ijlpr 2020; doi 10.22376/ijpbs/lpr.2021.11.1.L246-254

International Journal of Life science and Pharma Research

Research Article

Pediatrics for better child health

Knowledge, Attitude and Practice of Parents Towards Antibiotic Use for Children with Flu-Like Symptoms

Shereen M Abd El-Ghany[1,2], Reem S Alhasani, Alanode S Alfaris, Rahaf H Sibaa, Khawater N Almotairi and Rawan M ALjuaid

[1] *Department of Pediatrics Ibn Sina National College for Medical Studies, Jeddah, Kingdom of Saudi Arabia;*
[2] *Department of Pediatrics, hematology and Oncology Unit, Ain Shams University, Cairo, Egypt*

Abstract: Insufficient knowledge of antibiotic indications and side effects results in its misuse. This study aimed to investigate parents' knowledge, attitudes, and practices (KAP) on antibiotic use for their children who have flu-like symptoms**.** This was a cross-sectional survey study. Data was collected via an updated validated questionnaire that was developed by the study authors based on a literature review of previous similar studies. The questionnaire was sent electronically through social media and targeted only parents having children aged <16 years old. A total of 448 parents were included in the study, 86.4% of them were females. The highest percentage of the participants (40%) has three or more children and 36.2% of them have medical insurance. Almost two-thirds (62.9%) of the parents have scored poor level of knowledge, 24.1% have intermediate knowledge, and only 13% have good knowledge. Only 132 (29.5%) of the parents know that antibiotics are used against bacterial infections. Most parents (75%) reported that their choice of antibiotics should depend on doctor consultation. Twenty-seven percent of the parents reported that they purchased antibiotics without a prescription in the past 12 months. Saving time and effort was the main reason for antibiotics self-medication (26.1%). About 86% of parents stated that they don't switch antibiotics without counseling their pediatrician. 300 parents (67%) reported that they stopped antibiotics at the end of the treatment course. Most of the respondents (82.4%) reported that they never keep remnants of antibiotics and reuse them. Over 88% of parents reported keeping liquid antibiotics in the fridge. The results of the current study revealed that parents lack sufficient knowledge about antibiotic indications and the risk of antibiotic resistance. However, they showed an acceptable attitude and good practices. Therefore, such results enlighten the need for interventional programs imparting education and changing the attitude of parents regarding antibiotic use.

Keywords: Antibiotics, knowledge, Attitude, Practice, Children, Saudi Arabia, Upper respiratory tract infection, flu.

***Corresponding Author**

Rahaf H Sibaa , Department of Pediatrics Ibn Sina National College for Medical Studies, Jeddah, Kingdom of Saudi Arabia

Recieved On 01 November 2020
Revised On 12 December 2020
Accepted On 13 January 2021
Published On 16 January 2021

Funding This Research did not receive any specific grant from any funding agencies in the public, commercial or not for profit sectors.

Citation Shereen M Abd El-Ghany1,2, Reem S Alhasani, Alanode S Alfaris, Rahaf H Sibaa, Khawater N Almotairi and Rawan M Aljuaid , Knowledge, Attitude and Practice of Parents Towards Antibiotic Use for Children with Flu-Like Symptoms.(2021).Int. J. Life Sci. Pharma Res.11(1), L246-254 http://dx.doi.org/10.22376/ijpbs/lpr.2021.11.1.L246-254

1. INTRODUCTION

Antibiotics are agents that can destroy or inhibit the growth of pathogenic microorganisms [1]. Since its discovery, antibiotic use has tremendously increased worldwide [2]. Children are particularly prone to high rates of antibiotic use because of the greater frequency of respiratory tract infections (RTIs), and often unnecessary concerns about possible complications [3, 4]. Although antimicrobial resistance (AMR) emergence is a natural biological phenomenon, it is exacerbated by the use of inappropriate antibiotics, including needless use in non-therapeutic situations [5, 6]. Overall, antibiotics misuse can be either through medication non-compliance or self-medication [7]. Antibiotic self-medication is their purchase and self-administering, or administering them to children, with the purpose of treating a supposed infection without consulting a healthcare professional [8]. Globally, self-medication with antibiotics is an existing problem, mostly in low- and middle-income countries. Nevertheless, it has been also reported in high-income countries, particularly for cold and upper respiratory tract symptoms [9-11]. Antibiotic misuse was reported internationally, and many contributing factors were addressed for such phenomena, including lack of compliance, and availability of antibiotics as over the counter (OTC) medications [12, 13]. Misuse of antibiotics may have an enormous effect on social, economic, and health aspects due to bacterial resistance emergence which is the resistance of a microorganism to an antimicrobial drug that was originally effective for the treatment of infections caused by it [14]. Some factors were addressed to augment the issue of antibiotics misuse. These factors include elevated medical services, consultation and laboratory testing, and dissatisfaction with medical practitioners [10]. As per the WHO reports, there are increasing levels of antibiotic resistance that are threatening the control of bacterial diseases. Moreover, it has also reported a major knowledge gap about the magnitude of antibiotic resistance in the Middle East and worldwide [14]. Lack of knowledge and appropriate patient education usually plays a crucial role in antibiotics misuse [8]. A study published in 2016 showed that most of the participating parents were not aware of the indications of antibiotics with only 17% agreeing that antibiotics have no role against viruses, and around 60% believe that a full course of antibiotics should be completed and leftover antibiotics should not be saved for later use. The authors in this study concluded that the majority of participants' knowledge and attitude towards rational antibiotic usage is low [15]. Another study that assessed the knowledge, attitudes, and practices of parents related to antibiotic use and misuse among children with upper respiratory tract infections came out with the findings that More than one-third of parents were having poor knowledge about antibiotic use and misuse; and almost half of them were having little information about sensible use of antibiotic which reflected on their self-reported attitude and practice [16]. In addition, a local study including data from different cities revealed that parents' knowledge, attitudes, and practices on antibiotics for their children are poor [17]. Data in regards to the knowledge, attitude, and practice of parents towards antibiotic use for children with flu-like symptoms in Saudi Arabia is scarce. Therefore, in the current study, we aimed also to explore the knowledge, attitude, and practice (KAP) of parents towards antibiotic use among children with flu-like symptoms and factors associated with antibiotic self-medication.

