

PARENTAL PERCEPTION REGARDING ANTIBIOTIC USE IN CHILDREN- A CROSS-SECTIONAL STUDY IN A TERTIARY CARE HOSPITAL, ODISHASristi Ganguly^{1*}, Kiran C. Pankaj² and Saroj K. Satpathy¹¹Department of Pediatrics, SVPPGIP, SCBMCH, Cuttack, Odisha, India.²Department of Pediatrics, Dr. B.R. Ambedkar Memorial Hospital, Raipur, Chhattisgarh, India.***Corresponding Author: Sristi Ganguly**

Department of Pediatrics, SVPPGIP, SCBMCH, Cuttack, Odisha, India.

Article Received on 10/03/2020

Article Revised on 30/03/2020

Article Accepted on 20/04/2020

ABSTRACT

Background: Antimicrobial resistance is one of the top ten threats to public health worldwide, in which society plays a pivotal role. Irrational prescribing trends by doctors and easy availability of antimicrobials over the counter, and parents' attitudes and beliefs regarding antibiotics, assume prime importance. This study attempts to understand the parenteral perception of antibiotics use in children, and the factors responsible for a favourable attitude towards the same. **Methodology:** This is a hospital based cross-sectional study, enrolling parents of children aged upto 14 years, in SCBMCH and SVPPGIP, Cuttack, during March 2019 to September 2019. A structured questionnaire was administered, including socio-demographic details and twenty statements to assess their attitude. A scoring system employed with +1 and -1 for favourable and unfavourable response, and 0 for uncertain. A total score ≥ 0 was considered favourable attitude. Data was analysed with Chi-square test and percentages, using SPSS 18. **Results:** 30.7% and 26.3% felt antibiotics were needed to cure fever and cold respectively. 38.7% were unaware of side-effects of antibiotics and 42.3% refuted the phenomenon of resistance. 55% found using antibiotics without consulting a doctor to be acceptable. 33% even requested the doctor for antibiotics. 37% admitted discontinuing the antibiotics upon recovery. 53.3% had an overall favourable attitude towards antibiotic use. Child's age (p 0.003), mother's education (p 0.036), income (p 0.009), socioeconomic status (p<0.001), self-medication (p<0.001) were significantly associated with the same. **Conclusion:** The poor parenteral perception regarding antimicrobials mandates an urgent need to improve doctor-patient relationship, and create awareness among the public about the correct antibiotic practices.

KEYWORDS: Parental perception, knowledge, antibiotics.**INTRODUCTION**

According to World Health Organisation, antimicrobial resistance has been declared as one of the top ten threats to public health worldwide.^[1] The phenomenon of antibiotic resistance is further aggravated by their overuse in developed nations, and by misuse in developing nations. Overuse of existing drugs and the difficulty in developing new antibiotics, along with emergence of resistant bacteria that were responsible for common infections, results in prolonged illness, higher costs of health care and mortality in the community.^[2,3] Keeping this in mind, on the occasion of world health day 2011, WHO urged national commitment for a comprehensive and financed plan with accountability and civil society engagement.^[4]

Society plays a pivotal role in the emergence and control of such misuse and abuse of the drugs. Among the various factors that could be considered responsible for the havoc arising from such widespread overuse, such as irrational prescribing trends by doctors and easy

availability of antimicrobial over the counter using previous prescription or without prescription, the patients' attitudes and beliefs, satisfaction along with previous experiences with antibiotics, assume prime importance.^[5,6]

Children remain to be largely dependent on their parents and care-givers for their health and health related decisions, and thus the mind-set of the care-givers, their knowledge and attitudes determine the medicines and health care and consequences children face. Since they belong to population, who are exposed to multiple drugs, owing to their frequent common ailments, they easily fall prey to inadvertent use of antibiotics.^[7] The situation assumes an even more important mention in India, owing to its high pediatric population and increasing burden of infectious diseases, giving rise to increased usage of antimicrobials. The relaxed laws over the dispensing and distribution of these drugs in our country, further clears the path for antimicrobial abuse by the public.

Whether it is the doctors' prescribing trends that urge parents and care-givers to have such unrealistic expectations and faith in antimicrobials, or vice versa is a matter of concern. Planning for interventions to reduce antimicrobial misuse, would need an understanding of the root cause of the problem, for which it is essential to study the knowledge and attitudes of parents regarding the use of antibiotics in children. In the absence of such data, effective measures to tackle the issue and enforce laws and schemes to overcome this challenge may remain in vain.

