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UNDERSTANDING PARENTS' KNOWLEDGE AND PRACTICES REGARDING ANTIBIOTIC USE IN CHILDHOOD UPPER RESPIRATORY TRACT INFECTIONS IN MOSUL CITY, IRAQ

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ABSTRACT

Background: This study explores parents' understanding of antibiotic use and resistance in children with Upper Respiratory Tract Infections (URTIs) in Mosul city of Iraq. **Method:** A cross-sectional study was conducted using a self-administered questionnaire among parents. The research took place in December 2022 at a healthcare center in Mosul, northern Iraq. **Results:** In this Iraqi study, parents' knowledge and attitudes toward antibiotics revealed important trends. Notably, 32.1% of participants believed antibiotics had no toxicities. Approximately 52% would treat their children with antibiotics based solely on fever, regardless of the underlying cause. Some parents (27.1%) used previously prescribed antibiotics without seeking professional advice. Uncertainty persisted regarding antibiotics' appropriateness for viral infections, with 32% expressing less certainty and 26.3% remaining unsure. When specific symptoms like ear pain (65%) or vomiting (51.9%) occurred, parents anticipated the need for antibiotics. These findings emphasize the need for targeted education to promote responsible antibiotic use and combat resistance. **Conclusion:** This study highlights concerning gaps in parents' understanding and behaviors related to antibiotic use for URTIs in Mosul, Iraq. Misinformation and misconceptions exist, including underestimating antibiotic risks and misconstruing their necessity for viral infections. Education initiatives and clear guidelines are essential to improve decision-making and public health outcomes in the region, addressing these knowledge gaps and promoting responsible antibiotic practices against resistance.

KEYWORDS: Parents' Knowledge, Attitudes, Awareness, Antibiotic, Resistance, Children, Upper Respiratory Tract Infections (URTIs).

INTRODUCTION

Antibiotic resistance is a global health concern.[1] It is happens when bacteria no longer respond to the antibiotic which is previously sensitive and respond to it, thus they accommodate themselves and develop in the existence of an Antibiotic which designed to suppress growth or kill them.[2] Resistance can manifest through diverse means, including genetic changes or the horizontal transfer of resistance genes across microorganisms. The improper and excessive utilization of antibiotics in both the field of human medicine and agriculture have contributed to the emergence of bacteria that are resistant to antibiotics.

The World Health Organization (WHO) has recognized antimicrobial resistance as one of the ten most critical global public health challenges.[3] In 2016, during the United Nations General Assembly High-Level Meeting

on Antimicrobial Resistance, the significance of addressing antimicrobial resistance was formally recognized. Countries were urged to commit to national action plans to tackle this issue. However, despite these efforts, it is estimated that drug-resistant infections led to approximately 4.95 million deaths worldwide in 2019, with low- and middle-income countries disproportionately affected.[3] Antibiotic resistance is a formidable challenge worldwide, and several factors contribute to its emergence. Among these factors is the infrequent discovery of new antibiotics.[4],[5],[6] Optimal antibiotic stewardship plays a pivotal role in mitigating the emergence and spread of antibiotic resistance.[7],[8] The interplay between patient needs and self-reliance in antibiotic treatment significantly contributes to the phenomenon of antibiotic misuse, thereby fostering the development of antibiotic resistance.[6],[9],[10] Approximately 8.8% of Finnish children continue to receive antibiotics without clear medical justification for uncomplicated upper respiratory tract conditions.[11]

Antibiotic resistance constitutes a global menace, posing significant threats across the world, there is an unknown future for healthcare regarding antibiotic resistance due to the fact that infectious diseases cannot be treated with antibiotics.[12] This leads to the occurrence of serious diseases and prolonged hospitalization, in addition to raising the financial costs of health care, raising the costs of alternative medications as a second line drugs, and increase treatment failure.[13],[14],[15], and may increase the possibility of death from this serious infection.[16]

There are several factors contributing to antibiotic resistance. First, the improper use of antibiotics and exposing bacteria to a low dose of antibiotics with long duration of treatment is the main key to antibiotic resistance, because low sub-lethal concentrations of antibiotics cannot kill bacteria, but they may enhance the incidence of mutations, transmission of genetic material among different groups of bacteria, which encourage movement of antibiotic resistance genes between the bacteria ,this process called horizontal or lateral gene transfer as a mechanism of genetic change and augment the genetic recombination of bacteria, and enhance the chance to advance existing low-grade resistance mutations or progress the degree of drug resistance mutations.[17] The irrational and inappropriate utilization of antimicrobials stands as the foremost driver of drug resistance, influenced significantly by both parental behaviors and physicians' perspectives.[18] Furthermore, the inappropriate use of antibiotics in human medicine, veterinary practices, and animal husbandry has significant clinical and economic repercussions.[19] The adverse economic effects include elevated prices of healthcare borne by patients, whereas the adverse events include increased intake of antibiotics, elongated period of hospital stay, morbidity rate and mortality rate.[20],[21]