2. MATERIALS AND METHODS

This cross-sectional descriptive study has been conducted during the period from July to September 2019. The study was conducted after taking the ethical approval from the ethical committee at Ibn Sina National College for Medical Science [IEC Ref No.: H-04-11072019]. This study was conducted in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments in humans. Data for the current study was collected via an updated validated questionnaire that was developed by the study authors based on a literature review of previous similar studies [7, 13, 27, 32], and after pilot testing, the structure was modified in local settings in English and Arabic. The questionnaire was hosted on Google Forms and it was sent electronically through social media. We targeted parents having children aged <16 years old. Exclusion criteria: Parents of children with immunodeficiency/ immunosuppressive drugs. The questionnaire consisted of 33 questions, and it was divided into four sections. Section one: socio demographic characteristics of the parents including age, gender and nationality of parents, number of children in the family, residency, educational level, and monthly income. Section two: 3 questions regarding parent's knowledge about antibiotics and their use. Section three: 6 questions regarding parents' attitude towards antibiotic use. Section four: 11 questions regarding parents practice towards antibiotic use for their children. Correct answer score 1 and wrong answer score 0. We considered the parent has a good KAP if he scored ≥ 60% correct answers. The sample was calculated using an online sample size calculator for cross-sectional studies, with a response distribution of 50%, a margin of error of 5%, and a confidence interval of 95%. The estimated sample size was about 370 participants. We collected 500 questionnaires to compensate for incomplete data ending with 456 complete answers.

STATISTICAL ANALYSIS

Data analysis was performed using the statistical package for social sciences (SPSS, version 22). Descriptive and categorical statistics were used for the study. Categorical variables were presented as frequencies and percentages. Categorical variables were compared using the Chi-square test. The level of statistical significance was set at $p<0.05$.

3. RESULTS

A total of 456 parents have responded to the questionnaire, eight of them were excluded as their children had immunodeficiency or had a chronic disease. The majority of the respondents were females (86.4%), and almost half (45.8%) of them reside in Jeddah city. Approximately 95% of respondents have completed at least a secondary level of education, and 72.1% had a college degree. About 40% of the respondents have three or more children per household, above 40% had a monthly income of over 10,000 Saudi Riyals, and 63.8% have no medical insurance. The characteristics of the respondents are shown in **(table 1)**. Regarding parents' knowledge about antibiotic use, we found that only 132 (29.5%) of the parents knew that antibiotics are used against bacterial infections, 186 (41.5%) parents believed that antibiotics do not help in treating common cold symptoms, and 214 (47.8%) have heard about antibiotic resistance **(Table 2)**. This study revealed that almost two thirds (63%) of the

