PARENTAL KNOWLEDGE, ATTITUDE AND PRACTICE ON ANTIBIOTIC USE FOR UPPER RESPIRATORY TRACT INFECTIONS IN CHILDREN

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ABSTRACT

Background: *Several factors are evidently associated with the overuse of antibiotics both at the doctor`s level and the parents of children level.* ***Objectives:*** *To assess the level of knowledge and practice of parents about antibiotics use for upper respiratory tract infection (URTI) in their children as well as to determine the contributing factors for inappropriate use.* ***Material and Methods:*** *A cross-sectional study was carried out in two PHC centres in National Guard Health Affairs, Riyadh, between 1 January 2012 and 29 February 2012. It included parents of children (age from birth to 12 years) presenting with URTI symptoms.* ***Results:*** *The study included 352 parents of Saudi children. Most of the parents (71%) reported doctors as their source of antibiotic information. Only 1.4% of the participants identified correctly all antibiotics while 35.8% of them did not identify any antibiotic correctly. Factor analysis showed that the three common underlying factors responsible for antibiotics overuse were: parental self-prescribing tendency, parental tendency of asking for antibiotics from doctor and parental carefree attitude regarding over use and the three common underlying factors responsible for cautious approach to antibiotics use were: parental cautious nature, parental preference of advice over antibiotics and parental belief that URTI are mostly self-limiting.* ***Conclusions:*** *Parents are self-prescribing because of their easy access of antibiotics without prescription and their indifferent attitude toward microbial resistance.* ***Keywords***: *Antibiotics. Saudi Arabia, knowledge, URTI*

معرفة الوالدين وتوجهاتهم وممارساتهم في استخدام المضادات الحيوية لالتهابات الجهاز التنفسي العلوي عند الأطفال

ملخص: تشترك عوامل عدة في الاستخدام المفرط للمضادات الحيوية منها ما يخص الطبيب و منها ما يخص أولياء الأمور. **أهداف الدراسة:** تهدف هذه الدراسة إلى تقدير مستوى المعرفة و الممارسة بين أولياء الأمور فيما يتعلق بالمضادات الحيوية و العوامل التي تشترك في الاستخدام الخاطئ لها في علاج الأطفال المصابين بعدوى الجهاز التنفسي العلوي. **طريقة البحث:** تم إجراء دراسة مقطعية بمركزين صحيين تابعين للشئون الصحية للحرس الوطني بالرياض خلال المدة من 1 يناير حتى 29 فبراير للعام 2012. شملت الدراسة أولياء أمور الأطفال منذ الولادة و حتى سن الثانية عشر المصابين بأعراض عدوى الجهاز التنفسي العلوي. **النتائج:** ضمت هذه الدراسة 352 ولي أمر لأطفال سعوديين أكثر من نصفهم كانوا إناثا (59.4%). أقر معظم المشاركين (71%) أن مصدر معلوماتهم عن المضادات الحيوية كان الأطباء. من بين المشاركين، استطاع 1.4% فقط التعرف على كل المضادات الحيوية التي عرضت عليهم بينما 35.8% منهم لم يستطيعوا التعرف على أي مضاد حيوي. أكثر من ثلثي المشاركين (69.9%) استطاعوا التعرف على كل الأدوية غير المنتمية لفصيلة المضادات الحيوية. التحليل الإحصائي العاملي أوضح أنه يوجد ثلاثة عوامل رئيسية مؤثرة في الاستخدام المفرط للمضادات الحيوية وهي : ميل أولياء الأمور لوصفها بأنفسهم، ميلهم لطلب وصفها من الطبيب و اعتقادهم بأنها الأفضل. كما وجدت ثلاثة عوامل مؤثرة في استخدام المضادات الحيوية بحذر و هي : الطبيعة الحذرة لأولياء الأمور، و تفضيل سمع النصائح عن المضادات الحيوية و أخيرا اعتقاد أولياء الأمور أن عدوى الجهاز التنفسي تشفى تلقائيا . **الخلاصة:** يقوم الوالدان بصرف الدواء بأنفسهم بسبب الوصول السهل للمضادات الحيوية دون وصفة طبية، وموقفهم غير المبالي تجاه مقاومة الميكروبات للمضادات الحيوية , وأشار أولياء الأمور إلى أن هناك حاجة إلى مزيد من التعليم لكل من الأطباء والآباء والأمهات لاستخدام المضادات الحيوية بالطريقة المناسبة.

