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Overuse of antibiotics in Saudi children with upper respiratory infection and diarrhea

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ABSTRACT

Background: The growth of antibiotic-resistant bacteria has been accelerated in recent decades as a result of antibiotic abuse and misuse. The goal of the current study was to evaluate the misuse of pediatric antibiotics in Northern Saudi Arabia concerning upper respiratory tract infections (URTI) and diarrhea. *Methodology:* Between May and August 2022, 400 residents of Hail, Northern Saudi Arabia, participated in this community-based descriptive survey. Independent of their age, social position, educational attainment, or monthly income, the participants were picked at random. *Results*: Approximately 56.7% of fathers and 63% of mothers had engaged in antibiotic abuse. Most frequently, age between 35 and 45 years was implicated in antibiotic overuse 41.6%, followed by age between 25 and 35 years 36%. University graduates made up the majority of antibiotic misusers 63.7%, whereas those with secondary and primary educations made up 28.7% and 7.6%, respectively. *Conclusion:* In Northern Saudi Arabia, overuse of antibiotics is common, particularly among fathers' parents. Community-based educational initiatives on antibiotic abuse are necessary for addition to wristband laws to minimize antibiotic overuse in Northern Saudi Arabia.

Keywords: Antibiotic misuse, Antibiotic overuse, Antibiotic abuse, Saudi Arabia, pediatric, Diarrhea, URTI.

1. INTRODUCTION

Antimicrobial abuse and misuse have significantly increased in Saudi Arabia because of high non-prescription antimicrobial dispensing rates. In 2018, Saudi Arabia outlawed selling antibiotics without a prescription. Following the adoption of the regulation in community pharmacies across Saudi Arabia, non-prescription antimicrobial usage barely decreased (Al-Jedai et al., 2022; Jali et al., 2021). However, the use of antibiotics and awareness of antibiotic

resistance is positively correlated with dispensing policy. To ensure a better understanding of antibiotics use, national antibiotics regulations and policies must be maintained along with ongoing education and awareness. Thus, the present study aimed to assesspediatric antibiotics abuse associated with diarrhea and upper respiratory tract infection (URTI) in Northern Saudi Arabia.

2. MATERIALS AND METHODS

This was a community-based descriptive study with 400 participants living in Hail, Northern Saudi Arabia, between May and August 2022. The participants were chosen at random, independent of their age, social standing, education level, or monthly income. Only individuals with children who had previously purchased antibiotics for their child to treat URTI or diarrhea were eligible. Those who gave antibiotics to their children without a doctor's prescription, or a culture and sensitivity test were classified as antibiotic misusers. Those who demonstrated proven antibiotic use were determined to be non-abusers. The random sample yielded 240 abusers and 160 non-abusers (including 220 fathers and 180 mothers).

Data analysis

SPSS software was used to analyze the data, producing frequencies, cross-tabulations, and statistically significant values. The Chi-square test was used, with a 95% confidence interval. A P-value of 0.05 or less was judged statistically significant.

3. RESULTS

This study investigated pediatric antibiotic abuse in 400 parents (220 (55%) fathers & 180 (45%) mothers). Most participants were aged 25-35 years followed by 35-45 years, and > 45 years, representing 160/400 (40%), 152/400 (38%), and 68/400 (17%), respectively. Most study subjects were with university levels of education followed by secondary and primary constituting 268/400 (67%), 102/400 (26%), and 26/400 (7%), in that order. About 15/400 (4%) individuals were divorced and 4/400 (1%) were widows as indicated in Table 1, Fig 1.

Fathers 182/220 (83%) were predominantly studying subjects working in the governmental sector compared to mothers 102/180 (57%). On the other hand, the proportion of mothers 29/180 (16%) working in the private sector was higher than fathers 31/220 (14%). Jobless mothers 48/180 (27%) were significantly more than fathers 4/220 (0.5%). Most study subjects with a monthly income range of 5000-10000 SAR, followed by 10000-15000 SAR, constituting 142/400 (36%), and 136/400 (34%), in that order. Overall fathers have more income values than mothers, as indicated in Table 1, Fig 1.

