

Knowledge and Attitudes Regarding Antibiotic Use for Pediatric Pharyngitis Among Adults in Najran, Saudi Arabia: A Cross-Sectional Survey

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Abstract

Background

Pharyngitis is a common cause of pediatric healthcare visits and antibiotic prescribing, although most cases are viral. Inappropriate antibiotic use contributes to antimicrobial resistance. This study aimed to evaluate awareness, knowledge, and attitudes regarding appropriate antibiotic use for pediatric pharyngitis among the population of Najran City, Saudi Arabia.

Methods

A cross-sectional study was conducted among adults residing in Najran City from May to June 2026. Data were collected using a structured, self-administered online questionnaire distributed through social media. A non-probability convenience sampling technique supplemented by snowball sampling was used. Scores $\geq 75\%$ were considered good knowledge and positive attitudes. Data were analyzed using IBM SPSS Statistics version 29.0.

Results

A total of 422 participants were included. In particular, 84.6% demonstrated high awareness and knowledge, and 57.6% had appropriate attitudes. Awareness and knowledge were significantly associated with age, sex, nationality, parental educational level, and sources of health information. Participants receiving information from healthcare professionals, electronic resources, and educational institutions had significantly higher awareness and knowledge scores. Awareness and knowledge were positively correlated with attitude.

Conclusion

Although awareness and knowledge were generally good, inappropriate attitudes and misconceptions regarding antibiotic use persisted. Targeted educational interventions involving healthcare professionals and reliable educational resources are needed to promote rational antibiotic use and reduce antimicrobial resistance.

Categories: Family/General Practice, Emergency Medicine, Health Policy

Keywords: antibiotics, antimicrobial resistance, attitude, awareness, children, knowledge, pharyngitis, saudi arabia

Introduction

Worldwide, upper respiratory tract infections (URTIs) commonly result in morbidity in children. Most cases of pharyngitis are viral infections, such as adenovirus, enterovirus, or rhinovirus, but can be bacterial, such as Group A β -haemolytic streptococcus (GABHS). Tender cervical lymph nodes and soft palate inflammation are frequently linked to it. The main pathogen causing acute bacterial pharyngitis in children is GAS, sometimes referred to as *Streptococcus pyogenes*, which causes acute rheumatic fever (ARF) as a complication [1]. ARF and its sequela, rheumatic heart disease (RHD), continue to be important public health problems in developing and low-income countries [2,3,4].

Globally, an estimated 288.6 million cases of GAS pharyngitis in children five to 14 years of age are expected to occur annually [5]. In areas with a history of high prevalence and limited healthcare facilities, the global prevalence of ARF is approximately 18.4 per 1000 people [6]. The most recent statistics show that the RHD death rate is 7.5 per 1,000 patients yearly worldwide [7]. These findings emphasize the need for early interventions to prevent GAS infections [8,9].

How to cite this article

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There are many obstacles in the way of standardizing the diagnosis and treatment of this illness. The main problem is that, although GAS pharyngitis and viral pharyngitis have very similar clinical characteristics and are challenging to accurately differentiate, their treatment approaches are different [10]. Moreover, abnormalities are often associated with the clinical diagnosis of scarlet fever and GAS pharyngitis, especially when unusual rash symptoms are present. The lack of a standardized assessment procedure for pharyngitis may increase the risk of a missed or incorrect diagnosis for these reasons [11]. Moreover, the lack of knowledge among clinicians in the selection of antimicrobial principles can significantly affect the outcomes of treatment. Moreover, clinical scoring systems like the Centor and McIsaac scores and ancillary diagnostics such as throat cultures and rapid antigen detection tests (RADTs) are not routinely employed in medical facilities [12,13].

Regional studies from Saudi Arabia and neighboring countries have reported variable levels of public knowledge and persistent misconceptions regarding antibiotic use for childhood URTIs. These studies also suggest that inappropriate antibiotic expectations, self-medication, and non-prescription use remain important contributors to antimicrobial resistance. Collectively, these findings highlight the need to assess public awareness, knowledge, and attitudes toward appropriate antibiotic use for pediatric pharyngitis in the Najran region [14,15,16,17,18].

Antibiotics can be misused if parents are unaware of how to use them wisely to treat common childhood infections. However, doctors frequently prescribe antibiotics as a first line of treatment for a variety of ailments, typically attributing this overprescription to pressure from patients or parents. Cultural variables and behavioral traits, including self-medication, socioeconomic position, and educational attainment, are all associated with antibiotic misuse [15].

