**RESEARCH ARTICLE**

# A comparative knowledge, attitude, and practice study of antimicrobial use, self-medication and antimicrobial resistance among final year students of MBBS, BDS, and BSc Nursing at a tertiary care hospital at Kannur

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## ABSTRACT

**Background:** Antibiotics are the most commonly used drugs often associated with inappropriate use leading to resistance. While knowledge enlightens and provides an insight into the problems faced, behavioral change solely depends on the beliefs and attitude. **Aims and Objectives:** The present study was undertaken to assess and compare the existing knowledge, attitude, and practice (KAP) of final year students of all three specialties which include medical, dental, and nursing courses. **Materials and Methods:** A cross-sectional study was conducted in the Department of Pharmacology in Kannur Medical College, Kerala. Final year students of medical, dental, and nursing courses were included in the study. KAPs were assessed by using a preformed questionnaire which was divided into three areas, namely, antibiotic use, self-medication, and antimicrobial (antibiotic) resistance. **Results:** Overall, 222 final year students pursuing different courses which included MBBS ($n = 76$), BDS ($n = 72$), and BSc Nursing ($n = 74$) took participation in the study. The predominant level of knowledge (77.5%), attitude (79.7%), and practice (66.2%) came to be as moderate. Average of KAP came out to be moderate (74.4). Attitude scores in different gender groups in MBBS course were found to be statistically significant ($P = 0.019$). **Conclusions:** This study shows the KAP of budding health-care professionals in a real ground situation in our academics and the role of awareness about antibiotic use in health care which can help in preventing the emergence of antibiotic resistance. It provides useful information to plan a suitable educational intervention for rationale antibiotic use and to minimize resistance.

**KEY WORDS:** Antibiotic Policy; Antibiotic Resistance; H1 schedule; Self Medication; Knowledge, Attitude and Practice Study

## INTRODUCTION

Antibiotics are the most commonly used drugs often associated with inappropriate use leading to resistance.[1] The most documented risk factor for infection or colonization with resistant pathogens is recent antibiotic use.[2] There is a correlation existing between the usage of antibiotics and resistance where populations who use lower amount of antibiotics develop lower amount of resistance toward bacteria.[3] Despite this recognition, unnecessary antibiotic prescribing remains common even in developed countries such as the United States and Britain where more than a fifth of all antibiotic prescriptions for children and adults are written for upper respiratory tract infections or bronchitis, conditions that are almost always viral.[4]

Resistance is a serious problem leading to serious difficulty in treating bacterial infections.[5] The problem of resistance is compounded in developing countries due to multiple reasons which include self-medication without prescription, over-the-counter sale of antibiotics, inadequate regulation of antibiotics, high cost of medical consultations, and dissatisfaction with medical practitioners.[6,7]

The professional courses in India naming MBBS, BDS, and BSc Nursing are three specialties which have active participation in the usage of antibiotics after they are qualified. During their courses, they are exposed to basic courses such as pharmacology and microbiology which give in-depth knowledge of antibiotic usage and resistance, which is studied in the 2nd year. Earlier studies which have been published[1,8,9] took into consideration the 2nd-year, 3rd-year, and final year students of BDS and BSc nursing specialties. Whereas earlier studies[10,11] with MBBS have been done on 2nd-year undergraduate students. In the present study, only final year students of BDS and BSc nursing were selected as they are actively involved with patients after 2nd year of their course, while MBBS students have better exposure to patients in the 3rd and 4th years. The earlier studies[1,8-11] published so far had not taken this aspect to find whether knowledge which was delivered in the 2nd year of their respective course did had its effect in changing the practice and attitude when the students actually are nearing their end of course. Furthermore, there are no studies which have compared differences in attitude and practice of the three different specialties.

Hence, they form a good platform to conduct a knowledge, attitude, and practice (KAP) study and therefore, the present study was undertaken to assess the existing KAPs of final year students of all the three specialties.

### Objectives of Study

1. To find the students' KAP regarding antibiotic use, antibiotic self-medications, and antibiotic resistance in each specialty.
2. To compare the KAP among medical, dental, and paramedical students at a tertiary care hospital in Kannur.

## MATERIALS AND METHODS

### Place of Study

After taking approval from the Institutional Ethics Committee, the study was conducted at the Department of Pharmacology in Kannur Medical College, Kannur, Kerala.

### Study Population

Final-year students of Kannur Medical College, Kannur Dental College, and Kannur Paramedical College constituted the study population.

### Type and Duration of Study

This was a preformed questionnaire-based cross-sectional study and duration of the study was 3 months (May 2017 to July 2017).