Table 1 Distribution of the study population by demographic characteristics

Variable	Fathers (n=220)	Mothers (n=180)	Total (n=400)
Age			
< 25 years	6	10	16
25-35	73	87	160
35-45	87	65	152
> 45 years	51	17	68
Education level			
Primary	10	16	26
Secondary	45	57	102
University	162	106	268
Social status			
married	213	164	377
divorced	3	12	15
widow	1	3	4
Job			
governmental	182	102	284
private	31	29	60
Jobless	4	48	52
Income			
< 5000 SAR	25	38	63

5000-10000	60	82	142
10000-15000	92	44	136
> 15000	40	15	55

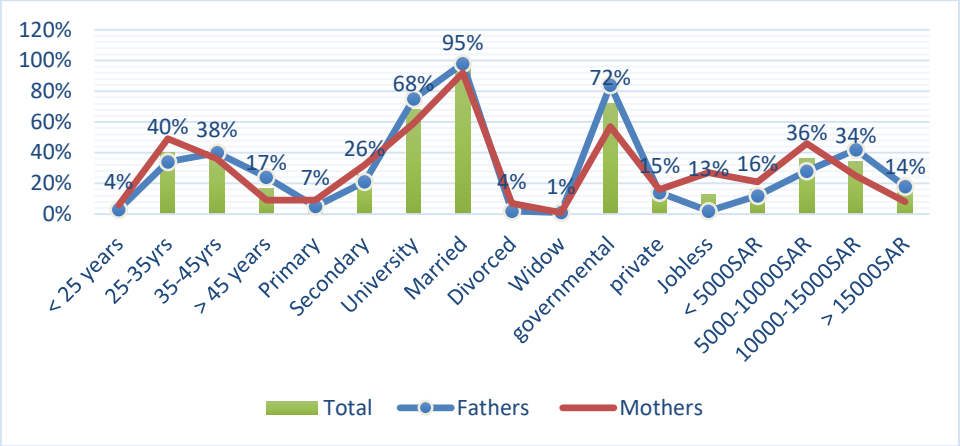

Figure 1 Description of the study subjects within demographic characteristics

As described in Table 2, Fig 2, about 124/220 (56.4%) of fathers have been involved in antibiotics misuse, compared to 113/180 (63%) of the mothers. The relative risk (RR) and the 95% confidence interval (95%CI) associated with mothers' antibiotics misuse was, RR (95%CI) =1.1047 (0.9408 to 1.2973), P = 0.2243. The most frequent age involved in antibiotic misuse was 35-45 years 99/238 (41.6%) followed by the age range 25-35 years 86/238 (36%). Concerning the married individuals, 225/377 (59.7%) were involved in antibiotic misuse compared to 11/15 (73.3%) of the divorced and ¼ (25%) of the widow.

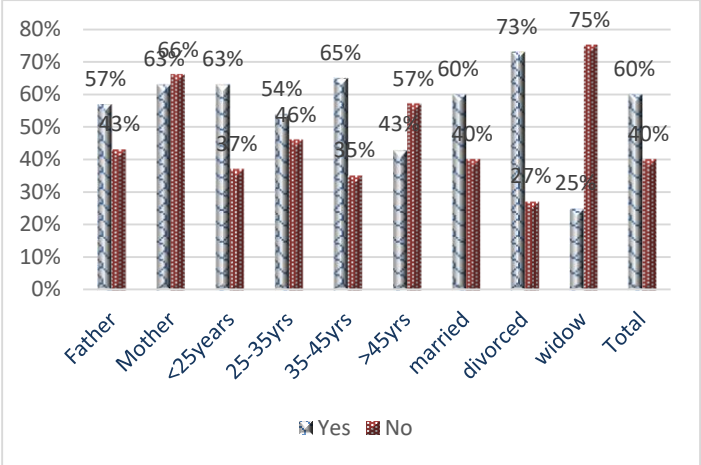

Figure 2 Description of the antibiotic misuse within entire variable groups

Table 2 Distribution of the parents, age, and social status by antibiotics misuse

Variables	Antibiotics misuse		
	Yes	No	Total
Parents			
Father	124	93	217
Mother	113	66	179
Total	237	159	396
Age			
< 25 years	10	6	16
25-35	86	74	160
35-45	99	53	152

> 45 years	43	25	68
Total	238	158	396
Social status			
married	225	152	377
divorced	11	4	15
widow	1	3	4
Total	237	159	396

Table 3, Fig 3, summarized the distribution of the education, job, and monthly income by antibiotics misuse. Individuals with university education levels represented the most frequently misused antibiotic 151/237 (63.7%) followed by secondary and primary representing 68/237 (28.7%), and 18/237(7.6%), respectively. However, within the entire group of educations, the proportions vary as shown in Fig 3. Out of those with governmental jobs, 161 /284 (56.7%) were involved in antibiotics misuse. Of the 60 private jobs, 38/60 (63.3%) were involved in antibiotic misuse. Of the 52 jobless, 38/52 (73%) were involved in antibiotic misuse. The association between monthly income and antibiotics misuse shows relatively comparable values as indicated in Table 3, Fig 3.

