



## Knowledge, attitude and practices towards antibiotic use among people residing near RHTC of a Tertiary care Hospital in Amroha

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**ABSTRACT: Background:** WHO says that antimicrobial resistance is one of the world's most serious public health problems and it is caused by inappropriate prescribing and use. Community plays a vital role in emergence and spread of antibiotic resistance.

**Objective:** To assess the knowledge, attitude and practices towards antibiotic use among people residing near RHTC of a Tertiary care Hospital in Amroha.

**Methods:** A cross sectional study was conducted among 420 subjects ( $\geq 18$  years age) from 1 December 2019 to 1 March 2020, through interview using pretested structured questionnaire consisting of 5 sections to enquire regarding demographic characteristics, antibiotic usage, knowledge, attitude and practices towards antibiotics use of study population selected by convenient sampling method. Home visits were conducted by trained research assistants who administered a questionnaire to participants about their antibiotic consumption.

**Results:** Majority of the study participants were aware of the term antibiotic use (97%). Knowledge level of majority of participants (69.7%) was found adequate. Over 50% participants had negative attitude and poor practices towards the use of antibiotics. Most of the antibiotics were accessed without Consulting Doctor (68%).

**Conclusion:** Majority of Study subjects had adequate knowledge but negative attitudes and poor practices towards antibiotic use.

**Keywords:** Antibiotic use, Knowledge, Attitude, Practice, Questionnaire

### I. INTRODUCTION

WHO says that antimicrobial resistance is one of the world's most serious public health problems and it is caused by inappropriate prescribing and use. It is reported as occurring at all economic levels. In 2011, WHO set the theme

of World Health Day as 'Combat Antimicrobial Resistance: No Action Today, No Cure Tomorrow.' [1, 2, 5]

The bacterial disease burden in India is among the highest in the world.<sup>4</sup> India tops in the indiscriminate and irrational use of antimicrobials.<sup>7</sup> India has two diametrically opposed problems when it comes to antibiotics. Many people die because they do not have access to antibiotics, while others contribute to the spread of antibiotic resistance when they overuse these drugs in situations where antibiotic use is not warranted.

The issues of antimicrobial misuse are of global concern, not only because of the spreading and developing resistance of most common bacteria to most antibiotics, but also due to escalating health care costs that cause severe financial hardship for the poor in developing countries where infectious diseases behold a major health challenge. High level of community antimicrobial resistance necessitates the use of expensive drugs and may not be affordable for majority of patients. Today the situation is that many of the second and third line agents are turning to be ineffective in clinical settings. In India, many of the newest drugs are out of reach for poor patients. Pneumonia is still the number one killer of children in India, indicating that a large number of children do not have access to the medicines that have made mortality from pneumonia low in the developed world.

In contrast to settings where antibiotics are out of reach, in parts of the country where antibiotics are readily available (often urban areas), on the path from illness to treatment, many different factors influence whether or not an antibiotic will be used. Uncertainty about the cause of an ailment, especially upper respiratory infections and diarrhoea, often leads doctors to prescribe antibiotics<sup>8</sup> (Kotwani et al. 2010). When microbiology facilities are not available, doctors may prescribe antibiotics to most patients with a



fever, taking it as a sign of bacterial infection<sup>9, 10</sup> (Sivagnanam et al. 2004; Bharathiraja et al. 2005). Some resistance to greater use of microbiology facilities may also come from patients. They may not want to spend their time and money to undergo tests for what they may feel is a small problem<sup>8</sup> (Kotwani et al. 2010). Patient demands can drive both doctors and pharmacists to prescribe antibiotics. In a study of 285 physicians in Tamil Nadu, 29 percent listed patient satisfaction, as a motivating factor behind antibiotic prescription (Sivagnanam et al. 2004)<sup>9</sup>. Focus group discussions also concluded that doctors feel pressured to prescribe antibiotics because patients may be upset if they are prescribed an over-the-counter drug (like paracetamol), particularly after they have paid for a consultation or waited in long lines (Kotwani et al. 2010)<sup>8</sup>. Patients also skip the medical consultation and go directly to pharmacies with their demands. In a review of antibiotic use in Kerala (Saradamma et al. 2000)<sup>11</sup>, antibiotic use was reported as higher in more educated families. Finally, financial incentives for pharmacists can drive up antibiotic sales. According to IMS Health information, antibiotic purchases in the retail sector in India increased by about 40 per cent between 2005 and 2009.