parents have scored poor levels of knowledge about antibiotics. A significant association was noted between parents' knowledge and both parents' educational level and family income. Families with low income and parents with low educational levels were associated with poor knowledge ($p < 0.05$). A good level of knowledge was found among mothers (38.2%), parents whose age is between 30 and 40 years (43.9%), non-medically insured parents (37.8%), and parents that are having 3 children or more (37.4%), however, this analysis showed no statistically significant difference ($p > 0.05$) **(table 3)**. Regarding parental attitude, 57.4% of the responders have a good attitude regarding the use of antibiotics. **(Table 4)** shows the relationship between sociodemographic characteristics and attitude. Mothers showed a statistically significant good attitude than fathers ($p < 0.05$). However, no significant difference was found between parental attitude and different age groups, level of education, family income, medical insurance status, and number of children in the house ($p>0.05$). Overall, 89.3% of parents have good practice regarding the use of antibiotics in treating upper respiratory tract infections in their children. Good practice score was found among mothers (91.2%) compared to fathers (77%) ($p = 0.001$). In contrast, other parameters of socioeconomic characteristics didn't affect parental practice towards antibiotics use **(table 5)**. Regarding how parents choose antibiotics for their children; most parents (75%) reported that their choice should mainly depends on doctor's consultation, 25% followed pharmacists' recommendations, 19.4% choice were influenced by previous experience, while 8.5% used previous prescriptions, 7.1% considered the opinions of family members and friends and 1.8% got their prescription from websites. Almost 70% of parents' main consideration when choosing antibiotics was the indication for use of this particular antibiotic. Only 15.2% of the parents thought that price affects the efficacy of antibiotics. Moreover, 42.2% of the responders stated that they never ask their pediatrician to prescribe antibiotics for the common cold, and 71% reported that they don't have antibiotics at home. Approximately 273 (60%) of parents reported that their children have received antibiotics in the past. In total, 123 (26.9 %) participants purchased antibiotics without a prescription in the past 12 months. The frequency of antibiotic use without prescription in the previous year varied between once, 3-5 times, and more than five times in 21.7%, 2.7%, and 2.5% respectively. Reasons for using antibiotics without prescription among parents were; to save time and effort (26.1%), to save money (6.9%), others responded that they don't like going to the doctor (12.3%), while few parents thought that their child wasn't severely ill (0.2%). About 86% of parents stated that they don't switch antibiotics without counseling their pediatrician. Over three-quarters of participants read the attached leaflets for indications and side effects of antibiotics, and 64.5% understood at least 50% of the instructions. Regarding reasons for antibiotic use without prescription, the majority of parents (72.5%) used antibiotics for fever and sore throat (**Fig.1**). Out of the total, 300 parents (67%) reported that they stopped antibiotics at the end of the treatment course, however, only 20.1% stopped antibiotics after the disappearance of symptoms (**Fig.2**). Most of the respondents (82.4%) reported that they never keep remnants of antibiotics and reuse them, and over eighty-eight percent of parents reported keeping liquid antibiotics in the fridge. Moreover, 92.6% of parents stated that they never give their children the same antibiotics they use if their children have similar symptoms to theirs.

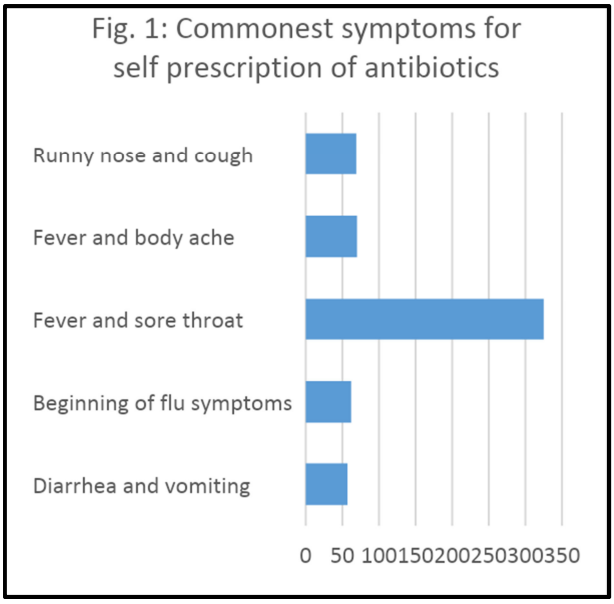
Table 1: Participants' characteristics

Characteristics		Frequency	%
Age	< 20	11	2.5
	20-30	111	24.8
	30-40	180	40.2
	40-50	108	24.1
	>50	38	8.5
Gender	Female	387	86.4
	Male	61	13.6
Residency	Jeddah	205	45.8
	Makkah	59	13.2
	Riyadh	67	15
	Other	117	26
Education level	Uneducated	4	0.9
	Primary	1	0.2
	Intermediate	18	4.0
	Secondary	102	22.8
	Undergraduate	214	47.8
	Postgraduate	109	24.3
Income	<3000	23	5.1

	3000-5000	113	25.2
	5000-10000	121	27.0
	>10000	191	42.6
Child age	<3mo	16	3.6
	3mo-12mo	85	19.0
	1yr-6yr	108	24.1
	6yr-12yr	165	36.8
	12yr-18yr	74	16.5
Number of children	1	138	30.8
	2	128	28.6
	3 or more	182	40.6
Medially insured	No	286	63.8
	Yes	162	36.2

Table 2: Parent knowledge regarding antibiotic use

Item	Answer	N	%
Antibiotic treat infections caused by	Bacteria	132	29.5
	Viruses	76	17
	Bacteria and viruses	152	33.9
	I don't know	88	19.6
Antibiotic accelerates recovery form the common cold	Yes	215	48
	No	186	41.5
	I don't know	47	10.5
Have you heard about bacterial resistance	Yes	214	47.8
	No	234	52.2



