Original Article

Middle Ear Infection in Children: Knowledge and Awareness Level Among Parents in Saudi Arabia

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Abstract

Middle ear infections are considered one of the most common reasons for pediatric medical visits. It is usually caused by a blockage of the Eustachian tube. Throughout their lifetime, 80% of all kids will get otitis media, most observed between the ages of 6 to 11 months. This study aims to measure the knowledge and assess the awareness level of Saudi parents towards otitis media among their children. A descriptive study (cross-sectional study) was conducted online across Saudi Arabia from September to December 2022. The online Questionnaire was distributed among Saudi parents who are having children aged ≤10 years old. To analyze the data, Statistical product and services solutions (SPSS) software ver.21.was used. The study included 1062 participants, 74.1% of them were females and 25.9% were males. 32% of study participants aged between 31- 40 years old. 87% heard of middle ear infections. 19.3% reported a history of middle ear infection in a child. 16.9% of study participants had low awareness of middle ear infections, 59.8% had moderate awareness and 23.3% had good awareness. 90.5% of participants reported that visiting a doctor is the first action taken when symptoms of middle ear infections appear in a child, 2.7% use home recipes, 2.4% use heat sinks, and 1.9% use antibiotics without a prescription. The study illustrates poor knowledge and awareness of middle ear infections among Saudi parents. Awareness scores were significantly associated with the age, gender, and educational level of participants.

Keywords: Otitis media, Parents, Awareness, Knowledge, Children, Middle Ear infection

Introduction

Otitis media (OM), Is middle ear inflammation [1]. It is a result of pharyngotympanic tube (Eustachian tube) obstruction. Thus, fluid was collected behind the tympanic membrane and the pressure in the middle ear was disturbed. Fluid is not able to be drained so it permits pathogens to colonize in the middle ear and cause infection [2-5]. The most common bacterial pathogens are *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis*, *and Staphylococcus epidermidis* [6]. Otitis media is classified into three types: Acute, chronic, and otitis media with effusion [7]. Symptoms of (OM) are fever, ear pain, hearing loss, ear discharge, anorexia, vomiting, or diarrhea, irritability, trouble sleeping, and reduced playfulness, but in infants with an illness, symptoms may be non-specific and difficult to identify and requires a high index of suspicion [8, 9]. Complications of (OM) are delay in speech and language, difficulties in reading and writing due to hearing loss, ruptured eardrum, and cholesteatoma. Other complications classify into intracranial and extracranial compilations [10]. Risk factors of (OM) include environmental like cigarette smoke exposure and living in a crowded area, genetic, demographic, and other diseases like adenoid enlargement, orofacial defects like cleft palate, eustachian tube dysfunction, allergic disorders, asthma, shorter breastfeeding length, and prolonged bottle feeding when lying down [11, 12]. In general, Ear infections consider one of the most common reasons for pediatric medical visits and antibiotic use [13]. Otitis media, or middle ear infection, is a common reason people seek medical attention and a significant contributor to avoidable hearing loss. Acute otitis media affects 11% of the population annually, while chronic otitis

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media affects 5% of the population; 50 and 22.6 percent of these cases, respectively, affect children under the age of five [10]. Despite the high prevalence of Acute Otitis Media in children, doctors frequently fail to diagnose it and properly treat it [14]. There is a study conducted in Saudi Arabia found that 56% of parents had good attitudes, and 86.6% did not consider vaccination as a prevention method of acute OM (AOM). Also, 81.8% of parents were willing to follow the watchful waiting approach, in case their child had OM [15]. And there are uncertainties about etiologies and methods of treatment in parents as the study which was done in Germany showed that 66% generally agree that bacteria cause AOM. 20.2 % generally agree that viruses cause AOM. 30.5 % do not generally agree that viruses cause AOM. Eight percent generally agree that AOM resolves spontaneously, whereas 53.6 % do not generally agree [16]. Assessing paternal knowledge and awareness regarding OM is very curial as it is reflecting against their care practices, therefore, the outcomes of OM among their children and the occurrence of OM [15]. Studies show that the vast majority of children will have at least 1 episode of acute otitis media. Peaking between the age of 6 and 11 months; 50 to 85% of children by the age of three have had AOM. As the recurrence of OM in children is high, recurrent acute otitis media which is defined as having 3 or more episodes affects nearly 20% of children by the age of one year. On the other hand, it is shown that older children will have 6 episodes or more [17]. Despite the previous research done on paternal awareness regarding otitis media affecting their children, there were an inadequate number of participants as well as conducting and limiting those researches in certain areas of Saudi Arabia as Alqassim, Alahssa, and Riyadh. Moreover, paternal ages were limited in some of these studies. This study aimed to assess the knowledge and awareness level of otitis media in children among Saudi parents.