This study, attempts to, thus, understand the parenteral perception of antibiotics in children, and the factors responsible for a favourable attitude towards the same.

METHODOLOGY

Objective: To assess the perception of parents regarding antibiotics and determine the factors associated with a favourable attitude.

Design settings: A hospital based cross-sectional study was conducted during the period April 2019 to September 2019 among the children attending the paediatric outpatient setting of SCBMCH and SVPPGIP, Cuttack, a tertiary care hospital in Odisha.

Inclusion and exclusion criteria: All the parents/ care-givers of patients aged >1 month attending Paediatric outdoor at S.V.P.P.G.I.P. & S.C.B. MCH, Cuttack were included in the study. Critically ill patients were excluded from the study.

Study tools: A structured dichotomous questionnaire was prepared by taking into account the standard format followed in previous studies, including details of demography, socio-economic scale of parents and children. A list of twenty statements pertaining to common assumptions and beliefs about antibiotics were administered and parents were asked to respond as either "agree" or "disagree" or "don't know", to the best of their knowledge. The questionnaire was prepared in both English and Odiya for convenience of the patient attendants, and was verbally administered.

The questionnaire was validated according to the geographical, religious and cultural factors. A pilot study was done at the start for period of 1 month, and necessary changes made in the questionnaire.

The parents were further scored on the basis of their response with scoring being as follows: +1 for favourable response (complying with the expected attitude), -1 for an unfavourable response and 0 for an uncertain ("don't know") response. The total score, thus, obtained was taken to reveal the overall perception of the parents, with a score ≥ 0 being favourable.

Method of collection of data: All the parents of paediatric patients aged above 1 month to 14 years,

attending the paediatric outdoor of SVPPGIP and SCBMCH, Cuttack, were considered eligible for the study. Informed consent was obtained from the patient attendants prior to the admission of the questionnaire. After obtaining the same, the attendants were administered the questionnaire enquiring about their demographic details, followed by the statements. The administration of the questionnaire on an average took 10-15 minutes per subject.

Data analysis: All the data was collected and compiled systematically. Data was evaluated with SPSS version 18.0 and analysed with Chi-square test and percentages.

RESULTS

A total of 300 patients were studied, majority of them being male (62.7%) and belonging to the age group 5 to 14 years (41%). The average age of the child's father was 35 and mother, 29 years respectively. 63.7% belonged to rural households, with nearly half (50.7%) of the study population earning a monthly income of around Rs. 5000 to Rs. 10000. (Table I).

The prevalence of self-medication in the study group was found to be 61%, whereas the prevalence of self-medication with antimicrobials was 21%. Further, 51% of the subjects kept left-over medicines at home.

The response of the twenty questions administered to assess the parental perception of antibiotics is tabulated in table II. The questions were grouped into six domains-questions related to role and indication of antibiotics; dose and duration related questions; common practices related to antibiotics; questions related to doctor-patient; dangers of antibiotics and personal beliefs about antibiotics.

In the domain of role and indication of antibiotics, 30.7% agreed that antibiotics were needed to cure fever and 26.3% agreed to needing them in cold and cough. A minority of the parents (16.7%) felt antibiotics could cure all diseases whereas majority of them (44.3%) did not know about the same.

Only 32% of the study population agreed to the possibility of antibiotics having side-effects; majority (38.7%) claimed they were unaware of the same. Further, most of the parents i.e. 42.3% disagreed to the phenomenon of resistance occurring on repeated use of antibiotics.

Little less than half (45.3%) of the population felt antibiotics could be taken in lesser dose and duration for less serious infections, and most (37%) agreed that they stopped the antibiotics once child recovered. Most of them (55%) also found using antibiotics without consulting a doctor to be an acceptable practice.

51% of parents confirmed that their doctor usually prescribes antibiotics for child's past ailments, and

around 37.3% said they resorted to the same antibiotic prescribed by their doctor, in the presence of similar symptoms. Furthermore, 33% of the study population even requested the doctor to prescribe antibiotics for their children.

On analysing the common beliefs of the parents regarding antibiotics, 26.7% believed their children did not recover without antibiotics, and more than half i.e. 55% agreed they should be administered to be on the safe side. On the other hand, a small proportion of parents (12.3%) considered antibiotics to be injurious to the child and hesitant to use them.

