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# A STUDY ON KNOWLEDGE ATTITUDE AND PRACTICE OF ANTIBIOTIC RESISTANCE AND ANTIBIOTIC PRESCRIBING PATTERNS AMONGST DOCTORS IN TERTIARY CARE HOSPITAL INDIA

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**ABSTRACT** **CONTEXT:** Antibiotic: resistance is an emerging public health problem, and resistance pathogens currently exist for which no first-line treatment is effective and is aggravated by the lack of development of new antimicrobial agents.

**AIM**: We aimed to assess the knowledge and explore the attitudes of doctors to antibiotic use in order to identify barriers to and enablers of appropriate antimicrobial prescribing.

**MATERIAL AND METHODS :** It is a cross sectional study. a questionnaire of 42 item had been given to the, clinical to assess their knowledge, attitude and practice (KAP) towards antibiotic prescribing methods. To assess the awareness amongst clinician in community practice, we included clinicians from two other nonteaching private hospital (hospital A &B)

**STATISTICAL ANALYSIS:** The data was analyzed using descriptive statistics in SPSS® version 23. Findings were presented as numbers and percentages in the form of tables and bar-charts.

**RESULT ;** Physicians in this survey showed variable knowledge and perceptions on antibiotic resistance in both the groups. However practice regarding antibiotic prescription after culture and sensitivity was found to be disappointing especially in nonteaching hospital (A&B). which is statistically significant ($p<0.05$). Most of them prefer broad spectrum antibiotics for most of infections, which is of great concern.

**CONCLUSION:** The study concluded that there is urgent need of training initiative for improving antibiotic prescribing behaviour of clinician through local guideline development and continuous education so as to promote rational antibiotic prescribing practice.

**KEYWORDS :** Antibiotic resistance, knowledge, attitude and practice (KAP), antimicrobial agents, public health problem, Infections.

## INTRODUCTION

Antibiotic overuse is a major public health challenge worldwide and results in emergence and spread of antibiotic-resistant bacterial pathogens in hospital, clinic, and community settings. Antibiotic overuse is common in India, a country with a population of 1028 million people, where 70% of individuals reside in rural areas but 60% of hospitals, 75% of clinics, and 80% of physicians are located in urban areas. Provision of health care to the population is through private sector; over 90% of hospitals are private.The recent reports of emergence and importation of novel multidrug-resistant mechanism in bacterial pathogens from India and other countries in South Asia is a serious concern. [1] The World Health Organization has identified the inappropriate use of antibiotics to be a major risk factor for antimicrobial resistance. In addition to that, the major drivers of inappropriate antimicrobial use are patient-related factors; therefore contributing to the increased prevalence of antimicrobial resistance. Furthermore, the aforementioned factors include patient's misperceptions, self-medication, advertisement, promotion, and poor adherence to dosage regimens.[2]

Interventions described by the surveyed physicians that would allow judicious use of antibiotics included access to diagnostic testing, improved awareness of antimicrobial resistance patterns and antibiotic knowledge, implementation of standard treatment guidelines, and receipt of periodic updates related to local bacterial resistance patterns. Interventions such as academic detailing for doctors and guidelines supported by microbiological data have been found to decrease inappropriate antibiotic practices. In spite of this, less than a fourth of physicians receive periodic information on resistance bacteria specific to their geographical working area. Surveillance of resistant strains in both hospitals and community settings provides key information for effective management of patient care and prescription practices. [1]

The rapid and sharp increase in antibiotic resistance has been attributed to inappropriate antimicrobial use and non-compliance with infection control precautions. It has been demonstrated that physicians will not alter their management practices unless they are both aware of and in agreement with the changes that are being proposed. Thus, a better understanding the knowledge, beliefs and awareness of resident house staffs is crucial to efforts to reduce inpatient antibiotic resistance, as they prescribe a substantial portion of these agents in teaching hospitals where problems of antibiotic resistance are most sever. Furthermore, since the problems of antimicrobial resistance are not limited by specialty, a better understanding of all specialties is also essential[3] .