Judicious antibiotic utilization in pediatric clinical practice, particularly among children, assumes paramount significance.[22] Research findings suggest that antibiotic misuse accounts for approximately 20% to 50% of cases.[23]

Several studies conducted to understand people's knowledge about antibiotics resistance showed contrast results. For example, A study conducted in the United Kingdom revealed a lack of awareness regarding antibiotic use, particularly in economically disadvantaged areas.[24] In a comparable British study, findings indicated that 38% of individuals mistakenly believe that antibiotics impact most kinds of coughs or common colds. Meanwhile, a larger proportion approximately 43% remain unaware of the detrimental effects antibiotics can have on beneficial gut bacteria.[25] In a research, study conducted in Malaysia, participant's demonstrated difficulty distinguishing viral infections from bacterial infections. Additionally, there was a widespread absence of awareness that antibiotics provide no advantage in treating common colds.[26] Contrastingly, a study conducted in Hong Kong revealed a positive outcome: participants demonstrated sufficient knowledge and appropriate behaviors regarding the optimal use of antibiotics.[10]

In the Swedish study, researchers discovered that some participants could not differentiate between bacteria and viruses, which is quite common. Additionally, about 20% of the participants believed that antibiotics could positively affect the common cold.[27] It is concerning that only a small percentage (around 10%) of Italian participants could define antibiotic resistance. This highlights the need for superior education and awareness, and this highpoints the essential for better education and awareness, some participants mistakenly believe that antibiotics can treat the common cold.[28] In Kuwait, there appears to be limited awareness regarding the rational use of antibiotics.[29] In Iraq, conducting this study is essential due to existing gaps in the literature. By doing so, we can enhance awareness, promote appropriate antibiotic usage among the public, and identify the challenges our society faces in comprehending antibiotic resistance. Effective interventions can then be implemented to control its spread.

OBJECTIVE OF THE STUDY

The objective of this research was to assess the understanding, attitudes, and awareness regarding antibiotic use and antibiotic resistance among children with URTIs in Iraq.

METHOD

Research Methodology and Participant Characteristics

A cross-sectional study was directed at Family Medicine center in Mosul City between December 2022 and February 2023. During this period, researchers designed and directed a questionnaire to evaluate parents' knowledge and attitudes concerning antibiotic use for their children with respiratory tract infections. The study

received approval from the Nineveh Health Institutional Review Board (IRB) Department (approval number 20/137). Participants consisted of adults and parents aged between 18 and 65 years who demonstrated mental competence and proficiency in reading, listening, and speaking.

Questionnaire

The analysis questionnaire was created by adapting previously validated questionnaires related to the common community's knowledge and alertness of antibiotic use. Specifically, the questions were derived from validated Greek questionnaires that had been used in various prior studies.[30],[31],[32] Furthermore, the questionnaire was enhanced by incorporating new statements to delve deeper into the public's attitudes and knowledge regarding antibiotic use in URTIs and antibiotic resistance.

The comprehensive questionnaire comprised four distinct sections, totaling 40 questions. These sections addressed various aspects: Demographic and socio-economic information, statements related to participants past antibiotic use, assessment of participants' knowledge regarding antibiotic use, mechanisms, and resistance, in addition to measurement of respondents' attitudes toward antibiotic use and antibiotic resistance. It's commendable that the Arabic-transformed form of the questionnaire was used with proper permissions.[30] Two bilingual linguistic authorities from the University of Philadelphia validated the translation, ensuring cultural and linguistic accuracy. Additionally, a pilot study involving 25 randomly selected parents was conducted to assess the questionnaire's practicality and comprehensibility. Based on insights from the pilot phase, minor modifications were made to the questionnaire structure. Notably, data collected during this pilot phase were excluded from the final data analysis.

RESULTS

Sociodemographic characteristics

In this study, the sample size consisted of 400 participants, comprising 208 mothers and 192 fathers. The overwhelming majority of participants (99.5%) had Iraqi origins. Among them, 223 individuals (55.8%) fell within the age range of 25 to 44 years. Table 1 provides a demographic overview of Study Participants.

[Insert table 1 here]

Knowledge

According to the survey parents, physicians constituted the principal source of facts on antibiotic use (72%), then by television (10.8%) and family memberships (5.5%). Furthermore, parents were presented with a list of medications and tasked with differentiating antibiotics from non-antibiotic drugs, such as antipyretics, pain reliever, and agents, which dilate the bronchus. Notably, over half of the participants provided improper answers (Figure 1).