Although much of the microbiology data published in India is overlooked by the media, New Delhi metallo-beta-lactamase-1 (NDM-1) is a major exception. NDM-1 is a gene that confers resistance to several antibiotics and can be transferred between different species of bacteria. It was first reported in 2009 in a Swedish patient who had undergone surgery in New Delhi. Subsequent studies isolated the resistance gene in Indian hospitals, and in drinking water and seepage in New Delhi. Establishing that NDM-1 evolved in India would be difficult, but the suggestion in the *Lancet* that UK citizens considering medical tourism in India should think twice led to an uproar in India. This crisis situation spurred the creation of an Antibiotic Task Force by the Ministry of Health and Family Welfare.

One of the controversial recommendations of the Task Force was that the government should strictly prohibit sales of antibiotics without the prescription of a registered medical practitioner. Additionally, some antibiotics would be reserved for use as a treatment of last resort in tertiary hospitals. Pharmacists' organizations were concerned that these regulations would lead to decreased profits and, more importantly, loss of access to life-saving drugs in isolated populations.

Speaking at the First Global Forum on Bacterial Infections in New Delhi in October

2011<sup>16</sup>, Indian Health Minister Hon. Dr Ghulam Nabi Azad explained that the proposals of the Task Force are on hold until the government develops methods of ensuring that increased regulation of antibiotic sales does not mean access to lifesaving drugs is cut off for segments of the population. Many rural areas do not have any Registered Medical Practitioners, so it could become impossible for residents to obtain legal prescriptions. The government will have to consider how to ensure access where no Registered Medical Practitioners work before implementing rules across the country.

Antibiotic resistance is a complex problem to deal within a country as diverse as India. To solve the problem of antibiotic misuse, a more thorough understanding of what influences the development and expression of patients' expectations is needed. Understanding patients' knowledge and practices may facilitate more effective communication between physicians, pharmacists and patients and help in the development of strategies to educate patients and the public.<sup>12</sup> Evidence suggests that educational interventions directed at patients, physicians and pharmacists can increase patients' knowledge and awareness as well as reduce the frequency with which physicians prescribe antibiotics inappropriately and pharmacists sell antibiotics indiscriminately.<sup>15, 13, 14</sup> A strong foundation is of utmost importance for a durable construction hence we need to strengthen the base of the health care system by nipping the problem of resistance in the bud itself. Therefore, the present study was undertaken to assess the existing knowledge, attitude and practices towards antibiotic use among people residing near RHTC of Tertiary care Hospital, Amroha.

## II. METHODS

A cross-sectional study was undertaken in a rural health training centre field practice area of a tertiary care hospital at Amroha from 1st December 2019 to 1st March 2020. Because of the absence of relevant data, we estimated a sample size of approximately 380 for an assumed prevalence of self-medication of 50%, a 95% confidence level and a 5% margin of error. Four hundred and twenty participants were included in this study to account for a 10% non-response rate. The subjects were selected using a convenient sampling method. Home visits were conducted by trained research assistants who administered a questionnaire to participants about their antibiotic consumption. Only one member of the household, selected randomly, completed the questionnaire. Those



under 18 years of age were excluded from the study. Informed consent was obtained from all participants. Simple descriptive statistics was used to generate frequencies and percentages.