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INTRODUCTION

During the winter period, the majority of cases visiting the primary health care centres are due to upper respiratory tract symptoms[1]. Literature reports have shown that upper respiratory tract infectious diseases worldwide include: common cold, influenza, rhinorrhea, and bronchitis[2]. Despite the predominantly viral cause, with no need for antibiotic therapy[3,4], antibiotics, in practice, are frequently prescribed to children with symptoms of acute respiratory tract infection (URTI)[4-8]. Children aged 0 to four years received 53% of all antibiotics prescribed to the pediatric population[9]. This misuse of antibiotics is currently one of the major public health issues worldwide[10-13].

Problems associated with the overuse of antibiotics include development of antibacterial resistance, increasing the burden of chronic disease, raising costs of health services, and the development of side effects (e.g. adverse gastrointestinal effects)[14]. In addition, antibiotics may reduce the duration of fever in children with influenza which could reflect an increased risk of secondary bacterial infection for such children[8].

Several contributing factors are evidently associated with the overuse of antibiotics both at the doctor`s level[15-21] and the parents of sick children level and[22-24], namely: cultural factors, behavioral characteristics, socio-economic status, and level of education[25-27]. Furthermore, doctors usually relate their pattern of over prescribing to parents` pressure[28]. Also, lack of health education is one of the major contributing factors in the overuse of antibiotics[29]. Thus, Pediatricians acknowledge prescribing antimicrobial agents when they are not indicated[15]. Pediatricians believe educating parents is necessary to promote the judicious use of antimicrobial agents[16]. Self-medication is also a behaviour that contributes to the misuse of antibiotics[30,31].

Thus, the current parental knowledge, attitude and practice on antibiotic use in common childhood URTI is a matter of great interest and importance, and this study is trying to address these issues in particular

MATERIAL & METHOD

This was a cross-sectional descriptive study carried out in two PHC centers [King Abdulaziz Housing Clinic (Iskan) and Health Center for Specialized Care (HCSC Kashm Alaan) , National Guard Health Affairs, Riyadh, Saudi Arabia between 1 January 2012 and 29 February 2012.

Parents having children, aged from 0 to 12 years, presenting with URTI symptoms (nasal congestion, cough, fever and sore throat) were included in this study. Children having fever lasting more than 7 days, or chronic diseases, or symptoms such as earache, or those who came without one of their parents and children with symptoms of lower respiratory tract symptoms such as wheezing, stridor and breathing difficulty were excluded.

The sample size of 352 was estimated based on 34% of parents giving their children antibiotics for URTI without physician's advice, in the Egyptian study[36], with a desired precision of + 5%, alpha of 0.05 (CI of 95%) and power of 0.8. Participants of the study were selected by convenient sampling as they visited the clinic during the study period, and presented with inclusion criteria. Participants' selection comes from the random order by which they visited the clinic.

A pre-tested questionnaire was used in this survey adopted from a similar Greek

study[32]. Permission was taken by email from the researchers, who used this questionnaire in Greece, to translate it in Arabic language and use for local study. The questionnaire contains demographic characteristics, knowledge of antibiotics, sources of information, practice of antibiotic use in URTI and awareness of first-aid resources. The KAP-questionnaire was structured in three main sections which displayed the Knowledge (Section A), Attitudes (Section B) and Practices (Section C) of parents regarding antibiotics use in URTI of their children.