Table 3 Distribution of the education, job, and monthly income by antibiotics misuse

Variable	Antibiotics misuse		
	Yes	No	Total
Education level			
Primary	18	8	26
Secondary	68	34	102
University	151	117	268
Total	237	159	396
Job			
Governmental	161	123	284
Private	38	22	60
Jobless	38	14	52
Total	237	159	396
Monthly income			
< 5000 SAR	33	30	63
5000-10000	89	53	142
10000-15000	82	54	136
> 15000	33	22	55
Total	237	159	396

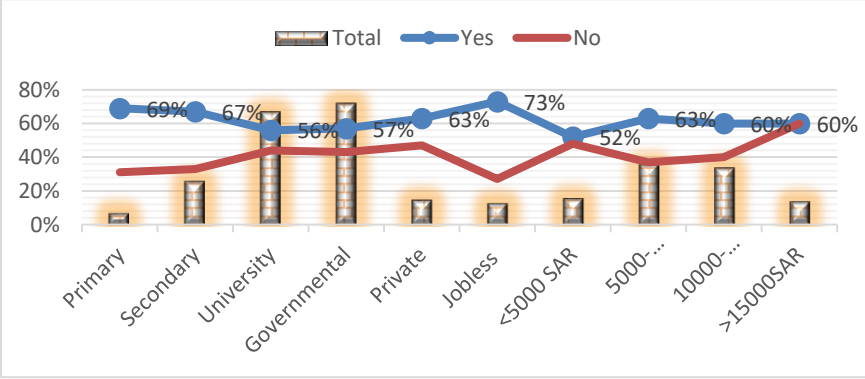

Figure 3 Description of antibiotics misuse with entire variable groups proportions

Table 4, Fig 4 summarized the distribution of the URTI by antibiotics misuse. About 174/237 (73%) individuals have antibiotics misused for URTI. The correct need for antibiotics, in general, was ascertained in 114/400 (28.5%). The risk of antibiotic misuse was, RR (95%CI) = 2.5941 (2.0022 to 3.3610), P < 0.0001. About 68/237 (28.7%) individuals have antibiotics misused for Diarrhea. The

correct need for antibiotics in general was ascertained in 43/400 (11%). The risk of antibiotic misuse was, RR (95%CI) = 1.0654 (0.7701 to 1.4741), P = P = 0.7020. Antibiotic misuse double use was identified in 186/237 (78.5%). The risk of double use associated with antibiotic misuse for URTI was RR (95%CI) = 7.3403 (4.6609 to 11.5598), P < 0.0001.

Table 4 Distribution of the URTI by antibiotics misuse

Variable	Antibiotics misuse		
	Yes	No	Total
URTI			
yes	174	114	288
no	37	32	69
I don't know	26	13	39
Total	237	159	396
Diarrhea			
yes	68	43	111
no	140	98	238
I don't know	29	20	47
Total	237	159	396
Double use			
yes	186	17	203
no	43	135	178
I don't know	8	7	15
Total	237	159	396