We evaluated the knowledge, attitudes, and practices in regard to antibiotic prescribing by physicians in Teaching Hospitals as well two other non teaching hospital, in our region with the goal of identifying knowledge gaps and inform interventions that could lead to judicious use of antimicrobials and development of antimicrobial stewardship program.

## MATERIAL AND METHOD

The study consisted of a cross sectional survey of physicians from our teaching institute Shri Shankaracharya Institute of Medical Sciences.Durg Chhattisgarh and 2 public hospitals, in our region during period of 5 months. These hospitals are private health care setup located in urban areas of Drug .

### Participants and survey instrument

A questionnaire was prepared from previous studies. [4, 5, 6] which were modified and was distributed in both hospitals among residents and clinicians. Medical doctors from psychiatry, radiology, ophthalmology and anaesthesiology were not included as they do not routinely prescribe antimicrobials. Questionnaires were distributed on site during working hours and participants were asked to respond immediately. The study tool had three section related to knowledge attitude and practice consist of 42 items. The study was approved by the Hospital Ethical Committee. As the nature of the study was anonymous, informed consent was not sought.

### Data Analysis and Presentation

The data were analyzed using descriptive statistics in SPSS® version 23. Findings were presented as numbers and percentages in the form of tables and bar-charts.

### Observation

A total of 375 copies of questionaire were sent to the clinicians of our institute as well as to clinicians of other two nonteaching hospitals., with a response rate of 83.2%. Among 312 returned, only 304 were completed which are included in our study. 92 clinicians were from our teaching institute while 212 clinician were from nonteaching hospitals (A&B).

More than two-thirds of the participants were able to identify the most common resistant organisms in the institution correctly as showed in fig 1. Participants believed that the widespread use and inappropriate empiric choice of antibiotics were the most important general causes of antibiotic resistance. More than half of the physicians think other elements as being very important causes of antibiotic resistance such as inadequate hand washing, lack of guidelines on antibiotic usage, duration of antibiotic therapy, prescribing unneeded broad-spectrum antibiotics, inadequate restrictions on antibiotic prescribing, and poor access to information on local antibiotic resistance patterns. The role of pharmaceutical companies in advertising and promoting the use of antibiotics, patient expectations, the use of antibiotics in the livestock industry, and random mutations in microbes were not identified by the participants as major factors causing antibiotic resistance (Table 1).most common antibiotic prescribtion for common infections are shown in table2.

Table 3 shows the overall response about attitude of clinician towards antibiotic prescribing methods like sources of information for antibiotic prescribers with internet reported to be the most useful and accessible source (94%) respectively in our inistitue and hospital A&B. On an average about 75% of the doctors from our area did not receive any training about antibiotics in the past and has been agree to implement training program about antibiotic awareness in our institute. The majority (97%) of the respondents strongly agreed that antibiotic resistance rate is public health problem. All respondents were interested in a training program to be initiated

Table 4 shows the overall response about prescribing practices . The majority (95.65% and 96.69%) in our hospital and hospital A& B respectively) of the respondents agreed that no antibiotic treatment is required in case of diarrhea but regarding antibiotic in upper respiratory tract infection only few of them answered corectly (23.91% & 7 19.8% respectively). However, rest of the participants would start amoxicillin for the upper respiratory tract infection as a first choice.

Half of the physicians in our survey expected a microbiological definition of the organism and its sensitivity in 3 days or less. They are most likely going to change the antibiotic according to the microbiology report(52.17% & 36.79% respectively) .