Section (A) included questions regarding parental knowledge concerning antibiotics. They were asked to mark antibiotic names out of seven commonly used medications and to answer questions relevant to antibiotics indications, side effects and their use in viral infections. Section (B) studied the parental attitudes regarding URTIs, antimicrobial agents' use and the doctors' role. Parents where asked which symptoms and what duration would lead them to seek medical attention for their children, as well as their expectations regarding antibiotics prescription. Other questions included reasons for antibiotic use without medical advice (over the counter acquisition of antibiotic, use of leftover antibiotic from previous illness, etc.) or whether they would seek for a doctor who is more lenient with antibiotic administration. Finally, (Section C) looked into parental practices and whether the parent-doctor relation is influenced by the latter's attitude on antibiotic prescription. Parents were asked whether their doctor spends enough time explaining the illness and suggested antibiotic treatment for their child, whether he is influenced by their demand to prescribe antibiotics, as well as whether their doctors gives them instructions over the phone (without previous examination) for antibiotic administration to their sick child.

Each question (apart from those included in the demographic data section) was in a format of five possible answers (accepting only one right answer), according to the 5-point Likert scale: 1 = strongly agree, 2 = agree, 3 = uncertain, 4 = disagree and 5 = disagree strongly or 1 = always, 2 = most of the times, 3 = often, 4 = sometimes and 5 = never.

To verify parent's responses consistency and exclude random completion, three couples of similar questions (where each couple included the same statement expressed in a different way) and three pairs of contradictory questions (where each question included the reverse statement requiring the opposite answer) were entered in the questionnaire's structure. All these questions were randomly placed in the questionnaire to minimize parents' awareness. Questionnaires with discordant responses to two or more of these paired questions were removed.

After we received written permission from King Abdullah Research Centre, the questionnaires were distributed by nurses to all parents attending the PHC with their children with URTI symptoms and before entering the doctor's room. In order to increase compliance, all nurses were personally informed by the researcher about the study nature and its importance. They were asked to distribute the questionnaires to parents, collect and mail them back to the researcher. An informed verbal consent was obtained from every parent before participation in the study. Participants were assured that collected data will be strictly confidential, and will not be disclosed for any reason, and will be used only for research purposes. Professional advice was provided regarding appropriate use of antibiotics in URTI in children

RESULTS

The data were verified manually, entered in computer and IBM-SPSS software statistical program version 19 was utilized for data entry and analysis. Categorical variables were presented as frequencies and percentages. Spearman's Rho was used to measure correlation between two variables. P-value of less than 0.05 was considered significant. Principle Component Analysis was carried out on the items in the questionnaire to find the main underlying factors; beliefs and behavioural that parents are influenced by in prescribing or avoiding antibiotics.

The study included 352 parents of Saudi children. Table (1) presented their baseline characteristics. (59.4%) of them are female. Almost one-third of the mothers were high school educated (35.2%) while 29.3% were university educated.

Table 1: Demographic characteristics

	Frequency	*Percent*
Gender		
Male	143	40.6
Female	209	59.4
Mother's educational level		
Primary	76	21.6
Secondary	49	13.9
High school	124	35.2
College	103	29.3
Father's educational level		
Primary	39	11.1
Secondary	59	16.8
High school	188	53.4
College	66	18.8
Family income		
Low	28	8.0
Middle	296	84.0
High	28	8.0
Relation of the patient to treating physician	17	4.8
Relative/family friend /formal relationship	335	95.2

More than half of the fathers were high school educated, while 18.8% were university educated. Family income was middle in most of the participants (84%). In majority, formal relationship to the treating physician was reported (95.2%).As obvious from figure (1), the access to health care system was described as good by 61.4% of the parents, while it was described as bad by 3.4% of them.

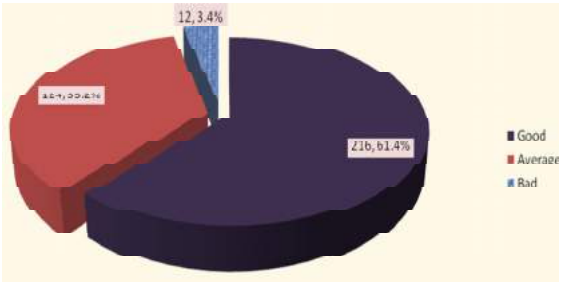

Fig. 1: Distribution of the parents according to their perceived access to health care system.

