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## Original article

## An exploration of parents' knowledge, attitudes and practices towards the use of antibiotics in childhood upper respiratory tract infections in a tertiary Jordanian Hospital

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## ABSTRACT

**Objectives:** The present study aimed to evaluate the parents' knowledge, attitudes and practices (KAP) towards the use of antibiotics for childhood upper respiratory tract infections (URTIs), at the Jordanian University Hospital.

**Methods:** This was a cross-sectional study. During the study period, 1301 parents of young children completed a validated – structured questionnaire.

**Results:** Gaps in common knowledge related to antibiotics and their use were noted among participants. Nearly half of respondents believed that antibiotics are void from adverse effects, while 72.4% of them believed that a child should be given an antibiotic if it develops fever, even though 60% they were aware that most URTIs were viral in nature. Parents reported that they administered antibiotics to children without medical advice most of the time for various causes, including using a previously prescribed antibiotic for a similar illness (27.1%), or based on pharmacist's recommendation (23.8%).

**Conclusion:** The results demonstrated the need for educational interventions to increase the awareness of parents about antibiotics to reduce inappropriate use and its consequences.

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## 1. Introduction

The discovery of antibiotics is considered one of the greatest achievements of the twentieth century, due to their pivotal role in saving the lives of millions of patients worldwide. Since their landmark discovery, the use of antibiotics has grown enormously. For instance, in 2010 azithromycin and amoxicillin were of the ten most commonly prescribed drugs in the United States (<http://www.webmd.com/drug-medication/news/20110420/the-10-most-prescribed-drugs#1> (accessed May 24, 2017)). Nevertheless, this tremendous growth in antibiotic utilization is not void of dangers, as inappropriate prescription of antibiotics by physicians and

overuse of antibiotics by the public, since it raises serious concerns about the emergence of resistant bacterial strains. These concerns stem from the well-established relationship between antibiotic use and resistance, as previous research has demonstrated that countries with the highest antibiotic consumption have the highest prevalence of resistant pathogens (Goossens et al., 2004; Ventola, 2015). As Upper Respiratory Tract Infections (URTI) are common in children and adults, overt or inappropriate antimicrobial treatment of URTIs even for viral infections is not unusual and has been reported in many studies in both developed and developing countries (Li et al., 2016; Hong et al., 1999). In fact, it is an important contributor not only to developing antibiotic resistant strains but also to increasing health care costs (Hersh et al., 2013; Salonga, 2009). Thus, all efforts must be made by governmental agencies and health care providers to control the prescription of antibiotics by physicians and utilization of antibiotics by the general public.

Controlling the public's misuse of antibiotics requires a multi-disciplinary plan that involves the effective cooperation between both health care professionals and members of the public. It has been claimed that there was a relationship between the number of children, the age of parents and income on parent's knowledge and attitude towards using antibiotics (Abu hammour

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et al., 2018). Based on the reports issued by the World Health Organization (WHO), substantial evidence pinpoints the importance of active engagement of patients in decisions related to therapeutic options in the management of their diseases in order to achieve favorable therapeutic and economic outcomes. Interventions targeted to improve patient engagement in decision-making should focus on improving health literacy, actively involving patients in decision-making, and empowering patients to manage their disease (Coulter et al., 2008). All these interventions focus basically on increasing patients' knowledge about their disease and therapeutic alternatives as knowledge has a pivotal role in shaping patients' attitudes towards their therapy. In the current technological era, the amount of information available on the web is enormous, but unfortunately not always accurate. This creates an extra task for health care professionals which includes refining and correcting patients' knowledge. Thus it is crucial to assess the parents', the parents' basic knowledge and attitudes towards the disease and its therapies, to allow the clinical team to correct any misconceptions.

The present research aims, through a cross-sectional survey, to evaluate the parents' Knowledge, Attitude, and Practice (KAP) towards the use of antibiotics for URTIs in children in a tertiary hospital in order to identify gaps in knowledge and malpractices that will allow physicians, clinical pharmacists and nurses to design educational programs to correct such misconceptions and malpractices.

