

## Original Research Article

# Self-medication with antimicrobials in children: a study in tertiary care hospital, Odisha, India

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## ABSTRACT

**Background:** Antimicrobial resistance is emerging as global threat to health, the injudicious use being linked to multiple reasons namely parental misconceptions, easy drug availability and previous experiences. Children, due to frequent illnesses, are victims of this misuse and more than fifty percent of these drugs are self-medicated by caregivers. This study attempts to assess the trends associated with self-medication with antimicrobials in children and the factors associated with it.

**Methods:** This is a hospital based cross-sectional study, among pediatric outpatients aged 1 month to 14 years, in SCBMCH and SVPPGIP, Cuttack, during March 2019 to September 2019. A structured dichotomous questionnaire was administered to caregivers, including details of socio-demography and antimicrobials self-medicated. A pilot study was done for period of 1 month, and questionnaire accordingly modified. Data was analysed with Chi-square test and percentages, using SPSS 18.

**Results:** Among the 300 patients studied, prevalence of self-medication with antimicrobials was 21%. Most patients self-medicated on pharmacists' advice (44.4%), commonest reason being similar illness previously (41.3%). Fever (31.7%) and cold cough (28.6%) were usual conditions, with Azithromycin being most frequently administered. 54% of cases self-medicating antimicrobials, had errors of dose or duration, with 27% reporting side-effects. Child's age ( $p=0.042$ ), father's age ( $p=0.044$ ), mother's age ( $p=0.002$ ), chronic illness in child ( $p=0.002$ ) and type of family ( $p=0.011$ ) were significantly associated with antimicrobial self-medication in children.

**Conclusions:** The high prevalence of self-medication with antimicrobials mandates need to educate parents and enforce laws regarding illegal dispensing of these drugs, to reduce the threat from resistance.

**Keywords:** Antibiotics misuse, Antimicrobials in children, Self-medication

## INTRODUCTION

A lot has changed in the domain of antimicrobials- since its introduction in 1940s when they were considered as miracle drugs, a medical revolution that was considered life-saving, to present times, where indiscriminate use has led to resistance being a public threat globally.<sup>1</sup>

The vicious cycle of unrealistic expectations of patients, injudicious use of broad-spectrum antimicrobials, leading

to resistance and introduction of higher order antibiotics even in common ailments, has further worsened the scenario.<sup>2</sup>

Several factors are considered responsible for the emergence of such widespread overuse, including irrational prescribing by doctors, patients' attitudes and beliefs on efficacy of antibiotics, easy availability of the drugs, patients' satisfaction and previous experience with antibiotics.<sup>3,4</sup>

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 street vendors in the informal sector.<sup>5</sup> Children, who contribute largely to the population receiving ample drugs, due to frequent common ailments, are often the victims of self-medication and non-prescribed drugs, including antibiotics.<sup>6</sup>

The inevitable consumption of the same, apart from leading to emergence of resistant strains of the microorganisms responsible for most of the infections in childhood, that were once easily treatable, has additional hazardous consequences namely adverse drug reactions, mistreatment of the original disease or missed diagnosis, polypharmacy, need for hospitalisation and ultimately, increased overall cost of treatment.<sup>7,8</sup>

Despite the graveness of the situation, especially in a developing country like India, where misconceptions regarding these drugs are high and knowledge of the impending consequences are low, there is paucity of literature about the practices and trends of self-medication with antibiotics among parents of 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, thus, focuses on the trends of antibiotic misuse by self-medication in children and the factors that may be responsible for the same.

Objective of this study was to determine the prevalence of self-medication with antimicrobials in children and associated risk factors for self-medication with antimicrobials.

## METHODS

It is a hospital based cross-sectional study, conducted during the period March 2019 to September 2019 among the children attending the pediatric outpatient setting of SCBMCH and SVPPGIP, Cuttack, a tertiary care hospital in Odisha, India.

### *Inclusion and exclusion criteria*

All patients aged >1 month attending Pediatric outdoor at S.V.P.P.G.I.P. and S.C.B. MCH, Cuttack were included in the study. Patients whose attendants were unable to recall the required information pertaining to the study such as names of the medications or provide any evidence for the same, and critically ill patients were excluded from the study.

