

Full Length Research Paper

Evaluation of non-prescribed antibiotic use among children with upper respiratory tract infection

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The effectiveness of the antibiotics in the community and the risk of resistance may be influenced by how they are used by the patient. The aim of the present study is to determine the extent of non-prescribed antibiotic use by mothers of children who had upper respiratory tract infections (URTIs) between the ages of 1 month and 9 years. The study was community-based, cross-sectional survey questionnaires in Jeddah, Saudi Arabia, from January 2011 to March 2011. The study included 209 mothers, 95.2% completed the questionnaire. The results revealed that 79.4% of the mothers preferred seeking medical advice for symptoms of URTIs in their children and 16.1% used non-prescribed antibiotic. The most commonly used non-prescribed antibiotics were amoxicillin/clavulanic acid (31.2%) and azithromycin (27.6%). Most mothers (69.3%) had negative impressions about antibiotic use which was attributed to their fear of potential side effects and the effect of antibiotics in decreasing child's natural immunity. Mothers' educational level positively correlated with knowledge of appropriate use of antibiotics. *In conclusion*, antibiotic misuse for pediatric URTIs was found to be a problematic situation influenced by low knowledge and easy availability of these drugs. Educational intervention and effective communication between physicians and parents should be encouraged.

Keywords: Misuse, non-prescribed antibiotics, upper respiratory tract infection, Saudi Arabia, children.

INTRODUCTION

Acute respiratory tract infections account for ~75% of antibiotic prescriptions written and are among the leading reasons for physician office visits in the United States (Fendrick et al., 2001; Steinberg, 2009). Acute febrile illnesses, either viral or bacterial, occur in children on average six to eight times a year. For this reason, pediatric infectious disease remains a significant community health problem (Winther et al., 2007). Children are increasingly exposed to potential pathogens at an earlier age, due to the social and family reliance on childcare arrangements. More children are attending day care where they are more likely to come in contact with an infected child or caregiver (Bradley et al., 2007).

Upper respiratory tract infection (URTI) represents the most common acute illness evaluated in the pediatric outpatient setting and range from the common cold to

life-threatening illnesses such as epiglottitis (McCaig and Hughes, 1995). Viruses account for most URTIs in children and antibiotics are usually not needed for their treatment (Huang and Huang, 2005). Avoidance of antibiotic management of viral URTIs is critical in efforts to limit the clonal expansion and spread of antibacterial-resistant organisms. Parents (or guardians) often have expectations of antibiotic treatments when their child is brought to a clinician for evaluation, and clinicians often presume such expectations (Mangione-Smith et al., 2006).

In the United States, antibiotics are among the most frequently prescribed drugs to children and almost three-quarters of all outpatient antibiotics are prescribed for acute respiratory infections (Bonati, 1994, McCaig and Hughes 1995, Kardas et al., 2005). Despite their importance, the continued efficacy of antibiotic therapies is threatened by the emergence of resistance. Much of this resistance has been attributed to indiscriminate overuse of antibiotics (Albrich et al., 2004). However, the effectiveness of antibiotics in the community and the risk

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Table 1. Survey Questions**Section (i)**

How old are you?

What's your level of education?

Do you work?

How many work hours/day?

Section (ii)

Do you ever use non-prescribed antibiotics? How many times do you use it?

When your child gets sick, do you prefer to go to a doctor to get prescribed antibiotic or do you use non-prescribed antibiotic?

If you have used non-prescribed antibiotics, from where did you get them?

Are most cough, cold, and flu illnesses (URTI's) caused by bacteria or viruses?

Are antibiotics used for bacterial infection, viral infection or for inflammation?

Do most cold, cough, and flu illnesses (URTI's) get better faster with antibiotics?

What is your impression about antibiotic use (pro or against antibiotic use)? Please list your reason.

Section (iii)

How many children do you have between the ages of 2-9?

Please provide the age and sex of each child between the ages of 2-9.

How often does your child get sick?

Do you seek medical advice or not, when your child gets sick (common cold, flu, cough)?

