

Public awareness on the overuse of antibiotics in upper respiratory tract infection in patients admitted at tertiary care hospital (Erode, Tamil Nadu, India.)

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ABSTRACT

To treat upper respiratory tract infections (URTIs), the over-use of antibiotics is a global public health concern. Aim of the study is to evaluate knowledge, attitudes, practice, and beliefs about the use of antibiotics and antibiotic resistance in the treatment of Upper Respiratory Tract Infection (URTI) in the general population. 375 adults of both genders who were visiting the general practitioner at Tertiary care hospitals in Erode included in this study. Patients had medical consultation for the same symptoms in the preceding 30 days, were on long-term immunosuppressive or oral corticosteroid medications, had chronic kidney disease, had a past history of advanced stage or metastatic cancer, were immune-compromised. Study period was July 2016 to February 2017. Raosoft sample size calculator was used to determine the sample size with a 5% margin of error and 95% confidence interval, assuming a response rate of 50%. Interviewer-assisted pre-consultation questionnaire was used to collect the information from patients. The maximum number of patients were 115 (30.47%) in the age group of 21-30 followed by 113 (79.95%) in the age group of 31-40. 19.89% says that viruses cause most respiratory infections and 80.11% do not agree with the statement. 151(40.05%) believes that antibiotics does not cause any side effect. In conclusion, this study revealed a high percentage of inappropriate antibiotic knowledge and a high rate of self-medication with antibiotics. Incorrect knowledge about antibiotics, and the belief that antibiotics cure URTI faster was highly prevalent, with the latter being strongly associated with wanting antibiotics.

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1. Introduction

Upper respiratory tract infection (URTI) has been recognized as one of the most common medical problems in the daily lives of people worldwide. A strong confirmation for the prevention of URTI is rather inadequate, and thus, the patients take preventive measures on the basis of their own experience or preferences (Spurling et al., 2013). However, an URTI is referred to as a viral infection causing inflammation and infection in the nose and throat. URTIs are contagious which remain for few hours to 2-3 days of exposure. Also, the symptoms have been known to last from 7-10 days, but reports have shown that the symptoms may last even longer. URTI has been regarded as a nonspecific term that is used to describe acute infections involving the nose, paranasal sinuses, pharynx, larynx, trachea, and bronchi. (Spurling et al., 2013; Kho et al., 2013). Although, there have been a range of

related conditions that may have similar or overlapping clinical presentations within each category of illness, and hence, judgment is required in determining the affected respiratory mucosal part. Various signs and symptoms of URTIs have been reports which include stuffy and runny nose, sneezing, coughing, sore throat, fever, vomiting, irritability, loss of appetite, and watery eyes (Cooper et al., 2001; Fondell et al., 2011). Further, the cause of URTIs have been attributed to viral, but studies have also suggested the cause to be bacterial. Viruses causing most URTIs include rhinovirus, parainfluenza virus, corona virus, adenovirus, respiratory syncytial virus, coxsackie virus, and influenza virus in most cases, whereas beta-hemolytic species like *Streptococci*, *Corynebacterium diphtheriae*, *Neisseria gonorrhoeae*, *Arcanobacterium haemolyticum*, *Chlamydia pneumoniae*, *Mycobacterium tuberculosis*, and *Mycobacterium avium* complex are also reported to cause URTIs.

-*plasma pneumoniae*, *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Bordetella pertussis*, and *Moraxella catarrhalis* are the most common bacteria's causing URTIs (Lee et al., 2000; Poole et al., 2005). Antibiotics are drugs used for treating infections caused by bacteria. Misuse and overuse of these drugs, however, have contributed to a phenomenon known as antibiotic resistance. This resistance develops when potentially harmful bacteria change in a way that reduces or eliminates the effectiveness of antibiotics. It occurs when bacteria develop resistance to antibiotics.

Antibiotic resistance is a global health problem, and a major cause for concern. Resistant bacteria continue to multiply in the presence of therapeutic levels of an antibiotic. (Arnold and Straus, 2009). Some bacteria are innately resistant to certain antibiotics. Antimicrobial resistance could be prevented by target vaccines that could be protection for drug-resistant over drug-sensitive strains.