Another significant contributing factor to antibiotic abuse is a lack of health education. The issue of antibiotic overuse is exacerbated by the fact that almost two-thirds of all oral antibiotics are given out without a prescription and are improperly utilized for illnesses like pneumonia, malaria, tuberculosis, and minor pediatric infections. The scenario is comparable in Saudi Arabia [15]. Because antibiotic resistance in bacteria is already a concerning problem in Saudi Arabia, the collective impact of antibiotic overuse impacts not just the patients but the entire population [14]. The ensuing problems heighten healthcare costs and the burden of chronic illnesses [13,15]. Approximately 26% of Saudi Arabia's population is under 14 years old; therefore, they probably need care from their parents or caretakers when they are ill. Furthermore, parents play a crucial role in the community [16]. Hence, the aim of this study was to evaluate the knowledge, attitude, and practice (KAP) of parents from Saudi Arabia toward their children's antibiotic use. The results of this study will give stakeholders information to plan interventions and to implement the necessary actions to mitigate the effects of antibiotic abuse in Saudi Arabia.

Rationale of the study

Although inappropriate antibiotic use for pediatric URTIs remains a public health concern, evidence regarding public awareness, knowledge, and attitudes toward antibiotic use for pediatric pharyngitis in the Najran region is limited. Understanding these factors is essential to identify misconceptions and information gaps that may contribute to inappropriate antibiotic use. Therefore, this study aimed to assess awareness, knowledge, and attitudes toward appropriate antibiotic use for pediatric pharyngitis among the population of Najran City. The findings may support the development of targeted educational and antimicrobial stewardship interventions in the region.

Aim and objectives

This study aimed to assess awareness, knowledge, and attitudes toward appropriate antibiotic use for pediatric pharyngitis among adults living in Najran City, Saudi Arabia. It also aimed to identify common misconceptions regarding antibiotic use, including its inappropriate use for viral infections; examine associations between sociodemographic characteristics and participants' awareness, knowledge, and attitude scores; and assess the relationship between awareness and knowledge and attitudes toward appropriate antibiotic use.

Materials And Methods

Design and setting of the study

This is a cross-sectional study performed to assess the awareness, knowledge, and attitude of the population in Najran, Saudi Arabia, regarding the use of antibiotics for pediatric pharyngitis.

Study population

The study population comprised adults aged 18 years or older residing in Najran City, Saudi Arabia. Participants were eligible regardless of parental status. Having children under 14 years of age was collected as a sociodemographic characteristic.

Data were collected through a self-administered online questionnaire shared through social media during

May 2026–June 2026. An introductory page explained the aims of the study, confirmed voluntary participation, and obtained electronic informed consent before answering the questionnaire. A non-probability convenience sampling technique was used, supplemented by a snowball method in which participants were asked to pass the survey link to other eligible individuals. All respondents who met the inclusion criteria and completed the questionnaire during the period of data collection were included in the study.

Inclusion criteria

An online Arabic-language survey was distributed through social media platforms to adults residing in Najran City. Eligible participants were adults aged 18 years or older who resided in the Najran region and provided informed consent.

Exclusion criteria

Exclusion criteria were individuals below 18 years, those who live outside Najran, those who did not want to complete the survey, and healthcare professionals to minimize sampling bias.

Sample size

Using Cochran's formula, the sample size was calculated at a 95% confidence level, a 5% margin of error, and an assumed proportion (p) of 0.59. $n = Z\text{-score}^2 * P * (1-P) / \text{margin of error}^2$. The calculation resulted in a sample size of 372 participants, and the sample size was increased to 422 to increase study power.

Data collection

Data were collected using a structured self-administered questionnaire with four sections (see Appendix). The first part contained the informed consent form in Arabic and English. The second part was used to evaluate the demographic characteristics of the participants. It consisted of questions regarding variables such as age, sex, educational level, occupation, and other relevant sociodemographic information. The third part assessed the knowledge and awareness of the participants regarding the use of antibiotics in pharyngitis in children using seven questions, and the fourth part assessed the attitudes toward the use of antibiotics in pediatric patients with pharyngitis using six questions. To achieve wide reach and obtain a diverse sample population, the questionnaire was distributed electronically via widely used social media platforms in Saudi Arabia, namely, WhatsApp and Telegram. The scores of the awareness, knowledge and attitude domains were expressed in percentage by applying the formula: (actual score/maximum possible score) $\times$ 100%, which enabled a standardized comparison of the different domains of the questionnaire.

The questionnaire was developed by the authors based on the study objectives and relevant literature and was reviewed to ensure the clarity and relevance of the items. Internal consistency was assessed using Cronbach's alpha, with coefficients of 0.78 for the knowledge scale and 0.81 for the attitude scale, indicating acceptable internal consistency. Knowledge responses were scored as 1 for correct answers and 0 for incorrect or "do not know" responses. Attitude items were scored using a five-point Likert scale, with negatively worded items reverse-coded where appropriate so that higher scores consistently reflected more favorable attitudes toward appropriate antibiotic use. A cutoff of $\geq 75\%$ (third quartile) was used to classify knowledge and attitude levels.