I am less satisfied with a doctor's visit if I do not receive an antibiotic. Do you agree?

If a doctor does not prescribe an antibiotic when I think one is needed, I will take my child to another doctor. Do you agree?

What non-prescribed antibiotic do you use?

Of resistance may also be influenced by how antibiotics are used by the patient (Branthwaite and Pechere, 1996). The longer the duration of antibiotic use, the higher the risk of antibiotic resistance. It is estimated that more than 50% of antibiotics worldwide are purchased privately without a prescription (Cars and Nordberg, 2005). The situation in developing countries is of particular concern because the use of antibiotics without medical guidance is largely facilitated by inadequate regulation of the distribution and sale of prescribed drugs (Hart and Kariuki, 1998; Byarugaba, 2004).

Very few data on non-prescribed antibiotic use in Saudi Arabia were available. Thus, the aim of this work is to determine the extent of non-prescribed antibiotic use by mothers of children who had URIs and to identify the factors, including socio-demographic, associated with antibiotics misuse.

METHODS

The study was a community-based, cross-sectional survey, conducted in Jeddah, Saudi Arabia from January 2011 to March 2011. The survey included mothers, as mothers clearly accounted for the largest proportion of persons responsible for dealing with children's illnesses. Also, the study included mothers who have children between the ages of 1 month and 9 years avoiding the neonatal and adolescent periods. The questionnaire was conducted in the national language (Arabic) and was

translated into the English for non-Saudi mothers. It was pre-tested on a small pilot population and revised on the basis of feedback from the pilot test. The questions were simplified so that the majority of the mothers could understand them no matter their level of education. Some of the questionnaires were distributed web-based to the students of King Abdulaziz University, Jeddah, Saudi Arabia to be completed by their mothers, while others were distributed at governmental and private sector hospitals to be self-completed by mothers.

A structured questionnaire (Table 1) consisted of sections on (i) demographic characteristics of the mother, (ii) mothers' knowledge and attitude regarding antibiotic use to treat URIs and (iii) general information about the child and antibiotic use. Data were analyzed descriptively.

RESULTS

From 209 mothers who were included in the study, 199 (95.2%) completed the questionnaire (80 from governmental hospitals, 70 from private hospitals and 49 from the web). The present study revealed that 78.4% of the mothers preferred seeking medical advice compared with 21.6% who didn't (Figure 1a). In addition, all mothers stated that they used non-prescribed antibiotics at least once, but 83.9% of mothers preferred the use of prescribed antibiotics compared with 16.1% who preferred the use of non-prescribed antibiotics either from previous experience or from a pharmacist advice