Development of antibiotic resistance represents are one of the most important issues of the global public health. The overuse and incorrect use of antimicrobial drugs may produce several problems, including the increase and spread of antibiotic resistance, increasing costs of healthcare services and an increased risk of side effects. Inappropriate expectations of antibiotics by patients have been commonly observed in primary healthcare, and is a key factor driving over-prescription of antibiotics in such settings. Respiratory tract infections account for almost 10% of worldwide morbidity and mortality. The respiratory tract is the most common site of infection because it comes into direct contact with the environment and airborne microorganisms. The most common causative agents in respiratory tract infections are viral. However, the respiratory tract may be infected by a range of microorganisms, including bacteria, fungi and parasites. Upper Respiratory Tract Infection (URTI) is one of the commonest conditions in the primary care setting for which antibiotic prescriptions have been reported to be high worldwide. However, current evidence-based guidelines do not support antibiotic use in the majority of URTI cases (Poole & Tobin, 1973; Gonzales et al., 2001) as URTIs are frequently of viral etiology (Meropol et al., 2013; Suiafan et al., 2012) are often self-limiting, and seldom lead to serious complications. This study focused on prevalence of misconceptions about URTIs and antibiotics, and identifies key misconceptions associated with inappropriately wanting antibiotics.

2. Methodology

The estimated sample size was 375 adults from people visiting the general practitioner at Tertiary care hospitals in Erode. Study period is July 2016 to February 2017. Using the updated software Rao Soft sample size calculator (http://www.raosoft.com/sample_size.html), the sample size was determined with a 5% margin of error and 95% confidence interval, assuming a response rate of 50%. Interviewer-assisted pre-consultation questionnaire was used to collect the information from patients. The questionnaire was designed to include several factors identified from the methods described in the previous study (Pan et al; 2016).

2.1. Inclusion criteria

- Patients aged 18 years and above, presenting with at least

one of four URTI symptoms (runny nose, blocked nose, cough or sore throat).

- Patients ever just heard the term antibiotics.

Participants were given a brief outline of the study, and verbal consent was obtained before administering the questionnaire.

2.2. Exclusion criteria

Patients had medical consultation for the same symptoms in the preceding 30 days, were on long-term immunosuppressive or oral corticosteroid medications, had chronic kidney disease, had a past history of advanced stage or metastatic cancer, were immune compromised (e.g. human immunodeficiency virus infection).

3. Results

A total of 377 patients were included in the study. Our survey results showed significant differences in levels of public attitudes, beliefs and knowledge concerning antibiotic use, self-medication and antibiotic resistance. Gender wise distribution of study population was found to be 184 males (54.20%) and 193 females (51.80%). The maximum number of patients were 115 (30.47%) in the age group of 21-30 followed by 113 (79.95%) in the age group of 31-40. The least number of patients were seen in the age group of 18-20 years which were only 16 (4.24%). 263 (69.75%) were married, 101 (26.79%) single, 5 (1.33%) divorced and 8 (2.12%) widowed. On analyzing the educational status of the study population we found that 220 patients (58.3%) were university graduates, 79 (20.99%) had secondary school education, 55 (14.58%) had primary school education and only 23 (6.09%) were illiterate. The symptoms and perceptions of illness severity were analyzed. Among 377 people, 132 (35.01%) showed symptoms for 1-2 days, 170 (45.10%) for 3-4 days and only 75 (19.89%) for 5-7 days. The types of symptoms seen in the study population were cough (70.02%), sore throat (64.9%), runny nose (70.02%), fever (29.97%) and 19.89% patients were worried that the illness was serious.

This study revealed important findings, related to inadequate public knowledge of antibiotics. Our results showed that antibiotic knowledge among the population was insufficient. Table 1 shows the knowledge of patients about URTI and antibiotic use. 45% says that viruses cause most respiratory infections and 55% do not agree with the statement. Only 29% believes that upper respiratory infections resolve on its own and 71% believes that upper respiratory infections not resolve by own defence mechanism.