### Inclusion Criteria

Final-year students from medical, dental, and paramedical wings on a voluntary participation basis were included in the study.

### Exclusion Criteria

First-, second- and third-year students and interns were excluded from the study.

### Data Collection

A preformed questionnaire consisting of 32 statements/questions was distributed and given 30 min to mark the response. After completion, the questionnaires were collected.

### The Questionnaire Development

A KAP questionnaire containing 32 questions (knowledge, 13; attitude, 9; and practice, 10) was designed by modifying the earlier ones which were used by others.[1,10-15]

The questionnaire was divided into three areas, namely, antibiotic use, self-medication, and antimicrobial (antibiotic) resistance. The options given for the corresponding areas were agree, uncertain, and disagree; yes, may be, and no; and always, sometimes, and never, respectively, with uncertain, may be, and sometimes used to eliminate any bias. Out of the total 32 questions, three (Qs Nos. 18, 20, and 23) were open-ended questions stating "more than one if applicable" which were not included in scoring and rest of all the questions with single option were included in scoring.

Scoring analysis: To compare the three specialties, a scoring system was designed in the KAP questionnaire.

|  | Poor | Moderate | Good | Maximum |
| --- | --- | --- | --- | --- |
| Knowledge | 0–7 | 8–15 | 16–22 | 22 |
| Attitude | 0–3 | 4–7 | 8–10 | 10 |
| Practice | 0–4 | 5–8 | 9–12 | 12 |

Some important highlighted statements and questions to which the correct responses in frequency and percentage (%) are provided are summarized in Table 1. The correct response percentage <50% was taken as inadequate.

### Statistical Analysis

Descriptive measures presented include percentages and corresponding 95% confidence intervals (CIs). Differences in distribution between groups were evaluated using ANOVA and *t*-tests. $P < 0.05$ was considered statistically significant.

| Sr. No. | Statements/questions | Response n (%) | | |
|---------|----------------------|----------------|---|---|
| | **Table 1:** Participants' belief on use, self-medication, and resistance of antibiotics | | | |
| | | MBBS (*n*=76) | BDS (*n*=72) | BSc Nursing (*n*=74) |
| 2A | Broad-spectrum antibiotics are better than narrow-spectrum ones (disagree) | 11 (14.47) | 17 (23.61) | 5 (6.75) |
| 2D | Antibiotic usage disturbs the gut flora and causes diarrhea (agree) | 56 (73.68) | 33 (45.83) | 34 (45.94) |
| 6B | Do you think that antibiotic should be used in any case, once you have fever? (no) | 18 (23.64) | 15 (20.83) | 5 (6.75) |
| 11B | Do you give the leftover antibiotics to your friend/roommate if they get sick? (never) | 38 (50) | 42 (58.33) | 46 (62.16) |
| 12 | Do you complete the full course of treatment? (always) | 54 (71.05) | 55 (76.38) | 49 (66.21) |
| 15 | Indiscriminate and injudicious use of antibiotics can lead to: | | | |
| D | Emergence of bacterial resistance (agree) | 60 (78.94) | 51 (70.83) | 43 (58.10) |
| E | Additional burden of medical cost to the patient (agree) | 57 (75) | 45 (62.50) | 49 (66.21) |
| 18 | What were your reasons of self-medication with antibiotics?* | | | |
| A. | Cost saving | 14 (18.42) | 16 (22.22) | 25 (33.78) |
| B. | Convenience | 59 (77.63) | 59 (81.94) | 52 (70.27) |
| C. | Lack of trust in prescribing doctor | 3 (3.94) | 3 (4.16) | 5 (6.75) |
| 19 | Have you ever treated yourself self-medicated with antibiotics? (never) | 18 (23.64) | 21 (29.16) | 31 (41.89) |
| 20 | If option above is marked yes, then for which of the following complaints did you use antibiotics?* | | | |
| A. | Sore throat | 37 (48.68) | 26 (36.11) | 23 (31.08) |
| B. | Fever | 30 (39.47) | 30 (41.66) | 23 (31.08) |
| C. | Diarrhea | 8 (10.52) | 3 (4.16) | 5 ( 6.75) |
| D. | Dental infection | 0 (0) | 1 (1.38) | 0 (0) |
| 23 | Spread of resistant microorganisms in the presence of antimicrobials is facilitated by * | | | |
| A. | Irrational use of drugs | 41 (53.94) | 47 (65.27) | 43 (58.10) |
| B. | Self-medication | 23 (30.26) | 25 (34.72) | 17 (22.97) |
| C. | Misuse of drugs | 32 (42.10) | 38 (52.77) | 23 (31.08) |
| 24 | Do you know that medicines with a red line on the strip should never be consumed without doctor's prescription? (agree) | 43 (56.57) | 68 (94.44) | 53 (71.62) |
| 26 | Do you think that the overuse of antimicrobials in food production is also contributing to increased drug resistance? (yes) | 50 (65.78) | 43 (59.72) | 23 (31.08) |
| 30 | Do you practice the usage of broad-spectrum antibiotic in every infectious disease? (never) | 20 (26.31) | 28 (38.88) | 29 (39.18) |