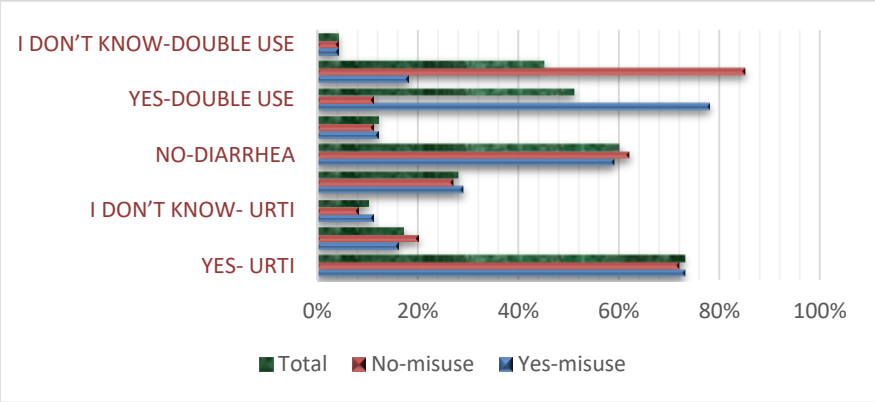

Figure 4 Description of the URTI by antibiotics misuse

4. DISCUSSION

Self-medication (SM) is a practice that is common all over the world. While rational SM has many advantages, it can also be troublesome and lead to adverse pharmacological events and poor health outcomes, especially antibiotic misuse. Even though Saudi Arabia has banned buying antibiotics without a prescription, there are still many isolated instances, especially among medical professionals and students (Mannasaheb et al., 2021; Tobaiqi et al., 2021; Al-Qahtani et al., 2022).

According to this study's findings, a significant percentage of parents (59.8%) abuse antibiotics on their children. Antibiotic abuse was more common in fathers than in mothers. Most misused antibiotics were for the treatment of URTIs and diarrhea. In a recent study, 30.5% of individuals reported using over-the-counter antibiotics in the previous year (19.7% did so once to twice and 10.8% more than twice). The likelihood that any non-prescription antibiotic usage was reported was higher among male and non-Saudi participants, with RRs (95% CIs) of 1.99 (1.30, 3.04) and 3.81 (1.73, 8.35), respectively. The most common justifications for using non-prescription antibiotics were prior experience with a medical issue (69.2%), lack of access to healthcare (26.6%), and suggestion from a friend or relative (16.1%) (Al-Hazmi et al., 2021).

According to the literature, Saudi Arabia's populace misuses antibiotics often, with rates ranging from 41% to 92% among children. There are many contributing variables to this high incidence, including cultural influences, behavioral traits,

socioeconomic status, and educational attainment (Alnemri et al., 2016; Zowawi, 2016). According to a recent Saudi Arabian study, the hospitals in Makkah utilize a lot of antibiotics, which may be a risk factor for the development of resistant strains, notably methicillin-resistant *Staphylococcus aureus* (MRSA) infections. Antimicrobials were administered parenterally to the vast majority of patients (90.3%). About 53.7% of the total antimicrobials prescriptions were utilized in medical departments, 23.7% in surgical departments, and 22.6% in intensive care units (Haseeb et al., 2021).

It was reported that the majority of URTIs are viral in origin and self-limiting without the need for antibiotics, according to 44% of parents. However, 19% of parents said that all kids with fevers should be given antibiotics. About 52% were aware that using antibiotics improperly decreases their effectiveness and promotes bacterial resistance. The medication that 60% of participants thought would be suggested was an antibiotic. The most common symptom of a URTI was fever, which caused 21.7 percent of patients to request antibiotic prescriptions from doctors on a regular basis. 36.5% of parents reported never asking pediatricians to prescribe antibiotics for their kids. Participant's attitudes and behaviors were correlated with how many kids they had; parents with five or more kids had less favorable attitudes and behaviors (Alsuhaibani et al., 2019).

Many parents had poor information, a depraved attitude, and inappropriate behavior when it came to using antibiotics on children. The right use of antibiotics in children was influenced by the educational level, employment situation, awareness of antibiotic use, and positive attitude of the parents. However, the results of the current study show a grouping of parents according to their occupations and levels of education, which limits the ability to make precise assessments of their effects. To achieve optimal antibiotic use in children, community-based educational programs can help the Saudi government's initiative to ban antibiotic purchases without a prescription in order to achieve zero antibiotic abuse.

5. CONCLUSION

Antibiotic misuse is prevalent in Northern Saudi Arabia, mainly among fathers' parents. Aside from banding policies and reducing antibiotic overuse in Northern Saudi Arabia, community-based educational campaigns on antibiotic abuse are required.

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Informed consent

Written & Oral informed consent was obtained from the participant identified in this study.

Ethical Approval

The ethical committee approved the study protocol at the University of Hail. Approval number: HERC 0137/CM.UOH/5/20.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data availability

Data available upon request from the corresponding author.

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