[Insert Figure 1 here]

In our study, over than half of the participants (52%) indicated their willingness to administer antibiotics to their children when faced with an increase in body temperature, irrespective of its underlying cause. Notably, approximately 16% disagreed with the recommendation against using antibiotics for viral infections, while 32% remained uncertain. Interestingly, over one-quarter of participants (32.1%) perceived antibiotics as entirely safe. On a positive note, 67.1% demonstrated awareness that inappropriate antibiotic use could lead to diminished effectiveness and bacterial resistance. For a deeper dive, Table 2, which provides additional insights into participants' knowledge-related responses.

[Insert table 2 here]

Attitude

Among parents seeking pediatric care, the most common reasons for contacting pediatricians relate to specific symptoms. These include 24.8%, 20.8%, 18.3%, 14.5, and 10.8% for cough, fever, nose drainage, hoarseness, and ear pain respectively. Conversely, a smaller proportion (6.5%) seek medical attention for sore throat or behavior changes (4.3%).

When queried about treatment preferences, parents predominantly mentioned analgesics (32%) and antibiotics (29.5%). Notably, parents associate the need for antibiotics with specific symptoms: ear pain (65%), vomiting (51.9%), and fever (51.1%). However, for conditions like the common cold (69.8%), nasal mucus or nasal secretion (69.3%), or sore throat (54.3%), parents anticipate using antibiotics less frequently or not at all.

Interestingly, parents sometimes administer antibiotics without physician consultation. The most common reasons include following a pharmacist's recommendation (14.3%) or relying on a previous doctor's prescription for similar symptoms (13%). Additional insights into the origins of self-administered antibiotics by parents can be found in (Figure 2).

[Insert Figure 1 here]

Furthermore, over two-thirds (70%) of participants expressed concern about excessive antibiotic usage. A significant majority (76.3%) advocated for educating both pediatricians and parents on appropriate antibiotic use. Additionally, 78.5% of participants showed their willingness to consult a pediatrician to mitigate complexities related to their child's illness. Conversely, 69.8% of parents approved that they should refrain from pressuring their pediatrician for antibiotic prescriptions in cases of recurrent URT (as shown in Table 3).

[Insert table 3 here]

Practice

Among the study participants, approximately half (50%) expressed their willingness to adhere to a physician's

instructions. A majority (59.3%) reported that their pediatricians rarely prescribe antibiotics during a phone call. Conversely, only 10.1% of respondents showed that they would actively try to find a pediatrician's prescription for antibiotics if they intended to administer them to their children. Additionally, 14.3% stated that they would encourage their pediatrician to recommend antibiotic treatment even in cases where the diagnosis remains uncertain, Notably, around 28.1% of participants mentioned that pediatricians prescribe antibiotics solely upon their request. Furthermore, a smaller proportion (17.5%) reported infrequent receipt of explanations from their pediatricians regarding their children's condition and the necessity of antibiotics (Table 4).
[Insert table 4 here]

Table 1: Demographic Overview of Study Participants (n=400).

Profile of Participants:	**Participant Distribution and Percentages in a Sample of 400**
Female Gender	208 (52%)
Average Number of Offspring	(3.39) %
Covered by Health Insurance	282 (70.5%)
Citizenship of Iraqi Origin	398 (99.5) %
Moderate Household Income	308 (77%)
High Household Income	28 (7%)
Educational Attainment of Fathers:	
Primary School	85 (21.3%)
Secondary School	94 (23.5%)
Diploma	79 (19.8%)
University Degree	142 (35.5%)
Educational Attainment of Mothers:	
Primary School	127 (31.8%)
Secondary School	84 (21%)
Diploma	91 (22.8%)
University Degree	94 (23.5%)
Having a Child Affected by URTI, such as Colds, Ear Infections, or Sore Throats	141 (35.3%)

Table 2: Assessing Antibiotic Knowledge among Parents: Insights from a Sample of 400.