A pilot study was conducted to assess the comprehensibility and practicality of the questionnaire prior to large-scale distribution. A sample of 20–30 individuals was included for pilot testing, consistent with standard practice for questionnaire validation studies. Additionally, responses from the pilot study were analyzed to assess reliability by using Cronbach's alpha.

Statistical analysis

The data collected were first entered into Microsoft Excel (version 2016, Microsoft Corporation, Redmond, WA, USA) on a computer using the Windows operating system. It was then exported to IBM SPSS Statistics for Windows, Version 29.0 (released 2022, IBM Corp., Armonk, NY). Descriptive statistics were used to summarize participants' demographic characteristics and responses. The mean and standard deviation were calculated for continuous variables. The two groups were compared by an independent t-test, while more than two groups were compared by an ANOVA test. Frequencies and percentages were used for categorical data. Pearson correlation was used to correlate continuous data. A p-value of less than 0.05 was considered statistically significant.

Ethical consideration

The Institutional Review Board (IRB) of the Najran Health Cluster approved the study (IRB Log May 2026–109A). The study followed accepted ethical norms and protocols, such as confidentiality and privacy protection, for research involving human subjects.

Results

Sociodemographic characteristics of the study participants

Half (56.2%) of the respondents were in the age group of 18-30, 23.5% in the age group of 31-40, and 20.4% in the age group of >40. The sample consisted of 41.0% males and 59.0% females. The majority of the participants were Saudi nationals (87.2%). In terms of educational level, most fathers (50.9%) and women (41.2%) were university graduates, and 9.5% of fathers and 5.2% of mothers had a postgraduate degree. Regarding occupation, most of the participants were employees (42.2%) and students (42.9%), and only 3.1% were retired. Almost half (51.2%) of the respondents had children <14 years of age, and the majority (89.8%) were from the Najran region. Friends (58.3%) were the most common source of knowledge on antibiotic use, followed by medical professionals (41.7%), social media (45.5%), educational institutions (35.3%), electronic resources (32.2%), and radio (12.8%) (Table 1).

Characteristic / Category	Number (n)	Percentage (%)
Age (years)		
18-30	237	56.2
31-40	99	23.5
>40	86	20.4
Participant sex		
Male	173	41.0
Female	249	59.0
Nationality		
Saudi	368	87.2
Not Saudi	54	12.8
Father's educational level		
Primary	44	10.4
Middle	31	7.3
Secondary	92	21.8
University	215	50.9
Postgraduate	40	9.5
Mother's educational level		
Primary	91	21.6
Middle	28	6.6
Secondary	107	25.4
University	174	41.2
Postgraduate	22	5.2
Occupation		
Student	181	42.9
Employee	178	42.2
Retired	13	3.1
Non worker	50	11.8
Residential area		
Inside the Najran region	379	89.8
Outside the Najran region	43	10.2

Have children under 14 years old		
Yes	216	51.2
No	206	48.8
Source		
Friends	246	58.3
Healthcare workers	176	41.7
Social media	192	45.5
Electronic	136	32.2
Educational institution	149	35.3
Radio	54	12.8

TABLE 1: Sociodemographic characteristics of the study participants (N = 422)

Note: Father's and mother's educational levels refer to the educational attainment of each participant's father and mother, respectively, and are reported for the total study sample.

Awareness, knowledge, and attitude scores

The mean score of the knowledge and awareness was 24.79 ± 4.58 . A minority of the participants (15.4%) had low awareness and knowledge, while most of the participants (84.6%) had high awareness and knowledge. The mean attitude score was 2.99 ± 1.65 . More than half of the participants (57.6%) had an appropriate attitude toward the use of antibiotics, and 42.4% had an inappropriate attitude (Table 2).