## 2. Methodology

### 2.1. Recruitment site and participants

The present study was conducted for a period of six months, from December/2015 until May/2016 via a cross-sectional design at Jordan University Hospital, a 600-bed teaching hospital in Jordan. Study subjects were adults who were parents of children aged between 4 and 8 years. Trained research assistants approached possible participants in pediatric outpatient clinics, emergency department in addition to pediatric wards. They provided a summary of the study and its aims. Parents who agreed to take part in the study were asked to complete pre-validated structured and anonymous questionnaire that was later collected by the research assistants. The study's protocol was approved by the hospital's institutional review board and has been granted an ethical approval (reference number is <https://doi.org/10/2015/20657>).

### 2.2. Data instrument

The questionnaire was developed by reviewing available questionnaires in the literature. The questions were adapted with modifications from published validated Greek questionnaires that were also utilized in a Palestinian study (Zyoud et al., 2015; Panagakou et al., 2011; Rousounidis et al., 2011). Comparability with these surveys and the validity of the instruments were important factors in determining which questions to be included in the final version of the questionnaire. Various drafts of the questionnaire were evaluated individually by a clinical pharmacist and an infectious control pediatric consultant in order to ensure face validity and to be applicable to Jordan. To facilitate data collection, the questionnaire was translated from English into Arabic and back into English by two individuals who are fluent in both languages. Additionally, a preliminary test was applied to 30 parents to address any ambiguity in the questions, and to determine whether the data would provide reliable information or not. Data collected during this pilot part of the study were excluded from the final data analysis.

The final version of the questionnaire developed by the research team comprised four sections as follows:

- (i) The first section was designed to gather sociodemographic information about respondents.
- (ii) The second section aimed to assess parents' knowledge regarding issues concerning URTIs and antibiotics.
- (iii) The third section contained statements and questions to assess the parents' attitudes in this regard.
- (iv) The last section contained statements and questions to assess the parents' practices through their actions in this regard.

### 2.3. Statistical analysis

The minimum required sample size was calculated to be 385 utilizing the [Raosoft sample size calculator](#). The calculations were made assuming an unlimited population size, a 95% confidence interval and 5% error margin and a 50% chance of agreeing to take part in the study. All responses were coded and entered into PASW Statistics (SPSS Inc., Chicago, IL, USA) version 20.0. Descriptive analyses were used where appropriate using frequencies of the variables.

## 3. Results

### 3.1. Socio-demographic profile

Questionnaires were distributed to 1380 parents in JUH, out of which 1374 were completed and collected, representing a response rate of 72.3%. Seventy-three questionnaires were excluded because of poor completion. More than half of the respondents were aged between 25 and 44 years (791, 60.8%). Less than a tenth of the respondents (9.3%) claimed that they had bad access to health care system, while the vast majority of respondents declared Jordanian nationality (90.6%) The demographic profile of the study population is presented in [Table 1](#).

### 3.2. Knowledge

According to the respondents, the main source of information on the use of antibiotics was obtained from physicians (65.2%) followed by the television (18.5%), and family relative (17.6%). A list of medications was given to parents and they were asked to distinguish antibiotic drugs from others which included antipyretics, analgesics, and bronchodilators. For each choice, at least half of

**Table 1**  
Demographic profile of respondents (n = 1301).

Characteristic	Number of Respondents (%)
Female	666 (51.2%)
Mean number of children	3.6
Insured	935 (71.9%)
Access to health care system* (medium-very good)	1194 (91.7%)
Jordanian nationality	1179 (90.6%)
High family income*	153 (11.8%)
Moderate family income*	790 (60.7%)
Father's education status (School graduate)	513 (40.1%)
(College or University)	779 (59.9%)
Mother's education status	
(School graduate)	461 (35.5%)
(College or University)	840 (64.6%)
Having a child that suffered from URTIs (i.e., colds, ear infections, sore throat)	599 (46.0%)

\* Self-assessment as perceived by the parents at the time of the survey.