4. Discussion

Upper Respiratory Tract Infection (URTI) is one of the commonest conditions in the primary care setting for which antibiotic prescriptions have been reported to be high worldwide (Balcioglu et al., 2017). This study aimed to describe the prevalence of misconceptions about URTIs and antibiotics, and identify key misconceptions associated with inappropriately wanting antibiotics. A total of 200 students were included in the study. Our survey results showed significant differences in levels of public attitudes, beliefs and knowledge concerning antibiotic use, self-medication and

Table 1. Knowledge about URTI and antibiotic use

| SN | Knowledge about URTI and antibiotics use | Answer | Boys (n=100) | Girls (n=100) | Total (n=200) | Percentage (%) |
|----|--|--------|--------------|---------------|---------------|----------------|
| 1 | Viruses cause most respiratory infections | YES | 43 | 48 | 91 | 45.5 % |
| | | NO | 57 | 52 | 109 | 54.5 % |
| 2 | Respiratory infection resolves on its own | YES | 28 | 31 | 59 | 29.5 % |
| | | NO | 72 | 69 | 141 | 70.5 % |
| 3 | Antibiotics are effective against viruses | YES | 53 | 54 | 107 | 53.7 % |
| | | NO | 47 | 46 | 93 | 46.3 % |
| 4 | Bacteria that normally live on the skin and in the gut are good for health | YES | 38 | 42 | 80 | 40.0 % |
| | | NO | 62 | 58 | 120 | 60.0 % |
| 5 | Infection by antibiotic resistant bacteria cannot be easily cured or cannot be cured. | YES | 53 | 39 | 92 | 46.0 % |
| | | NO | 47 | 61 | 108 | 54.0 % |
| 6 | Antibiotics do not cause side effects eg. diarrhoea, vomiting, allergic reaction | YES | 74 | 53 | 127 | 63.5 % |
| | | NO | 26 | 47 | 73 | 36.5 % |
| 7 | If I use too much antibiotics, it can result in them losing effectiveness in long term | YES | 18 | 35 | 53 | 26.5 % |
| | | NO | 82 | 65 | 147 | 73.5 % |

Table 2. Attitude, belief and practices pertaining to antibiotics

| SN | Questions | Answer | Boys (n=100) | Girls (n=100) | Total (n=200) | Percentage (%) |
|----|---|--------|--------------|---------------|---------------|----------------|
| 1 | I believe that antibiotics cure my respiratory infection faster | YES | 68 | 80 | 148 | 74% |
| | | NO | 32 | 20 | 52 | 26% |
| 2 | I want to receive antibiotics if I suffered from upper respiratory tract infections | YES | 80 | 77 | 157 | 78.5% |
| | | NO | 20 | 23 | 43 | 21.5% |
| 3 | I take leftover antibiotics when I have similar symptoms | YES | 31 | 51 | 82 | 41% |
| | | NO | 69 | 49 | 118 | 59% |
| 4 | I normally keep antibiotic stock at home in case of emergency | YES | 33 | 28 | 61 | 25.5% |
| | | NO | 77 | 72 | 149 | 74.5% |
| 5 | If my family is sick, I usually give my antibiotic to them | YES | 27 | 25 | 52 | 26% |
| | | NO | 73 | 75 | 148 | 74% |

antibiotic resistance. Gender wise distribution of study population was found to be 100 boys and 100 females. The numbers of student's were 200 in the age group of 18-21.

This study revealed important findings, related to inadequate public knowledge of antibiotics. Our results showed that antibiotic knowledge among the population was insufficient. Table 1 shows the knowledge of students about URTI and antibiotic use. 45.5% says that viruses cause most respiratory infections and 54.5% do not agree with the statement. Only 29.5% believes that upper respiratory infections resolve on its own and 70.5% believes that upper respiratory infections not resolve by own defence mechanism. This belief was also most strongly associated with wanting antibiotics, while knowing that viruses caused most respiratory infections was not associated with wanting antibiotics. On the other hand, patients who knew that URTI resolves on its own were significantly less likely to want antibiotics. The content of health education messaging must hence go beyond educating about the causes of URTI to emphasizing its self-limiting nature and the ineffectiveness of antibiotics against viruses.

