 (6.9)	29 (10.7)		
Moderate (5 - 10)	59 (38.6)	59 (38.6)	35 (22.9)	153 (56.7)		
High (10 - 13)	47 (53.4)	31 (35.2)	10 (11.4)	88 (32.6)		
Complications					2.34	0.67
Low (0 - 5)	4 (30.8)	6 (46.2)	3 (23.1)	13 (4.8)		
Moderate (6 - 10)	52 (42.3)	50 (40.7)	21 (17.1)	123 (45.6)		
High (11 - 15)	65 (48.5)	46 (34.3)	23 (17.2)	134 (49.6)		
Treatment					9.30	0.054
Low (0 - 5)	6 (100.0)	0 (0.0)	0 (0.0)	6 (2.2)		
Moderate (6 - 10)	50 (42.4)	43 (36.4)	25 (21.2)	118 (43.7)		
High (11 - 15)	65 (44.5)	59 (40.4)	22 (15.1)	146 (54.1)		
Prevention					20.74	< 0.0001
Low (0 - 4)	11 (100.0)	0 (0.0)	0 (0.0)	11 (4.1)		
Moderate (5 - 8)	53 (51.5)	37 (35.9)	13 (12.6)	103 (38.1)		
High (9 - 12)	57 (36.6)	65 (41.7)	34 (21.8)	156 (57.8)		
Diagnosis					2.44	0.655
Low (0 - 4)	7 (50.0)	4 (28.6)	3 (21.4)	14 (5.2)		
Moderate (5 - 8)	41 (50.0)	30 (36.6)	11 (13.4)	82 (30.4)		
High (9 - 12)	73 (42.0)	68 (39.1)	33 (19.0)	174 (64.4)		
Total score					3.92	0.14
Moderate (23 - 45)	52 (52.0)	35 (35.0)	13 (13.0)	100 (37.0)		
High (46 - 67)	69 (40.6)	67 (39.4)	34 (20.0)	170 (63.0)		

^aComponents of parental knowledge of UTI in children

Table 5. Results of Relationship Between Histories of UTIs in Children and Parental Knowledge About UTIs

Variables Level ^a	History of UTI in Children (Frequency (%))			χ^2	P Value
	Yes	No	Total		
Symptoms				0.30	0.86
Low (0 - 4)	12 (41.4)	17 (58.6)	29 (10.7)		
Moderate (5 - 10)	67 (43.8)	86 (56.2)	153 (56.7)		
High (10 - 13)	41 (46.6)	47 (53.4)	88 (32.6)		
Complications				0.028	0.99
Low (0 - 5)	6 (46.2)	7 (53.8)	13 (4.8)		
Moderate (6 - 10)	55 (44.7)	68 (55.3)	123 (45.6)		
High (11 - 15)	59 (44.0)	75 (56.0)	134 (49.6)		
Treatment				0.97	0.62
Low (0 - 5)	2 (33.3)	4 (66.7)	6 (2.2)		
Moderate (6 - 10)	56 (47.5)	62 (52.5)	118 (43.7)		
High (11 - 15)	62 (42.5)	84 (57.5)	146 (54.1)		
Prevention				12.66	0.002
Low (0 - 4)	6 (54.5)	5 (45.5)	11 (4.1)		
Moderate (5 - 8)	59 (57.3)	44 (42.7)	103 (38.1)		
High (9 - 12)	55 (35.3)	101 (64.7)	156 (57.8)		
Diagnosis				11.83	0.003
Low (0 - 4)	0 (0.0)	14 (9.3)	14 (5.2)		
Moderate (5 - 8)	39 (47.6)	43 (52.4)	82 (30.4)		
High (9 - 12)	81 (46.6)	93 (53.4)	174 (64.4)		
Total score				0.38	0.31
Moderate (23 - 45)	42 (42.0)	58 (58.0)	100 (37.0)		
High (46 - 67)	78 (45.9)	92 (54.1)	170 (63.0)		

^aComponents of parental knowledge of UTI in children

ness of complications, treatment, prevention, and diagnosis of UTIs in children were high, while the parental awareness of UTI symptoms in children was moderate. With an increase in the fathers' level of education, their awareness increased about how to treat and diagnose UTIs and their overall score of knowledge about UTIs in children, and the higher maternal education was associated with a greater awareness of symptoms and how to prevent UTIs in children. There was an inverse relationship between the level of awareness of UTIs and the parental age and lack of UTIs in other children of the family. It is suggested that educational programs be promoted to raise the parental awareness of UTIs in infants and children, especially of UTIs symptoms in lower educated old parents whose other children have had no history of UTIs.

Footnotes

Authors' Contribution: AS and MT designed the study and observed the accuracy and validity of the study. MS and MS collected the data and followed the study. SH did the statistical analysis of the data and interpreted them. AS and MT wrote the paper. All authors edited and revised the final manuscript and agreed with its publication.

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