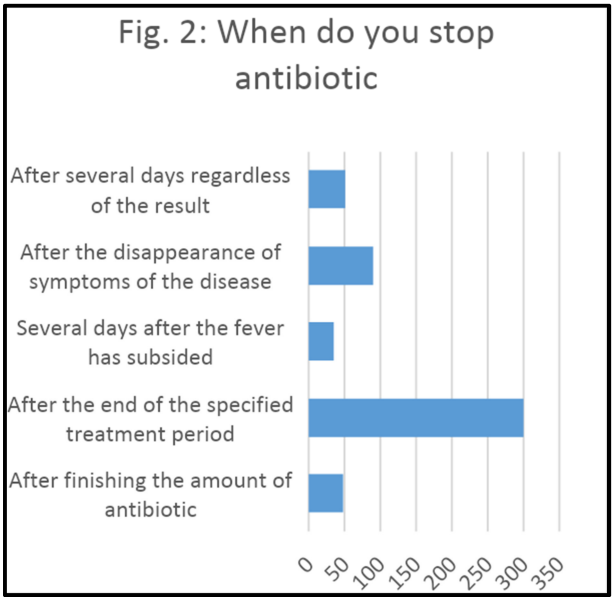


Table 3: Comparison between knowledge score and respondents' characteristics

	n.	Knowledge		P
		Poor (%)	**Good (%)**	
Gender				0.24
Male	61	43 (70.5)	18 (29.5)	
Female	387	239 (61.8)	148 (38.2)	
Age				0.069
< 20	11	10 (90.9)	1 (9.1)	
20-30	111	76 (68.5)	35 (31.5)	
30-40	180	101 (56.1)	79 (43.9)	
40-50	108	68 (63)	40 (37)	
> 50	38	27 (71.1)	11 (28.9)	
Education				0.000
High school or less education	125	98 (79.7)	27 (20.3)	
Graduate or higher education	323	184 (57)	139 (43)	
Income				0.000
< 3000	23	23 (100)	0 (0)	
3000-5000	113	82 (72.6)	31 (27.4)	
5000-10000	121	76 (62.8)	45 (37.2)	
> 10000	191	101 (52.9)	90 (47.1)	
Medical insurance				0.68
No	286	178 (62.2)	108 (37.8)	
Yes	162	104 (64.2)	58 (35.8)	

Number of children in the family				0.9
≤ 2	266	168 (63.2)	98 (36.8)	
≥ 3	182	114 (62.6)	68 (37.4)	

Table 4: Comparison between attitude score and respondents' characteristics

	n.	Attitude		P
		Poor (%)	**Good (%)**	
Gender				0.008
Male	61	36 (59)	25 (41)	
Female	387	155 (40)	232 (60)	
Age				0.333
< 20	11	6 (54.5)	5 (45.5)	
20-30	111	45 (40.6)	66 (59.4)	
30-40	180	67 (37.2)	113 (62.8)	
40-50	108	49 (45.4)	59 (54.6)	
> 50	38	24 (63.2)	14 (36.8)	
Education				0.649
High school or less education	125	60	65	
Graduate or higher education	323	131	192	
Income				0.119
< 3000	23	15 (65.2)	8 (34.8)	
3000-5000	113	48 (42.5)	65 (57.5)	
5000-10000	121	53 (43.8)	68 (56.2)	
> 10000	191	75 (39.3)	116 (60.7)	
Medical insurance				0.42
No	191	126 (66)	65 (34)	
Yes	257	160 (62.3)	97 (37.7)	
Number of children in the family				0.61
≤ 2	266	116 (43.6)	150 (56.4)	
≥ 3	182	75 (41.2)	107 (58.8)	

Table 5: Comparison between practice score and respondents' characteristics

	n.	Practice		P
		Poor (%)	**Good (%)**	
Gender				0.0008
Male	61	14 (23)	47 (77)	
Female	387	34 (8.8)	353 (91.2)	
Age				0.199
< 20	11	2 (18.1)	9 (81.9)	
20-30	111	9 (8.1)	102 (91.9)	
30-40	180	17 (9.5)	163 (90.5)	
40-50	108	12 (11.1)	96 (88.9)	
> 50	38	8 (21)	30 (79)	
Education				0.06
High school or less education	125	19 (15.2)	106 (84.8)	
Graduate or higher education	323	29 (9)	294 (91)	
Income				0.069
< 3000	23	2 (8.7)	21 (91.3)	
3000-5000	113	12 (10.6)	101 (89.4)	
5000-10000	121	16 (13.2)	105 (86.8)	
> 10000	191	18 (9.4)	173 (90.6)	
Medical insurance				0.4
No	286	28 (9.8)	258 (90.2)	
Yes	162	20 (12.3)	142 (87.7)	
Number of children in the family				0.88
≤ 2	266	28 (10.5)	238 (89.5)	
≥ 3	182	20 (11)	162 (89)	