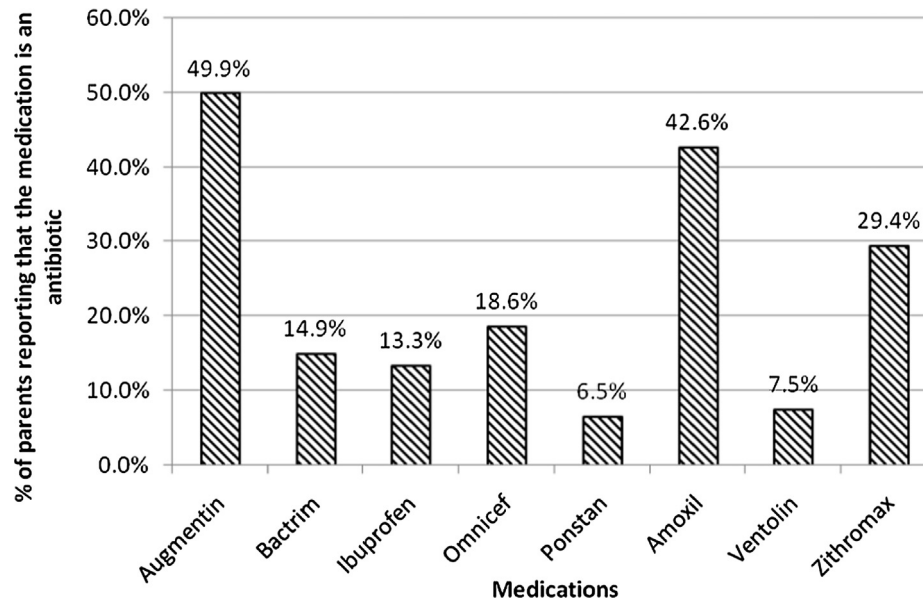


Fig. 1. Ability of parents to recognize antibiotics portrayed as the percentage of respondents reporting that each of the above medications is an antibiotic.

Table 2

Parents' knowledge regarding the appropriate use of antibiotics (n = 1301).

	Strongly agree/ agree N (%)	Neither agree nor disagree N (%)	Strongly disagree/ disagree N (%)
Once your child develops fever, you should give him/her antibiotic regardless the cause	942 (72.4%)	76 (5.8%)	283 (21.8%)
Since upper respiratory tract infections such as flu, common cold, ear infections and sore throat are usually of a viral cause, antibiotics should not be used to cure them	781 (60%)	351 (27%)	169 (13%)
A child with a cold or a flu will improve quickly if it receives regular antibiotic doses	932 (71.6%)	200 (15.4%)	169 (13%)
Novel antibiotics can be always produced by scientists to eradicate resistant bacteria	909 (69.8%)	272 (20.9%)	120 (9.2%)
Antibiotics do not cause adverse events	680 (51.5%)	268 (20.6%)	123 (17.9%)
If antibiotics are given for no reason. Its effect will decrease and bacteria become resistant	889 (68.3%)	289 (22.2%)	167 (9.4%)
Complications of upper respiratory tract infections could be minimized by giving the antibiotics	826 (63.5%)	308 (23.7%)	123 (12.8%)

the respondents chose the incorrect answer. Parents' choices of antibiotics are portrayed in Fig. 1. More than fifth of the respondents appeared less certain about the possibility of side effects emergence due to antibiotic use while almost half of the respondents wrongly believed that antibiotics are void of side effects. More than two-thirds (72.4%) believed that once the child has developed a fever, antibiotics should be given. On the other hand, a total of 68.3% of respondents were aware that misuse of antibiotics will lead to an increase in bacterial resistance. Table 2 demonstrates the responses to questions present in the knowledge section.

### 3.3. Attitude

Almost two-thirds of respondents (68.0%) will seek a pediatrician's opinion once their child develops URTI symptoms. The most common symptoms leading to a visit to the pediatrician are: fever (60.3%), ear pain (51.9%), nose drainage (32.7%), sore throat (23.3%), and change in behavior (21.9%). Whereas less than one-fifth of parents will do so in the case of hoarseness (13.2%) or cough (6.0%). When parents were asked for the possible treatment options, almost half of them chose antibiotics, and analgesics as a possible therapy most of the time (48.9% and 49.7% respectively). Parental expectations for antibiotic use in relation to URTIs indicated that ear pain, sore throat, or fever were the most common symptoms for which respondents expect to receive antibiotics most of the time (% 60.5%, 51.8%, 45.9% respectively). Whereas

more than two-thirds of respondents expect to receive antibiotics sometimes or not at all in the case of vomit (71.7%), cough (73.3%), nose drainage (81.0%), or cold (84.0%). Finally, parents have reported administering antibiotics without consulting a physician. A detailed frequency analysis of antibiotic self-administration by parents stratified by etiology is presented in Fig. 2.

