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Elucidating parental roles in pediatric otitis media: a cross-sectional study in Bisha, Saudi Arabia

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ABSTRACT

Background: Ear infections are among the most common pediatric conditions worldwide and remain a significant public health concern. Parental knowledge plays an essential role in early recognition, management, and prevention of complications.

Methods: A cross-sectional study was conducted in Bisha, Saudi Arabia, between February and July 2025. A structured questionnaire was distributed to parents to assess their knowledge, attitudes, and practices (KAPs) regarding ear infections. Data were analyzed using SPSS (version 26.0; IBM Corp., Armonk, NY). Chi-square test and logistic regression analysis were performed.

Results: A total of 370 participants were included in the study. Only 32.2% demonstrated adequate overall knowledge regarding pediatric ear infections. Awareness of treatment (98.9%) and prevention (93.8%) was high, whereas knowledge regarding causes (15.9%) and complications (26.2%) was limited. Positive attitudes and appropriate practices were reported by 89.7% and 79.7% of participants, respectively. A significant association was observed between knowledge and practice levels ($p = 0.012$), while no significant association was found between knowledge and attitude levels ($p = 0.775$). No significant associations were identified between knowledge and sociodemographic characteristics.

Conclusion: Despite positive parental attitudes and practices toward pediatric ear infections, overall knowledge regarding symptoms, causes, and complications remained inadequate. The significant association between knowledge and practice highlights the importance of improving parental awareness to promote appropriate healthcare-seeking behaviors and early management of otitis media. Targeted educational interventions are recommended to address persistent knowledge gaps and improve child health outcomes.

Keywords: Otitis media, pediatric health, parental knowledge, attitudes and practices, ear infection.

Introduction

Ear infections in children are a major public health concern worldwide, particularly in developing countries [1]. Otitis media (OM) is one of the most common pediatric conditions and occurs more frequently in children than in adults due to anatomical and immunological factors [2]. Acute OM (AOM) is among the most prevalent childhood infections, affecting millions of children globally and representing a substantial healthcare burden. [3]. It is

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estimated that approximately 80% of children experience at least one episode of OM by the age of three, with many developing recurrent infections [4].

OM includes different clinical types, such as AOM, OM with effusion (OME), and chronic suppurative OM (CSOM) [5]. Children are more susceptible to ear infections due to the anatomical characteristics of the eustachian tube, which is shorter and more horizontal compared to adults, facilitating the spread of pathogens [2,6]. Several host and environmental factors also contribute to the development of OM, including age, immune response, exposure to tobacco smoke, and upper respiratory infections [5,7-9]. Common symptoms of ear infections include ear pain, fever, irritability, and hearing difficulties, which are frequent reasons for medical consultation [10-12]. If left untreated, OM may lead to complications such as hearing loss, speech delay, and impaired cognitive development [13].

Parental knowledge and awareness play a crucial role in early detection, timely management, and prevention of complications. Limited awareness may result in delayed healthcare-seeking behavior, misuse of antibiotics, and increased risk of adverse outcomes [14-17]. Improving parental awareness has been shown to enhance early recognition of symptoms and reduce disease burden [18]. Globally, the burden of ear infections continues to impact child health and quality of life, particularly in low-resource settings [19]. In Saudi Arabia, recent studies have highlighted variations in parental awareness and practices regarding OM, indicating the need for targeted educational interventions [20].

Despite the high prevalence and potential complications of OM, parental awareness regarding its causes, symptoms, and management remains insufficient in many settings. Limited data are available from the Bisha region of Saudi Arabia regarding parental knowledge and practices toward pediatric OM. Therefore, this study aimed to assess parents' knowledge, attitudes, and practices (KAPs) regarding pediatric ear infections in Bisha, Saudi Arabia.

Methods

Study design and setting

This was a descriptive cross-sectional study conducted in Bisha, Saudi Arabia, between February and July 2025. The study was community-based and used an online survey to reach parents. We included participants from Bisha city, the surrounding villages of Bisha Government, and also those living outside the government, as long as they had access to the questionnaire link.