Among 200, 53.5% believed that antibiotics are effective against viruses and 46.5% believes just the opposite. The majority (53.5%) of the respondents incorrectly agreed with the statement "antibiotics kill viruses". The lack of knowledge

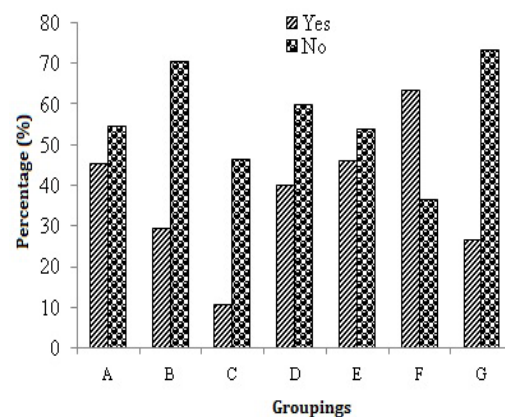


Figure 1. Knowledge about URTI and antibiotic use

(Indications- A: Viruses cause most respiratory infections; B: Respiratory infection resolves on its own; C: Antibiotics are effective against viruses; D: Bacteria that normally live on the skin and in the gut are good for health; E: Infection by antibiotic resistant bacteria cannot be easily cured or cannot be cured; F: Antibiotics do not cause side effects eg. diarrhoea, vomiting, allergic reaction; G: If I use too much antibiotics, it can result in them losing effectiveness in long term)

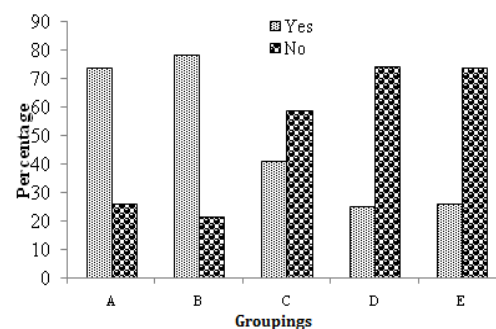


Figure 2. Attitude, belief and practices pertaining to antibiotics

(Indications: A: I believe that antibiotics cure my respiratory infection faster; B: I want to receive antibiotics if I suffered from upper respiratory tract infections; C: I take leftover antibiotics when I have similar symptoms; D: I normally keep antibiotic stock at home in case of emergency; E: If my family is sick, I usually give my antibiotic to them)

on the indication of antibiotics is universally reported and not unique to India. For instance, studies in Malaysia reported similar findings to India with 67% of their respondents agreeing with the same statement. When discussing the reasons for the use of antibiotics, we highlighted that the respondents indicated respiratory tract infection symptoms (which are self-limiting and could be viral in nature) as the reason they used antibiotics. These findings can be explained by the fact that most of the respondents think that antibiotics kill viruses, therefore they are likely to seek antibiotic therapy for their viral infections. This validates previous reports on the misconceptions regarding the role of antibiotics among students.

There exists a correlation: respondents who believe that antibiotics kill viruses also tend to believe that they should take antibiotics when they have a cold to recover faster. These respondents also believe that they should take antibiotics when they have a cold to prevent it from getting worse and also reported to expect an antibiotic from a doctor when severely sick with a cold.

Several studies have revealed that the patient's expectation is an important determinant of antibiotic prescription and

that antibiotics are more likely to be prescribed under pressured clinical context (Butler et al., 1998; Ong et al., 2007; Kumar et al., 2003). However, inaccurate and over-estimation of patient expectations do occur which result in unnecessary prescribing. Furthermore, the decision to prescribe is also greatly influenced by the doctor patient relationship, in which the doctor would want to meet the patients satisfaction even though the prescriber feels antibiotics are unnecessary. Previous studies have suggested that patients were satisfied with a better understanding of their illnesses even when antibiotics were not prescribed.