Study tool used was a structured dichotomous questionnaire was prepared by taking into account the standard format followed in previous studies, including details of demography, socio-economic scale, the list of

medications and antimicrobials that have been self-administered for the current complaints and other instances where self-medication with antibiotics was instituted, in the past one year. Self-medication was defined as any medicine taken without consultation of the doctor, including use of drugs brought over the counter, left-over at home, using previous prescription and even drugs prescribed verbally over phone by medical professional. The details and accuracy of the antibiotics self-medicated were also noted. The reasons and perceptions for need of self-medication were further documented.

The questionnaire was prepared in both English and Odiya for convenience of the patient attendants, and was verbally administered for parents who were illiterate/could not comprehend.

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.

All the pediatric patients aged above 1 month to 14 years, attending the pediatric 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 and about the details of their self-medication practices, if they follow it. The administration of the questionnaire on an average took 15-20 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 35.11 and mother, 29.62 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 1). The prevalence of self-medication with antimicrobials in the study population was 21% (63 out of 300). Most of the patients received these medications on the advice of the pharmacist (44.4%), followed by parents (27%) and medical personnel over phone (12.8%). 7.9% of cases self-medicating did so upon advice of quacks and family members each. Though majority of the population i.e. 61.9%, brought these drugs newly from stores, 33.3% and 4.8% of them, used medicine previously available at home and borrowed from neighbourhood respectively.

**Table 1: Demographic details of study population.**

Gender	No. of cases	Percentage (n=300)
Male	188	62.7%
Female	112	37.3%
<b>Age</b>		
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%
<b>Residence</b>		
Rural	191	63.7%
Urban	109	36.3%
<b>Parents' monthly income (in Rs.)</b>		
<5000	44	14.7%
5000 -10000	152	50.7%
10000 - 20000	46	15.3%
20000 -40000	22	7.3%
>40000	36	12%
<b>Presence of chronic illness in child</b>		
Yes	74	24.7%
No	226	75.3%
<b>No. of children in the family</b>		
1	99	33%
2	152	50.7%
3	32	10.7%
>4	17	5.7%
<b>Socioeconomic status of family</b>		
Upper (I)	27	9%
Upper middle (II)	51	17%
Lower middle (III)	80	26.7%
Upper lower and lower (>IV)	142	47.3%
Total	300	100%

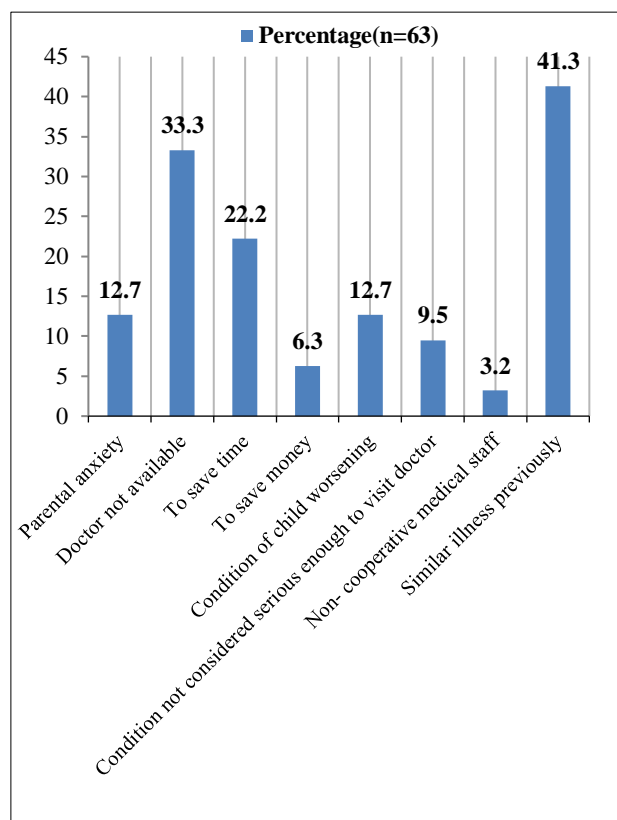
Various reasons were identified as to why parents resorted to self-medication with antibiotics, in their children, as shown in Figure 1. Leading in the list was the presence of a similar illness in child previously (41.3%), followed by unavailability of the doctor (33.3%) and to save time (22.2%).