Strong agreement (88.3%, 85.8%, and 75.8%) was indicated by three statements in particular: "Do you believe that antibiotics are used excessively", "I think that both pediatricians and parents should receive information regarding proper use of antibiotics" and "In order to avoid any complications of my child's infection", I would visit the pediatrician respectively (Table 3).

### 3.4. Practice

Almost a tenth of the respondents has rarely followed pediatricians' instructions and advice (10.2%), or their pediatricians rarely explained to them if their child's condition required antibiotics (11.3%). More than half of the respondents (54.5%) asked the pediatrician most of the time when he/she prescribed an antibiotic if it is actually necessary. Less than half of the respondents (42.0%) indicated that pediatricians never prescribe antibiotics by phone, or never praise their pediatrician if he/she preferred not to give an antibiotic (43.0%).

Nearly one-quarter of the respondents claimed that most of the time they asked for antibiotics directly from the pediatrician in case they strongly wanted their child to receive it (26.3%), urge

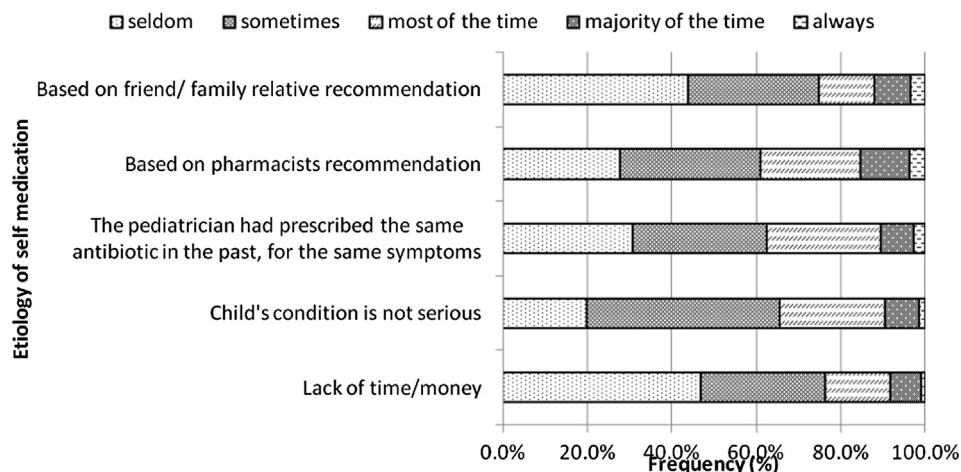


Fig. 2. Frequency analysis of antibiotics self-administration by parents stratified by etiology.

Table 3

Summary of responses about parents' attitudes regarding antibiotics (n = 1301).

	Strongly agree/ agree N (%)	Neither agree nor disagree N (%)	Strongly disagree/ disagree N (%)
Do you believe that antibiotics are used excessively?	1149 (88.3%)	88 (6.8%)	64 (4.9%)
If, based on your opinion, your pediatrician does not prescribe your child antibiotics often enough, would you change him/her?	508 (39.1%)	200 (15.4%)	593 (45.5%)
If, based on your opinion, your pediatrician prescribes your child antibiotics very often, would you change him/her?	657 (50.5%)	349 (26.8%)	295 (22.7%)
If your child presents with the same symptoms of a previous illness, would you use the antibiotic used by your child during that illness?	723 (55.5%)	240 (18.4%)	338 (26.0%)
I think that both pediatricians and parents should receive information regarding proper use of antibiotics	1116 (85.8%)	125 (9.6%)	60 (4.7%)
If your child suffers from recurrent upper respiratory tract infections, would you pressure your pediatrician for prescribing an antibiotic?	480 (36.9%)	297 (22.8%)	524 (40.3%)
When your child has only nose drainage, would you take it to the pediatrician?	569 (43.7%)	152 (11.7%)	580 (44.6%)
I think I'm more concerned about my child health more than other parents do for theirs	748 (57.5%)	296 (22.8%)	257 (19.7%)
In order to avoid any complications of my child's infection, I would visit the pediatrician	987 (75.8%)	132 (10.1%)	182 (14.0%)

their pediatricians most of the time to give antibiotics even when the diagnosis was not confirmed (23.7%), and (22.2%) of respondents think that their pediatrician gave them antibiotics only because they asked him or her to prescribe it (Table 4).