Study population

The target population consisted of parents who had at least one child aged ten years or younger. We excluded parents whose children were all older than ten, those who refused to participate, and any non-parental caregivers.

Sample size calculation

We calculated the sample size using the Raosoft online calculator [21]. The parameters were a 95% confidence level, a 5% margin of error, and an expected proportion of adequate knowledge set at 50%, which is the most conservative estimate when no prior local data exist. The minimum required sample size was 384 participants. A total of 370 participants completed the questionnaire fully, reaching approximately 96% of the target.

Sampling technique

We used a convenience sampling method. Participants were recruited by sharing the questionnaire link on social media platforms, including Twitter (X), WhatsApp, and Telegram, specifically in local parenting groups and health awareness pages. In addition, several primary healthcare centers in Bisha forwarded the link through their patient text messaging systems. No financial or other incentives were offered for participation.

Questionnaire development

The questionnaire was developed based on a comprehensive review of previously published studies assessing parental KAPs regarding pediatric ear infections [22]. The instrument contained four sections. The first section collected sociodemographic data: age, gender, marital status, educational level, job status, monthly income, place of residence, and number of children. The second section assessed knowledge, covering symptoms (how many symptoms a participant could name), causes, prevention, treatment, and complications of ear infections. The third and fourth sections measured attitudes and practices, which were scored as positive or negative according to predefined criteria. Adequate overall knowledge was defined as scoring 60% or higher on the knowledge items, which included correctly identifying at least two symptoms. Participants scoring below 60% were classified as having inadequate knowledge. Before full deployment, the questionnaire was face-validated by three experts: two consultant otolaryngologists and one public health specialist. We then conducted a pilot test on 30 parents who were not part of the final sample to assess clarity and internal consistency. Cronbach's alpha for the knowledge domain was 0.78, indicating acceptable reliability.

Data collection

Data were collected using a self-administered online questionnaire built with Google Forms. No personal identifiers such as names, phone numbers, or IP addresses were collected, ensuring anonymity. The survey link was distributed through the social media channels and healthcare center messages described above. Completing the questionnaire took approximately eight to ten minutes. We received 384 responses in total, of which 14 were excluded due to incomplete data or failure to meet the inclusion criteria, leaving 370 valid responses for analysis. Because the link was shared openly online, we could not calculate a precise response rate.

Statistical analysis

We performed all statistical analyses using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY). Descriptive statistics were calculated as frequencies and percentages for all variables. We used the chi-square test to examine associations between knowledge level and attitude, between knowledge level and practice, and between knowledge level and each sociodemographic variable (age, gender, marital status, education, job status, income, residence, and number of children). A p-value of <0.05 was considered statistically significant. For multivariable analysis, we performed binary logistic regression to identify predictors of adequate knowledge.

Ethical considerations

Ethical approval was obtained from the Institutional Review Board/Ethics Committee of King Abdullah Hospital, Bisha, Saudi Arabia (E-CTS Ref No. BIS-24-0002, approved on 23 October 2024) before the commencement of the study. The study was conducted in accordance with the Declaration of Helsinki. All participants provided electronic informed consent before accessing the questionnaire. Participation was entirely voluntary, and respondents could withdraw at any time without penalty. No personal identifiers were collected, and all data were stored on a password-protected computer accessible only to the research team.

Results

A total of 370 participants were included in the study. Nearly half of the participants were aged 41-50 years (47.6%), and the majority were female (70.5%) and married (92.4%). Most participants held a bachelor's degree (64.1%) and were employed (68.1%). Regarding residence, 63.8% lived in Bisha Government. Monthly income above 15,000 SAR was reported by 34.9% of participants, while 60.8% had five or more children (See Table 1 below).