	Fully agree	**Certainly agree**	**Uncertain**	**Disagree**	**Absolutely disagree**
When your child has a fever, it's essential to administer antibiotics regardless of the underlying cause	68 (17%)	140 (35%)	65 (16.3%)	93 (23.3)	31 (7.8%
Given that URTIs like the influenza, cold, ear infections, and sore throat are typically caused by viruses, it's generally not advisable to use antibiotics to treat them	52 (13%)	152 (38%)	128 (32%)	52 (13%)	14 (3.5%)
If a child has a cold or the flu, administering regular antibiotic doses won't lead to rapid improvement	49 (12.3%)	139 (34.8%)	107 (26.8%)	87 (21.8%)	18 (4.5%)
Scientists can continually develop novel antibiotics to combat resistant bacteria	73 (18.3%)	174 (43.5%)	105 (26.3%)	31 (7.8%)	17 (4.3%)
Antibiotics do not cause side effects	35 (8.8%)	93 (23.3%)	105 (26.3%)	107 (26.8%)	60 (15%)
When antibiotics are administered without a valid reason, their effectiveness diminishes, and bacteria can develop resistance.	105 (26.3%)	163 (40.8%)	88 (22%)	31 (7.8%)	13 (3.3)
Minimize URTI complications with antibiotics.	70 (17.5%)	173 (43.3%)	124 (31%)	24 (6%)	9 (2.3%)

Table 3: The findings related to parents' attitudes concerning antibiotics.

	Absolutely agree.	Agree	Uncertain	Disagree	Absolutely disagree,
Do you think there is an excessive use of antibiotics?	116 (29%)	164 (41%)	75 (18.8%)	26 (6.5%)	19 (4.8%)
If your pediatrician consistently refrained from prescribing antibiotics for your child, would you alter him/her?	29 (7.3%)	103 (25.8%)	100 (25%)	142 (35.5%)	26 (6.5%)
If your pediatrician frequently prescribes antibiotics for your child when you believe they may not be necessary, would you alter him/her?	40 (10%)	151 (37.8%)	100 (25%)	92 (23%)	17 (4.3%)
If your child were to exhibit, the same symptoms as an earlier illness, would you consider using the antibiotic that was effective during that earlier illness.	45 (11.3%)	151 (37.8%)	78 (19.5%)	100 (25%)	26 (6.5%)
I believe that providing information on the appropriate use of antibiotics is essential for both pediatricians and parents	153 (38.3%)	152 (38%)	56 (14%)	28 (7%)	11 (2.8%)
If your child experiences frequent URTIs, would you insist that your pediatrician prescribe antibiotics?	30 (7.5%)	27 (6.8%)	64 (16%)	87 (21.8%)	192 (48%)
If your child experiences only nasal drainage, would you consider taking them to the pediatrician?	44 (11%)	113 (28.3%)	92 (23%)	125 (31.3%)	26 (6.5%)
I believe I am more attentive to my child's health than most other parents are to theirs.	74 (18.5%)	156 (39%)	98 (24.5%)	60 (15%)	12 (3%)
To prevent any potential complications from my child's infection, I would seek advice from a pediatrician	114 (28.5%)	200 (50%)	50 (12.5%)	27 (6.8%)	9 (2.3%)

Table 4: The findings related to Parental Antibiotic Practices (n=400).

	Always N(%)	Generally N(%)	Often N(%)	Occasionally N(%)	Rarely N(%)
Whenever the pediatrician prescribes an antibiotic for your child, I'll inquire whether it's truly indicated	39 (9.8%)	27 (6.8%)	104 (26%)	100 (25%)	130 (32.5%)
I will support my pediatrician's decision if they choose not to prescribe antibiotics	189 (47.3%)	138 (34.5%)	52 (13%)	12 (3%)	9 (2.3%)
The pediatrician issues antibiotic prescriptions over the phone	5 (1.3%)	10 (2.5%)	50 (12.5%)	98 (24.5%)	237 (59.3%)
If I intend to administer an antibiotic to my child, I will request a prescription from the pediatrician	15 (3.8%)	25 (6.3%)	67 (16.8%)	102 (25.5%)	191 (74.8%)
I adhere to the pediatrician's guidance.	140 (35%)	60 (15%)	96 (24%)	39 (9.8%)	65 (16.3%)
If an unconfirmed diagnosis arises, I will insist that the pediatrician prescribe an antibiotic.	30 (7.5%)	27 (6.8%)	64 (16%)	87 (21.8%)	192 (48%)
The pediatrician provides me with an explanation regarding my child's condition and whether antibiotics are necessary	54 (13.5%)	70 (17.5%)	116 (29%)	90 (22.5%)	70 (17.5%)
The pediatrician recommends antibiotics only because I request him	13 (3.3%)	31 (7.8%)	68 (17%)	100 (25 %)	188 (47 %)