Materials and Methods

Study Design

A descriptive study (cross-sectional study) was conducted online across Saudi Arabia from January to December 2022. The participants in this study are Saudi parents, who have children ≤10 years old.

The Sample Size

With an anticipated absolute error of 5% and a 95% confidence interval (CI), the required sample size was determined using the Kish formula ($n = z^2pq\backslash d^2$), resulting in a minimum required sample size of 384.

The Sample size was estimated using the formula: $n= P (1-P) * Z\alpha^2 / d^2$ with a confidence level of 95%;

n: Calculated sample size
Z: The z-value for the selected level of confidence (1- a) = 1.96.
P: An estimated prevalence of knowledge
Q: (1 – 0.50) = 50%, i.e., 0.50
D: The maximum acceptable error = 0.05.
So, the calculated minimum sample size was:
$n = (1.96)^2 X 0.50 X 0.50/ (0.05)^2 = 384$.

Inclusion and Exclusion Criteria

This study includes Saudi parents of children <10 years old. Who are willing to participate in the study; implying that the study sample is composed of both males and females of various ages. Non-Saudi parents were excluded from the study and who disagree to participate in this study.

Method of Data Collection and Instruments (Data Collection Technique and Tools)

A structured electronic survey created for the study and converted into Arabic by the research group and approved by the supervisors was used to gather data.

We will use Google Forms to submit our online survey. Since the study is specified for Saudi parents, a random sample of them will receive the survey and be asked to participate.

Our questionnaire will contain 48 questions divided into 4 sections:

1. Socio-demographic data, including gender, age, nationality, residency, marital status, degree of education, monthly income, and the number of children.
2. Previous experience related to middle ear infections.
3. knowledge of middle ear infections, including their risk factors, etiology, symptoms, complications, and management.
4. attitude toward Middle ear infections

For a more accurate evaluation of the actual knowledge, we provide (I don't know) as an answer option.

Scoring System

33 questions in our survey will assess respondents' knowledge and attitude toward middle ear infections. Any correct answers will receive a score of 1, whereas those who provide (incorrect, I don’t know) will receive a score of 0. The participants were divided into three groups based on their scores: those with scores below 7 were classed as having poor awareness, while those with scores between 8 and 20 as having moderate awareness, and those with scores over 20 as having high awareness.

Pilot Test

The questionnaire was distributed to 20 individuals and asked to fill it out. This was done to test the simplicity of the questionnaire and the feasibility of the study. Data from the pilot study were excluded from the final data of the study.

Analyzes and Entry Method

Statistical analysis was performed using SPSS software (version 23). Data are presented as means and standard deviations (SD). For categorical data, absolute and relative

frequencies were used to determine the difference in knowledge scores between the two groups. The chi-square test was used to determine the association between sociodemographic factors and knowledge scores and the use of PPIs. Using the Student's t-test, significance thresholds were established at $P < .05$.

The ethical approval was obtained from the Institutional Review Board (IRB) at King Faisal University, college of medicine.