4. DISCUSSION

Parent's knowledge, attitudes, and practice (KAP) towards antibiotics use play a vital role in the success of the treatment plan. Currently little is known about the parent's KAP of antibiotics in Saudi Arabia and even globally. In this study, we aimed to analyze the KAP of parents in Saudi Arabia towards antibiotic usage. The results of the current study revealed that parents in Saudi Arabia have poor knowledge about antibiotics use. Our findings showed that the median score on the 33 questions regarding antibiotic knowledge was 60%. About two-thirds of the parents had a poor level of knowledge of antibiotic use. Parents with high educational levels and high family income were significantly associated with good knowledge regarding antibiotics use. This result is similar to that obtained from previous studies done in Cyprus, Macedonia, and Malaysia [18-21]. Parents with higher education levels are more likely to be exposed to information regarding antibiotic use, indications, and side effects. Also, families with high income may have more access to knowledge regarding antibiotics [15]. However, we found no significant relationship between education level and family income and parent's attitude and practice of antibiotic use. In spite that mothers showed no significantly better knowledge, however, they had a significantly better attitude and practice towards antibiotics use. These results highlight the importance of the performance of campaigns that aim to improve the knowledge, attitude, and practice about antibiotic use among people. Additionally, less than one third (29.5%) of parents in our study knows that antibiotics are used against bacterial infections. Such results are considered even worse compared to a similar study conducted in India [22], where less than half (43.5%) knew that bacterial infections are treated with antibiotics. Additionally, the understanding of the respondent's knowledge clearly showed a high level of misunderstanding, and this is evident from the fact that the largest proportion of the respondents thought that antibiotics are effective against both bacteria and viruses. On the other hand, and in contrast to the Indian study in which only 83% agreed that antibiotics have no role against viruses [22], the current study participant showed far better knowledge where only 17% agreed on that. Additionally, our results in this point are considered better compared to the study of Ivanovska et al. which showed that 30–40% of the parents erroneously believed that antibiotics were effective against viruses and common URTIs [22]. So, overall, our findings indicate that parents who participated in the current study have a general misconception that infection of any origin needs antibiotic treatment, and this is in line with the results of previous similar studies including western countries [23-25]. Around 41.5% of parents in our study understood that antibiotics were not effective against viruses, a percentage which is considered higher compared to what has been previously reported in a study from the Netherlands at 30% [23]. However, still, our population needs to be educated about the differences between infections caused by viruses or bacteria. Such educational trials are considered of great importance, despite being difficult as shown from previous experiences. For example, in France, after successive campaigns over 5 years, more than half (54%) of the public still did not know that most upper RTIs are of viral origin and do not need treatment with antibiotics [26]. In Egypt, a similar study showed that 42% of parents agreed that antibiotics can cure viral infections, and only 56% heard about antibiotic resistance [27]. In the current study, 47.8% of the parents have heard about antibiotic resistance, a percentage that is lower compared to the Egyptian study. More than one quarter (26.9 %) of the participants performed antibiotic self-medication during the year before the study. When looking at the rate of antibiotic self-medication globally, it was found that areas like Greece and Ghana reported >70% [29, 31], Spain reported 41% [30], Jordon and Finland about 40% each [7, 28], Cairo 29.8% [32] and Romania 19.8% [9]. However, when looking at the previous local studies, the estimated self‑medication rate in this study is higher than most reported rates in Saudi Arabia (22% and 11.6%) [33, 34]. Therefore, our results in this regard is considered low compared to many countries globally. Different factors may play a role in self-medication with antibiotics. Such factors include individual attitudes towards the use of antibiotics, poor knowledge of antibiotic indications, and unawareness of antimicrobial resistance (AMR), all have been associated with higher rates of self-medication [35]. From another side, at pharmacies, over the counter (OTC) sales of antibiotics contribute to high rates of self-medication and are often related to the absence of rules and regulations that prohibit such practice [35, 36]. In the current study, saving time and effort was the main cause behind antibiotic self-medication, followed by the unwillingness to go to physicians. This raises questions about the regulatory agency's role in decreasing antibiotic misuse among our population and highlights the importance of initiating an appropriate national booking and follow-up system that facilitates physician consultation and minimizes waiting time within the country. Moreover, the results of the current study revealed that although policies exist to regulate antibiotic use, access to antibiotics remains uncontrolled and suggest that enforcement and education on antibiotic use and antimicrobial resistance are still insufficient or even lacking in our context. In the Egyptian study [24], misconceptions, accessibility of antibiotics to the general population in community pharmacies and the economic status and beliefs were among the reasons for antibiotics self-medication. In a study from Greece, parents revealed that although they have the opportunity to purchase antibiotics over the counter, only less than 10% of parents would consider doing so, and very few parents admitted administering antibiotics to their children suffering from URTIs without first consulting their pediatrician [19]. Many factors may explain the difference in self-medication prevalence among different studies, including the study area (community, hospital, and pharmacy), the healthcare services, and the culture. Main reasons given for self-medication practiced in developing countries include the nearness of pharmacies to their residence or long distance to healthcare facilities, lack of money, unawareness, poor attitude of health workers, mild/minor illness, re-treatment of similar illness and lack of health personnel [37, 38]. Overall, the respondents showed fairly good practice of antibiotics. For example, most of them (86%) reported not switching antibiotics without counseling their pediatrician, and 75% also reported reading the attached leaflet for indications and side effects. This might be an indication that parents are satisfied with the received health care services. In a similar Jordanian study [39], a significant proportion of participating parents were doubtful about their pediatricians' practice of antibiotic prescription as nearly 39 % and 51 % of them would change their pediatrician in case of their under or over-prescription of antibiotics, respectively. Another study from Greek showed that parents wouldn't usually change their pediatrician based on the pattern of their antibiotic prescription [40]. In contrast to the Palestinian [41] and Malaysian [21] communities that showed the common use of "leftover" and "shared" antibiotics by parents to their child, the majority of our population reported that they never keep a