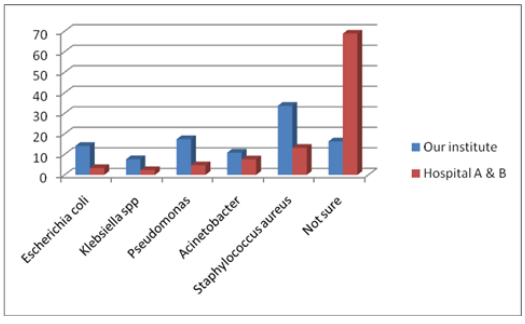


**Fig 1 common resistant organisms in our institute.**

## DISCUSSION

There is a paucity of literature from India related to antimicrobial surveillance and antibiotic prescribing patterns. A recent community based surveillance report indicated a much higher use of antimicrobials in three Indian cities compared with two cities in South Africa. In contrast, data from private teaching hospitals related to antimicrobial use are very scarce where patients usually pay for medical care. One report from two private hospitals in Ujjain, India, demonstrates widespread antibiotic prescribing. The World Health Organization has developed a global strategy for combating antimicrobial resistance. Assessment of physicians' knowledge, attitudes, and behavior is a necessary first step toward understanding why gaps appear between evidence and practice. [1]

Overall, the theoretical knowledge about AMs in our study ranged from moderate to good, however attitude and practice were found to be poor amongst all respondents Majority of participants show poor knowledge about the prevalence of resistant organisms in our setup.Similar findings have been described in other studies.[3,7,8]

Amongst hospital A & B, 68.86% of clinician were not aware about prevalent organism in their setup. Which is satistically significant.($p<0.05$) Reason behind that is they are not having microbiological facility of culture and sensitivity, although they are outsourcing their samples to other laboratory, but that too not routinely. which is consistent with earlier studies, as reported by Faizullah M (2017) and other studies conducted in Pakistan whereby culture sensitivity testing was non-existent [9]and in Bangladesh reporting that 90% of the antibiotics were prescribed without laboratory findings . [7] This practice of not conducting culture and sensitivity test may exacerbate the problem of antibiotic resistance as the sensitivity analysis is one of the various means to minimize the occurrence of antibiotic resistance and promoting rational prescription of antibiotics. [10]

Also in our study attitude and practice regarding culture sensitivity is disappointing, as majority of clinician both from our institute as well as from other two hospitals felt that culture and sensitivity are useless and time consuming. Similar attitude of clinicians is reported in other studies [11,12,5] And these absence of laboratory services was found to be one of the major reasons of excessive antimicrobial prescribing practice.

furthermore, majority of clinicians agreed that antibiotic treatment is not needed in diarrheal case, 23.91% clinician from our institute and 19.8% from hospital A & B were agree not to start antibiotics in respiratory tract infection were all other would either prefer to start amoxicillin or amoxiclave as empirical therapy. E K Genga (2017) reported similar finding. The US Centers for Disease Control and Prevention and Infectious Disease Society of America Guidelines do not recommend routine antibiotic treatment of cold or upper respiratory tract infection or uncomplicated acute bronchitis since the vast majority of these illnesses have a nonbacterial etiology. [1]

Upon asking the participants about their first-choice antibiotic for common bacterial infections, they choose amoxicillin–clavulanate (64.62%) or ceftriaxone (40.6%) for treating community-acquired pneumonia. In treating urinary tract infection, most physicians preferred using ciprofloxacin (46.71%) & ceftriaxone (36.18%), Variable results were noted in treating surgical wound infections, and the main choices were amoxicillin–clavulanate, piperacillin–tazobactam, or ceftriaxone. One-third preferred to use piperacillin–tazobactam for intra-abdominal sepsis, followed by meropenem and metronidazole Also many physicians are unaware of resistance-inducing antibiotics such as third generation cephalosporins, which should be avoided in resistant organisms as empiric therapy which is in consistent with study conducted by [3]. Also, some interventions showed that discouraging the use of ceftriaxone and ceftazidime will reduce the rate of ESBL bacteria. [6]