In fact, among those parents who self-medicated on basis of previous similar experience, 69.2% had decided by themselves that it was the same disease as previously, without medical consultation.

Most of them started the medications immediately after the onset of symptoms (60.3%), whereas 22.3% remaining started within 3 days. However, 9.5% of the study population chose to self-medicate even after consultation with a physician.

Table 2 further lists the common conditions for which parents chose to self-medicate with antimicrobials,

primary ones being fever (31.7%) and cold and cough (28.6%). Among the antibiotics that were self-medicated, the popular choices were Azithromycin (28.6%), amoxicillin+clavulanic acid (15.9%), ofloxacin (22.2%) and cefixime (15.9%) (Figure 2).



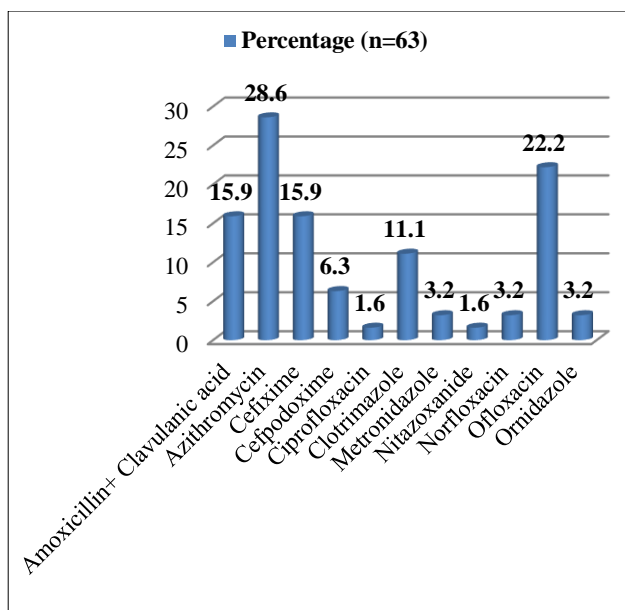
\*Percentages will not add upto 100, because more than one option was allowed to be selected.

**Figure 1: Reasons for self-medication with antimicrobials in study population**

**Table 2: Common conditions for self-medication with antibiotics in study group.**

Condition/ Ailment	No. of patients	Percentage (n=63)
Cold cough	18	28.6
Fever	20	31.7
Pain abdomen	9	14.3
Loose stools	4	6.3
Vomiting	1	1.6
Eye and ear problem	2	3.2
Skin rashes	5	7.9
Urinary symptoms	2	3.2
Others	2	3.2

A little more than half i.e. 55.6% of the parents self-medicated, felt that child recovered with the antibiotics, whereas 36.5% said they did so sometimes. 49.2% of them felt it was safe to administer these drugs by themselves, though 27% did consider it unsafe; the rest having no opinion regarding the same.



\*Percentages will not add up to 100, because one patient may have taken more than one antibiotic.

**Figure 2: Common antimicrobials self-medicated in study population.**

However, 54% of the cases self-administering antibiotics were guilty of medication error, in the form of incorrect dose or duration of the antimicrobials. Further, 27% of them also reported side-effects in children, they experienced after such self-medication.

Upon analysing the various factors that may be associated with self-medication with antibiotics, a significant association was found between such practice and age of the child (p-value =0.042), father's age (p-value=0.044), mother's age (p-value=0.002), presence of chronic illness in child (p-value=0.002) and type of family (p-value =0.011). No significant association was seen with sex of child (p-value=0.888), address (p-value=0.578), number of children in family (p-value=0.146), presence of health professional in family (p-value=0.858), and education (father's education and mother's education p-value 0.247 and 0.6 respectively) and income of parents (p-value= 0.114).