remnant of antibiotics and reuse them, that they never give their children the same antibiotics they use when their child complained of the same illnesses because they had similar symptoms. Fever and sore throat were the main reasons (72.5%) for antibiotic use among parents in the current study. In Palestine, earache (86%) and fever (64%) were the most common reasons for which parents use antibiotics [41]. In a cross-sectional KAP study including 421 parents in Malaysia, 76% of parents believed that antibiotics were helpful in the treatment of fever [21]. In the current study, data were collected from parents via a webbased questionnaire sent through social media. We chose this method over the direct interview one to avoid influencing the parents' response during conversation or decreasing the quality of response due to the responders' discomfiture. As with almost all studies, the current study has some limitations including the relatively small sample size, it did not cover the whole kingdom cities, and thus the results cannot be generalized to the whole parents with children aged <16 years old in Saudi Arabia. Accordingly, we recommend conducting large‐scale studies that cover all cities in Saudi Arabia.

5. CONCLUSION

The results of the current study revealed that parents lack sufficient knowledge about indications of antibiotics and the risk of antibiotic resistance that may occur following antibiotic misuse and/or self-medication. Only less than one-third of the respondents know that antibiotics are used against bacterial infection, while three quarters correctly know that antibiotic choice should depend on doctor consultation. On the other hand, they showed an acceptable attitude towards, and good practices of antibiotics use. Therefore, such results enlighten the need for interventional programs imparting education and changing the attitude of parents regarding antibiotic use.

6. AUTHOR CONTRIBUTION STATEMENT

Author Contribution Statement: S.M.A. contributed to the idea of the research, study design, analysis of the results, revision and editing of the final manuscript. R.S.A. interpreted the results. R.S.A., A.S.A., R.H.S., K.N.A and R.M.A. wrote the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

7. CONFLICT OF INTEREST

Conflict of interest declared none

8. REFERENCES

1. Waksman SA. What is an antibiotic or an antibiotic substance? Mycologia. 1947 Sep 1;39 (5):565-9. doi:10.2307/3755196
2. Rogawski ET, Platts-Mills JA, Seidman JC, John S, Mahfuz M, Ulak M, Shrestha SK, Soofi SB, Yori PP, Mduma E, Svensen E. Use of antibiotics in children younger than two years in eight countries: a prospective cohort study. Bulletin of the World Health Organization. 2017 Jan 1; 95(1):49. doi: 10.2471/blt.16.176123
3. Keith T, Saxena S, Murray J, Sharland M. Risk–benefit analysis of restricting antimicrobial prescribing in children: what do we really know? Current opinion in infectious diseases. 2010 Jun 1; 23(3):242-8. doi: 10.1097/QCO.0b013e328338c46d
4. Guillemot D, Carbon C, Balkau B, Geslin P, Lecoeur H, Vauzelle-Kervroëdan F, Bouvenot G, Eschwége E. Low dosage and long treatment duration of β-lactam: risk factors for carriage of penicillin-resistant Streptococcus pneumoniae. Jama. 1998 Feb 4; 279 (5):365-70. doi: 10.1001/jama.279.5.365
5. Liu YC, Huang WK, Huang TS, Kunin CM. Inappropriate use of antibiotics and the risk for delayed admission and masked diagnosis of infectious diseases: a lesson from Taiwan. Archives of internal medicine. 2001 Oct 22;161 (19):2366-70. doi: 10.1001/archinte.161.19.2366
6. Kardas P, Devine S, Golembesky A, Roberts C. A systematic review and meta-analysis of misuse of antibiotic therapies in the community. International journal of antimicrobial agents. 2005 Aug 1;26 (2):106-13. doi: 10.1016/j.ijantimicag.2005.04.017
7. Al-Azzam SI, Al-Husein BA, Alzoubi F, Masadeh MM. Self-medication with antibiotics in Jordanian population. International journal of occupational medicine and environmental health. 2007 Oct 1;20(4):373. doi: 10.2478/v10001-007-0038-9
8. Landers TF, Ferng YH, McLoughlin JW, Barrett AE, Larson E. Antibiotic identification, use, and self-medication for respiratory illnesses among urban Latinos. Journal of the American Academy of Nurse Practitioners. 2010 Sep;22(9):488-95. doi: 10.1111/j.1745-7599.2010.00539.x
9. Grigoryan L, Haaijer-Ruskamp FM, Burgerhof JG, et al. Self-medication with antimicrobial drugs in Europe. Emerg Infect Dis 2006 Mar: 12(3):452–9. doi: 10.3201/eid1203.050992
10. Morgan DJ, Okeke IN, Laxminarayan R, Perencevich EN, Weisenberg S. Non-prescription antimicrobial use worldwide: a systematic review. The Lancet infectious diseases. 2011 Sep 1;11(9):692-701. doi: 10.1016/S1473-3099(11)70054-8
11. Hart CA, Kariuki S. Antimicrobial resistance in developing countries. Bmj. 1998 Sep 5;317(7159):647-50. doi: 10.1136/bmj.317.7159.647
12. Byarugaba DK. Antimicrobial resistance in developing countries and responsible risk factors. International journal of antimicrobial agents. 2004 Aug 1;24(2):105-10. doi: 10.1016/j.ijantimicag.2004.02.015
13. Huang Y, Gu J, Zhang M, Ren Z, Yang W, Chen Y, Fu Y, Chen X, Cals JW, Zhang F. Knowledge, attitude and practice of antibiotics: a questionnaire study among 2500 Chinese students. BMC medical education. 2013 Dec;13(1):1-9. doi:10.1186/1472-6920-13-163
14. World Health Organization. Antimicrobial resistance: global report on surveillance. World Health Organization; 2014. https://www.who.int/drugresistance/documents/surveillancereport/en/
15. Chinnasami B, Sadasivam K, Ramraj B, Pasupathy S. Knowledge, attitude and practice of parents towards antibiotic usage and its resistance. International Journal of Contemporary Pediatrics. 2016 Dec 31;3(1):256–61. doi: 10.18203/2349-3291.ijcp20160171