### Development of questionnaire

The questionnaire was adapted from previous studies and modified to suit the local population. The questionnaire was comprised of five parts. **Part 1** obtained the demographic characteristics of the respondents. **Part 2** was designed to assess recent antibiotic usage among the respondents for the past three month. Respondents were requested to provide further information by asking closed ended questions with different answering modality mainly Yes or No, regarding the source and reason for taking antibiotics if they had taken antibiotics within this period. **Part 3** of the questionnaire consisted of statements to evaluate knowledge. The score is the sum of 8 variables created by using a simple dichotomous scale (yes = 1/no = 0). Scores were not constructed in reference to an absolute gold standard, but rather were used for their relative values as simple tools in the analysis of knowledge

of antibiotics use. The knowledge section of the questionnaire consisted of 8 items; a score of 0–2 was defined as none, 3–4 as low, 5–6 as moderate, and 7–8 as high. To simplify the analysis, we classified those who answered none and low as inadequate and moderate and high as adequate. A further four statements addressing public attitudes toward antibiotic usage were included in **Part 4**. A five-point Likert scale ranging from “Strongly Agree” to “Strongly Disagree” was used to assess the responses of the participants. To simplify the analysis, we classified those who answered “Strongly Agree” and “Agree” as having agreed and those who answered “Strongly Disagree” and “Disagree” as having disagreed and further attitude was assessed as positive or negative on the basis of expected responses to asked attitude questions. **Part 5** of the questionnaire consisted of four statements to assess self-medication practice with antibiotics and from where they did access the antibiotics. To simplify the analysis, we classified practices as good or poor depending upon the expected answer given by the respondent to asked practice question.

## III. RESULTS:

**Table 1: Demographic details of Study Participants**

Variables		N (%)
<b>Sex</b>	Male	261 (62%)
	Female	159 (38%)
<b>Religion</b>	Hindu	281 (67%)
	Muslim	88 (21%)
	Buddhist	29 (7%)
	Others	22 (5%)
<b>Age</b>	18-30	190 (45.2%)
	31-40	104 (24.8%)
	41-50	59 (14%)
	51-60	39 (9.3%)
	>60	28 (6.7%)
<b>Education</b>	Illiterate	5 (1.2%)
	Primary School	27 (6.4%)
	Middle School	40 (9.5%)
	High School	180 (42.9%)
	Intermediate	98 (23.3%)
	Graduate	63 (15%)
<b>Occupation</b>	Post graduate & Above	7 (1.6%)
	Private Business	97 (23.1%)
	Government Servant	56 (13.3%)
	Farmer	131 (31.2%)
	Labourer	96 (22.9%)
<b>Marital Status</b>	Unemployed	40 (9.5%)
	Married	296 (70.5%)
	Unmarried	9 (2.1%)
	Divorced	15 (3.6%)



	Widowed	19 (4.5%)
Monthly Income (In Rs.)	<10000	204 (48.5%)
	10000-20000	130 (31%)
	>20000	86 (20.5%)

**Table 2: Knowledge towards antibiotics use among Study Participants (n=420)**

Questions	Statements	Frequency	Percentage
	<b>Knowledge</b>	<b>Correct Answers</b>	
K1	Can antibiotics be used to cure Infections caused by bacteria	322	76.7%
K2	Can antibiotics be used to cure infections caused by viruses	138	32.8%
K3	Amoxicillin is antibiotic	222	53%
K4	Overuse of antibiotics can cause antibiotic resistance	248	59%
K5	Antibiotics have no side-effects	307	73%
K6	Different antibiotics are needed to cure different diseases	311	74%
K7	Is Ibuprofen an antibiotic?	302	72%
K8	Are you aware of the term antibiotic resistance?	408	97%

**Table 3: Level of Knowledge among Study Participants (n=420)**

Level of Knowledge	Frequency	Percentage values
High	122	29 %
Adequate	171	40.7%
Low	86	20.5%
None	41	9.8%
Total	420	100