#### 4. Discussion

The pattern of misuse and abuse of antibiotics by Jordanian parents when their children are affected by URTIs has not been investigated previously. However, studies investigating the patterns of antibiotic consumption and its appropriateness in community pharmacies or households (Al-Azzam et al., 2007; Al-Bakri et al., 2005) revealed unacceptably high frequency of over the counter dispensing of antibiotics from pharmacies, as 46% of dispensed antibacterials were without a prescription and were dispensed based either on the patient's desire or based on pharmacists' advice. Furthermore, the use of 34% of the antibiotics prescribed over the counter was judged to be inappropriate (Al-Bakri et al., 2005). Thus, it is expected that inappropriate consumption is frequent amongst parents of children with URTI. The first step to assess and solve this problem is to understand the knowledge, attitudes, and practices of Jordanian parents towards antibiotics administered to their children when affected by URTIs, for this reason the present study was designed and conducted.

The response rate obtained in the present study (72.3%) was similar to rate obtained in a Cyprus study (69.3%) (Rousounidis

et al., 2011) but lower than the response rate obtained in a small size (n = 385) Palestinian study (96.1%) (Zyoud et al., 2015). All these studies utilized self-administered questionnaires. High response rates exceeding 90% have been also obtained in studies utilizing phone interviews. Nevertheless, as a methodology, self-reported questionnaires are reported to provide more accurate information compared to phone interviews (Rousounidis et al., 2011). This methodology can also provide more accurate results compared to face to face interviews as parents will not be influenced or embarrassed by the interviewer (Rousounidis et al., 2011).

This study has revealed that parents are satisfied with the received health care services. The main source for requiring information regarding antibiotics was physicians for about two-thirds of parents. Nevertheless, it seems that a significant proportion of them were skeptical about their pediatricians' practice regarding antibiotic prescription since as much as 39.1% and 50.5% of them states that they would change their pediatrician if he/she under or over-prescribes antibiotics respectively. This opposes results obtained from Greek parents as they wouldn't usually change their pediatrician based on his/her pattern of antibiotic prescription (Panagakou et al., 2011).

As reported previously, many respondents appeared to have misconceptions or inadequate overall knowledge regarding the antibiotics and their appropriate use (Zyoud et al., 2015). The majority of recruited parents agreed that antibiotics are required



**Table 4**  
Summary of responses about parents' practice regarding antibiotics (n = 1301).

	Most of the time/always N (%)	Sometimes N (%)	Seldom N (%)
I pay attention to the possible adverse events of antibiotics	812 (62.5%)	268 (20.6%)	221 (17.0%)
I will ask the pediatrician when he/she prescribe antibiotic for my child if it is actually indicated	709 (54.5%)	315 (24.2%)	227 (21.3%)
I will express approval for my pediatrician if he/she prefers not to prescribe antibiotics	404 (31.1%)	337 (25.9%)	560 (43.0%)
Pediatrician prescribes antibiotics by phone	318 (24.4%)	437 (33.6%)	546 (42.0%)
I will ask the pediatrician to prescribe antibiotic when I wish to give it to my child	342 (26.3%)	366 (28.1%)	593 (45.6%)
I follow the pediatrician's instructions	926 (71.2%)	242 (18.6%)	133 (10.2%)
I will urge the pediatrician to prescribe antibiotic even incase of unconfirmed diagnosis	309 (23.7%)	237 (18.2%)	755 (58.0%)
The pediatrician explains to me the condition of my child and if he/she is in a need of antibiotic or not	860 (66.0%)	294 (22.6%)	147 (11.3%)
The pediatrician prescribes antibiotic only because I ask him	290 (22.2%)	381 (29.3%)	630 (48.4%)