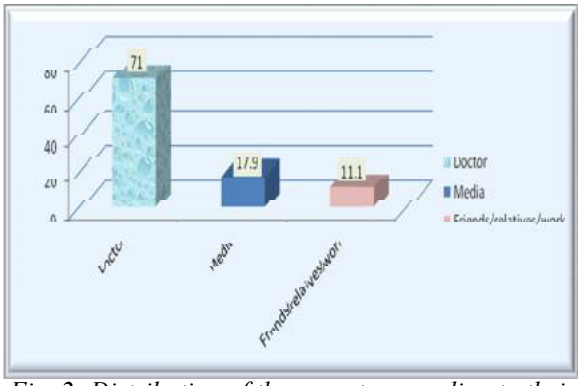

Fig. 2: Distribution of the parents according to their source of information about antibiotics.

Most of the parents (71%) reported doctors as their source of antibiotic information, while media and friends/relatives were reported by 17.9% and 11.1% of them respectively, as sources of antibiotic information (Fig. 2).

Parental knowledge about commonly used antibiotics: As shown in table (2), amoxicillin and Augmentin were recognized by 44.6% and 38.9% of the parents, respectively as antibiotics compared to clarithromycin that reported by 16.5% of them as an antibiotic. On the other hand, histop (antihistamine) was reported as an antibiotic by 21.6% of the

parents while normal saline nasal drops, flagyl and oral rehydration solution were reported as antibiotic by 9.9%, 6.3% and 4.5% of the participants, respectively.

Table 2: Knowledge about commonly used medications (n=352).

Common Medications	*Yes (%)*	*No (%)*
Augmentin	38.9	61.1
Clarithromycin	16.5	83.5
Histop	21.6	78.4
Amoxicillin	44.6	55.4
Flagyl	6.3	93.7
Normal saline nasal drops	**9.9**	**90.1**

URTI and practice of parents: As shown in table (4), 79% of the parents expected prescription of paracetamol and analgesics by their physicians to treat URTI, while 47.4% of them expected prescription of antibiotics. Antitussives, normal saline nasal drops and antihistamine were expected to be prescribed by physicians for URTI treatment among 31.8%, 31.3% and 19.3% of parents, respectively.

Table (5): Responses of the participants to the questions about their likelihood of antibiotic prescription to their child by doctors (n=352).

Childs Symptoms	*Always*	*Most of the time*	*Usually*	*Sometimes*	*Never*
Cold	47 (13.4)	53 (15.1)	50 (14.2)	111 (31.5)	91 (25.9)
Runny nose	24 (6.8)	48 (13.6)	46 (13.1)	100 (28.4)	134 (38.1)
Sore throat	93 (26.4)	80 (22.7)	63 (17.9)	94 (26.7)	22 (6.3)
Cough	56 (15.9)	56 (15.9)	62 (17.6)	99 (28.1)	79 (22.4)
Vomiting	57 (16.2)	86 (24.4)	38 (10.8)	78 (22.2)	93 (26.4)
Fever	97 (27.6)	84 (23.9)	36 (10.2)	67 (19.0)	68 (19.3)
Ear pain	109 (31.0)	92 (26.1)	34 (9.7)	63 (17.9)	54 (15.3)

Likelihood of antibiotic prescription to their child by doctors: On descriptive analysis, parents were more likely (always or most of the time) to request antibiotic for ear pain (57.1%), fever (51.5%), sore throat (49%) while less likely to request antibiotic for vomiting (40.6%), cough (31.8%), cold (28.5%) and runny nose (20.4%).

Antibiotic use without the doctor's advice: Non-serious status of the child (23.6%), lack of time or money (20.8%) were the reason for giving antibiotics to the child without physician's advice.

Table 4: Parental reasons for giving their child antibiotics without physician's advice. (n=352).