**Table 4: Attitude towards antibiotics use among Study Participants (n=420)**

	Attitude Questions	Strongly agree n (%)	Agree n (%)	Neither Agree nor Disagree	Disagree n (%)	Strongly disagree n (%)
A1	I expect antibiotics to be prescribed by my doctor if I suffer from common cold symptoms for more than a week	199 (47.3%)	104 (24.7%)	5(1.2%)	76(18.1%)	36(8.6%)
A2	I prefer to keep antibiotics at home in case there may be a need for them later	116 (27.6%)	112(26.7%)	4(0.95%)	109(26%)	79(18.8%)



A3	Is it good to be able to get antibiotics from relatives or friends without having to see a medical doctor?	101 (24%)	119 (28.3%)	9 (2.1%)	93 (22.1%)	98 (23.3%)
A4	Taking antibiotics when having a cold could help recover faster.	160 (38%)	113 (26.9%)	8 (1.9%)	87 (20.7%)	52(12.4%)

**Table 5: Practices towards antibiotics use among Study Participants (n=420)**

	Practice Questions	Responses indicating Poor practice	Percentage
P1	I always check expiry date of drugs before using it	365	86.9%
P2	Do you use antibiotics for prophylaxis?	381	90.7%
P3	Do you prefer to obtain antibiotics directly from pharmacy rather than taking it after Doctor's prescription?	286	68%
P4	Do you stop usage of antibiotics after taking 2 or 3 doses without completing full treatment course, if you feel better?	298	71%

**Table 6: Details of Antibiotic Usage among Study Participants (n=420)**

<b>Recent Use</b>		
Yes	118	28%
No	302	72%
<b>Sources of Antibiotic</b>		
After Consulting Doctor	134	32%
Without Consulting Doctor	286	68%
<b>Reasons of taking Antibiotic</b>		
Fever	171	40.7%
Respiratory Illness	96	22.9%
Urinary Tract Infection	63	15%
Skin problem/Wound	35	8.3%
Others	55	13.1%

#### IV. DISCUSSION:

Out of a 420 participants who were selected randomly (response rate-100%), 62% were males while the rest were females (Table 1). The average age of the respondent were 32.8 years and about (70.0%) falling in the age group of 18-30 years & 31-40 years. Majority of the respondents had completed education upto high school (43.0%), and were farmers and daily wage earners (54.0%). Around 48.5% belonged to lower income group (<Rs.10000) followed by 31% belonging to middle income group (Rs. 10000-Rs. 20000).

From the results obtained regarding the usage of antibiotics (Table 6), 28% (n = 118) of the

respondents reported using antibiotics three month prior to the survey. Majority of study subjects (68%) reported that their antibiotics were obtained without prescription from a retail pharmacy without consultation while the remaining 32% took antibiotics only after consulting doctor. The reasons for taking antibiotics were mostly due to fever (40.7%) or respiratory illness (22.9%).

From the assessment of the knowledge regarding the role of antibiotics (Table 2), it was found that the highest correct response in the knowledge domain was in identifying antibiotics as a means of treating bacterial infection (76.7%). However, 67.2% incorrectly thought that



antibiotics are used to treat viral infection, which was the highest incorrect response in the knowledge domain. As for the identification of antibiotics, more than half of the respondents could correctly identify Ibuprofen as not an antibiotic (72%) as compared to other medicines tested in this section. In addition, about 59% of the respondents knew that overuse of antibiotics could cause antibiotic resistance. As for the feedback pertaining to the need to use different antibiotics for different diseases, a high percentage (74%) among the cohort gave a positive response. Majority of the study participants were aware of the term antibiotic resistance (97%) and knowledge level of majority of participants (69.7%) was found adequate (Table 3). Similarly, good knowledge was reported by Jairoun, A., Hassan, N., Ali, A. et al<sup>19</sup> in a KAP study on antibiotic use among university students. For all the knowledge statements tested, inadequate knowledge was mostly found among respondents between 18 to 30 years, primary or lower educational level, and lower income group (< 10000). Respondents were generally found to have more negative attitudes toward antibiotics with results over 50% for almost all dimensions studied (Table 4). Similarly negative attitude was reported by Jafar et al and Awad et al in their study.<sup>15,17</sup> Nevertheless, the expectation of a doctor to prescribe antibiotics for common colds accounted for 72% (47.3% + 24.7%), the highest rate of negative response in this section. This was followed by 64.9% (38%+26.9%) of the respondents who wrongly believed that taking antibiotics when having a cold could help them recover faster. Majority of the respondents (over 50%) were found to have poor practices towards antibiotic use for almost all dimensions studied (Table 5). Similarly poor practices was reported in a KAP study on antibiotic use in Harar city by Jafar et al.<sup>15</sup> Consistent with the knowledge section, younger age group(18-30 years old), lower income group (<Rs. 10000) and primary or lower educational status were the most frequently observed groups associated with negative attitudes and poor practices towards antibiotic usage.