Results and Discussion

The study included 1062 participants, 74.1% of them were females and 25.9% were males. 32% of study participants were aged between 31- 40 years old while 31.6% were aged between 30- 30 years old. 89.9% of participants were married. 67.8% had a bachelor's degree. 39.7% had a good monthly income. 22.7% had two children and 21.4% had one child.

Table 1. Sociodemographic characteristics of participants (n=1062)

Parameter		No.	%
Age	20- 30	336	31.6
	31- 40	340	32.0
	41 - 50	251	23.6
	51 – 60	121	11.4
	more than 60	14	1.3
Gender	Male	275	25.9
	Female	787	74.1
City	Baha	5	.5
	Jawf	36	3.4
	Northern borders	3	.3
	Riyadh	141	13.3
	Eastern	365	34.4
	Al-Qassim	24	2.3
	Medina	35	3.3
	Tabuk	164	15.4
	Jeddah	122	11.5
	Jizan	2	.2
	Hail	2	.2
	Asir	80	7.5
	Makkah	35	3.3
	other	48	4.5
Marital status	Married	955	89.9
	Divorced	71	6.7
	Widow	36	3.4
Scientific level	Illiterate	1	.1
	primary	5	.5
	Intermediate	5	.5
	secondary	121	11.4
	Bachelor's degree	720	67.8
	diploma	106	10.0
	Postgraduate	104	9.8
Monthly income	less than 5000	253	23.8
	Between 5,000 - 10,000	387	36.4
	More than 10,000	422	39.7
Number of children	1	227	21.4
	2	241	22.7
	3	205	19.3
	4	175	16.5
	5	101	9.5
	More than 6	113	10.7

As illustrated in the **Table 2**, 5.9% of participants have a child who has previously undergone ear surgery. 4.5% have had a child with congenital problems since birth. 87% heard of middle ear infections. 19.3% reported a history of middle ear infection in a child.

Table 2. Prevalence of congenital ear problems and history of ear surgery or middle ear infection among participants (n=1062)

Parameter		No.	%
Have a child who has previously undergone ear surgery	Yes	63	5.9
	No	999	94.1
Have a child with congenital problems since birth	Yes	48	4.5
	No	969	91.2
	Don't know	45	4.2
Heard of a middle ear infection	Yes	924	87.0
	No	138	13.0
History of middle ear infection (otitis media) in a child	Yes	205	19.3
	No	749	70.5
	Don't know	108	10.2

Table 3. Participants' knowledge of symptoms, causes, risk factors, and management of middle ear infections (n=1062)

Parameter	Yes	No	Maybe	Don't know
Fever is a symptom of otitis media	556 52.4%	96 9.0%	289 27.2%	121 11.4%
Ear pain is a symptom of otitis media	825 77.7%	28 2.6%	172 16.2%	37 3.5%
Ear fluid is a symptom of otitis media	456 42.9%	119 11.2%	335 31.5%	152 14.3%
Impaired hearing is a symptom of otitis media	488 46.0%	105 9.9%	328 30.9%	141 13.3%
Nasal congestion is a symptom of otitis media	376 35.4%	139 13.1%	362 34.1%	185 17.4%
Rhinorrhoea is a symptom of otitis media	315 29.7%	178 16.8%	315 29.7%	254 23.9%
Headache is a symptom of otitis media	623 58.7%	65 6.1%	271 25.5%	103 9.7%
Weakness is a symptom of otitis media	429 40.4%	146 13.7%	279 26.3%	208 19.6%
Vomiting is a symptom of otitis media	252 23.7%	268 25.2%	254 23.9%	288 27.1%
Diarrhoea is a symptom of otitis media	117 11.0%	445 41.9%	180 16.9%	320 30.1%
Cough is a symptom of otitis media	166 15.6%	334 31.5%	265 25.0%	297 28.0%
Sleep disturbance is a symptom of otitis media	745 70.2%	32 3.0%	208 19.6%	77 7.3%
Crying constantly is a symptom of otitis media	771 72.6%	38 3.6%	197 18.5%	56 5.3%
Ear tugging is a symptom of otitis media	712 67.0%	70 6.6%	180 16.9%	100 9.4%
Bacterial infection is a cause of otitis media	567 53.4%	34 3.2%	292 27.5%	169 15.9%
Viral infection is a cause of otitis media	366 34.5%	109 10.3%	380 35.8%	207 19.5%
Bacterial and viral infections both are **the** cause of otitis media	384 36.2%	104 9.8%	356 33.5%	218 20.5%