Reason	*Always*	*Most of the time*	*Usually*	*Sometimes*	*Never*
Lack of time or money to visit physician	39 (11.1)	34 (9.7)	38 (10.8)	66 (18.8)	175 (49.7)
Child's condition did not seem serious enough.	28 (8.0)	55 (15.6)	40 (11.4)	73 (20.7)	156 (44.3)
Knowledge of antibiotics for the same symptom so self-prescribed	34 (9.7)	33 (9.4)	44 (12.5)	47 (13.4)	194 (55.1)
Pharmacist recommended the antibiotic.	24 (6.8)	29 (8.2)	39 (11.1)	86 (24.4)	174 (49.4)
Friend or relative recommended the antibiotic.	12 (3.4)	16 (4.5)	29 (8.2)	41 (11.6)	254 (72.2)
Lack of time or money to visit physician	39 (11.1)	34 (9.7)	38 (10.8)	66 (18.8)	175 (49.7)
Child's condition did not seem serious enough.	28 (8.0)	55 (15.6)	40 (11.4)	73 (20.7)	156 (44.3)

Similarly physician`s prescription (19.1%), pharmacist recommendation (15%) and friend/family relative recommendation (7.9%) were the reasons for giving antibiotics to the child without physician's advice, respectively.

Parental believes and practice for appropriate use of antibiotics: The majority of the parents (84%) agreed that parents and doctors should be informed about judicious antibiotic use. Almost two-thirds of them (66.4%) agreed that

overuse and inappropriate use of antibiotics reduces efficacy.

More than half of the parents (50.2%) agreed that antibiotics are used unnecessarily while more than one-third of them (39.5%) agreed that most of URTI are of viral origin. Thirty percent of the parents agreed that they may change their doctors because of prescribing antibiotics to their children to treat URTI. Slightly less than half of the parents (49.1%) agreed that most of URTI are self-limited.

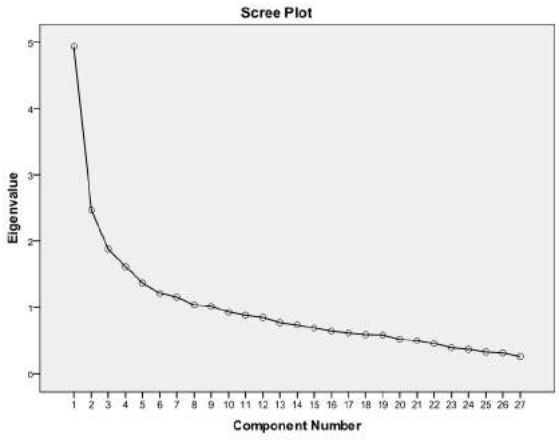

Fig. 3: Scree Plot for Principal Component Analysis.

Around half of the participants (49.2%) are well informed about judicious antibiotic use. Almost two-thirds of the parents (63.5%) asked their doctor to prescribe antibiotics to treat URTI of their children. Most of the participants (82.9%) mostly followed doctors` instruction and 43.3% of them appreciated the doctors who did not prescribe antibiotics.

Parental believes and practice for in-appropriate use of antibiotics: Table (8) shows that more than half of the parents (53.4%) agreed that children with flu like symptoms get better with antibiotics and 44.3% agreed that antibiotics can prevent URTI complications. Almost one-third of them (32.8%) agreed that new antibiotics that can kill resistant bacteria can be produced by scientists.

Table (8): Parental beliefs, attitudes & practices regarding antibiotic use.

Beliefs and attitudes (Practices)	*Strongly agree (Always)*	*Agree (Mostly)*	*Not sure (Usually)*	*Disagree (Sometimes)*	*Strongly Disagree (Never*
Lack of time and resources	39 (11.1)	34 (9.7)	38 (10.8)	66 (18.8)	175 (49.7)
child condition is not seriousness	28 (8.0)	55 (15.6)	40 (11.4)	73 (20.7)	156 (44.3)
Similar prescription	34 (9.7)	33 (9.4)	44 (12.5)	47 (13.4)	194 (55.1)
Pharmacist recommendation	24 (6.8)	29 (8.2)	39 (11.1)	86 (24.4)	174 (49.4)
Friend/relative recommendation	12 (3.4)	16 (4.5)	29 (8.2)	41 (11.6)	254 (72.2)
Phone antibiotic recommendation	11 (3.1)	13 (3.7)	22 (6.3)	20 (5.7)	289 (81.3)
Ask antibiotic prescription directly	14 (4.0)	32 (9.1)	26 (7.4)	62 (17.6)	218 (61.9)
Insist prescribing antibiotics	11 (3.1)	33 (9.4)	30 (8.6)	45 (12.9)	231 (66.0)
Doctor prescription only because you asked him	14 (4.0)	22 (6.3)	25 (7.1)	58 (16.5)	233 (66.2)