## DISCUSSION

Among the 300 patients who attended the pediatric outdoor of SCBMCH and SVPPGIP, Cuttack, a tertiary care hospital, the prevalence of self-medication with antimicrobials was noted to be 21%. Though this figure was lower than the rates seen in previous studies in China (59.4%), Mongolia (42.3%), UAE (56%), Pakistan (34%) and Yemen (60%), it is still a significant proportion that cannot be dismissed, owing to the grave impact that inadvertent and non-prescribed antibiotics have on health of children and society.<sup>9-13</sup> Certain disturbing trends were seen when it was analysed on whose advice the antibiotics were administered. Most of the patients

received these medications on the advice of the pharmacist (44.4%), which is against the law in India, where antibiotics are neither to be prescribed/advised nor dispensed to public without doctor's advice. Secondly, 12.8% of patients were medicated as per the advice of medical person over phone, without actual examination of the patient, a practice that needs to be strongly condemned, owing to the risks of misdiagnosis and mistreatment. It further gives the parents a false sense of security that an expert opinion has been considered. Thirdly, 7.9 % of the study population procured these medications on the basis of advice from unqualified practitioner, such as non-allopathic practitioner, who have no knowledge or authority regarding the same, reflecting the level of ignorance and lack of awareness in our population.

Two main sources of these drugs were identified. Majority of the population i.e. 61.9%, brought these drugs newly from stores, followed by use of medicine previously available at home (33.3%), which was similar to other studies done in UAE, China, Mongolia and Yemen. In India, according to Pharmacy Council of India, pharmacists are neither allowed to advise or dispense antibiotics without the prescription of registered medical practitioner.<sup>9,10,13-15</sup>

The easy access to antibiotics through pharmacies, using old prescription or without prescription, is serious deviation from law, and exposes the lack of enforcement of laws of drug distribution control that exists. The use of left-over medicines at home poses various issues such as storage, refrigeration, and reuse after previous reconstitution and expiry. Liquid formulations have short shelf lives, prone to physical, chemical and microbiological instability. Thus, not only are there doubts of therapeutic effect but also risk of harmful effects of left-over medications.

Most of the study population started the medications immediately after the onset of symptoms (60.3%), whereas 22.3% remaining started within 3 days. However, 9.5 % of the study population chose to self-medicate even after consultation with a physician, a trend that mostly shows the anxious nature of parents and their misplaced faith in antimicrobials, as a cure for all diseases.

Out of 63 cases who self-medicated with antibiotics, 13 (20.6%) admitted to have self-medicated in previous instances as well, in the past one year. 11(17.5%) also revealed keeping antibiotics at home as 'emergency stock' or left-over medicines, with azithromycin being the most common antimicrobial kept. These figures were much lower than those reported in China (48.1%) and Mongolia (58.4%), probably due to the better accessibility to pharmacies and health facilities in our country, and the varying level of educations among the different countries.<sup>10,16</sup> However, the use of left-over or emergency medicines at homes has been established in

studies done previously, as important factor responsible for parental self-medication, which mandates to eliminate this practice as much as possible.<sup>10,17,18</sup>

A number of reasons were considered which led parents and care-givers to resort to practice of self-medication with antimicrobials. In our study, leading the list with 41.3% was the presence of similar illness previously in the child. Parents often judge the symptoms themselves and based on previous experiences, reach a diagnosis and management of their own.

They also consider themselves to have adequate knowledge regarding antibiotics and the presence of similar illness and previous prescription further gives them false sense of security of taking the right decision. Our study supports the studies done in UAE, Mongolia and USA, where a similar opinion existed.<sup>10,14,19</sup> Also, in this study, among those parents who self-medicated on basis of previous similar experience, 69.2 % had decided by themselves that it was the same disease as previously, without medical consultation.

This was in contrast to few other studies done in Ethiopia and South India, where cost of medical visit, seemed to be the most common cause for self-medication.<sup>20,21</sup> Self-medication seemed to by-pass the consultation charges and save the money for medications, which were considered more important in the treatment process. Since in Odisha, where our study was conducted, patients have access to free consultations and medicines, cost of visit contributed to reason for self-medication in only 6.3% of cases.