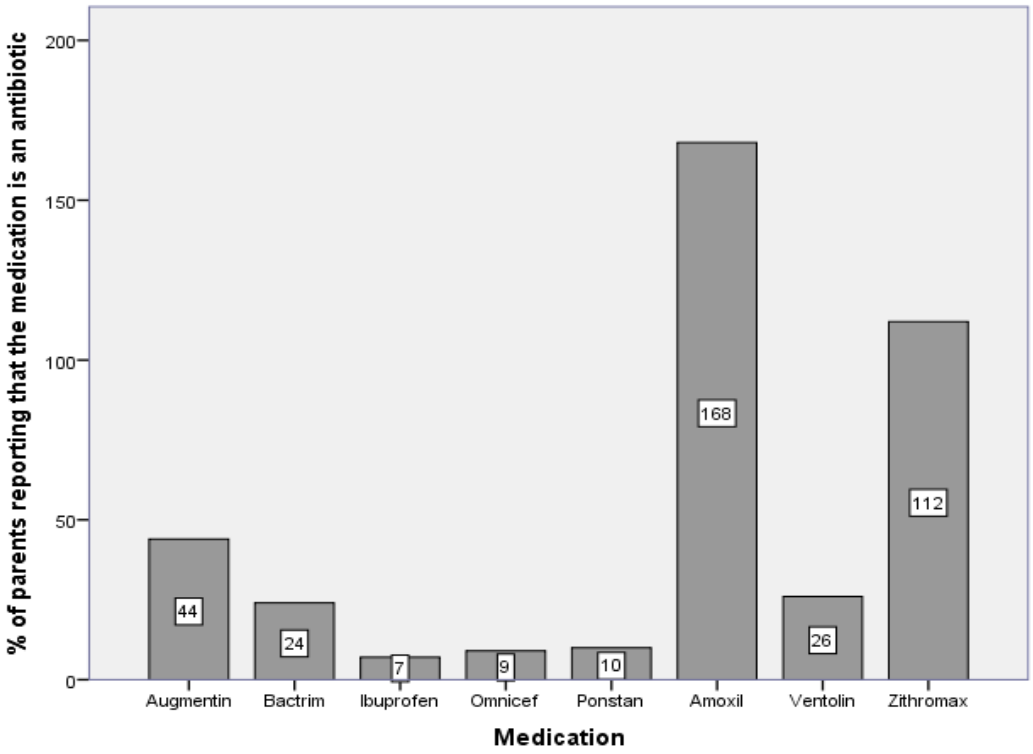

Figure 1: Parents' ability to recognize antibiotics portrayed.

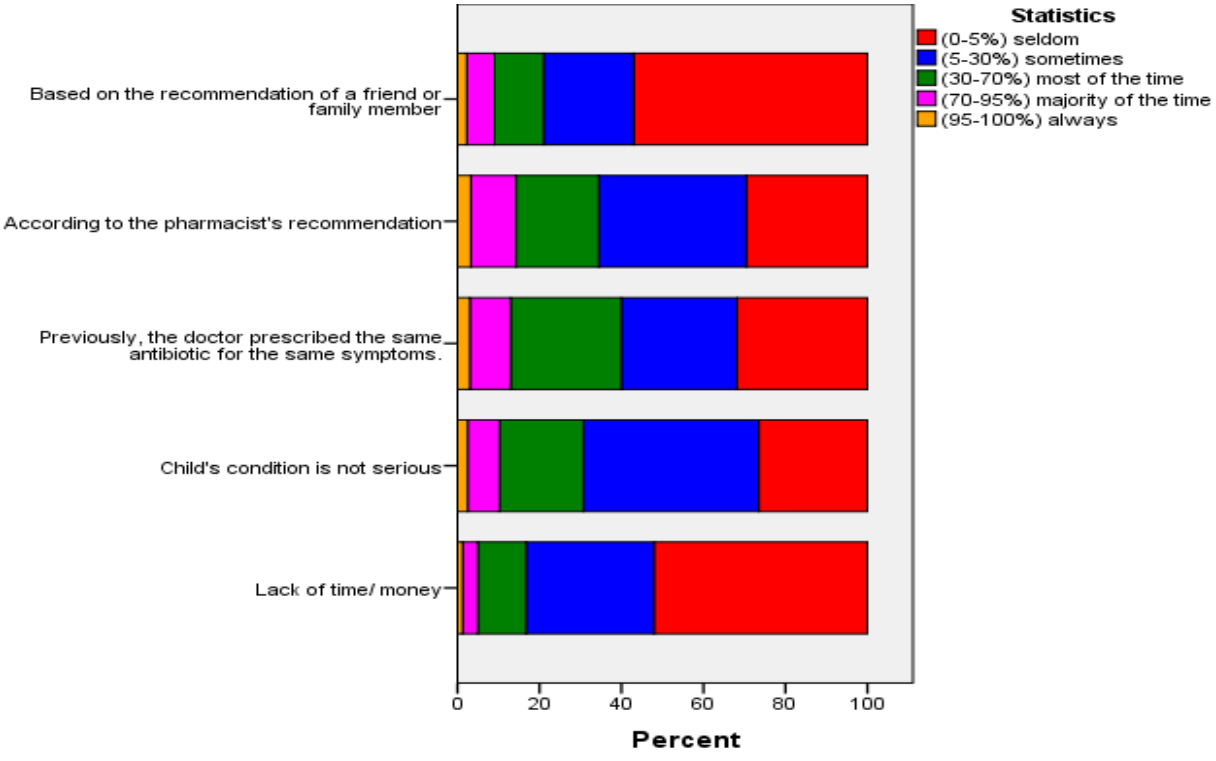

Figure 2: Etiology of antibiotic self- administration by parents (Percentage).