Almost one-quarter of the parents (26.1%) agreed that they would use any leftover antibiotics whenever their child presented with similar URTI symptoms, 17.1% of them agreed that antibiotics have no side effects while 20.5% agreed that they would change their doctors because of non-prescription of antibiotics as they think appropriate.

Only 19.7% of the parents were much dissatisfied with antibiotic non-prescription. The common reported reasons for inappropriate antibiotic use always or most of the time were non-seriousness of the child status (23.6%), lack of time and resources (20.8%),

pediatrician has prescribed the same antibiotic in the past for the same symptoms. (19.1%), pharmacist recommendation (15%) and friend/relatives recommendation (7.9%).

Table (9): Underlying Factors prompting parents to prescribe or avoid antibiotics for their children.

	*Rotated Factor Loadings**					
	Self-Prescribing	Asking for antibiotics	Cautious about use	Antibiotics are good	Prefer advice only	Disease self-limiting
Faster recovery with antibiotics	-	-	-	0.547	-	-
Scientists can produce new antibiotics.	-	-	-	0.504	-	-
Inappropriate use reduces efficacy	-	-	-	0.534	-	-
Antibiotic use prevents complications of URTI.	-	-	-	0.732	-	-
Not enough time or money for doctor visit.	0.751	-	-	-	-	-
Thought child's condition was not serious enough	0.708	-	-	-	-	-
Same antibiotic prescribed in past, for same symptoms	0.586	-	-	-	-	-
Because a pharmacist recommended the antibiotic.	0.78	-	-	-	-	-
Because a friend/ relative recommended the antibiotic	0.694	-	-	-	-	-
Would reuse any leftover antibiotics for URTI symptoms	0.412	-	-	-	-	-
Antibiotics are used too much and unnecessarily	-	-	0.462	-	-	-
Will change doctor as he prescribes antibiotics a lot	-	-	0.549	-	-	-
Parents & doctors should be informed on antibiotic use	-	-	0.65	-	-	-
Consider antibiotic adverse reactions when using them	-	-	0.584	-	-	-
Antibiotics have no side- effects.	-	-	-0.552	-	-	-
Ask doctor if antibiotics is necessary	-	-	-	-	0.767	-
Glad if doctor does not prescribe antibiotics	-	-	-	-	0.692	-
Doctor recommends antibiotics on the phone	-	0.771	-	-	-	-
Ask directly your doctor to prescribe antibiotics	-	0.784	-	-	-	-
Insist on prescribing antibiotics as a precaution	-	0.711	-	-	-	-
Doctor prescribes antibiotic only because you ask	-	0.776	-	-	-	-
Most URTI are viral, not requiring antibiotics	-	-	-	-	-	0.75
Most URTI are self-limiting, not needing antibiotics	-	-	-	-	-	0.577
Eigen Value	3.06	2.96	2.08	1.54	1.52	1.48
% of Variance	11.35	10.95	7.72	5.71	5.62	5.46
Cumulative % of Variance	11.35	22.3	30.02	35.73	41.35	46.81

* values > 0.4 only shown

KMO and Bartlett's Test*		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.77
Bartlett's Test of Sphericity	Approx. Chi-Square	2236.97
	Df	351
	p-value	<0.001

* KMO > 0.5 suggest sample size adequacy for analysis, and statistically significant Bartlett's test for Sphericity suggest correlations between items were sufficiently large for Principal Component Analysis.

Antibiotic recommendation by physician via phone was reported always or most of the time by 6.7% of parents, 13.1% of the parents asked antibiotic prescription directly from their physicians, 12.5% of parents insisted prescribing antibiotics and 10.3% of them have mentioned that their doctors prescribed antibiotics mostly only because they asked them.