Among the 300 cases in the study population, 53.3% (160 out of 300) had a favourable attitude towards antibiotic use in children, with a total score greater than

zero. The highest score was 14 and the worst being -13, with mean score being 0.56.

Among the multiple factors that were thought to be significantly associated with favourable attitude, those with significant association included age of the child (p-value=0.003), mother's education (p-value = 0.036), total income (p-value= 0.009), socioeconomic status (p-value<0.001). Self-medication and self-medication with antibiotics, both were found to have a highly significant association, with p-values <0.001 each.

No significant association was seen with father's and mother's age (p-value 0.075 and 0.118 respectively), sex of child (p-value 0.254), residence (p-value 0.739), father's education (p-value 0.27), type of family (p-value 0.222), number of children in family (p-value 0.309), presence of health professional in family (p-value 0.313) and using left-over medications at home (p-value 0.08).

Table I: Demographic Details of Study Population.

Gender	No. of cases	Percentage (n=300)
Male	188	62.7%
Female	112	37.3%
AGE		
0 to 6 months	22	7.3%
6 to 12 months	49	16.3%
1 to 2 year	34	11.3%
2 to 5 year	72	24%
5 to 14 year	123	41%
Residence		
Rural	191	63.7%
Urban	109	36.3%
Parents' Monthly Income (in Rs.)		
<5000	44	14.7%
5000 – 10000	152	50.7%
10000 – 20000	46	15.3%
20000 – 40000	22	7.3%
>40000	36	12%
Presence of chronic illness in child		
Yes	74	24.7%
No	226	75.3%
No. of children in the family		
1	99	33%
2	152	50.7%
3	32	10.7%
≥4	17	5.7%
Socioeconomic status of family		
Upper (I)	27	9%
Upper middle (II)	51	17%
Lower middle (III)	80	26.7%
Upper lower & Lower (≥IV)	142	47.3%
Total	300	100%

Table 2: Parents' Response To Statements To Assess Parental Perception.

Statement	Agree	Disagree	Don't know
Role and indication			
Antibiotics are needed to cure fever	92 (30.7%)	128 (42.7%)	80 (26.7%)
Antibiotics are needed to treat cold and cough	79 (26.3%)	142 (47.3%)	79 (26.3%)
Antibiotics can treat all diseases	50 (16.7%)	117 (39%)	133 (44.3%)
Dangers of antibiotics			
Antibiotics can cause side effects in my child	96 (32%)	88 (29.3%)	116 (38.7%)
Antibiotics if used again and again can cause resistance	56 (18.7%)	127 (42.3%)	117 (39%)
Dose and duration of antibiotics			
Milder infections require smaller dose and duration of antibiotics	136 (45.3%)	76 (25.3%)	88 (29.3%)
Antibiotics can be stopped when symptoms reduce	11 (37%)	100 (33.3%)	80 (29.7%)
Doctor-patient relationship			
My doctor usually prescribes antibiotics for all my child's past ailments	153 (51%)	70 (23.3%)	77 (25.7%)
I request doctor to prescribe antibiotics when my child falls ill	99 (33%)	114 (38%)	87 (29%)
If my doctor does not prescribe antibiotics, I visit another doctor	41 (13.7%)	245 (81.7%)	14 (4.6%)
I have sufficient knowledge about antibiotics from my doctor	81 (27%)	125 (41.7%)	94 (31.3%)
I use the same antibiotic doctor prescribed for similar symptoms last time	112 (37.3%)	98 (32.7%)	90 (30%)
Practices related to antibiotics			
I use google to judge the best antibiotic for my child	48 (16%)	228 (76%)	24 (8%)
It is okay to take antibiotics without consulting a doctor	167 (55.7%)	83 (27.7%)	50 (16.7%)
It is okay to use antibiotics which were left over at home, from previous time	158 (52.7%)	81 (27%)	61 (20.3%)
Personal beliefs regarding antibiotics			
Antibiotics have worked before with good results in my child, hence it will work this time	138 (46%)	53 (17.7%)	109 (36.3%)
My child does not recover without antibiotics	80 (26.7%)	127 (42.3%)	93 (31%)
Antibiotics should be given to be on the safe side	165 (55%)	72 (24%)	63 (21%)
Antibiotics are injurious for my child	37 (12.3%)	229 (76.3%)	34 (11.3%)
Antibiotics reduce the duration of disease	172 (57.3%)	55 (18.3%)	73 (24.3%)

DISCUSSION

According to the US Centre for Disease Control and Prevention, where children are concerned, inappropriate use of antibiotics not only leads to increased resistance but also increases the financial burden on the health system because resistant infections are harder, take longer, and are more expensive to treat.^[8] In a developing country like India, where personal beliefs and practices govern the mannerism of health practice, evaluating the knowledge and attitude of the public may aid in more effective communication between the healthcare practitioners and patients, as well as promote the development of policies and schemes to educate the public.