Most of the physicians were aware about the importance of hand washing in reducing hospital acquired infection (65.21%). This may be due to a recent awareness program conducted by us about hand washing importance in our institute. However knowledge regarding hand hygiene were found to be poor in other two hospitals (46.69%). The spread of resistant organisms throughout a ward or even a hospital has repeatedly been identified as being related to the breakdown of infection control measures, especially hand hygiene. Hand-washing has been shown to be the single most important factor in the prevention of transmission of infection in the hospital setting. [3]

It was noted that physicians are not exposed to nonclinical causes of antibiotic resistance like the basic bacterial mechanism of resistance and the use of antibiotics in the livestock industry. All of these risk factors of developing antimicrobial resistance that are mentioned in Table 4 were identified as carrying the risk of the emergence and spread of resistant bacteria, including those capable of causing infections in both animals and people. [6]

Influence of pharmaceutical companies on doctors is very well recognized and many local and international studies confirm that drug companies representative's visits markedly influence doctors' drug preference towards the marketed drugs and have effect in attitude and behavior of prescribing pattern of general practitioner .[3]

Another issue worth mentioning is that the physicians instead of using narrow or single spectrum antibiotics prefer wide spectrum ones, even if these antibiotics have no indications. [14] The government encourages the use of generic medicines for prescriptions and procurements, however; the negative perceptions among the doctors, pharmacists and even the general public about the quality and efficiency of generics as reported in a systematic review, might be the reason that discourages

the practitioners from prescribing the generics. [15] Similarly, among the reasons causing antibiotic resistance, patient-related problems (self-medication) existed more often. A number of recent studies have presented the similar findings and the common reasons for such practices included low socio-economic status and level of education, previous experience, and ease of purchasing antibiotics from pharmacies without prescription.[16,17,18] This is also consistent with a French study which stated that parents generally preferred self-medication for mild pathologies in their children. [19] A study in China showed that children had received self-medication by 51% of the parents. [20] Many studies in developing countries presented that antibiotics are used most commonly in everyday practice, whereas the most common symptom of the use of antibiotics was fever. Management of fever with antibiotics without microbiological investigations has been considered as a primary factor of irrational drug use in the developing. [21]

In our study, respondents from other two hospital reported that their hospitals do not have an infection control policy in place. This finding is of major concern as infection control program can limit the emergence and transmission of antimicrobial-resistant bacteria.

### Study limitations

Our study is limited by the fact that participants may tend to give socially desirable answers rather than expressing their true opinions.The present setting was a teaching hospital,we included two other hospital to reflect the knowledge and attitudes towards community infections of clinicians in the general community the results may be applied to other public general hospitals. However, the generalizability of the results to other health care settings remains to be demonstrated. Despite these limitations, our study provides a good insight into physician's knowledge, attitudes, and practice patterns related to antibiotic use in our region Data from this survey can be utilized to enhance education, antimicrobial surveillance, and antibiotic prescribing patterns among physicians in our setting.

## CONCLUSION

Present study highlights the need to regulate the prescribing of antibiotic and training initiatives for improving antibiotics prescribing behavior of medical doctors in our region. In order to overcome the problem of antibiotic resistance in our setting: there is urgent need to improve antimicrobial prescribing practice by educational, by monitoring and providing feedback regarding antibiotic resistance, nosocomial infection, reviews at epidemic control meetings, and the discussions at the microbiology unit. Current antibiograms for the most hospitals in our country are not readily available and there is need of improving access to results of local antimicrobial susceptibility tests because there is currently no feedback to the clinician about the local resistance trends at the surveyed hospitals. Finally, local guidelines and continuous education of general health professionals would be an essential step to promote rational use of antibiotics.