DISCUSSION

The aim of this research was to assess the knowledge, attitudes, and awareness related to antibiotic use and antibiotic resistance among children with URTIs in Iraq. While public awareness and understanding of antibiotic use remain significant healthcare challenges, little research has explored the specific attitudes and practices of Iraqi parents regarding antibiotic administration when their children experience URTIs.

In recent research, participants consistently demonstrated misconceptions and insufficient knowledge concerning the antibiotic use for pediatric URTIs. Remarkably, these findings mirror those from a study conducted in Oman, emphasizing that parents frequently lack the necessary understanding of appropriate antibiotic administration. Unfortunately, this knowledge gap contributes to patterns of both misuse and overuse, underscoring the importance of targeted education and responsible antibiotic practices.[33] Recent research underscores the critical need for widespread education on proper antibiotic use to combat antibiotic resistance. Effective communication between healthcare providers and patients highlighting both risks and benefits of antibiotic treatment is essential. Equally crucial is emphasizing the importance of completing the full-prescribed course of antibiotics. By rectifying misconceptions and promoting responsible antibiotic management, we can safeguard the efficacy of these vital treatments for future generations.

The survey findings highlight that many participants recognize the link between improper antibiotic use and the emergence of bacterial resistance. Interestingly, this observation aligns with corroborating evidence from other studies. It underscores the importance of responsible antibiotic practices to mitigate the growing threat of resistance. This finding aligns with consistent evidence from other research studies.[30],[32] This finding reflects an increasing awareness and concern among the general population about the potential consequences of excessive antibiotic use. Moreover, it emphasizes the ongoing need for education and public health initiatives to promote responsible antibiotic practices and combat the rise of antibiotic resistance. By harnessing these insights and working collaboratively, we can help reservation the efficiency of antibiotics for future generations.

In the present study, parental responses indicate that parental pressure is not the primary factor influencing physicians' decisions to prescribe antibiotics. Surprisingly, less than 25% of respondents believe that their pediatricians prescribe antibiotics solely due to parental requests. However, this finding diverges from other studies. For instance, an extensive survey involving 1000 general practitioners in the United Kingdom revealed that a significant proportion (55%) would administer antibiotics even when uncertain about their medical necessity.[34] In this context, the primary driver behind physicians' antibiotic prescribing decisions was parental pressure. Additionally, a notable 44% of them admitted to prescribing antibiotics merely to expedite patient visits. The variation in results can be attributed to cultural disparities in healthcare practices between the United Kingdom and Iraq. Moving forward, research should prioritize investigating the factors influencing physicians' antibiotic decisions. This exploration will inform targeted interventions aimed at reducing unnecessary antibiotic use and combating antibiotic resistance. Moreover, it remains crucial to educate both parents and healthcare providers about proper antibiotic utilization and the potential consequences of excessive prescriptions an essential step in promoting responsible antibiotic stewardship.

This study has several limitations. Its exclusive focus on a single hospital restricts generalizability. Additionally, the sample size may not allow definitive conclusions about the entire population. Selection bias could have influenced the results, as specific patients were included. The cross-sectional design, while informative, has inherent weaknesses. To improve reliability, future research should address these limitations.

CONCLUSION

The study's insights into parents' understanding, attitudes, and practices regarding antibiotic use for children with URTIs are truly fascinating. It highlights parental uncertainties about proper antibiotic utilization. These findings will serve as a crucial foundation for cutting-edge awareness initiatives in Iraq. Additionally, they provide evidence supporting the implementation of national regulations on antibiotic dispensing without prescriptions. Policymakers can use this information to develop more effective strategies for promoting responsible antibiotic use and combating resistance. By customizing education and communication, healthcare practitioners can address specific parental concerns. Ultimately, this study contributes to safeguarding antibiotics' efficacy for future generations worldwide.