Considering the domain of role and indication of antibiotics, 30.7% agreed that antibiotics were needed to cure fever and 26.3% agreed to needing them in cold and cough. This was substantially lower than the results seen in studies done in Malaysia and Israel, where it was 76% and 59.4% respectively, for fever. For cough and cold, the figures were as high as around 70%. The difference in rates in the different studies could be due to the difference in education and beliefs.^[9, 10] Furthermore, a significant proportion of our study population were

uncertain, unlike the other studies. Sadly, a minor proportion of the study population (16.7%) agreed that antibiotics can cure all diseases, which was in line with the studies done by Okeke et al,^[11] Lansang et al^[12] and Hui et al.^[13]

Nearly one-third of the population (32%) agreed that antibiotics have side-effects, which was significantly lower than in Israel, where it was as high as 78%.^[9] However, the real gravity of the situation lay in the response received when parents were asked about the issue of resistance being caused by repeated antimicrobial use, 39% were unaware of this phenomenon. Worse still, 42.3% refuted it. Though this is comparable to previous study done in India^[14], it was in stark contrast to the findings in surveys conducted in UK and Europe.^[15,16]

Comparable to the study done in Oman,^[17] nearly half the population felt it was correct to adjust the dose and duration of the antimicrobials depending on the disease severity. Further, 37% of parents declared to have discontinued antibiotics when their children felt better. With reference to course completion, the situation was

worse in studies done in Peru^[18] and UK,^[19] where more than 60% did not feel the need to complete the course.

Antimicrobials have been glorified to such an extent that most patients have unrealistic confidence and expectations from them. The fact that 33% of the study population opted to request the doctor for antibiotics, stands evidence to the same. Similar trends can be noted in Jordan^[20] and Palestine^[9]. 13.7% of parents further admitted that they would change the doctor if they did not prescribe antibiotics to their child, which was little lower than the percentage in Jordan (29.1%)^[20]. On the other hand, 51% claimed that it was their doctor who had prescribed antibiotics for child's previous ailments and 41.7% confessed that their doctor did not provide them enough information regarding these drugs. This brings us to a valid point, that physicians, must keep in mind, about not only being cautious and restrained with their prescriptions, but at the same time, educate the people about the pros and cons of these drugs, with strict instructions on the indications, course and side-effects.

More than half (55%) of the parents found it was acceptable to use an antibiotic without consulting a doctor, which was higher than other studies done in UAE (43.5%)^[21], Peru^[18] (23.5%), Malaysia(5%)^[9] and UK(5%)^[15]. This difference probably lies in the weak enforcement of laws in our country, which leads to illegal dispensing and circulation of drugs, over-the-counter from pharmacies without the authentic prescription of a doctor.

Another dangerous trend noted was the willingness to use left-over medicine at home for future ailments, admitted by 52.7% of our study population. This observation was consistent with the findings seen in studies in UAE^[21], Jordan^[20] and Peru^[18]. In the global survey conducted by Pechere *et al.* a higher rate of wrong belief among the public was reported with 62% believing that leftover antibiotics can be saved and used again.^[22] The practice of self-medication- be it from pharmacies, or reusing old medicines or sharing from nearby sources, perpetuates a vicious cycle of misconceptions and misuse. A parent who self-medicates, does not consult a doctor, misses out on an opportunity to be corrected about dose, duration and indications of the antibiotics. The child may be further misdiagnosed and consequent health and side-effects of the drugs are often unreported, or delayed. The child, who fortunately recovers, gives the wrong message to the parents about dependence on the antibiotic and issues of resistance are never brought up. The satisfied parent continues this self-medication the next time and so on.