Measure / Category	Value
Awareness and knowledge	
Mean $\pm$ SD	24.79 ± 4.58
High, n (%)	357 (84.6%)
Low, n (%)	65 (15.4%)
Attitude	
Mean $\pm$ SD	2.99 ± 1.65
Appropriate, n (%)	243 (57.6%)
Inappropriate, n (%)	179 (42.4%)

TABLE 2: Awareness, knowledge, and attitude scores regarding antibiotic use for pediatric pharyngitis among the study participants (N = 422)

Table 3 presents the associations between sociodemographic characteristics, sources of information, and participants' awareness, knowledge, and attitude scores. Awareness and knowledge scores were significantly associated with age ($p < 0.001$), participant sex ($p = 0.038$), nationality ($p = 0.030$), father's educational level ($p < 0.001$), and mother's educational level ($p < 0.001$). Higher awareness and knowledge scores were also associated with receiving information from healthcare professionals ($p = 0.001$), electronic resources ($p = 0.014$), and educational institutions ($p = 0.001$). No significant associations were found with occupation ($p = 0.295$), residential area ($p = 0.440$), having children under 14 years of age ($p = 0.235$), friends ($p = 0.226$), social media ($p = 0.064$), or radio ($p = 0.107$).

Characteristic / category	Awareness and knowledge (Mean $\pm$ SD)	P-value	Attitude (Mean $\pm$ SD)	P-value
Age (years)				

18-30 y	23.95 ± 4.03 a		2.78 ± 1.58 a	
31-40 y	24.92 ± 5.57 b	≤0.001*	3.09 ± 1.76	0.003*
>40 y	26.95 ± 4.07 ab		3.47 ± 1.58 a	
Sex				
Male	25.34 ± 5.17	0.038*	3.14 ± 1.69	0.122
Female	24.40 ± 4.10		2.89 ± 1.61	
Nationality				
Saudi	26.06 ± 6.02	0.030*	3.54 ± 1.64	0.010*
Not Saudi	24.60 ± 4.31		2.92 ± 1.64	
Father's education				
Primary, middle, and secondary	23.04 ± 3.91	≤0.001*	2.78 ± 1.59	0.034*
University, postgraduate	25.93 ± 4.64		3.13 ± 1.67	
Mother's education				
Primary, middle, and secondary	23.65 ± 4.06	≤0.001*	2.83 ± 1.57	0.035*
University, postgraduate	26.09 ± 4.81		3.17 ± 1.72	
Occupation				
Student	24.45 ± 4.55	0.295	2.93 ± 1.59 a	0.038*
Employee	24.83 ± 4.67		3.62 ± 1.72 ab	
Retired	24.76 ± 4.51		3.07 ± 1.80	
Non-worker	25.86 ± 4.37		2.87 ± 1.65 b	
Residential area				
Inside the Najran region	24.85 ± 4.69	0.440	2.97 ± 1.67	0.370
Outside the Najran region	24.28 ± 3.54		3.21 ± 1.42	
Have children under 14 y				
Yes	24.53 ± 4.80	0.235	2.92 ± 1.68	0.378
No	25.06 ± 4.34		3.07 ± 1.62	
Source: Friends				
Yes	25.02 ± 4.69	0.226	3.17 ± 1.61	0.007*
No	24.47 ± 4.42		2.73 ± 1.66	
Source: Healthcare workers				
Yes	25.64 ± 4.78	0.001*	3.21 ± 1.71	0.024*
No	24.18 ± 4.34		2.84 ± 1.59	
Source: Social media				
Yes	24.33 ± 4.61	0.064	3.02 ± 1.68	0.772
No	25.16 ± 4.51		3.12 ± 1.67	
Source: Electronic				
Yes	25.16 ± 4.51	0.014*	3.12 ± 1.67	0.015*
No	24.00 ± 4.66		2.71 ± 1.57	
Source: Educational institution				
Yes	25.35 ± 4.46		3.12 ± 1.65	

Table with 5 columns: Response, Mean ± SD, P-value, Mean ± SD, P-value. Rows include 'No' (23.75 ± 4.64, 0.001*), 'Source: Radio' (23.85 ± 5.59, 0.107), 'Yes' (24.92 ± 4.41, 0.034*), and 'No' (2.76 ± 1.62, 0.366).

TABLE 3: Association between sociodemographic characteristics and awareness, knowledge, and attitude scores regarding antibiotic use for pediatric pharyngitis

Attitude scores were significantly associated with age (p = 0.003), nationality (p = 0.010), father’s educational level (p = 0.034), mother’s educational level (p = 0.035), and occupation (p = 0.038). Significant associations with attitude scores were also observed for information obtained from friends (p = 0.007), healthcare professionals (p = 0.024), electronic resources (p = 0.015), and educational institutions (p = 0.034). Attitude scores were not significantly associated with participant sex (p = 0.122), residential area (p = 0.370), having children under 14 years of age (p = 0.378), social media (p = 0.772), or radio (p = 0.366). Awareness and knowledge scores were positively correlated with attitude scores (r = 0.386, p < 0.001).

Correlation between awareness and knowledge scores and attitude scores

Table 4 demonstrates a significant positive correlation (r = 0.386, p < 0.001) between the awareness, knowledge, and attitude scores of the study participants. The results showed that the higher the level of knowledge and awareness, the more appropriate the attitude regarding the use of antibiotics for pediatric pharyngitis (Figure 1).