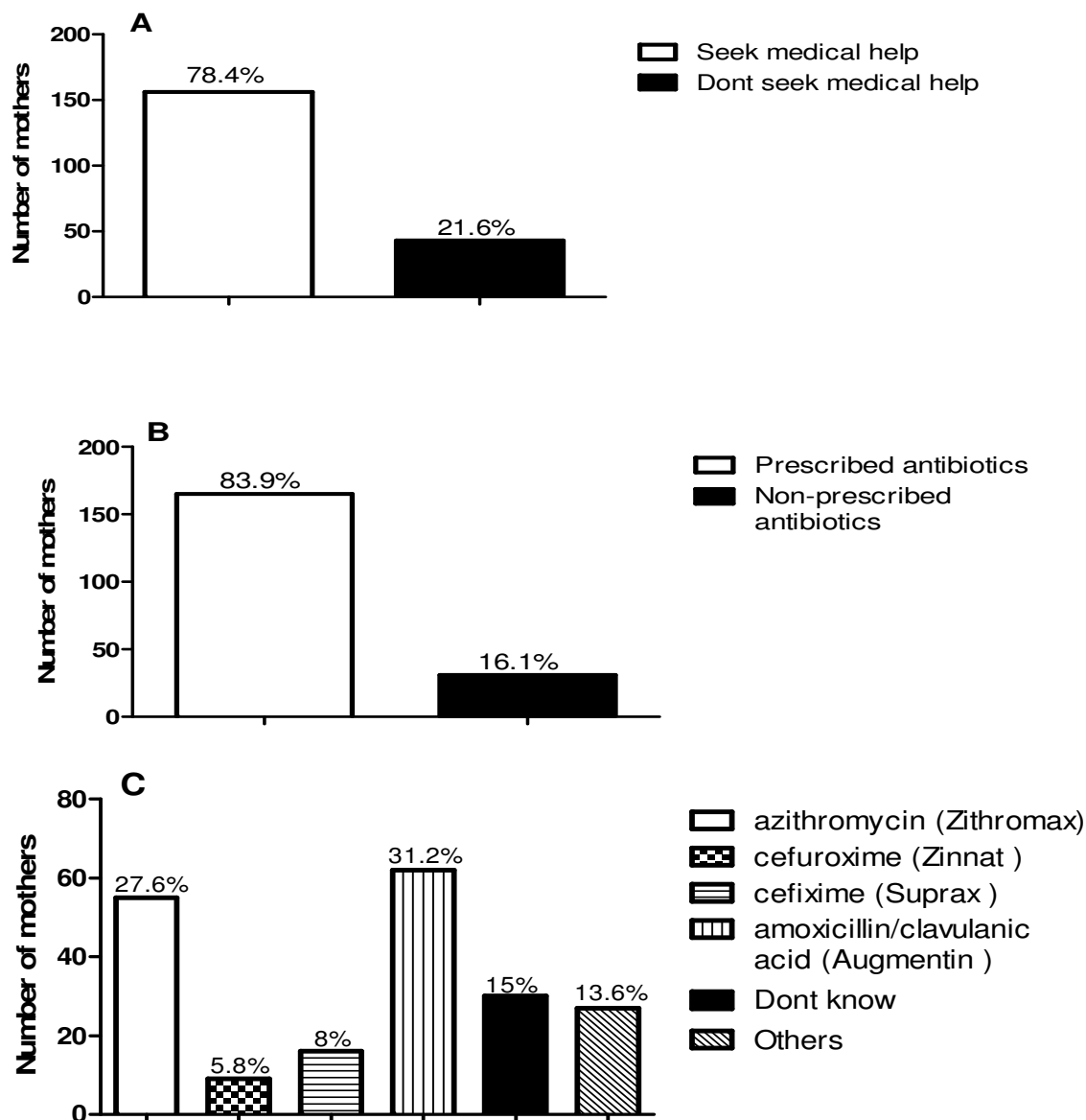


Figure 1a. Proportion of mothers who seek and don't seek medical advice for upper respiratory tract infections (URTI) in their children, **b.** Proportion of mothers who prefer getting prescribed antibiotics vs non-prescribed antibiotics, **c.** Percentages of non-prescribed antibiotic types used by children.

(Figure 1b). The most commonly used non-prescribed antibiotics were amoxicillin/clavulanic acid (Augmentin®) and azithromycin (Zithromax®) (31.2% and 27.6% respectively) while cefuroxime (Zinnat®) and cefixime (Suprax®) were used less frequently (5.8% and 8% respectively) (Figure 1c).

Regarding their impression about antibiotic use, most mothers (69.3%) had a negative impression compared with 30.7% who had a positive impression (Table 2). Mothers with negative impression thought that antibiotics decrease natural immunity (80.4%) while positive impression was mostly attributed to the effective cure of antibiotics (50%).

Regarding mothers' attitudes and expectations when visiting a doctor's clinic, 18.6% of mothers reported that they were not satisfied if they did not receive an antibiotic prescription. Moreover, 6% revealed that they would take their child to another doctor seeking an antibiotic prescription.