57.3% were under the impression that antibiotics reduced the duration of disease, which was comparable to the results obtained in the study done in UAE^[21] and Palestine^[9]. In fact, 26.7% of the parents believed their children did not recover without antibiotics. Partly, this maybe contributed with their previous successful

experiences with these drugs, as agreed by 46% of parents. On the other extreme, there were 12.3% of parents who thought antimicrobials are injurious and unnecessary for the child, similar to 17% reported in Malaysia.^[10]

Overall, 53.3% (160 out of 300), in our study, had a favourable attitude towards antibiotic use in children, with a total score greater than zero. This is a figure with serious implications, as almost half the population has much misconceptions regarding antimicrobial use, in children, a vulnerable group. However, the high proportion of people answering many questions in uncertainty represents minds with scope to be moulded, provided they are taught the right information at the right time.

Age of the child (p-value=0.003), mother's education (p-value = 0.036), total income (p-value= 0.009) and socioeconomic status (p-value<0.001) were the social and demographic factors that were found to be significantly associated with a favourable attitude towards antimicrobial use.

With respect to age of the child, increasing age of child showed rising trend in favourable attitude towards antimicrobials, probably as parents would have used them previously, and become increasingly aware, and misconceptions begin to clear. This was also seen in a study done in Mumbai, where parents with previous experience with antibiotics showed better attitude and knowledge about the same.^[14] Another variable that showed significant association was the education of the mother, with more educated mothers being more likely to have the right approach towards antibiotics. This seems rather obvious, as an educated mother, who forms the first line of care to a child, is in a better situation to comprehend and follow instructions that the doctor explains to her. A similar association was found with level of education in other studies as well.^[14, 20, 21] Income and consequently, socioeconomic status of the parents were also significant factors that affected the attitude towards antimicrobials, which was on the lines of the studies done in UAE and Jordan.^[20, 21]

Our study however, did not show any significant differences in attitudes towards antimicrobial use on the basis of gender, parents' age, rural or urban or type of family. This was in contrast to few studies done previously, which had found association with gender and age of parents.^[14, 20]

Self-medication forms a distinct link in the chain of antibiotic misuse as it has been estimated that more than 50% of antibiotics worldwide are purchased privately without a prescription, from pharmacies or other sources.^[23] The uses of "leftover" and "shared" antibiotics by parents to their child are common situations in the Palestinian^[9] and Malaysian.^[10] communities. The practice of self-medication and

specifically self-medication of antibiotics, both formed a highly significant association with attitude towards antimicrobials (p value <0.001). Similar significance was established in the studies done in Jordan and UAE.^[20,21]

The weight of antimicrobial misuse and resistance rests on two pillars- one being the various beliefs and misconceptions cultivated by the patients, and the other, being the advice and education imparted by physicians to the people. Though the false faith and trust of the people poses a significant barrier in the path of rational drug use, it is imperative that doctors, stand strong and united, and lead by example, throwing light on the importance of supportive measures in common ailments, the importance of adherence and compliance, and the dangers of self-medication and use of left-over medications, rather than succumb to the pressures of the patients requests and satisfaction. With collective efforts of doctors and regulatory laws in place, increasing awareness will hopefully restrict the impending doom of resistance that otherwise awaits us.

CONCLUSION

The parental perception of antimicrobial use in children in Odisha has lot of scope for improvement. Lack of knowledge and incorrect practices are much prevalent. There is much need to improve the doctor- patient relationship, impart education and awareness to the parents, in an attempt to improve the looming dangers of increasing antibiotic abuse and resistance, before it becomes too late.