**Table.1 Do you think each of the following contributes to evelopment of antibiotic reistance**

| Cause of antibiotic reistance | Our setting (n=92) (Agree) | Hospital A & B (Agree) (n=212) |
|---|---|---|
| Widespread use of antibiotics | **87(94.56%)** | **192(90.56%)** |
| Inappropriate empiric choice of antibiotics | **68(73.91%)** | **154(72.64%)** |
| Inappropriate duration of antibiotic therapy | **64(69.56%)** | **148(69.81%)** |
| Prescribing broad-spectrum antibiotics when equally effective narrow spectrum antibiotics are available | **62(67.29%)** | **152(71.69%)** |
| Inadequate hand washing | **60(65.21%)** | **99(44.69%)** |
| Inadequate restrictions on antibiotic prescribing | **55(59.78%)** | **122(57.54%)** |
| Poor access to information on local antibiotic resistance patterns | **52(56.52%)** | **139(65.56%)** |
| Lack of guidelines on antibiotic usage | **54(58.69%)** | **118(55.66%)** |
| Random mutations in microbes | **21(22.82%)** | **58(27.35%)** |
| Patient demands and expectations for antibiotics | **22(23.91%)** | **49(23.11%)** |
| Use of antibiotics in the livestock industry | **15(16.30%)** | **29(13.67%)** |
| Role of pharmaceutical companies in advertising and promoting use of antibiotics | **23(25%)** | **128(60.37%)** |

**Table. 2 Results of clinician practice regarding most common antibiotic prescribe for common infection**

| Antibiotics | Our institute | | | Hospital A &B | | |
|---|---|---|---|---|---|---|
| | RS | UTI | Intra abdo Sepsis | RS | UTI | Intra abdo Sepsis |
| Ceftiaxone | 39(42.39)% | 32(34.78%) | - | 84(39.62%) | 78(36.79%) | - |
| amoxicillin–clavulanate | 41(44.56%) | - | - | 96(45.28%) | - | - |
| ciprofloxacin | - | 51(55.43%) | - | - | 91(42.92%) | - |
| piperacillin–tazobactam | - | - | 34(36.95%) | - | - | 99(46.69%) |
| metronidazole | - | - | 27(29.34%) | - | - | 84(39.62%) |
| meropenam | - | - | 26(28.26%) | - | - | 3(1.41%) |
| vancomycin | 7(7.60%) | | | 12(13.04%) | | |
| Gentamicin | - | 2(2.17%) | - | - | 16(7.5%) | 21(9.90%) |
| Amikacin | - | 1(1.08%) | - | - | 12(5.66%) | 5(2.35%) |
| No ans | 4(4.34%) | - | 4(4.34%) | 14(6.60%) | 8(3.77%) | - |
| As per culture sensitivity | 1(1.08%) | 6(6.52%) | - | 6(2.83%) | 7(3.30%) | - |

**Table 3. Doctors attitude towards antibiotic reistance**

| | Our hospital (Agree) | Hospital A & B (Agree) |
|---|---|---|
| • Antibiotic resistance is an important Public Health problem in our setting. | 90(97.82%) | 209(98.58%) |
| • In a primary-care context, one should wait for the microbiology results before treating an infectious disease. | 53(57.60%) | 118(55.66%) |
| • The prescription of an antibiotic to a patient does not influence the possible appearance of resistance. | 68(73.91%) | 129(60.84%) |
| • The use of antibiotics on animals is an important cause of the appearance of new resistance to pathogenic agents in humans. | 52(56.52%) | 108(50.94%) |
| • In case of doubt, it is preferable to use a wide-spectrum antibiotic to ensure that the patient is cured of an infection. | 89(96.73%) | 207(97.64%) |
| • I frequently prescribe an antibiotic in situations in which it is impossible for me to conduct a systematic follow-up of the patient. | 88(95.65%) | 209(98.58%) |
| • In situations of doubt as to whether a disease might be of bacterial aetiology, it is preferable to prescribe an antibiotic. | 90(97.82%) | 209(98.58%) |
| • I sometimes prescribe antibiotics so that patients continue to trust me. | 84(91.30%) | 176(83.01%) |
| • If a patient feels that he/she needs antibiotics, he/she will manage to obtain them at the pharmacy without a prescription, even when they have not been prescribed. | 87(94.56%) | 192(90.56%) |
| • Two of the main causes of the appearance of antibiotic resistance are patient self-medication and antibiotic misuse. | 92(100%) | 210(99.05%) |
| • Dispensing antibiotics without a prescription should be more closely controlled. | 91(98.91%) | 212(100%) |
| • Training program regarding antibiotic resistant is needed. | 71(77.17%) | 162(76.41%) |