Table 2 below reveals that only 32.2% of the participants demonstrated adequate overall knowledge regarding ear infections. Knowledge of symptoms was unevenly distributed; more than half of the participants (52.2%) reported only one symptom, while a smaller proportion (11.9%) were able to identify three or more symptoms. On the contrary, awareness of treatment and prevention was notably high, with 98.9% and 93.8% of participants reporting knowledge in these areas, respectively. However, awareness of complications was relatively low (26.2%), and knowledge of the causes (etiology) of ear infections was the lowest, with only 15.9% of participants identifying them correctly. Attitudes toward ear infections were predominantly positive, as reported by 89.7% of participants. In addition, 79.7% demonstrated appropriate health practices, such as seeking medical care and adhering to recommended treatments.

Table 1. *Sociodemographic characteristics of the study participants (n = 370).*

Parameter	Category	Frequency (*n*)	Percent %
Age	18-30 years old	48	12.973
	31-40 years old	95	25.676
	41-50 years old	176	47.568
	>50 years old	51	13.784
Gender	Male	109	29.459
	Female	261	70.541
Marital status	Married	342	92.432
	Divorced	19	5.135
	Widow	9	2.432
Educational level	Bachelor	237	64.054
	Diploma	56	15.135
	Postgraduate studies	40	10.811
	High school or less	37	10
Job status	Employee	252	68.108
	Unemployed/Retired Student*	110	29.73
	Freelance	8	2.162
Place of residence	Bisha Governorate	236	63.784
	Villages of Bisha Governorate	30	8.108
	Outside Bisha	104	28.108
Income (per month)	<5,000 SAR	46	12.432
	5,000-10,000 SAR	94	25.405
	10,001-15,000 SAR	101	27.297
	>15,000 SAR	129	34.865
Number of children	<5	145	39.189
	≥5	225	60.811

Data are presented as frequency (*n*) and percentage (%). SAR, Saudi Arabian Riyal.

Figure 1 below demonstrates that the majority of participants had inadequate overall knowledge regarding pediatric ear infections, accounting for 67.8% of the study population, while only 32.2% demonstrated adequate knowledge.

Table 3 below reveals there was a significant association between practice level and knowledge level ($\chi^2 = 6.377$, $p = 0.012$). Participants with positive practice had a higher proportion of adequate knowledge (35.25%) compared to those with negative practice (20.00%). However, there was no significant association between attitude level and knowledge level ($\chi^2 = 0.081$, $p = 0.775$), as the proportion of adequate knowledge was comparable between participants with positive (31.9%) and negative attitudes (34.2%).

Table 4 below showed no statistically significant association between overall knowledge regarding pediatric ear infections and sociodemographic characteristics, including age ($\chi^2 = 3.641$, p = 0.303), gender ($\chi^2 = 0.927$, $p = 0.336$), marital status ($\chi^2 = 1.282$, p = 0.527), educational level ($\chi^2 = 2.588$, $p = 0.460$), job status ($\chi^2 = 1.946$, $p = 0.746$), monthly income ($\chi^2 = 0.409$, $p = 0.938$), residence ($\chi^2 = 1.359$, $p = 0.507$), and number of children ($\chi^2 = 0.291$, $p = 0.590$). Although

Table 2. *Participants' KAPs related to ear infection.*

Variable	Category	No. (%)
Knowledge about the manifestation of ear infections	I don't know (0 symptoms)	23 (6.2)
	1 symptom	193(52.2)
	2 symptoms	110 (29.7)
	≥3 symptoms	44 (11.9)
Knowledgeable about the etiology of ear infections	Yes	59 (15.9)
	No	311 (84.1)
Knowledgeable about prevention	Yes	347 (93.8)
	No	23 (6.2)
Knowledgeable about treatment	Yes	366 (98.9)
	No	4 (1.1)
Knowledgeable about the consequences of infections	Yes	97 (26.2)
	No	273 (73.8)
General knowledge about ear infection	Adequate knowledge	119 (32.2)
	Inadequate knowledge	251 (67.8)
Attitude towards ear infection	Positive attitude	332 (89.7)
	Negative attitude	38 (10.3)
Practice related to ear infection	Positive practice	295 (79.7)
	Negative practice	75 (20.3)

Data are presented as frequency (*n*) and percentage (%).