once a child develops a fever (72.4%). Furthermore, 63.5% of them believed that antibiotics will decrease complications of URTIs. This belief was reflected in the parents' attitudes as their antibiotic expectations for certain URTIs were high. In addition, parents admitted that they administer antibiotics to their children, even without medical advice. On the other hand, as much as 60% of the parents were aware that URTIs are usually of viral origin and do not require antibiotic therapy. This contradiction could possibly be explained by the fact that more than half of parents believed that antibiotics are void from side effects. Thus, even if URTIs are of viral origin, they believe that antibiotics should be administered to a child if he/she develops a fever as they are not harmful.

Similar to previous research, the results of the present study has revealed that most of the respondents agreed that inappropriate use of antibiotics is one of the factors which may lead to developing bacterial resistance (Zyoud et al., 2015). At the same time the majority of respondents (69.8%) also believed that despite the emergence of resistance from inappropriate use, scientists will always be able to develop effective antibiotics for resistant bacteria which could explain their tendency to the overuse of antibiotics.

Fever was the most common symptom leading to visits to pediatricians according to respondents. Similar results have been reported by a Palestinian cross-sectional study (Zyoud et al., 2015). On the other hand, in Greece, such visits were driven by a runny nose accompanied by other URTIs in 95.0% of respondents (Panagakou et al., 2011).

As expected administrating antibiotics without prescription was high. For instance, parents reported administering antibiotic to their children without referring to their pediatrician most of the time due to various causes including presenting the same symptoms of a previous disease for which a physician has prescribed an antibiotic (27.1%), the symptoms of the disease are mild (25.0%), or based on pharmacist's advice (23.8%). Our results in this regard are not surprising as in Jordan, similar to other developing countries antibiotics are sold over the counter without the need for a prescription despite being an illegal action. As a result, the parent can easily dispense any type of an antibiotic based on his own knowledge or based on the pharmacists' recommendation. This contrasts results obtained from Cyprus studies were only a small number of parents or patients reported administering antibiotics to their children or themselves without first consulting a physician. This could be attributed to the strict regulations that are implemented in the country to control antibiotic dispensing from community pharmacies (Rousounidis et al., 2011; Scicluna et al. 2009). Thus, to limit the phenomenon of self-medication and its unwanted sequels, educational programs for both parents and health care providers paralleled by applying strict regulations for antibiotic dispensing from community pharmacies are of paramount importance.

Patients can have an influential role in the physician's decision to prescribe drugs including antibiotics. For instance, the results of a large-scale survey that included 1000 general practitioners from

the UK revealed that as much as 55% of them would prescribe an antibiotic even when they were not certain about their medical necessity, the main reason was the parental pressure. Furthermore, 44% of them confessed that they only prescribed an antibiotic to get the patient to leave (Cole, 2014). We have not investigated the pediatricians' opinion in the present study, nevertheless, based on parents' answers it seems that the parental pressure is not the leading cause of prescribing an antibiotic by the physician because less than a quarter of respondents think that their pediatrician prescribed them an antibiotic only because they have asked him or her to do so.

The present study, as any other study, has several strengths and limitations that should be acknowledged. The strengths of this study lay in the fact that it is the first study up to our knowledge to assess parents' knowledge, attitudes, and practices towards antibiotic use in children with URTIs at pediatrics clinics at a Jordanian teaching hospital. The large sample size (more than three-folds of the minimum required sample size) and the relatively high response rate is another strength point. On the other hand, the generalizability of the results can be limited by the fact that the study was conducted in only one hospital.

## 5. Conclusion

Despite the limitations of the present study, it has provided some interesting data regarding parents' knowledge, attitude, and practice towards antibiotic use in children with URTIs. It has highlighted the ambiguities among parents with regard to the appropriate use of antibiotics. Thus, the results obtained from this study will be a cornerstone for designing innovative awareness programs for Jordanians. Furthermore, it adds more evidence to policy makers about the importance of implementation of national legislations regarding over the counter dispensing of antibiotics which will help to improve the utilization of antibiotics and to decrease antimicrobial resistance.