## V. CONCLUSION:

In the present study, widespread use of antibiotics was reported, most of this antibiotics being accessed without consulting doctor (68%). Majority of the study participants were aware of the term antibiotic resistance (97%). Knowledge level of majority of participants (69.7%) was found adequate. Over 50% participants had negative attitude and poor practices towards the use of antibiotics.

**Recommendations:** Educational interventions on antibiotics use and its association with drug resistance are needed to promote judicious use of antibiotic. Improving general awareness of public regarding antibiotic use is the need of the hour. Enforcing antibiotic regulations at a national level is also a key measure to reduce over the counter sales which in turn reduce antibiotics self-prescription.

**Limitations of the Study:** This study should be interpreted cautiously for many reasons. Generalisability of the study is questionable since the study was conducted among people near RHTC so the results may not be indicative of the entire population. In addition, since this is descriptive cross-sectional design, we were not able to identify associated factors with knowledge, attitude, and practice of the participants.

## REFERENCES

- [1]. Clardy J, Fischbach MA, Currie CR. The natural history of antibiotics. *Curr Biol*. 2009; 19(11):437-41.
- [2]. World Health Day 2011-Antibiotic resistance: No action today, no cure tomorrow. Available at [http://www.who.int/mediacentre/news/statements/2011/whd\\_20110407/en/index.htm](http://www.who.int/mediacentre/news/statements/2011/whd_20110407/en/index.htm). Accessed 12 July 2016.
- [3]. World Health Organization. The evolving threat of antimicrobial resistance: options for action. Geneva: World Health Organization; 2012. Available at: [http://apps.who.int/iris/bitstream/10665/44812/1/9789241503181\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/44812/1/9789241503181_eng.pdf). Accessed November 10, 2015.
- [4]. Nirmal Ganguly et al. GARP. Rationalizing antibiotic use to limit antibiotic resistance in India. *Indian J Med Res* 134, September 2011, pp 281-294
- [5]. Padmanabha TS, Nandini T, Manu G, Savkar MK, Shankar RM. Knowledge, attitude and practices of antibiotic usage among the medical undergraduates of a tertiary care teaching hospital: an observational cross-sectional study. *Int J Basic Clin Pharmacol* 2016;5:2432-7.
- [6]. Higueta-Gutiérrez, L.F., Roncancio Villamil, G.E. & Jiménez Quiceno, J.N. Knowledge, attitude, and practice regarding antibiotic use and resistance among medical students in Colombia: a cross-sectional descriptive study. *BMC Public Health* 20, 1861 (2020). <https://doi.org/10.1186/s12889-020-09971-0>
- [7]. Nouf Al Shibani, Nawaf Labban, Reem Al