DECLARATIONS

Funding: Nil

Conflict of interest: None declared

REFERENCES

1. Organization W H. Ten threats to global health in 2019, 2019. Available: <https://www.who.int/emergencies/ten-threats-to-globalhealth-in-2019>. [Accessed 19 Jul 2019]
2. World Health Organization. The evolving threat of antimicrobial resistance: options for action. Available from: http://apps.who.int/iris/bitstream/10665/44812/1/9789241503181_eng.pdfnew [Accessed October 10, 2018].
3. Morgan DJ, Okeke IN, Laxminarayan R, Perencevich EN, Weisenberg S. Non-prescription antimicrobial use worldwide: a systematic review. *Lancet Infect Dis.*, 2011; 11(9): 692-701.
4. World Health Organization. World Health Day 2011: Policy briefs. Geneva, 2011. Available from: <http://www.who.int/world-healthday/2011/policybriefs/en/index.html>. [Accessed April 9, 2018].
5. 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. *Int J Antimicrob Agents*, 2005; 25(5): 439-443.
6. Al-Azzam SI, Al-Husein BA, Alzoubi F, Masadeh MM, Al-Horani MA. Self-medication with antibiotics in Jordanian population. *Int J Occup Med Environ Health*, 2007; 20(4): 373-380. doi: 10.2478/v10001-007-0038-9.
7. A World Health Organization resource: the role of pharmacist in self-care and self-medication, 1998.
8. The Centers for Disease Control and Prevention (CDC) Be Antibiotics Aware: Smart Use, Best Care, 2017. <https://www.cdc.gov/features/antibioticuse>. [Accessed September 9, 2018].
9. Zyoud SH, Abu Taha A, Araj KF, et al. Parental knowledge, attitudes and practices regarding antibiotic use for acute upper respiratory tract infections in children: a cross-sectional study in Palestine. *BMC Pediatr*, 2015; 15: 176. Published 2015 Nov 11. doi:10.1186/s12887-015-0494-5
10. 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. *Singapore Med J.*, 2006; 47(4): 266-70.
11. Okeke IN, Lamikanra A, Edelman R. Socioeconomic and behavioral factors leading to acquired bacterial resistance to antibiotics in developing countries. *Emerg Infect Dis.*, 1999; 5: 18-27.
12. Lansang MA, Lucas-Aquino R, Tupasi TE, et al. Purchase of antibiotics without prescription in Manila, the Philippines. Inappropriate choices and doses. *J Clin Epidemiol*, 1990; 43: 61-67.
13. Hui L, Li XS, Zeng XJ, Dai YH, Foy HM. Patterns and determinants of use of antibiotics for acute respiratory tract infection in children in China. *Pediatr Infect Dis J.*, 1997; 16: 560-564.
14. Shreya Agarwal, Vijay N yewale, DhaNya DharmaPalaN. Antibiotics Use and Misuse in Children: A Knowledge, Attitude and Practice, Survey of Parents in India. *Journal of Clinical and Diagnostic Research*, 2015 Nov; 9(11): SC21-SC24. DOI: 10.7860/JCDR/2015/14933.6819.
15. McNulty CAM, Boyle P, Nichols T, Clappison P, Davey P. Don't wear me out—the public's knowledge of and attitudes to antibiotic use. *J Antimicrob Chemother* [Internet], 2007; 59(4): 72738. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=med5&NEWS=N&AN=17307770> 10.1093/jac/dkl558.
16. Branthwaite A, Pechere JC. Pan-European survey of patients' attitudes to antibiotics and antibiotic use. *J Int Med Res*, 1996; 24: 229-38
17. Jose J, Jimmy B, Alsabahi AG, Al Sabei GA. A study assessing public knowledge, belief and behavior of antibiotic use in an omani population. *Oman Med J.*, 2013; 28(5): 324-330. doi:10.5001/omj.2013.95.
18. Paredes JL, Navarro R, Riveros M, et al. Parental Antibiotic Use in Urban and Peri-Urban Health Care

- Centers in Lima: A Cross-Sectional Study of Knowledge, Attitudes, and Practices. *Clin Med Insights Pediatr*, 2019; 13: 1179556519869338. Published 2019 Aug 21. doi:10.1177/1179556519869338.
19. McNulty CA, Boyle P, Nichols T, Clappison P, Davey P. The public's attitudes to and compliance with antibiotics. *J Antimicrob Chemother*, 2007 Aug; 60(Suppl 1): i63-i68.
 20. Shehadeh M, Suaifan G, Darwish RM, Wazaify M, Zaru L, Alja'fari S. Knowledge, attitudes and behavior regarding antibiotics use and misuse among adults in the community of Jordan. A pilot study. *Saudi Pharm J.*, 2012; 20(2): 125–133. doi:10.1016/j.jsps.2011.11.005
 21. Salama AR, Bader KN, Rahman AS, Hashmi FY. Parents Knowledge, attitudes and practice of use of antibiotics for upper respiratory tract infections in children: a cross-sectional study in Ras Al Khaimah, United Arab Emirates. *Epidemiology Biostatistics and Public Health*, 2018; 15(4).
 22. Pechère JC, Hughes D, Kardas P, Cornaglia G. Non-compliance with antibiotic therapy for acute community infections: a global survey. *Int J Antimicrob Agents*, 2007 Mar; 29(3): 245-253.
 23. Cars O, Nordberg P. Antibiotic resistance – The faceless threat. *Int J Risk Saf Med*, 2005; 17: 103-10.