Congenital deformity of the ear is a cause of otitis media	229 21.6%	238 22.4%	290 27.3%	305 28.7%
Congenital ear deformity followed by infection is a cause of otitis media	258 24.3%	190 17.9%	298 28.1%	316 29.8%
Delay in speaking and language is a complication of otitis media	462 43.5%	120 11.3%	286 26.9%	194 18.3%
Difficulties in reading and writing **are** a complication of otitis media	338 31.8%	157 14.8%	345 32.5%	222 20.9%
Poor academic performance is a complication of otitis media	428 40.3%	114 10.7%	328 30.9%	192 18.1%
Hearing impairment or loss is a complication of otitis media	525 49.4%	62 5.8%	344 32.4%	131 12.3%
Eardrum rupture is a complication of otitis media	423 39.8%	90 8.5%	342 32.2%	207 19.5%
Stuffy nose is a risk factor for otitis media	503 47.4%	36 3.4%	351 33.1%	172 16.1%
Allergic nose is a risk factor for otitis media	419 39.5%	59 5.6%	410 38.6%	174 16.4%
Misfeed is a risk factor for otitis media	256 24.1%	243 22.9%	262 24.7%	301 28.3%
Antibiotics important in treating middle ear infection	728 68.5%	20 1.9%	251 23.6%	63 5.9%
Vaccines have a role in reducing the incidence of middle ear infection	302 28.4%	163 15.3%	347 32.7%	250 23.5%

Table 4 shows that 90.5% of participants reported that visiting a doctor is the first action taken when symptoms of middle ear infections appear in a child, 2.7% use home recipes, 2.4% use heat sinks, and 1.9% use antibiotics without a prescription. Neglecting to treat middle ear infections was reported to lead to serious complications by only 83.2%.

Table 4. Knowledge of participants of online nutritional applications and tele-dietetics (n=1062).

Parameter		No.	%
Action when symptoms of middle ear infections appear in the child	Using antibiotics without a prescription	20	1.9
	Use home recipes	29	2.7
	Only use heat sinks	25	2.4
	Visit the doctor	961	90.5
	Follow the child without interference	19	1.8
	I don't know	8	.8
Neglecting to treat middle ear infections leads to	Serious complications	884	83.2
	Nothing	61	5.7
	I don't know	117	11.0

As illustrated in **Figure 1**, 16.9% of study participants had low awareness of middle ear infections, 59.8% had moderate awareness and 23.3% had good awareness.

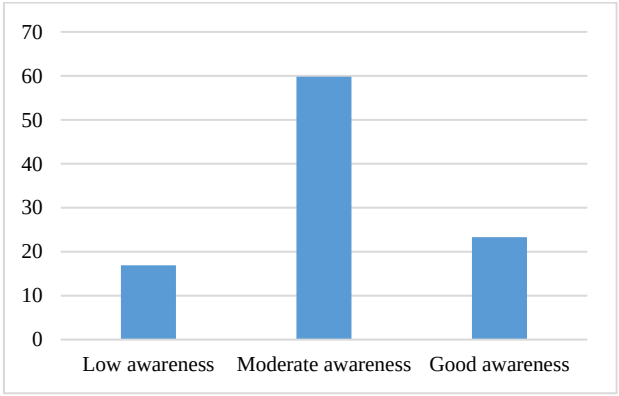

Figure 1. Awareness score of otitis media among study participants (n=1062).