| | | |
|---|---|---|
| **In the treatment of infection how would you rate the usefulness of each of these source of knowledge (Agree/Diaagree)** | | |
| • Clinical practice guidelines. | 52(56.52%) | 115(54.24%) |
| • Previous clinical experience. | 62(67.39%) | 192(90.56%) |
| • Continuing Education Courses. | 64(69.56%) | 148(69.81%) |
| • Others, e.g., contribution of specialists (microbiologists, infectious disease specialists, etc.). | 54(58.69%) | 58(27.35%) |
| • Contribution of peers (of the same specialisation). | 82(89.13%) | 158(74.52%) |
| • Data collected via the Internet | 87(94.56%) | 189(89.15%) |

**Table 4 .Practice of clinician regarding antibiotic prescribtion.**

| QUESTIONS | NUMBER (%)in our hospitals | NUMBER (%) In other hospital |
|---|---|---|
| **A 4-year-old child had diarrhea for 4 days (3 stools daily). She had no fever during the past days nor at consultation. What is your treatment choice?**<br>Amoxicillin orally<br>Trimethoprim/Sulphamethoxazole<br>Amoxicillin/Clavulanic acid<br>* No antibiotic, just oral Rehydration | 88(95.65%) | 205(96.69%) |
| **A 6-year-old child has a fever (38°C), nasal discharge and a painful throat for two days. A visual inspection, the throat is reddish. What is your treatment choice?**<br>Trimethoprim/Sulphamethoxazole<br>Amoxicillin orally<br>Amoxicillin/Clavulanic acid<br>* No antibiotic | 22(23.91%) | 42(19.8%) |
| **Which of the following antibiotics has the best activity against anaerobes?**<br>Ciprofloxacin<br>Trimethoprim/Sulphamethoxazole<br>* Metronidazole | 82(89.13%) | 198(93.39%) |
| **Methicillin resistant - Staphylococcus aureus is susceptible to:**<br>Amoxicillin/ Clavulanic acid<br>Cefotaxime<br>Ceftriaxone<br>* None of these antibiotics | 68(73.91%) | (129(68.84%) |
| **In general, how long does it take to get results from your microbiology department?**<br>0–3 days<br>4–7 days<br>1–2 weeks | 60(65.21%)<br>32(34.78%)<br>- | -<br>39(18.39%)<br>- |
| **In a patient who is responding clinically to current antibiotic therapy, what is your response to a culture report that indicates the organisms isolated are resistant to that antibiotic regime?**<br>I change to appropriate antibiotics based on the report<br>I continue the present antibiotics<br>I add one of the susceptible antibiotics to the current regime | 48(52.17%)<br>6(6.52%)<br>38(41.30%) | 78(36.79%)<br>118(55.66%)<br>129(60.84%) |
| **If the culture report shows an isolate that is sensitive to my current antibiotics, but also to a narrower-spectrum antibiotic** | | |
| • I continue present therapy | 60(65.21%) | 192(90.56%) |
| • I change to the narrow-spectrum antibiotic | 32(34.78%) | 10(4.71%) |
| **In your practice, how often would you say that your empiric coverage correlated with susceptibility reports from the microbiology laboratory?** | 15(16.30%) | - |
| • often | 42(45.65%) | - |
| • Somewhat often | 19(20.65%) | - |
| • Sometime | 8(8.6%) | - |
| • Rarely | 2(2.17%) | 36(16.98%) |
| • Extremely rarely | | |
| • Never checked/not sure | 6(6.5%) | 176(83.01%) |

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