16. Thabet AM, Zaki NA-E, Fathy A. Knowledge, Attitudes and Practices of Parents related to Antibiotic Use and Misuse among Children with Upper Respiratory Tract Infections. Assiut Scientific Nursing Journal. 2015 Dec 1;3(6):26–39. doi: 10.21608/asnj.2015.59776
17. Al-Ayed MSZ. Parents' Knowledge, Attitudes and Practices on Antibiotic Use by Children. Saudi J Med Med Sci. 2019;7(2):93–9. doi: 10.4103/sjmms.sjmms_171_17
18. Rouusounides A, Papaevangelou V, Hadjipanayis A, Panagakou S, Theodoridou M, Syrogiannopoulos G, Hadjichristodoulou C. Descriptive study on parents' knowledge, attitudes and practices on antibiotic use and misuse in children with upper respiratory tract infections in Cyprus. International journal of environmental research and public health. 2011 Aug; 8(8):3246-62. doi:10.3390/ijerph8083246
19. Alili-Idrizi E, Dauti M, Malaj L. Validation of the parental knowledge and attitude towards antibiotic usage and resistance among children in Tetovo, the Republic of Macedonia. Pharmacy Practice. 2014 Oct; 12(4). doi:10.4321/s1886-36552014000400003
20. Chan GC, Tang SF. Parental knowledge, attitudes and antibiotic use for acute upper respiratory tract infection in children attending a primary healthcare clinic in Malaysia. Malaysian Family Physician. 2012 Mar 31; 2(1):5.
21. Teck KC, Ghazi HF, Bin Ahmad MI, Binti Abdul Samad N, Ee Yu KL, Binti Ismail NF, Bin Esa MA. Knowledge, attitude, and practice of parents regarding antibiotic usage in treating children's upper respiratory tract infection at primary health clinic in Kuala Lumpur, Malaysia: pilot study. Health services research and managerial epidemiology. 2016 Apr 27;3:2333392816643720. doi: 10.1177/2333392816643720
22. Ivanovska V, Angelovska B, Van Dijk L, Zdravkovska M, Leufkens HG, Mantel-Teeuwisse AK. Change in parental knowledge, attitudes and practice of antibiotic use after a national intervention programme. The European Journal of Public Health. 2018 Aug 1;28 (4):724-9. doi: 10.1093/eurpub/ckx240
23. Curry M, Sung L, Arroll B, Goodyear-Smith F, Kerse N, Norris P. Public views and use of antibiotics for the common cold before and after an education campaign in New Zealand. The New Zealand Medical Journal (Online). 2006 May 5;119 (1233). PMID: 16680174
24. Grigoryan L, Burgerhof JG, Degener JE, Deschepper R, Lundborg CS, Monnet DL, Scicluna EA, Birkin J, Haaijer-Ruskamp FM, SAR consortium. Attitudes, beliefs and knowledge concerning antibiotic use and self-medication: a comparative European study. Pharmacoepidemiology and drug safety. 2007 Nov;16(11):1234-43. doi: 10.1002/pds.1479
25. Pan H, Cui B, Zhang D, Farrar J, Law F, Ba-Thein W. Prior knowledge, older age, and higher allowance are risk factors for self-medication with antibiotics among university students in southern China. PloS one. 2012 Jul 20;7(7):e41314. doi: 10.1371/journal.pone.0041314
26. Huttner B, Goossens H, Verheij T, Harbarth S. Characteristics and outcomes of public campaigns aimed at improving the use of antibiotics in outpatients in high-income countries. The Lancet infectious diseases. 2010 Jan 1;10 (1):17-31. doi: 10.1016/S1473-3099(09)70305-6
27. El-Hawy RM, Ashmawy MI, Kamal MM, Khamis HA, El-Hamed NM, Eladely GI, Abdo MH, Hashem Y, Ramadan M, Hamdy DA. Studying the knowledge, attitude and practice of antibiotic misuse among Alexandria population. European Journal of Hospital Pharmacy. 2017 Nov 1;24(6):349-54. doi: 10.1136/ejhpharm-2016-001032