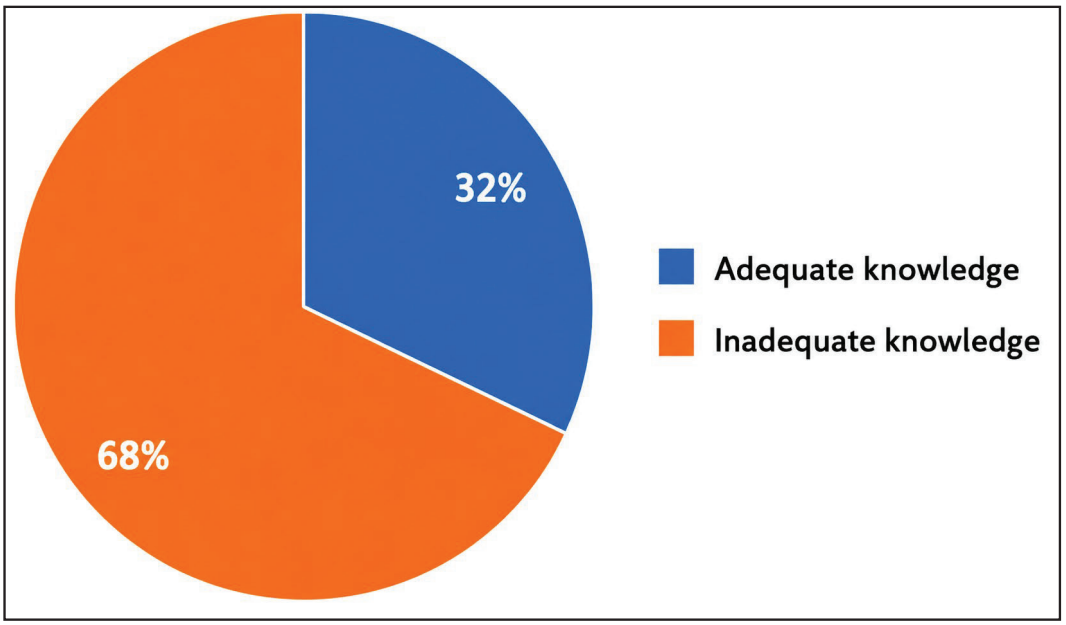

Figure 1. *Parental awareness level regarding pediatric ear infections (N = 370).*

Table 3. *Associations between KAP.*

Variable	Category	Inadequate no. (%)	Adequate no. (%)	χ^2	*p*-value
Practice level	Positive	191 (64.75%)	104 (35.25%)	6.377	0.012
	Negative	60 (80.00%)	15 (20.00%)		
Attitude level	Positive	226 (65.1%)	106 (31.9%)	0.081	0.775
	Negative	25 (65.8%)	13 (34.2%)		

Data are presented as frequency and percentage. Chi-square test was used to evaluate the association between knowledge level and participants' attitude and practice levels regarding pediatric ear infections. A *p*-value <0.05 was considered statistically significant. χ^2 = Chi-square value.