The other prominent reasons included non-availability of doctor (33.3%), which refers not only to absence of any physician nearby but also the doctor of parents' choice or specialist; and to save time (22.2%). Both these points reflect the demand and supply state of our health care system, where the low doctor to patient ratio versus the higher pharmacy to patient ratio, combined with easy accessibility in terms of both distance and time, pave way for dangerous trends of self-medication.

Various conditions were noted in the study, for which parents practised self-medication with antibiotics. Fever (31.7%) and cold cough (28.6%) were the most common conditions, both of which were predominantly viral in young children. Globally, self-medication with antibiotics is common in viral infections, especially upper respiratory tract infections, which is evident from the studies done in Yemen, UAE, China, Mongolia, Trinidad and Europe.<sup>9,10,13,22-24</sup> Most patients may not be aware of the difference between viral and bacterial infections, and may administer antimicrobials to be on the safe side, unaware of the side-effects and long term risks. Whether doctors' previous patterns of antimicrobial prescription or parental insistence of prescribing antibiotics is the triggering factor for this malpractice, needs to be further evaluated.

Among the antibiotics that were self-medicated, the popular choices were Azithromycin (28.6%), amoxicillin+clavulanic acid (15.9%), ofloxacin (22.2%) and cefixime (15.9%). This was in contrast to previous studies done in other countries, where amoxicillin and amoxicillin-clavulanic acid formed around 50% of the self-medicated antibiotics, and contribution of others like azithromycin and cefixime was less than 15%.<sup>11,13,14,22,25</sup> This variation reflects the worrisome nature of prescribing in our area, which could be partly due to the changing sensitivity of the organisms or the urge to use higher generation or broader spectrum antibiotics, for feeling of better efficacy.

A little more than half i.e. 55.6% of the parents self-medicated, felt that child recovered with the antibiotics. This is important to note because this feeling often compels patients to reuse the antimicrobials in future episodes, using the reason of previous similar experiences. This may also lead to delay in reaching the right diagnosis. Further, 49.2% of them felt it was safe to administer these drugs by themselves, which was higher than those seen in UAE (26.8%) and Macedonia (30.4%).<sup>14,26</sup> Further, 27% of our study population, also reported side-effects in children, they experienced after such self-medication, which is comparable to the study done in UAE.<sup>14</sup>

In this study, 54% of the cases self-administering antibiotics were guilty of medication error, in the form of incorrect dose or duration of the antimicrobials. In a study done in UAE, 42.7% did not complete the course of antibiotics, instead stopped them when symptoms subsided or when the medicine was finished.<sup>14</sup> The same study also stated that 17.9% used previous experiences and 12.6% consulted family members/ friends for dosages. Incorrect dosing and duration not only endangers the health of child, but in the long term, result in antimicrobial resistance, which is stated by WHO as one of the top ten threats to public health worldwide.<sup>27</sup>

Upon analysing the various factors that were thought to be associated with self-medication with antibiotics, namely parent's age, gender, age of child, residence, parents' education and occupation, monthly income, number of children, type of family, presence of chronic illness, health professional in family. A significant association was found between such practice and age of the child (p value =0.042), father's age (p value=0.044), mother's age (p-value=0.002), presence of chronic illness in child (p- value=0.002) and type of family (p-value =0.011).

A significant association was found with such practice and age of the child, with p-value 0.042. Increasing age was found to be associated with increasing practice of antibiotic self-medication, probably as parents gain more confidence about diagnosing the symptoms and administering medication. They are also more familiar with the medications likely to be used, based on the



previous experiences and prescriptions, giving a false sense of security and safety regarding self-medication. The situation worsens after start of school years and adolescence, where they start equating the child as miniature adult and administer same medications as adults, with dose reduced in their terms, probably proportionate to age and severity of disease. Similar association was also seen in studies in Mongolia and China.<sup>9,10</sup>

Increasing father's age and mother's age, both, were found to be significantly associated with increased prevalence of self-medication of antibiotics (p value 0.042 and 0.044 respectively). Increased age of mother increases the tendency to resort to previous experiences, and resorting to a particular antibiotic for the child. However, no association was established between self-medication and parents' income, parents' education and sex of the child. These findings were in accordance to study done in Philippines.<sup>28</sup> Though the number of children did not have any significant association with self-medication (p-value= 0.146), similar to study done in Philippines, it was in contrast to study in Sri Lanka and China.<sup>28-30</sup> A significant association was noted between type of family and self-medication with antimicrobials, p value being 0.01. The higher degree of self-medication in joint families can be attributed to the increased number of family members, with varying opinions and advice.