Parental belief that antibiotics were being used excessively was found to be significantly correlated to parental consideration of antibiotic side effects before use (Spearman's rho 0.339, p-value 0.01).

Parents who believed that antibiotics are used excessively also thought that physicians and patients should be informed well about the judicious use of antibiotics (Spearman's rho 0.179, p-value 0.01).

Parental belief that most URTI were viral in origin correlated with non-use of antibiotics for URTI as these would be self-limiting (Spearman's rho 0.187, p-value 0.01)

Parental belief that antibiotics have no side effects was found to be correlated with the behavior of insisting on antibiotic prescription on unconfirmed diagnosis (Spearman's rho 0.266, p-value 0.01).

Parental behavior of reusing leftover antibiotics was found be correlated to self-prescribing antibiotics without physician's advice based on old knowledge for similar symptoms (Spearman's rho 0.377, p-value 0.01) and to the belief that scientists can discover antibiotics against resistant microbes (Spearman's rho 0.105, p-value 0.049).

Six factor combinations (components) based on screen-plot and having Eigen values higher than Kaiser criterion of 1, were included here for interpretation, although rotated components, 7-9 could also be considered for inclusion as Eigen values were also higher than 1, but these were single items and the Scree plot appears to smooth out after 6.

These six common underlying factors were responsible for overuse or cautious approach to antibiotics: Inappropriate Use; Parental self-prescribing tendency, Parental tendency of asking for antibiotics from doctor and parental carefree attitude regarding over use while for appropriate Use; Parental cautious nature, Parental preference of advice over antibiotics and parental belief that URTI are mostly self-limiting.

DISCUSSION

This is not the first study indicating public misconceptions with regards to antibiotic use for common URTIs. In our study, although parents believed that most URTIs are self-limiting, they expected to receive antibiotics when this diagnosis was made. Similarly, in a web-based questionnaire among a sample of the general Dutch population, Cals et al showed that nearly half of the responders (47%) incorrectly identified antibiotics as being effective in treating viral infections [38]. In the same study, the term "acute bronchitis" raised an immediate expectation for an antibiotic prescription similar to "ear ache-otitis", as shown in the current study.

Almost half of parents believed that URTIs are mostly self-limited although approximately two-thirds of them asked physicians to prescribe antibiotics for treating URTI. Slightly less than half of parents (47%) expected to possibly receive antibiotics when such a diagnosis was given. However, it is incorrect to assume that 47% of the parents desired only antibiotic therapy because the

majority of them also preferred other drugs given for symptomatic therapy as paracetamol and analgesics.

Ear ache, fever and sore throat were the most common diagnosis for which parents always or usually expect to receive antibiotics. Comparable results have been reported in a study conducted among Greek parents[32].

Approximately 15-35% of parents gave antibiotics to their children without consulting their physician and almost two-thirds of them appreciated that unnecessary antibiotic use reduces its efficacy.

Saudi parents also reported that information regarding unnecessary antibiotic use and resistance came from their physicians, which is similar to what has been reported by Greek parents[32] while it is different from findings of a public survey published by Hawkings et al where respondents reported that most information regarding antibiotic resistance was derived from the media[39]. In the same study, patients had a low sense of personal ability to help contain this problem. It is possible that many parents might have endorsed their physicians as their primary health influence and derived most of their opinions regarding antibiotics from them.

These different responses between studies are possibly a reflection of the difference in health care systems. In western countries, the great majority of children have regular follow-up by private consultant pediatricians who are accessible either on the phone or with a home/office visit. This leads to a close and trusted relationship between the parent-child and the physician.

In KSA, parents have free access to all types of antibiotics despite a specific legislation forbidding antibiotic use without a prescription.

It is not uncommon that many parents believe weather change to be the main cause of URTI. Many think their children are more vulnerable to URTI, especially after being exposed to colder weather or the rainy season. This health belief may be derived from their past experience or cultural belief. In the current study, only 40% of parents recognizes that URTI mostly of viral origin.