Table 4. *Associations between knowledge and sociodemographic factors.*

Parameter	Category	Inadequate knowledge *N* (%)	Adequate knowledge (*N*%)	Chi-square test	p-value
Age	18-30 years old	33 (68.75%)	15 (31.25%)	3.641	0.303
	31-40 years old	60 (63.16%)	35 (36.84%)		
	41-50 years old	127 (72.16%)	49 (27.84%)		
	>50 years old	31 (60.78%)	20 (39.22%)		
Gender	Male	70 (64.22%)	39 (35.78%)	0.927	0.336
	Female	181 (69.35%)	80 (30.65%)		
Marital status	Married	233 (68.13%)	109 (31.87%)	1.282	0.527
	Divorced	11 (57.90%)	8 (42.10%)		
	Widow	7 (77.78%)	2 (22.22%)		
Education	Diploma	34 (60.71%)	22 (39.29%)	2.588	0.460
	Bachelor's degree	163 (68.78%)	74 (31.22%)		
	High school or less	28 (75.68%)	9 (24.32%)		
	Postgraduate studies	26 (65.00%)	14 (35.00%)		
Job status	Retired	28 (63.64%)	16 (36.36%)	1.946	0.746
	Unemployed/Housewife	43 (74.14%)	15 (25.86%)		
	Employee	168 (66.67%)	84 (33.33%)		
	Freelancer	6 (75.00%)	2 (25.00%)		
	Student	6 (75.00%)	2 (25.00%)		
Income (SAR)	<5,000	30 (65.22%)	16 (34.78%)	0.409	0.938
	5,000-10,000	66 (70.21%)	28 (29.79%)		
	10,001-15,000	68 (67.33%)	33 (32.67%)		
	>15,000	87 (67.44%)	42 (32.56%)		
Residence	Bisha Governorate	160 (67.80%)	76 (32.20%)	1.359	0.507
	Villages in Bisha	23 (76.67%)	7 (23.33%)		
	Outside Bisha	68 (65.38%)	36 (34.62%)		
Number of children	<5	96 (66.2%)	49 (33.8%)	0.291	0.590
	≥5	155 (68.9%)	70 (31.1%)		

Data are presented as frequency and percentage. Chi-square test was used to assess the association between participants' sociodemographic characteristics and knowledge level regarding pediatric ear infections. A *p*-value < 0.05 was considered statistically significant. *N*, number; SAR, Saudi Riyal.

minor variations in adequate knowledge levels were observed across categories, inadequate knowledge remained common among most participants.

Logistic regression analysis

Binary logistic regression was performed to identify independent predictors of knowledge, attitude, and practice levels regarding pediatric ear infections after adjusting for age, marital status, educational level, job status, monthly family income, place of residence, number of children, and prior awareness of ear infections.

For adequate knowledge, the overall multivariable model was not statistically significant ($\Delta\chi^2 = 14.643$, $p = 0.621$), with limited explanatory value (Nagelkerke $R^2 = 0.054$). Among the included predictors, lack of prior awareness about ear infections was independently associated with lower odds of adequate knowledge (OR = 0.556; 95% CI: 0.316-0.976; p = 0.041). Other sociodemographic factors, including age, marital status, educational level, job status, income, residence, and number of children, were not significantly associated with adequate knowledge. Full details about the logistic regression data for knowledge are outlined in Supplementary Table 5.

For attitude level, the logistic regression model was also not statistically significant overall ($\Delta\chi^2 = 20.077$, $p = 0.270$), with Nagelkerke $R^2 = 0.109$. None of the examined sociodemographic or awareness-related variables was significantly associated with a negative attitude. Although higher income showed a borderline association, it did not reach statistical significance (OR = 0.394; 95% CI: 0.151-1.027; p = 0.057). In-depth information about the logistic regression model for attitude is presented in Supplementary Table 6.

For practice level, the overall model was not statistically significant ($\Delta\chi^2 = 23.256$, $p = 0.141$), with Nagelkerke $R^2 = 0.096$. No variable was independently associated with negative practice. Residence in villages of Bisha Governorate showed a borderline association with higher odds of negative practice (OR = 2.383; 95% CI: 0.981-5.792; p = 0.055), and lack of prior awareness about ear infections also approached significance (OR = 1.733; 95% CI: 0.956-3.142; p = 0.070). However, neither association met the threshold for statistical significance, as shown in Supplementary Table 7.

Discussion

The present study assessed parental KAPs regarding pediatric ear infections in Bisha, Saudi Arabia, in line with the study objective of evaluating awareness and health-related behaviors toward OM. The findings demonstrated that overall knowledge was inadequate among most participants, with only 32.2% showing adequate knowledge despite high awareness regarding treatment and prevention. Knowledge gaps were particularly evident in recognizing the causes and complications of ear infections. This level of adequate knowledge was lower than that reported by Khurayzi et al. [23], who found that approximately 56% of participants had adequate knowledge, although awareness was still considered suboptimal. The observed difference may be attributed to variations in study populations, educational backgrounds, and access to healthcare information.