Table with 4 columns: Score, Correlation, r, P-value. Row 1: Attitude score, Awareness and knowledge score, 0.386, ≤0.001*.

TABLE 4: Correlation between awareness and knowledge scores and attitude scores regarding antibiotic use for pediatric pharyngitis

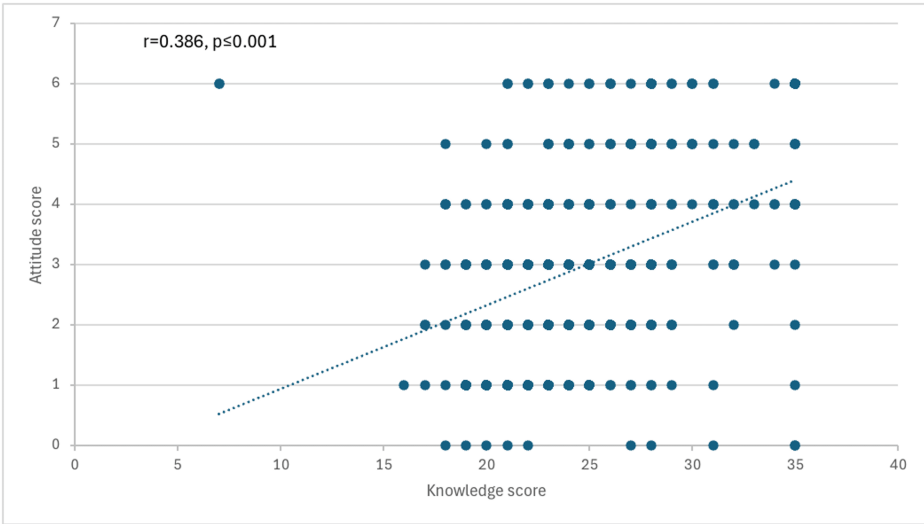


FIGURE 1: Scatter diagram for positive correlation between knowledge scores and attitude scores

Discussion

Acute pharyngitis is the most common infectious disease of children. Twenty to thirty percent (20-30%) of

cases of pharyngitis in children are caused by GAS. GAS pharyngitis is most common in school-aged children, particularly those seven to eight years old. Diagnosis of this disease is made on the basis of detailed history, close physical examination, and initial screening with clinical prediction tools. The definitive diagnosis relies on identification of the etiology by throat culture and nucleic acid amplification techniques [19].

The present study showed a relatively high level of knowledge and awareness of antibiotic use for pediatric pharyngitis. The mean knowledge and awareness score was 24.79 ± 4.58 , and most of the participants (84.6%) had high awareness and knowledge. The high level of awareness in the present study could be related to the relatively high educational level of the participants, increased access to health information, and the widespread availability of information through healthcare providers and social media.

This finding is in line with previous Saudi studies, which demonstrated a relatively good awareness in some important aspects of antibiotic use. Alrafiaah et al. reported that 81% of Saudi parents knew that inappropriate use of antibiotics could result in antibiotic resistance; however, only 44% knew that most URIs are caused by viruses. They also found that physicians were the main source of antibiotic-related information for 77% of the participants [20]. Likewise, Al-Shawi et al. reported that about two-thirds of parents knew that URIs were of viral origin and higher knowledge scores were significantly associated with higher educational level and income [21]. These findings support the potential association between educational and socioeconomic factors and higher antibiotic-related knowledge.

However, the current study revealed a higher level of knowledge and awareness compared to several previous Saudi studies. Al-Shawi et al. reported that only 13% of parents had an excellent knowledge score and 52.7% had an intermediate level of knowledge regarding the use of antibiotics for URIs. Moreover, 58.6% of these parents still expected an antibiotic prescription for their children with URI despite having excellent knowledge [21]. Alrafiaah et al. also concluded similarly that although most of the participants were educated, there were still significant gaps in knowledge on the use of antibiotics in pediatric URIs [20]. This difference of results from ours can be justified by the difference in the study population, geographical areas, educational characteristics, questionnaire, scoring system, and cutoff points for categorization of knowledge and awareness.

The present study also showed that the mean attitude score was 2.99 ± 1.65 and 57.6% of the participants had appropriate attitude toward antibiotic use and 42.4% had inappropriate attitude. It is encouraging to find that more than half of the participants had an appropriate attitude, and this may suggest increasing awareness of the importance of rational antibiotic use. However, the relatively high proportion of participants with inappropriate attitudes is worrisome, especially because inappropriate expectations and attitudes toward antibiotics may lead to inappropriate consumption of antibiotics and antimicrobial resistance.