The presence of chronic illness was found to have a negative association with self-medication with antimicrobials, which was likely due to the fact that parents of such children are probably more anxious and cautious to consult a doctor for most symptoms. It is also likely that other members and pharmacist also may be scared to self-medicate in case of any risks associated with the disease and drug interactions. Overall, the misuse of antimicrobials in children, in the form of self-medication, with incorrect doses and unnecessary conditions, is very much a reality, that aggravates the crisis of resistance and drug wastage. It is not limited to residence, socioeconomic status or occupation of parents, but rather a combination of parental perception and attitudes regarding the drugs, which is influenced by age of parents and disease of the child, and the failing law enforcement of procuring these drugs over the counter without prescription.

There is thus, an imminent need of the hour, to educate, counsel and convince patients and caregivers about the rational use of antimicrobials, and the growing concerns if they fail to do the same, and simultaneously urge the government to take strict action against the illegal handling and dispensing of these drugs.

## CONCLUSION

Self-medication with antimicrobials is a common practice, among children in Odisha, with the common source being pharmacies, mostly assuming same illness

as previously. This indiscriminate use of antimicrobials mandates the need for measures by health facilities to educate caregivers and parents about the appropriate use and side-effects of these drugs, and strict enforcement of the laws by the government, regarding dispensing of drugs, especially in a developing country like India.

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## REFERENCES

1. Slama TG, Amin A, Stephen Brunton SA, File TM Jr, Milkovich G, Rodvold KA, et al. A clinician's guide to the appropriate and accurate use of antibiotics: the Council for Appropriate and Rational Antibiotic Therapy (CARAT) criteria. *Am J Med.* 2005;118(Suppl7A):1S-6S.
2. Gold HS, Moellering RC. Antimicrobial-drug resistance. *N Engl J Med.* 1996;335:1445-53.
3. 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):439-43.
4. 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):373-80.
5. Cars O, Nordberg P. Antibiotic resistance - The faceless threat. *Int J Risk Saf Med.* 2005;17:103-10.
6. A World Health Organization resource: the role of pharmacist in self-care and self-medication (1998). Available at: <https://apps.who.int/medicinedocs/en/d/Jwhozip32e/2.html>. Accessed 18 September 2019.
7. Donkor ES, Tetteh-Quarcoo PB, Nartey P, Agyeman IO. Self-medication practices with antibiotics among tertiary level students in Accra, Ghana: A cross-sectional study. *Int J Environ Res Public Health.* 2012;9:3519-29.
8. Rizwan KA. Self-Medication with Antibiotics: Practices among Pakistani Students in Sweden and Finland; PA 240, Södertörn University, Stockholm, 15:00 (English). Master Thesis. 2011:55.
9. Bi P, Tong S, Parton KA. Family self-medication and antibiotics abuse for children and juveniles in a Chinese city. *Soc Sci Med.* 2000;50:1445-50.
10. Togobaatar G, Ikeda N, Ali M, Sonomjamts M, Dashdemberel S, Mori R, et al. Survey of non prescribed use of antibiotics for children in an urban community in Mongolia. *Bull World Health Organ.* 2010;88:930-6.
11. Abasaheed A, Vlcek J, Abuelkhair M, Kubena A. Self-medication with antibiotics by the community of Abu Dhabi Emirate, United Arab Emirates. *J Infect Dev Ctries.* 2009;3:491-7.