28. Bronzwaer SL. European Antimicrobial Resistance Surveillance System. A European study on the relationship between antimicrobial use and antimicrobial resistance. Emerg Infect Dis. 2002;8:278-82. doi: 10.3201/eid0803.010192
29. Mitsi G, Jelastopulu E, Basiaris H, Skoutelis A, Gogos C. Patterns of antibiotic use among adults and parents in the community: a questionnaire-based survey in a Greek urban population. International journal of antimicrobial agents. 2005 May 1;25(5):439-43. doi: 10.1016/j.ijantimicag.2005.02.009
30. Väänänen MH, Pietilä K, Airaksinen M. Self-medication with antibiotics—does it really happen in Europe?. Health policy. 2006 Jul 1;77(2):166-71. doi: 10.1016/j.healthpol.2005.07.001
31. Tagoe D, Attah C. A Study of Antibiotic Use and Abuse in Ghana: a case study of the Cape Coast Metropolis. The Internet Journal of Health. 2010;11(2). doi: 10.5580/bec
32. Elmasry AA, Bakr AS, Kolkailah DA, Khaskia MA, Mohammed ME, Riad OH, Abdelrahman SA. Pattern of antibiotic abuse–a population-based study in Cairo. Egyptian Journal of Chest Diseases and Tuberculosis. 2013 Jan 1;62(1):189-95. doi: 10.3889/oamjms.2020.3323
33. Elbur A, Albarraq A, Abdallah M. Saudi parents' knowledge, attitudes and practices on antibiotic use for upper respiratory tract infections in children: a population–based survey; Taif, Kingdom of Saudi Arabia. J Med Res. 2016;2(4):99-103. doi: 10.4103/sjmms.sjmms_171_17
34. Aleem MA, Rahman MM, Ishfaq M, Mehmood K, Ahmed SS. Determinants of antibiotics misuse by the parents in children: a survey from northern region of Saudi Arabia. Bangladesh Journal of Child Health. 2016;40(2):64-71. doi: 10.3329/bjch.v40i2.31560
35. Grigoryan L, Burgerhof JG, Degener JE, Deschepper R, Lundborg CS, Monnet DL, Scicluna EA, Birkin J, Haaijer-Ruskamp FM. Determinants of self-medication with antibiotics in Europe: the impact of beliefs, country wealth and the healthcare system. Journal of Antimicrobial Chemotherapy. 2008 May 1;61(5):1172-9. doi: 10.1093/jac/dkn054.
36. Marković-Peković V, Grubiša N. Self-medication with antibiotics in the Republic of Srpska community pharmacies: pharmacy staff behavior. Pharmacoepidemiology and drug safety. 2012 Oct;21(10):1130-3. doi: 10.1002/pds.3218.
37. James H, Handu SS, Al Khaja KA, Otoom S, Sequeira RP. Evaluation of the knowledge, attitude and practice of self-medication among first-year medical students. Medical principles and practice. 2006;15(4):270-5. doi: 10.1159/000092989.
38. Ocan M, Bwanga F, Bbosa GS, Bagenda D, Waako P, Ogwal-Okeng J, Obua C. Patterns and predictors of self-medication in northern Uganda. PloS one. 2014 Mar 21;9(3):e92323. doi: 10.1371/journal.pone.0092323

39. Hammour KA, Jalil MA, Hammour WA. 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 Pharmaceutical Journal. 2018 Sep 1;26(6):780-5. doi: 10.1016/j.jsps.2018.04.006
40. Panagakou SG, Spyridis N, Papaevangelou V, Theodoridou KM, Goutziana GP, Theodoridou MN, Syrogiannopoulos GA, Hadjichristodoulou CS. Antibiotic use for upper respiratory tract infections in children: a cross-sectional survey of knowledge, attitudes, and practices (KAP) of parents in Greece. BMC pediatrics. 2011 Dec;11(1):1-0. doi: 10.1186/s12887-019-1391-0
41. Sa'ed HZ, Taha AA, Araj KF, Abahri IA, Sawalha AF, Sweileh WM, Awang R, Al-Jabi SW. Parental knowledge, attitudes and practices regarding antibiotic use for acute upper respiratory tract infections in children: a cross-sectional study in Palestine. BMC pediatrics. 2015 Dec;15(1):1-9. doi: 10.1186/s12887-015-0494-5