- Kattan, Hanam Al Otaibi, Sara Alfadda. Knowledge, attitude and practice of antibiotic use and misuse among adults in Riyadh, Saudi Arabia. *Saudi Med J* 2017; Vol. 38 (10): 1038-1044.
- [8]. Kotwani A, Wattal C, Katewa S, Joshi PC, Holloway K. Factors influencing primary care physicians to prescribe antibiotics in Delhi India. *Fam Pract.* 2010 Dec;27(6):684-90. doi: 10.1093/fampra/cmq059. Epub 2010 Jul 26. PMID: 20660529.
- [9]. Sivagnanam G, Thirumalaikolundusubramanian P, Mohanasundaram J, Raaj AA, Namasivayam K, Rajaram S. A survey on current attitude of practicing physicians upon usage of antimicrobial agents in southern part of India. *MedGenMed.* 2004 May 11;6(2):1. PMID: 15266228; PMCID: PMC1395775.
- [10]. Bharathiraja, R., Sridharan, S., Chelliah, L.R. et al. Factors affecting antibiotic prescribing pattern in pediatric practice. *Indian J Pediatr* 72, 877-879 (2005). <https://doi.org/10.1007/BF02731121>
- [11]. Rema Devi Saradamma, Nick Higginbotham, Mark Nichter. Social Factors Influencing the Acquisition of Antibiotics without Prescription in Kerala State, South India. April 2000. *Social Science & Medicine* 50(6):891-903 DO - 10.1016/S0895-4356(97)87308-8
- [12]. McDonough RP, Bennett MS. Improving communication skills of pharmacy students through effective precepting. *Am J Pharm Educ.* 2006 Jun 15;70(3):58. doi: 10.5688/aj700358. PMID: 17136179; PMCID: PMC1636963.
- [13]. Llor, C., & Bjerrum, L. (2014). Antimicrobial resistance: risk associated with antibiotic overuse and initiatives to reduce the problem. *Therapeutic advances in drug safety*, 5(6), 229-241. <https://doi.org/10.1177/2042098614554919>
- [14]. Kumar SG, Adithan C, Harish BN, Sujatha S, Roy G, Malini A. Antimicrobial resistance in India: a review. *J Nat Sci Biol Med.* 2013;4:286-9.
- [15]. Jifar A, Ayele Y. Assessment of Knowledge, Attitude, and Practice toward Antibiotic Use among Harar City and Its Surrounding Community, Eastern Ethiopia. *Interdiscip Perspect Infect Dis.* 2018 Aug 8;2018:8492740. doi: 10.1155/2018/8492740. PMID: 30174690; PMCID: PMC6106796.
- [16]. Mudur Ganapati. Developing countries must balance access to antibiotics with action to curb resistance *BMJ* 2011; 343 :d6471
- [17]. Shrestha R. Knowledge, Attitude and Practice on Antibiotics Use and its Resistance Among Medical Students in A Tertiary Care Hospital. *JNMA J Nepal Med Assoc.* 2019 Mar-Apr;57(216):74-79. PMID: 31477936.
- [18]. Awad AI, Aboud EA. Knowledge, attitude and practice towards antibiotic use among the public in Kuwait. *Plos one* 2015; 10: e0117910.
- [19]. Jairoun, A., Hassan, N., Ali, A. et al. Knowledge, attitude and practice of antibiotic use among university students: a cross sectional study in UAE. *BMC Public Health* 19, 518 (2019). <https://doi.org/10.1186/s12889-019-6878-y>
- [20]. Mohit Nair et al. Knowledge, attitudes, and practices related to antibiotic use in Paschim Bardhaman District: A survey of healthcare providers in West Bengal, India. <https://doi.org/10.1371/journal.pone.0217818>
- [21]. Andre M, Vernby A, Berg J, Lundborg CS. A survey of public knowledge and awareness related to antibiotic use and resistance in Sweden. *J Antimicrob Chemother.* 2010;65(6):1292-6.
- [22]. You JH, Yau B, Choi KC, Chau CT, Huang QR, Lee SS. Public knowledge, attitudes and behavior on antibiotic use: a telephone survey in Hong Kong. *Infection.* 2008; 36(2):153-7.
- [23]. Harakeh S, Almatrafi M, Ungapen H. Perceptions of medical students towards antibiotic prescribing for upper respiratory tract infections in Saudi Arabia. *BMJ Open Respir Res.* 2015; 2:e000078.
- [24]. World health organization. Prevention and containment of antimicrobial resistance. Available at [http://www.ino.searo.who.int/LinkFiles/Other\\_Content\\_WHD11-Seminar\\_Presentation-WR.pdf](http://www.ino.searo.who.int/LinkFiles/Other_Content_WHD11-Seminar_Presentation-WR.pdf). Accessed 15 February 2016.
- [25]. World health organization. Prevention and containment of antimicrobial resistance. Available at [http://www.searo.who.int/entity/antimicrobial\\_resistance/sea\\_cd\\_273.pdf?Ua=1](http://www.searo.who.int/entity/antimicrobial_resistance/sea_cd_273.pdf?Ua=1). Accessed 12 July 2016.
- [26]. Directorate general of health service. National policy for containment of antimicrobial resistance India. Available at [http://www.ncdc.gov.in/writereaddata/linkimages/am\\_r\\_policy1600931343.pdf](http://www.ncdc.gov.in/writereaddata/linkimages/am_r_policy1600931343.pdf). Accessed