REFERENCES

1. M. Irfan, A. Almotiri, and Z. A. AlZeyadi, "Antimicrobial Resistance and Its Drivers—A Review," *Antibiotics*, 2022; 11(10). doi: 10.3390/antibiotics11101362.
2. D. Porooshat, "Antimicrobial Resistance : Implications and Costs," *Infect. Drug Resist.*, 2019; 12(1): 3903–3910.
3. T. R. Walsh, A. C. Gales, R. Laxminarayan, and P. C. Dodd, "Antimicrobial Resistance: Addressing a Global Threat to Humanity," *PLoS Med.*, July 2023; 20(7): 12–15, doi: 10.1371/journal.pmed.1004264.
4. E. N. M. Sacomboio, C. S Sebastião, J. L. F. Antonio, Á. K. Vezo, D. V. S. Bapolo, and J. Morais, "Factors Associated With Resistance to In-Hospital Treatment of Malaria in Angolan Patients," *Infect. Dis. Res. Treat.*, 2022; 15: 117863372210768, doi: 10.1177/11786337221076836.
5. I. Ghiga, E. Pitchforth, C. Stålsby Lundborg, and A. Machowska, "Family doctors' roles and perceptions on antibiotic consumption and antibiotic resistance in Romania: a qualitative study," *BMC Prim. Care*, 2023; 24(1): 1–15, doi: 10.1186/s12875-023-02047-z.
6. S. Earnshaw *et al.*, "Global collaboration to encourage prudent antibiotic use.," *Lancet. Infect. Dis.*, Dec. 2013; 13(12): 1003–1004, doi: 10.1016/S1473-3099(13)70315-3.
7. J. Rose, M. Crosbie, and A. Stewart, "A qualitative