The finding of an appropriate attitude in 57.6% of participants is partially consistent with the findings of Al-Shawi et al. who reported that 62.5% of parents agreed that children should not receive antibiotics for fever and nasal congestion. However, the same study revealed important misconceptions as 63.5% of parents believed that antibiotics should be prescribed for ear or throat pain and 58.6% of parents with excellent knowledge still expected an antibiotic prescription for URIs [21].

Conversely, Alrafiaah et al. reported common inappropriate attitudes and practices among Saudi parents despite the relatively high awareness about the antibiotic resistance. In their study, fever was the most common symptom for which parents sought antibiotic prescriptions, and the authors concluded that inadequate knowledge was associated with inappropriate attitudes and practices [20]. Similarly, a study by Alsuhailani et al. among parents in the Al-Qassim region showed significant misconceptions regarding the use of antibiotics in children with URIs [22]. These results were not in accordance with the current study in which the majority of the participants had high knowledge and appropriate attitude.

In the current study, we observed that several sociodemographic factors were significantly associated with awareness and knowledge of antibiotic use for pediatric pharyngitis. Older participants, especially those >40 years old, had the highest scores in awareness, knowledge, and attitudes. This may be because older adults have had more cumulative experience with healthcare services, have been exposed to antibiotic-related information before, and have more responsibility for decisions about family health. A Saudi study performed on the general population in the Western region reported similar results, where age was one of the significant factors related to antibiotic knowledge [20]. In addition, a recent multicountry study on adults in nine Arab countries has shown that demographic and socioeconomic factors like age and income influence knowledge of antibiotic use in pediatric respiratory infections [21].

Males had significantly higher awareness and knowledge scores than females in the present study. This finding is in line with the findings of a Saudi study that investigated knowledge, attitudes, and practices toward antibiotic use and antimicrobial resistance, in which gender was reported as an important factor associated with the knowledge on antibiotics. In a study of Saudi parents, demographic characteristics excluding gender and residence had a significant effect on knowledge [22,23].

A significant association was found between educational level of the parents and awareness and knowledge. The participants whose parents had university or postgraduate education scored significantly higher than the participants whose parents had lower educational levels. This is consistent with previous evidence from Saudi Arabia. Al-Shawi et al. found that parents with a higher level of education were more likely to have good knowledge and positive attitudes and practices toward antibiotic use [24]. Alharbi et al. also found that higher educational level was significantly associated with better knowledge of antibiotic use. A study among consumers in Al-Kharj found significantly higher knowledge scores among participants with higher educational levels [24,25]. These results suggest that education might improve health literacy and the ability to understand information about indications, resistance, adverse effects and proper use of antibiotics.

Moreover, the current study showed a significant relationship between the source of health information and awareness and knowledge. Participants who received information from healthcare professionals, electronic resources and educational institutions had significantly high knowledge and awareness scores. Several studies in Saudi Arabia support the importance of the role of healthcare professionals. In the Al-Qassim region, 81% of parents reported that physicians were the main source of information on antibiotics [26]. Similarly, in the study by Al-Shawi et al., physicians and healthcare facilities were identified as important sources of information about antibiotics but higher knowledge scores were also observed among participants who received information thru websites and social media [25]. The current study findings therefore highlight the role of health professionals and formal educational institutions in spreading correct information on antibiotic indications and antimicrobial resistance.

In the present study, awareness and knowledge score and attitude score had significant positive correlation ($r = 0.386$, $p < 0.001$), which indicates that the higher the awareness and knowledge score, the more appropriate attitude toward antibiotic use for pediatric pharyngitis. This finding provides some evidence that better understanding of antibiotics and their appropriate uses may result in more rational beliefs and attitudes.

The current finding is strongly supported by previous Saudi studies. The study by Al-Khaldi et al. reported a significant positive association between knowledge and attitude on antibiotics among consumers in Al-Kharj ($r = 0.523$, $p < 0.001$) and participants with better knowledge had more positive attitude toward the appropriate use of antibiotics. Similarly, a large field study of Saudi community members found that participants with knowledge of antibiotics had more positive attitudes toward their appropriate use [23]. These findings are in line with the current results and suggest that improving antibiotic-related knowledge could be a key avenue for attitude improvement.

Strengths of the study

This study has several strengths. It included a relatively large sample of adults from Najran City and addressed an important public health issue related to appropriate antibiotic use for pediatric pharyngitis. In addition, it simultaneously assessed awareness, knowledge, attitudes, common misconceptions, and their associations with sociodemographic characteristics and sources of health information. These findings provide useful regional evidence to support future educational and antimicrobial stewardship interventions.