A more in-depth investigation of knowledge components highlighted significant differences in awareness among parents. While most subjects reported adequate knowledge about treatment (98.9%) and prevention (93.8%), only 15.9% of the respondents were aware of the factors responsible for the ear infection, and only 26.2% knew the complications arising from the condition. Furthermore, more than half of the respondents (52.2%) were only able to name one sign of an ear infection, and only 11.9% named three or more signs. These results imply that parental knowledge is mostly experiential, mainly involving treatment and preventive actions common in healthcare settings but not disease-specific information. Similar findings were reported by Alsuhaibani et al. [24], where more than half of the participants had suboptimal knowledge regarding OM despite relatively positive attitudes.

A significant association was observed between knowledge and health practices ($p = 0.012$), indicating that better knowledge may contribute to more appropriate health-related behaviors. These findings are consistent with studies conducted in Saudi Arabia, which reported positive attitudes and practices despite variability in knowledge levels [4,23,24]. They also align with existing evidence showing that increased awareness improves early recognition, treatment adherence, and prevention of complications [3,7,25].

From a clinical and public health perspective, improving parental knowledge may contribute to earlier diagnosis, appropriate management, and reduced risk of complications associated with OM [11,13]. The findings of this study add to the existing literature by highlighting the gap between knowledge and practice in this population.

Compared to international studies, knowledge levels in this study were lower, although attitudes and practices were relatively higher [26]. Other studies have also reported limited awareness of risk factors despite good knowledge of prevention [27].

This study has several strengths, including the use of a structured questionnaire and a relatively large sample size. However, limitations should be considered. The cross-sectional design limits causal inference, and the use of self-reported data may introduce reporting bias. In addition, the sample was predominantly female and married, which may affect generalizability.

Future research should focus on longitudinal designs and more diverse populations to better understand causal relationships and evaluate targeted educational interventions aimed at improving parental awareness and health outcomes [28].

Limitations

The relatively higher proportion of female and married participants, which may limit generalizability. The use of self-reported data may also introduce reporting bias. In addition, the cross-sectional design limits the ability to establish causal relationships between KAPs. Future research should focus on longitudinal study designs to better understand causal relationships. Expanding the study to more diverse populations would improve generalizability. In addition, qualitative studies may provide deeper insights into cultural beliefs and barriers to knowledge acquisition. Evaluating targeted educational interventions may further improve health outcomes.

Conclusion

Despite positive parental attitudes and practices toward pediatric ear infections, overall knowledge regarding symptoms, causes, and complications remained inadequate. The significant association between knowledge and practice highlights the importance of improving parental awareness to promote appropriate healthcare-seeking behaviors and early management of OM. Targeted educational interventions are recommended to address persistent knowledge gaps and improve child health outcomes.

List of Abbreviations

AOM	acute otitis media
CI	confidence interval
CSOM	chronic suppurative otitis media

KAP	knowledge, attitudes, and practices
OM	otitis media
OME	otitis media with effusion
OR	odds ratio
SPSS	Statistical Package for the Social Sciences

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Data availability statement
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Ethical approval and consent to participate
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Author contributions
Rudaina Hussain Alelyani led the research process, including study design, methodology, literature review, data collection, and manuscript writing. Mashael Sharaf S. Alshahrani, Lama Abdulaziz Alshahrani, Mohammed Thamer A. Alshahrani, and Naif Abdulaziz M. Alqarni contributed to the study design, literature review, data collection, and manuscript writing. Mohammed Ahmed A. Alshehri, Lama Zafi A. Aldrehan, Sultan Dhafer A. Alshehri, Zainab Ali Alalqam, Mohammed Mushari Alsueri, and Sami Mohammed A. Alaklabi participated in the literature review, data analysis, and manuscript preparation. Mohammed AlQarny provided supervision, data analysis, and critical revision of the manuscript. All authors read and approved the final version of the manuscript.

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Supplementary content (If any) is available online.

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