Around 40% says that bacteria that normally live on the skin and in the gut are good for health and, 60% believes that bacteria not present in Gut. It shows that an integrated health education program is essential which promotes rational use of antibiotics in the students. Around 46% students know that infection by antibiotic resistant bacteria cannot be easily cured or cannot be cured. 54% believes that antibiotics do not cause any side effect. This misconception about the use of antibiotics may put the consumer at risk because some strains of bacteria have become resistant.

Study shows that (26.5%) are aware about overuse of antibiotics may result in losing effectiveness in long term. Opinions about antibiotic resistance demonstrate that many students are concerned about the issue and think more care should be taken regarding antibiotic use. It is possible that this apparent difference between concern at a 'global' level and the lack of apparent concern at an individual level may indicate where education is required. The link between individual behaviour and use of antibiotics may not be recognized as a negative externality to society as a whole. However, it is recognized that providing respondents with a statement about antibiotic resistance in the questionnaire may have influenced respondents towards a concern they may not have previously been aware of 148 (74%) patients believed that antibiotics could cure their respiratory tract infection faster. The majority of the participants had no knowledge as to the cause of common colds and coughs, whereas more than half of participants did not know that antibiotics do not work on most coughs and colds.

Among them, 82 (41%) take leftover antibiotics when they have similar product. 61 (30.5%) patients normally keep antibiotics stock at home for emergency situations. 52 (26%) of the patients given antibiotics to family members usually when they are sick. Insufficient control of the availability of antibiotics could partly contribute to improper antibiotics use in the students. It has been reported in other countries that there was a possibility that people could obtain antibiotics without a medical prescription even though this practice was illegal. Health-care professionals should share the responsibility of the misuse of antibiotics by the public (Bennadi, 2014). The inappropriate prescribing and selling of antibiotics in the community could be driven by both the patient's demands and the profit interest of the health-care providers, which may jeopardize the health-care needs of the patients as well as their safety. This is a complex situation in which a balance needs to be achieved between professionalism and profitable business goals.

Gaining a better understanding of public attitudes to antibiotic resistance, antibiotic use and the management of RTI is essential for the design of suitable student's education initiatives. The survey has provided some essential data which can now be used to assess any future local health education activity.

Major strengths of this study include that this is, to our knowledge, the first study specifically investigating student knowledge, and attitudes towards antibiotic use and resistance among people visiting the general practitioner at Tertiary care hospitals in Erode. However, several limitations of the present study should be acknowledged. First, the cross-sectional nature of this study makes it difficult to interpret any cause effect relationship. Second, the respondents interviewed were from non medical students and therefore, the results of this study cannot be generalized to the general population. A validated study is required to further explore knowledge, attitudes and practices to prevent antimicrobial resistance and/or improve antimicrobial control.

5. Conclusion

Our results suggest a substantial proportion of patients are misinformed on the role of antibiotics in URTI. In conclusion, this study revealed a high percentage of inappropriate antibiotic knowledge and a high rate of self-medication with antibiotics. Incorrect knowledge about antibiotics, and the belief that antibiotics cure URTI faster was highly prevalent, with the latter being strongly associated with wanting antibiotics. The public involved in this survey generally had deficiencies in some important aspects related to prudent use of antibiotics and had negative attitudes toward rational use of antibiotics. The results of the survey suggest that population-based surveys are important in understanding the public's attitude towards antibiotics as such knowledge is important in contributing to efforts to minimize inappropriate use of antibiotics.

Continuing medical education, professional development and training workshops for healthcare professionals regarding rational use of antibiotics and health risks associated with the spread of antibiotic resistance are needed. In addition, minimizing non-prescription use of antibiotics and increasing the public awareness about the health and economic hazards of antibiotic resistance are also required. Understanding the magnitude of the problem and the population groups most affected can help tailor the efforts to improve antibiotic use among the public to the local situation. Stringent enforcement of pharmacy regulations; continuous professional education for doctors and pharmacists on the consequences of inappropriate antibiotic use; and, education of the public specifically to discourage unnecessary use of antibiotics are suggested interventions.

Conflict of interest

All the authors report no conflict of interest.

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