Limitations of the study

This study has several limitations that should be considered in the interpretation of the findings. First, convenience non-random sample was used, and only people with access to social media platform can participate. Second, the study used self-reported data, which may be subject to recall bias and social desirability bias, as participants may overestimate the appropriate behaviors related to antibiotics. Third, despite the large sample size from Najran City, the results may not be generalizable to other regions of Saudi Arabia due to differences in culture, education, and access to healthcare. Fourth, the questionnaire was designed to measure awareness, knowledge, and attitudes, not actual antibiotic use practices, so the answers of the participants might not be an accurate predictor of their real-life behaviors.

Conclusions

Among the surveyed adults residing in Najran City, awareness and knowledge regarding appropriate antibiotic use for pediatric pharyngitis were generally high; however, inappropriate attitudes and misconceptions persisted. The observed association between awareness and knowledge scores and attitude scores should be interpreted cautiously because of the cross-sectional design and convenience sampling method. Therefore, the findings primarily reflect the sampled cohort and may not be generalizable to the wider population of Najran or other regions of Saudi Arabia. Nevertheless, the findings may help identify local knowledge gaps and inform future educational initiatives promoting appropriate antibiotic use.

Based on these findings, locally tailored educational initiatives could be considered to address misconceptions regarding antibiotic use for pediatric pharyngitis. Healthcare professionals, educational institutions, and reliable electronic resources may help guide awareness interventions. Future studies using probability-based sampling and assessing actual antibiotic use practices could provide more representative evidence and further inform local antimicrobial stewardship strategies.

Appendices

Study questionnaire

Part 1

Informed consent (Arabic and English versions)

هذه الدراسة هي جزء من بحث يهدف إلى تقييم الوعي والمعرفة بين سكان منطقة نجران حول استخدام المضادات الحيوية لعلاج التهاب الحلق لدى الأطفال .

(المدة المتوقعة للإجابة على الاستبيان هي من ٨-١٠ دقائق)

ستوفر الدراسة الحالية معلومات قيمة عن مستويات الوعي، وقياس المعرفة والاتجاهات لدى سكان نجران حول استخدام المضادات الحيوية لعلاج التهاب الحلق عند الأطفال .

مشاركتك في الدراسة الحالية تعتبر مشاركة اختياريه تفيدنا في جمع المعلومات، بناءً على مساهمتك في الاستبيان

ستبقى المعلومات في هذا الاستبيان سرية [] في حالة وجود أي استفسارات، يمكنك التواصل مع الباحثين في الدراسة.

الموافقة على المشاركة في الاستبيان

موافق

غير موافق

This study is part of research related to evaluating the awareness, knowledge, and attitude of the population in Najran Region about using antibiotics for pharyngitis in pediatric patients.

(The expected time to answer the questionnaire is eight to 10 minutes)

The current study will provide valuable information about the awareness, knowledge, and attitude of the population in the Najran Region about using antibiotics for pharyngitis in pediatric people.

Your participation in the current study is considered optional participation that helps us collect information based on your contribution to the questionnaire. The information in this survey will be kept confidential. In case of any inquiries, you can contact the study researchers.

Consent to participate in the survey:

- Accept
- Decline

Part 2

الجنسية • سعودي • غير سعودي	Nationality : • Saudi • Non Saudi
الجنس • ذكر • أنثى	Gender : • Male • Female
العمر • ١٨-٣٠ • ٣١-٤٠ • أكبر من ٤٠	Age : • 18-30 years • 31-40 years • Over 40 years
مستوى تعليم الأم • ابتدائي • متوسط • ثانوي • بكالوريوس • ماجستير	Mother eduction level : • Primary school • Secondary school • Intermediate school • Bachelor's degree • Master degree
مستوى تعليم الأب • ابتدائي • متوسط • ثانوي • بكالوريوس • ماجستير	Father eduction level : • Primary school • Secondary school • Intermediate school • Bachelor's degree • Master degree
الوظيفة • طالب • موظف • موظف مستقل • غير موظف • متقاعد	Occupation : • Student • Employed • Self employed • Unemployed • Retired
منطقة السكن • داخل منطقة نجران • خارج منطقة نجران	Residential area : • inside Najran Region • Outside Najran Region
أطفال أقل من ١٤ سنة • نعم • لا	children under 14 years: • Yes • No
مصادر المعلومات: • أفراد العائلة أو الأصدقاء • منصات التواصل الاجتماعي (فيسبوك، إنستغرام، إكس، وغيرها) • المصادر الإلكترونية (المواقع الإلكترونية، المدونات، إلخ) • الإذاعة / التلفزيون • العاملون في الرعاية الصحية (الأطباء، الممرضون، وغيرهم) • المؤسسات التعليمية (المدارس، الجامعات، إلخ)	Sources of information : • Family members or Friends • Social media platforms (Facebook, instagram, X ,etc ..) • Online resources (websites ,blogs, etc..) • Radio /television • Healthcare workers (doctors ,nurses , etc ..) • Eduction institutional (schools , universities , etc ..)