12. Gohar U F, Khubaib S and Mehmood A. Self-Medication Trends in Children by their Parents. *J Develop Drugs.* 2017;6:2
13. Mohanna M. Self-medication with Antibiotic in Children in Sana'a City, Yemen. *Oman Med J.* 2010;25(1):41-3.
14. Sharif SI, Masalmeh BE, Awad HM, Osama A, Abdulmgasood YA, Bugaighis LM. Parents' knowledge and attitude to self-medication of children with antibiotics. *Arch Pharma Pract.* 2015;6:71-6.
15. Clarification on Pharmacy Practice Regulations, 2015 notified by Pharmacy Council of India in Gazette of India No.17 dt.16.1.2015. Available at: <http://www.pci.nic.in/pdf/38.pdf> Accessed 8 February 2020.
16. Sun C, Hu YJ, Wang X, Lu J, Lin L, Zohu X. Influence of leftover antibiotics on self-medication with antibiotics for children: a cross-sectional study from three Chinese provinces. *BMJ.* 2019;9:e033679.
17. Chang J, Lv B, Zhu S, Yu J, Zhang Y, Ye D, et al. Non-Prescription use of antibiotics among children in urban China: a cross-sectional survey of knowledge, attitudes, and practices. *Expert Rev Anti Infect Ther.* 2018;16:163-72.
18. Yu M, Zhao G, Lundborg CS, Zhu Y, Zhao Q, Xu B. Knowledge, attitudes, and practices of parents in rural China on the use of antibiotics in children: a cross-sectional study. *BMC Infect Dis* 2014;14.
19. Collett CA, Pappas DE, Evans BA, Hayden GF. Parental knowledge about common respiratory infections and antibiotic therapy in children. *South Med J.* 1999;92:971-6.
20. Suleman S, Ketsela A, Mekonnen Z. Assessment of self-medication practices in Assendabo town, Jimma zone, southwestern Ethiopia. *Res Social Adm Pharm.* 2009;5:76-81.
21. Saradamma RD, Higginbotham N, Nichter M. Social factors influencing the acquisition of antibiotics without prescription in Kerala State, south India. *Soc Sci Med.* 2000;50:891-903.
22. Sharif SI, Nassar AH, Al-Hamami FK, Hassanein MM, Elmi AH, Sharif RS. Trends of pediatric outpatients prescribing in Umm Al Quwain, United Arab Emirates. *Pharmacol Pharm.* 2015;6:9-16.
23. Parimi N, Pinto Pereira LM, Prabhakar P. Caregivers' practices, knowledge and beliefs of antibiotics in paediatric upper respiratory tract infections in Trinidad and Tobago: A cross-sectional study. *BMC Fam Pract.* 2004;5:28.
24. Grigoryan L, Haaijer-Ruskamp FM, Burgerhof JG, Mechtler R, Deschepper R, Tambic-Andrasevic A, et al. Self-medication with antimicrobial drugs in Europe. *Emerg Infect Dis.* 2006;12:452-9.
25. Panagakou SG, Papaevangelou V, Chadjipanayis A, Syrogiannopoulos GA, Theodoridou M, Hadjichristodoulou CS. Risk factors of antibiotic misuse for upper respiratory tract infections in children: results from a cross-sectional knowledge-attitude-practice study in Greece. *ISRN Pediatr.* 2012;2012:685302.
26. Alili-Idrizi E, Dauti M, Malaj L. Validation of the parental knowledge and attitude towards antibiotic usage and resistance among children in Tetovo, the Republic of Macedonia. *Pharm Pract.* 2014;12(4):467.
27. Organization W H. Ten threats to global health in. Available at: <https://www.who.int/emergencies/ten-threats-to-globalhealth-in-2019> Accessed 19 July 2019.
28. Bulario JS, Cruz ILP, Pilapil MC, Gutierrez MM. Factors Associated with Parental Self-medication of Antibiotics in Health Centers of Manila in 4th International Research Conference on Higher Education, KnE Social Sciences. 2018:891-910.
29. Kariyawasam, S. H. A Descriptive Cross sectional Study on Mothers Self-Medicating Children. *Sri Lanka J Child Health.* 2005:7-12.
30. Yu M, Zhao G, Lundborg CS, Zhu Y, Zhao Q, Xu B. Knowledge, attitudes, and practices of parents in rural China on the use of antibiotics in children: a cross-sectional study. *BMC Inf Dis.* 2014:112.

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