As given in **Table 5**, awareness score was significantly associated with age, gender, residence region, educational level, and the number of children (P< 0.05).

Table 5. Association between awareness scores with the sociodemographic character of participants (n=1062)

		Awareness score			Total (N=1062)	P value
		Good awareness	Moderate awareness	Poor awareness		
Age	20 - 30	58	227	51	336	0.001
		23.5%	35.7%	28.3%	31.6%	
	31 - 40	70	216	54	340	
		28.3%	34.0%	30.0%	32.0%	
	41 - 50	75	131	45	251	
		30.4%	20.6%	25.0%	23.6%	
	51 - 60	39	57	25	121	
		15.8%	9.0%	13.9%	11.4%	
	more than 60	5	4	5	14	
		2.0%	0.6%	2.8%	1.3%	
Gender	Male	83	139	53	275	0.001
		33.6%	21.9%	29.4%	25.9%	
	Female	164	496	127	787	
		66.4%	78.1%	70.6%	74.1%	
Ragin	**Baha**	2	1	2	5	0.001
		0.8%	0.2%	1.1%	0.5%	
	Jawf	16	11	9	36	
		6.5%	1.7%	5.0%	3.4%	
	Northern borders	0	3	0	3	
		0.0%	0.5%	0.0%	0.3%	
	Riyadh	32	86	23	141	
		13.0%	13.5%	12.8%	13.3%	
	Eastern	88	202	75	365	
		35.6%	31.8%	41.7%	34.4%	
	Al-Qassim	7	16	1	24	
		2.8%	2.5%	0.6%	2.3%	
	Medina	8	23	4	35	
		3.2%	3.6%	2.2%	3.3%	
	Tabuk	49	100	15	164	
		19.8%	15.7%	8.3%	15.4%	
	Jeddah	25	71	26	122	
		10.1%	11.2%	14.4%	11.5%	
	Jizan	0	2	0	2	
		0.0%	0.3%	0.0%	0.2%	
	Hail	2	0	0	2	

		0.8%	0.0%	0.0%	0.2%	
	Asir	0	80	0	80	
		0.0%	12.6%	0.0%	7.5%	
	Makkah	7	17	11	35	
		2.8%	2.7%	6.1%	3.3%	
	other	11	23	14	48	
		4.5%	3.6%	7.8%	4.5%	
Marital status	Married	219	580	156	955	
		88.7%	91.3%	86.7%	89.9%	
	divorced	20	34	17	71	0.284
		8.1%	5.4%	9.4%	6.7%	
	Widow	8	21	7	36	
		3.2%	3.3%	3.9%	3.4%	
Education level	Illiterate	0	0	1	1	
		0.0%	0.0%	0.6%	0.1%	
	primary	3	2	0	5	
		1.2%	0.3%	0.0%	0.5%	
	Intermediate	0	5	0	5	
		0.0%	0.8%	0.0%	0.5%	
	secondary	20	70	31	121	0.001
		8.1%	11.0%	17.2%	11.4%	
	Bachelor's degree	155	455	110	720	
		62.8%	71.7%	61.1%	67.8%	
	diploma	44	39	23	106	
		17.8%	6.1%	12.8%	10.0%	
	Bachelor's degree	25	64	15	104	
		10.1%	10.1%	8.3%	9.8%	
Monthly income	less than 5000	47	152	54	253	
		19.0%	23.9%	30.0%	23.8%	
	Between 5,000 - 10,000	95	246	46	387	0.005
		38.5%	38.7%	25.6%	36.4%	
	More than 10,000	105	237	80	422	
		42.5%	37.3%	44.4%	39.7%	

One of the most typical ailments in infants and young children is acute middle ear infections (also known as acute otitis media, or AOM). By the time they turn three, the majority of kids have experienced at least one severe middle ear infection. Acute middle ear infections, however, typically go away on their own in two to three days, and major sequelae are quite uncommon. This study aimed to assess the level of knowledge and awareness regarding causes, manifestations, complications, and management of acute otitis media among Saudi parents.