TABLE 5: Demographic factors

Part 3

التهاب البلعوم (التهاب الحلق) عند الأطفال يكون غالبًا ناتجًا عن عدوى فيروسية: • أوافق بشدة • أوافق • محايد • لا أوافق • لا أوافق بشدة	Pharyngitis (sore throat) in children is most commonly caused by a viral infection: • Strongly agree • Agree • Neutral • Disagree • Strongly disagree
المضادات الحيوية يمكنها علاج جميع أنواع العدوى (البكتيرية والفيروسية): • أوافق بشدة • أوافق • محايد • لا أوافق • لا أوافق بشدة	Antibiotics can treat all types of infections (bacterial and viral): • Strongly agree • Agree • Neutral • Disagree • Strongly disagree
يتطلب الحصول على المضادات الحيوية وصفة طبية من الطبيب: • أوافق بشدة • أوافق • محايد • لا أوافق • لا أوافق بشدة	A doctor's prescription is required to obtain antibiotics: • Strongly agree • Agree • Neutral • Disagree • Strongly disagree
يجب إعطاء المضادات الحيوية في جميع الحالات بمجرد إصابة الطفل بالحمى: • أوافق بشدة • أوافق • محايد • لا أوافق • لا أوافق بشدة	Antibiotics should be given in all cases once a child develops a fever : • Strongly agree • Agree • Neutral • Disagree • Strongly disagree
إذا كان الطفل يعاني من السعال، وسيلان الأنف، والتهاب الحلق، فسوف يتعافى بشكل أسرع إذا تلقى مضادًا حيويًا: • أوافق بشدة • أوافق • محايد • لا أوافق • لا أوافق بشدة	If a child has a cough, runny nose and sore throat, they will recover faster if they receive an antibiotic: • Strongly agree • Agree • Neutral • Disagree • Strongly disagree
يجب إيقاف المضادات الحيوية بمجرد اختفاء الأعراض: • أوافق بشدة • أوافق • محايد • لا أوافق • لا أوافق بشدة	Antibiotics should be stopped once the symptoms disappear : • Strongly agree • Agree • Neutral • Disagree • Strongly disagree
الإفراط في استخدام المضادات الحيوية يزيد من خطر مقاومة المضادات الحيوية: • أوافق بشدة • أوافق • محايد • لا أوافق • لا أوافق بشدة	Overuse of antibiotics increases the risk of antibiotic resistance : • Strongly agree • Agree • Neutral • Disagree • Strongly disagree

TABLE 6: Awareness and knowledge about antibiotic use for pharyngitis in children (ER setting)

Part 4

عندما يعاني طفلي من التهاب الحلق، أזור قسم الطوارئ لطلب المضادات الحيوية لمنع تدهور الحالة. • نعم • لا	When my child has a sore throat, I visit the Emergency Department (ER) to request antibiotics to prevent the condition from worsening. • Yes • No
إذا لم يصف طبيب الطوارئ المضادات الحيوية، أشعر بعدم الرضا عن الزيارة. • نعم • لا	If the emergency physician does not prescribe antibiotics, I feel dissatisfied with the visit. • Yes • No
إذا كانت أعراض طفلي مشابهة لالتهاب الحلق السابق، سأستخدم ما تبقى من المضادات الحيوية دون استشارة الطبيب. • نعم • لا	If my child's symptoms are similar to a previous sore throat, I would reuse leftover antibiotics without consulting a doctor. • Yes • No
بعض حالات التهاب الحلق عند الأطفال يمكن أن تتحسن دون استخدام المضادات الحيوية. • نعم • لا	Some cases of sore throat in children can get better without antibiotics. • Yes • No
أعتقد أن إعطاء المضادات الحيوية فوراً يمكن أن يمنع المضاعفات في التهاب الحلق. • نعم • لا	I believe that giving antibiotics immediately can prevent complications in sore throat. • Yes • No
سأفكر في تغيير طبيب الطوارئ إذا كان يرفض وصف المضادات الحيوية بشكل متكرر. • نعم • لا	I would consider changing the emergency physician if they frequently refuse to prescribe antibiotics. • Yes • No

TABLE 7: Attitude about antibiotic use for pharyngitis in children (ER setting)

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

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