- 12 July 2016.
- [27]. Sumanth Gandra, Jyoti Joshi, Anna Trett, Anjana Sankhil Lamkang, and Ramanan Laxminarayan. 2017. Scoping Report on Antimicrobial Resistance in India. Washington, DC: Center for Disease Dynamics, Economics & Policy.
- [28]. Eng JV. Consumer attitudes and use of antibiotics. *Emerging Infectious Diseases*. 2003; 9(9):1128-35.
- [29]. Chen C. Behavior, attitudes and knowledge about antibiotic usage among residents of Changhua, Taiwan. *J Microbiol Immunol Infect*. 2005; 38:53-9.
- [30]. Hsiao FY, Lee JA, Huang WF, Chen SM, Chen HY. Survey of medication knowledge and behaviors among college students in Taiwan. *Am J Pharm Edu*. 2006; 70(2):30.
- [31]. Thriemer K. Antibiotic prescribing in DR Congo: a knowledge, attitude and practice survey among medical doctors and students. *PLoS One*. 2013; 8(2):e55495.
- [32]. Sellman JS, Decarolis D, Schullo-Feulner A, Nelson DB, Filice GA. Information resources used in antimicrobial prescribing. *J Am Med Inform Assoc*. 2004;11:281-4.
- [33]. Wester CW, Durairaj L, Evans AT, Schwartz DN, Husain S, Martinez E. Antibiotic Resistance - A Survey of Physician Perceptions. *Arch Intern Med*. 2002; 162:2210-6.
- [34]. Khan A, Banu G, Reshma KK. Antibiotic resistance and usage: a survey on the knowledge, attitude, perceptions and practices among the medical students of a southern Indian Teaching Hospital. *J Clin Diag Res*. 2013; 7(8):1613-6.
- [35]. Azevedo MM, Pinheiro C, Yaphe J, Baltazar F. Portuguese students' knowledge of antibiotics: a cross-sectional study of secondary school and university students in Braga. *BMC Public Health*. 2009; 9:359.
- [36]. Steinberg I. Clinical choices of antibiotics: judging judicious use. *The Am J Managed Care*. 2000; 6(23):S1178-88.
- [37]. Mäkelä MJ, Puhakka T, Ruuskanen O, Leinonen M, Saikku P, Kimpimäki M, et al. Viruses and bacteria in the etiology of the common cold. *J Clin Microbiol*. 1998; 36(2): 539-42.
- [38]. Zafar SN, Syed R, Waqar S, Zubairi AJ, Waqar T, Shaikh M et al. Self-medication amongst university students of Karachi: Prevalence, knowledge and attitudes. *JPMA*. 2008;58:214-7.
- [39]. Nathwani D, Davey P. Antibiotic prescribing-are there lessons for physicians? *J Med*. 1999;92:5:287- 92.
- [40]. Davey P, Garner S. Professional education on antimicrobial prescribing: a report from the Specialist Advisory Committee on Antimicrobial Resistance (SACAR) Professional Education Subgroup. *J Antimicrobial Chemotherapy*. 2007; 60(1):i27-32.