Table 3 shows the correlation between awareness and use of antibiotics with demographic factors. There seemed no major correlation between age of the mother or number of children the mother had and the variables under study. Mothers with higher level of education tended to have better knowledge about the use of antibiotics, etiology of URIs and the use of antibiotics in

Table 2. Mothers' impression about antibiotics

	Reasons (% (n))
In favor of antibiotic use 30.7% (61)	Speedy recovery 24.6% (15) Effective cure 50.0% (30) Strong drugs 3.3% (2) Savior 10.0% (6) Always been dependable 6.7% (4) Other reasons 6.7% (4)
Against antibiotic use 69.3% (138)	It decreases Natural immunity 80.4% (111) Child had side effects during the last course 4.3% (6) Aggressive 13% (18) Other reasons 2.17% (3)

Table 3. Socio-demographic correlates of non-prescribed antibiotic use, awareness about antibiotic use, nature of upper respiratory tract infections and frequency of children's Sickness.

Demographics (% (n))	Prescribed antibiotics (% (n))	Non- prescribed antibiotics (% (n))	Awareness about Proper Use of Antibiotics (% (n))	Awareness about the common Nature/ Source of URTI's (% (n))	Awareness about the use of Antibiotics in URTI's (% (n))	Frequency of Children's Sickness that required medications (% (n))	
						≤ 6 times/ year (% (n))	> 6 times/ year (% (n))
Mothers' age (in years)							
20-30 (45.7% (91))	93.4% (85)	6.6% (6)	39.6% (36)	72.5% (66)	36.3% (33)	80.22%(73)	19.78%(18)
31-40 (44.7% (89))	88.7% (79)	11.2% (10)	53.9% (48)	68.5% (61)	51.7% (46)	74.16%(66)	25.84%(23)
>40 (9.5% (19))	84.2% (16)	15.8% (3)	42.1% (8)	84.2% (16)	52.6% (10)	94.74%(18)	5.26% (1)
Mothers' education							
School edu. (17.1% (34))	94.1% (32)	5.9% (2)	14.7% (5)	52.9% (18)	8.8% (3)	61.8% (21)	38.2% (13)
University graduates (58.3% (116))	90.5%(105)	9.4% (11)	42.2% (49)	73.3% (85)	44.8% (52)	79.31%(92)	20.69%(24)
Postgraduate education (24.6% (49))	87.8% (43)	12.3% (6)	77.6% (38)	81.6% (40)	69.4% (34)	85.7%(42)	14.28%(7)
Working mothers							
> 8 hours/day (17.1% (34))	82.4% (28)	17.6% (6)	58.8% (20)	85.3% (29)	41.2% (14)	79.41%(27)	20.59% (7)
< 8 hours/day (32.7% (65))	90.8% (59)	9.2% (6)	53.8% (35)	80.0% (52)	52.3% (34)	87.69%(57)	12.31% (8)
Housewife (50.3% (100))	93% (93)	7% (7)	37.0% (37)	62.0% (62)	41.0% (41)	70% (70)	30% (30)
Number of children							
One (47.2% (94))	94.7% (89)	5.3% (5)	36.2% (34)	80.9% (76)	41.5% (39)	79.79%(75)	20.21%(19)
Two (33.2% (66))	81.9% (54)	18.2% (12)	63.6% (42)	71.2% (47)	50.0% (33)	78.78%(52)	21.21%(14)
Three (15.6% (31))	96.8% (30)	3.2% (1)	35.5% (11)	54.8% (17)	41.9% (13)	74.19%(23)	25.81%(8)
More than Three [4.0% (8)]	87.5% (7)	12.5% (1)	62.5% (5)	37.5% (3)	50.0% (4)	75.00(6)	25% (2)

URTIs. Similarly a lower proportion of children of better educated mothers tended to get sick more than 6 times a year. Working mothers were better aware of the use of antibiotics and etiology of URTIs than housewives.

DISCUSSION

Misuse of antibiotic therapy may have an influence on its

effectiveness and can potentially expose patients to suboptimal doses which can result in insufficient antibiotic exposure for eradicating infectious bacteria. This may potentially create an environment that promotes antibiotic resistance. Misuse of antibiotic therapy has ramifications on healthcare costs, antibiotic resistance, treatment failure, hospitalization time, wasted medication and increased return visits to the physician (Sclar et al., 1994; Branthwaite and Pechere, 1996; Dajani, 1996; Pechere,

2000). Studies from American, Asian and European countries indicate that between 22% and 70% of parents have misconceptions about the appropriate applications and efficacy of antibiotics (Belongia et al., 2002; Huang et al., 2007) and often use them without a prescription (Bi et al., 2000; Larsson et al., 2000).