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## Ethical approval

The Institutional Review Board at the University of Jordan hospital.

## Conflict of interest

None declared.

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## References

- Abu hammour, K., Abu Farha, R., Alsous, M., Rizik, M., Abu Hammour, W., 2018. Evaluation of risk factors affecting parental knowledge and attitude toward antibiotic use in children with upper respiratory tract infections. *Eur. J. Integr. Med.* 17, 107–111.
- Al-Azzam, S., Al-Husein, B., Alzoubi, F., Masadeh, M., Ali, Al-Horani Mohammad, 2007. Self-medication with antibiotics in Jordanian Population. *Int. J. Occup. Med. Environ. Health* 20, 373–380.
- Al-Bakri, A.G., Bustanji, Y., Yousef, A.-M., 2005. Community consumption of antibacterial drugs within the Jordanian population: sources, patterns and appropriateness. *Int. J. Antimicrob. Agents* 26, 389–395.
- Cole, A., 2014. GPs feel pressurised to prescribe unnecessary antibiotics, survey finds. *BMJ* 349, g5238.
- Coulter, A., Parsons, S., Askham, J., 2008. Where Are the Patients in Decision-Making about Their Own Care? World Health Organization, World Health Organization 2008 and World Health Organization, on Behalf of the European Observatory Health Systems and Policies 2008. <http://www.who.int/management/general/decisionmaking/WhereArePatientsinDecisionMaking.pdf>.
- Goossens, H., Ferech, M., Vander Stichele, R., Elseviers, M., 2004. ESAC Project Group L. Outpatient antibiotic use in Europe and association with resistance: a cross-national database study. *Lancet (London, England)* 365, 579–587.
- Hersh, A.L., Jackson, M.A., Hicks, L.A., 2013. American Academy of Pediatrics Committee on Infectious Diseases. Principles of judicious antibiotic prescribing for upper respiratory tract infections in pediatrics. *Pediatrics* 132, 1146–1154.
- Hong, J.S., Philbrick, J.T., Schorling, J.B., 1999. Treatment of upper respiratory infections: do patients really want antibiotics? *Am. J. Med.* 107, 511–515.
- Li, J., Song, X., Yang, T., et al., 2016. A systematic review of antibiotic prescription associated with upper respiratory tract infections in China. *Medicine (Baltimore)* 95, e3587.
- Panagakou, S.G., Spyridis, N., Papaevangelou, V., et al., 2011. Antibiotic use for upper respiratory tract infections in children: a cross-sectional survey of knowledge, attitudes, and practices (KAP) of parents in Greece. *BMC Pediatr.* 11, 60.
- Rousounidis, A., Papaevangelou, V., Hadjipanayis, A., et al., 2011. Descriptive study on parents' knowledge, attitudes and practices on antibiotic use and misuse in children with upper respiratory tract infections in Cyprus. *Int. J. Environ. Res. Publ. Health* 8, 3246–3262.
- Salonga, M.J., 2009. Beliefs and practices of parents on the use of antibiotics for their children with upper respiratory tract infection. *Pediatr. Infect. Dis. Soc. Philipp. J.* 10, 40–44.
- Sample Size Calculator by Raosoft, Inc. <http://www.raosoft.com/samplesize.html> (accessed Jun 15, 2017).
- Scicluna, E.A., Borg, M.A., Gür, D., et al., 2009. Self-medication with antibiotics in the ambulatory care setting within the Euro-Mediterranean region; results from the ARMed project. *J. Infect. Publ. Health* 2, 189–197.
- The 10 Most Prescribed Drugs <http://www.webmd.com/drug-medication/news/20110420/the-10-most-prescribed-drugs#1> (accessed May 24, 2017).
- Ventola, C.L., 2015. The antibiotic resistance crisis: part 1: causes and threats. *P T.* 40, 277–283.
- Zyoud, S.H., Abu Taha, A., Araj, K.F., et al., 2015. Parental knowledge, attitudes and practices regarding antibiotic use for acute upper respiratory tract infections in children: a cross-sectional study in Palestine. *BMC Pediatr.* 15, 176.