literature review exploring the drivers influencing antibiotic over-prescribing by GPs in primary care and recommendations to reduce unnecessary prescribing," *Perspect. Public Health*, 2021; 141(1): pp. 19–27, , doi: 10.1177/1757913919879183.
8. H. Goossens, M. Ferech, R. Vander Stichele, and M. Elseviers, "Outpatient antibiotic use in Europe and association with resistance: a cross-national database study," *Lancet*, 2005; 365(9459): 579–587. doi: https://doi.org/10.1016/S0140-6736(05)17907-0.
9. S. Earnshaw *et al.*, "European Antibiotic Awareness Day: a five-year perspective of Europe-wide actions to promote prudent use of antibiotics," *Eurosurveillance*, 2014; 19(41): 20928.
10. M. Shehadeh, G. Suaifan, R. M. Darwish, M. Wazaify, L. Zaru, and S. Alja'fari, "Knowledge, attitudes and behavior regarding antibiotics use and misuse among adults in the community of Jordan. A pilot study," *Saudi Pharm. J.*, 2012; 20(2): 125–133, doi: 10.1016/j.jsps.2011.11.005.
11. M. Korppi, P. Heikkilä, S. Palmu, H. Huhtala, and P. Csonka, "Antibiotic prescribing for children with upper respiratory tract infection: a Finnish nationwide 7-year observational study," *Eur. J. Pediatr.*, 2022; 181(8): 2981–2990, doi: 10.1007/s00431-022-04512-w.
12. A. Chokshi, Z. Sifri, D. Cennimo, and H. Horng, "Global contributors to antibiotic resistance," *J. Glob. Infect. Dis.*, 2019; 11(1): 36–42, doi: 10.4103/jgid.jgid_110_18.
13. E. C. for D. P. and Control and E. U. body or agency, "Surveillance of antimicrobial resistance in Europe : annual report of the European Antimicrobial Resistance Surveillance Network (EARS-Net) 2017.," European Union, 2019. doi: https://doi.org/10.2900/230516.
14. P. Shrestha *et al.*, "Enumerating the economic cost of antimicrobial resistance per antibiotic consumed to inform the evaluation of interventions affecting their use," *Antimicrob. Resist. Infect. Control*, 2018; 7(1): 1–9, doi: 10.1186/s13756-018-0384-3.
15. F. Prestinaci, P. Pezzotti, and A. Pantosti, "Antimicrobial resistance: A global multifaceted phenomenon," *Pathog. Glob. Health*, 2015; 109(7): 309–318, doi: 10.1179/2047773215Y.0000000030.
16. M. A. Salam *et al.*, "Antimicrobial Resistance: A Growing Serious Threat for Global Public Health," 2023. doi: 10.3390/healthcare11131946.
17. J. Davies and D. Davies, "Origins and evolution of antibiotic resistance.," *Microbiol. Mol. Biol. Rev.*, Sep. 2010; 74(3): 417–433, doi: 10.1128/MMBR.00016-10.
18. A. S. Coco, M. A. Horst, and A. S. Gambler, "Trends in broad-spectrum antibiotic prescribing for children with acute otitis media in the United States, 1998-2004," *BMC Pediatr.*, 2009; 9: 1–10, doi: 10.1186/1471-2431-9-41.
19. R. Laxminarayan *et al.*, "Access to effective antimicrobials: A worldwide challenge," *Lancet*, 2016; 387: 10014, 168–175, doi: 10.1016/S0140-6736(15)00474-2.
20. I. I. Otaigbe and C. J. Elikwu, "Drivers of inappropriate antibiotic use in low- and middle-income countries," *JAC-Antimicrobial Resist.*, 2023; 5(3): 1–9, doi: 10.1093/jacamr/dlad062.
21. J. Janssen *et al.*, "Exploring the economic impact of inappropriate antibiotic use: the case of upper respiratory tract infections in Ghana," *Antimicrob. Resist. Infect. Control*, 2022; 11(1): 1–8, doi: 10.1186/s13756-022-01096-w.
22. T. Tan, P. Little, and T. Stokes, "Antibiotic prescribing for self limiting respiratory tract infections in primary care: summary of NICE guidance," *BMJ*, Jul. 2008; 337(a437). doi: 10.1136/bmj.a437.
23. R. Mangione-Smith, E. A. McGlynn, M. N. Elliott, L. McDonald, C. E. Franz, and R. L. Kravitz, "Parent expectations for antibiotics, physician-parent communication, and satisfaction," *Arch. Pediatr. Adolesc. Med.*, 2001; 155(7): 800–806.
24. T. Mason, C. Trochez, R. Thomas, M. Babar, I. Hesso, and R. Kayyali, "Knowledge and awareness of the general public and perception of pharmacists about antibiotic resistance," *BMC Public Health*, 2018; 18(1): 1–10, doi: 10.1186/s12889-018-5614-3.
25. C. A. M. McNulty, P. Boyle, T. Nichols, P. Clappison, and P. Davey, "Don't wear me out - The public's knowledge of and attitudes to antibiotic use," *J. Antimicrob. Chemother.*, 2007; 59(4): 727–738, doi: 10.1093/jac/dkl558.
26. K. K. Lim and C. C. Teh, "A Cross Sectional Study of Public Knowledge and Attitude towards Antibiotics in Putrajaya, Malaysia.," *South. Med Rev.*, Dec. 2012; 5(2): 26–33.
27. M. André, Å. Vernby, J. Berg, and C. S. Lundborg, "A survey of public knowledge and awareness related to antibiotic use and resistance in Sweden," *J. Antimicrob. Chemother.*, 2010; 65(6): 1292–1296, doi: 10.1093/jac/dkq104.
28. F. Napolitano, M. T. Izzo, G. Di Giuseppe, and I. F. Angelillo, "Public knowledge, attitudes, and experience regarding the use of antibiotics in Italy," *PLoS One*, 2013; 8(12): 1–6, doi: 10.1371/journal.pone.0084177.
29. A. I. Awad and E. A. Aboud, "Knowledge, attitude and practice towards antibiotic use among the public in Kuwait," *PLoS One*, 2015; 10(2): 1–15, doi: 10.1371/journal.pone.0117910.
30. K. A. Hammour, M. A. Jalil, and W. A. Hammour, "An exploration of parents' knowledge, attitudes and practices towards the use of antibiotics in childhood upper respiratory tract infections in a tertiary Jordanian Hospital.," *Saudi Pharm. J. SPJ Off. Publ. Saudi Pharm. Soc.*, Sep. 2018; 26(6): 780–785, doi: 10.1016/j.jsps.2018.04.006.
31. S. G. Panagakou *et al.*, "Antibiotic use for upper respiratory tract infections in children: A cross-sectional survey of knowledge, attitudes, and practices (KAP) of parents in Greece," *BMC Pediatr.*, 2011; 11. doi: 10.1186/1471-2431-11-60.

32. S. H. Zyoud *et al.*, "Parental knowledge, attitudes and practices regarding antibiotic use for acute upper respiratory tract infections in children: A cross-sectional study in Palestine," *BMC Pediatr.*, 2015; 15(1): 1–9, doi: 10.1186/s12887-015-0494-5.
33. A. S. Al Hashmi, A. S. Al Shuhumi, and R. M. Al Kindi, "Parental knowledge, attitudes and practices regarding antibiotic use for upper respiratory tract infections in children," *Sultan Qaboos Univ. Med. J.*, 2021; 21(2): e289–e296, doi: 10.18295/squmj.2021.21.02.019.
34. A. Cole, "GPs feel pressurised to prescribe unnecessary antibiotics, survey finds," *BMJ Br. Med. J.*, Aug. 2014; 349: g5238, doi: 10.1136/bmj.g5238.