In the present study, the high response rate to the questionnaire may be partially attributed to the web-based method of distribution of the questionnaire and the increasing educational level among people in the Saudi community in recent years. The results clearly showed that mothers who seek medical advice and prefer the use of prescribed antibiotics outnumbered those who depend on themselves in treating their children. Moreover, mothers who were against the use of antibiotics outnumbered those who endorsed it. This may be attributed to the educational level of the mothers included in the present study which revealed that most of them were university graduates. The level of education was directly proportional to the knowledge level about the use of antibiotics and the etiology of URTIs. Increased educational level is suspected to decrease antibiotic misuse among mothers in the community. This finding is in accordance with that found by Yunis et al., (2008) in Beirut, Lebanon and Saradamma et al., (2000) in the Indian state of Kerala.

The present study showed that only ~ 50% of the mothers knew what antibiotics are used for. Hence educating mothers is an important issue. Interestingly, working mothers' children get sick less often than children of housewives. This finding may be explained by the association of the working and educational level. Moreover, the current study showed that working mothers had better knowledge than housewives regarding antibiotic use and cause of URTIs which may also be attributed to the educational level. In a Hong Kong survey study, it was found that educated respondents and working parents had higher knowledge scores, and those who knew the viral etiology of URTIs were less likely to demand antibiotics (Chan, 1996). On the other hand, the present study showed that there were a relatively small number of mothers who preferred to use non-prescribed antibiotics or pressured their doctors to prescribe an antibiotic for their children. This is inconsistent with the results of a previous survey which was done in the United States, where 48% of pediatricians reported that parents always or often pressure them to prescribe antibiotics. In that same study 78% of the pediatricians sampled believed that educating parents on appropriate indications for antibiotic use was the single most important factor to promote suitable prescribing (Bauchner et al., 1996).

Another reason for the high percentage of mothers who sought medical advice might be related mainly to the fear of antibiotic side effects and the thoughts about possible effect of antibiotic in decreasing natural immunity. In a similar study done by Al Zamil (2005) in

Riyadh, Saudi Arabia, where he questioned parents about antibiotic use for their children, 46.3% thought that antibiotics lower immunity, 11.6% thought that they cause damage to the kidney, 8.6% thought that they cause diarrhea, 8% were afraid that if they did not complete the course then the child might get infected with stronger organisms, while 34.9% believed that antibiotics may cause all the above mentioned side effects. In addition, the current study shows that the most commonly used non-prescribed antibiotic was amoxicillin in combination with clavulanate compared to the finding of Al Zamil, (2005) which revealed that amoxicillin alone was the most used non-prescribed antibiotic.

The main limitation of the present study was that, the recall among respondents might not have been accurate. In addition, we did not determine whether the mothers used the leftover antibiotics stored in respondents' homes or not, that may affect the effectiveness and side effects of the antibiotics. Moreover, part of the present study was web-distributed, so, the sample might not be representative of all society classes. Other limitations include that the survey was done in the city of Jeddah only and does not depict the status in rural communities as well as data on economic status was not collected which might have better explained the distribution of study variables.

CONCLUSION

Inappropriate antibiotic use for pediatric URTIs in Jeddah, Saudi Arabia is a health problem and may have been facilitated by low knowledge and easy availability without required prescription at a retail pharmacy. Educational intervention on the consequences of inappropriate antibiotic use in children and effective communication between physicians and parents are recommended. The current study emphasizes that socio-demographic classes of mothers should be especially targeted. Moreover; healthcare providers should be encouraged to discuss the influence of antibiotic misuse with parents. Pharmacists have a serious responsibility not to dispense these agents without prescriptions and to discourage patients from obtaining these drugs for self-treatment. A multidisciplinary approach to rational antibiotic use, dispensing these drugs as 'prescription only medicine' and educating the mothers, especially about the proper use of the antibiotics, can halt inappropriate use and contain resistance.

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