In this study, almost 53% of parents felt that their child with flu like symptoms needed antibiotics, which was not prescribed by the doctor. There is a widespread perception that for every symptom, there is a specific remedy or drug, and antibiotics are viewed as wonder drugs capable of healing a wide variety of illnesses ranging from gastrointestinal disorders to headaches[40]. Parents may feel that antibiotics could help ease their anxiety and worry if it is given to their sick child. In addition, they do not need to come back again to ask for an antibiotic after one to two days of "poor improvement" of the illness.

Principal component analysis reveals that parents can be grouped as over-users and proper-users of antibiotics. The over-users have a tendency to self-prescribe perhaps due to easy availability of antibiotics without the need of a doctor's prescription, coupled with a carefree indifferent attitude regarding antibiotic resistance or irrespective of whosoever may be giving the condoning advice and even demanding or having no shyness in demanding the antibiotics from physician in case his/her advice is sought.

The proper users / under-users of antibiotics for their children have some common characteristics as well: these tend to be cautious in nature regarding

antibiotic use, believe that most URTI are self-limiting or viral in nature, therefore are better informed and take their doctor's advice seriously, giving it value and that supersedes their personal preference.

It appears that the parents can be given more health education regarding proper use of antibiotics, as many parents also feel that it is needed. In addition, physicians need to be educated not be pressured by the parents, however, tighter regulation of pharmacies may be the solution to curb easy access to antibiotics. This would limit influences of self, media, friends and those other than physicians encouraging to initiate antibiotics for lesser than necessarily severe symptoms.

In the current research, data were collected from parents through a self-administered questionnaire with the help of trained nurses. This kind of data collection was preferred versus the pattern of interviewing the parents, taking into account many drawbacks. First, the interviewer might influence the parents' response during their conversation, and secondly interviewees may respond in accordance with what they believe to be the "correct" replies. Additionally, the probability of the responders' embarrassment towards the interviewer would affect the quality of their answers. Moreover, a large number of interviewers would have to be trained to be sent to interview the parents, which was impractical. Finally, the variability among the interviewers could not be excluded. Using the questionnaires on the other hand, each responder received the same set of questions phrased in exactly the same way, so the answers were derived in a more objective way. Questionnaires may, therefore, yield data more precise than information obtained through an interview[41-42].

Among limitations of the current research, first: the study was associated with a poor recall of an URTI experience and antibiotic use. Therefore, parents' knowledge, attitude and practices may not always be consistent with their actual behavior. Invalid answers may also have occurred because of embarrassment. Second: the language and phrasing used in writing the questions may not have been fully understood by parents of low socioeconomic status (because of the use of medical terms), leading to inaccurate answers. Finally, subjective appreciation of URTI symptoms (cough, runny nose, and ear ache) may have influenced the responses.

In conclusion, this study has documented many areas in which parental knowledge on antibiotic use for acute URTI is considerably lacking, resulting in inappropriate attitudes and practices. Half of the parents attending the physicians for their children with URTI expected to get antibiotics. Factors responsible for inappropriate use were parental self-prescribing tendency, parental tendency of asking for antibiotics from doctor and parental carefree attitude regarding over use. Parents are self-prescribing because of their easy access of antibiotics without prescription and their indifferent attitude toward microbial resistance. Parents pointed out that more education is needed for both doctors and parents for appropriate antibiotic use.

From the results of the current study, we recommend implementation of educational programs on antibiotic use for parents, helping reduce their misuse. It is essential to establish evidence-based clinical practice guidelines of acute URTI for doctors with regular medical audit of treatment for acute URTI to ensure that patients receive the best quality of care. The Saudi parents and physicians should have a trusted relationship because most parents will be happy with the information

provided to them and they would not change their private physician if antibiotics were used too much or too little. Strict enforcement of over-the-counter sale of antibiotics should be implemented.

It is hoped that by identifying weak areas in parents' knowledge and attitude, better planned educational and behavioral modification efforts can be made to reduce unnecessary prescription of antibiotics and curtail the still burgeoning problem of bacterial resistance in children specifically and in the community at large.

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