According to our study results, 16.9% of study participants had low awareness of middle ear infections, 59.8% had moderate awareness and 23.3% had good awareness. In a prior Saudi study, it was discovered that the majority of participants (62%) had insufficient knowledge about AOM [3]. Different levels of parental understanding of AOM were documented in a number of research carried out in various locations. Similar findings were observed by Al-Hammar *et al*., who evaluated participants in their study group's level of knowledge and awareness of OM risk factors [4]. However, according to Mukara *et al*. study, 76.6% of the participants

demonstrated a solid understanding of OM [5]. These results are comparable to those of Adeyemo [18] in Nigeria, who discovered a limited general understanding of otitis media, and Srikanth [19], who examined knowledge, attitudes, and behaviors with regard to OM in a rural community in India.

Regarding management, 68.5% of our study participants reported that antibiotics are important in treating middle ear infections. 1.9% use antibiotics without a prescription when symptoms of otitis media appear in their children. According to a recent study, the majority of the parents who participated in the poll believed that all patients with OM should be provided antibiotics [3]. In a different study, most parents stated that oral antibiotics were the first line of treatment [9]. This notion is further corroborated by earlier research showing that a large percentage of parents think antibiotics are required to treat AOM [20-23]. According to a study, parents' perceptions that antibiotics are the best and only option for treating their child's AOM are primarily based on their own prior experiences, recommendations from their GPs, and a widespread belief that antibiotics speed up the healing process while preventing complications. The majority of research showed that parents find observation and painkillers without antibiotics uncomfortable for a child with OM. Based on several experiences, the careful waiting strategy for AOM in children is well-established [10, 24-27].

Our results showed a substantial association between age and awareness scores, in contrast to a study that found no significant correlation between age and higher KAP scores [10]. In Indonesia, where younger people were less likely to seek medical attention, Irwan *et al*. discovered that older parents had higher KAP ratings [27].

In contrast to another study that found no significant correlation between gender and KAP scores [10] and Alharbi MM *et al*., which found a positive correlation between female gender and KAP scores [17], our sample found that gender was associated with awareness scores. Mothers did better on attitudes and practices, but they performed worse on knowledge parameters [10]. However, there was no statistically significant change. Di Berardino *et al*. discovered that women knew more about ear and hearing management than men did [28].

Education level is related to awareness levels, which is consistent with a study that found that education and socioeconomic growth are both crucial for enhancing knowledge, attitudes, and behaviors [10]. Otitis media is more common in lower socioeconomic groups of the population, according to similar research conducted elsewhere [19, 29, 30].

Insights on parents' understanding of and expectations for the treatment of acute otitis media are provided by this study, which may assist doctors to understand perspectives and misconceptions that are worthwhile to elicit and discuss. For the consultation to go as well as possible, doctors must be aware of the knowledge and expectations of the parents. Antibiotic expectations are frequently indirectly elicited by doctors, making it difficult to address and manage them. Shared decision-making is crucial in this situation. Patients' concerns and expectations are clearly sought out and discussed as part of the collaborative decision-making process [31]. Evidence is also brought into the discussion. It has been demonstrated that explaining to patients or parents that the advantages of antibiotics for acute otitis media may only slightly if at all, outweigh the risks, and can decrease their desire for antibiotics. Future work should concentrate on raising the doctor's knowledge of the necessity of managing expectations and eliciting them, as well as on developing skills for incorporating collaborative decision-making into consultations [32].

Conclusion

The study illustrates poor knowledge and awareness of middle ear infections among Saudi parents. Given that this is a barrier to health care-seeking behaviors, more work should be done to improve the accessibility and delivery of health services. Since this is the primary source of information, medical professionals and CHWs should be informed about ear infections. To determine the effect of education and health promotion on parents' knowledge and treatment habits for ear infections, more research is necessary.

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