Frequency (n) and percentage (%) of participants giving correct response on statements; *Participants could agree on more than one statement

## RESULTS

Overall, 222 final-year students pursuing different courses including MBBS (*n* = 76), BDS (*n* = 72), and BSc Nursing (*n* = 74) took participation in the KAP study of antibiotic use, self-medication, and antibiotic resistance.

Gender distribution is depicted in Figure 1 where it is clearly shown that females are higher in each course compared to males and the number of females is getting increased as we move from MBBS to BDS and to BSc Nursing courses.
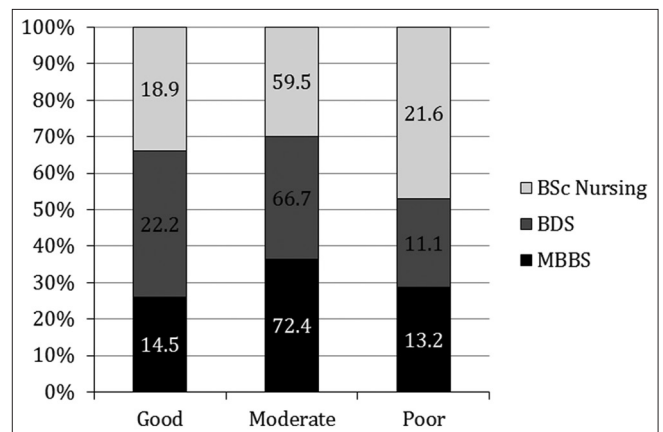
The parameters of the study, namely knowledge, attitude, and practice have been graded on the basis of scores obtained such as good, moderate, and poor. Figures 2-4 show that overall there is good knowledge and good attitude among the students of MBBS as compared to students of BDS and least in students of BSc Nursing, while good practice is being shown by BDS students followed by BSc Nursing students and least by MBBS students. The predominant level of knowledge (77.5%), attitude (79.7%), and practice (66.2%) came to be as moderate, but overall good attitude is high followed by good knowledge and least is good practice as shown in Figure 5.
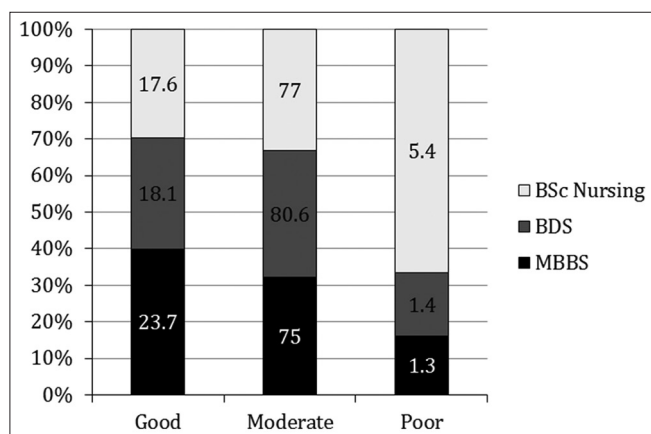
Based on KAP scores obtained by each student from all courses, no statistical significance was found as shown in Table 2. However, attitude scores in different gender groups in MBBS course were found to be significant ($P = 0.019$) as shown in Table 3.
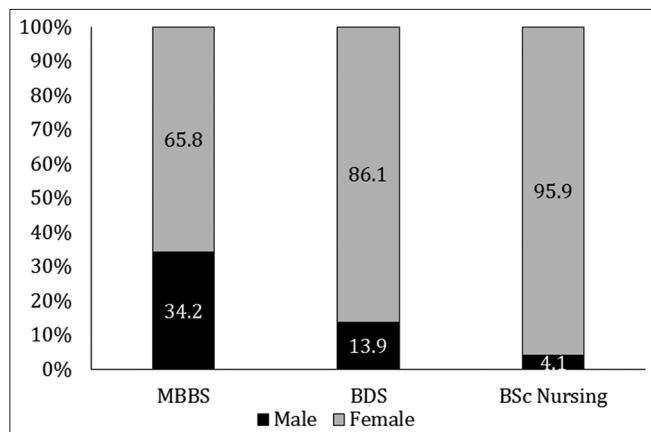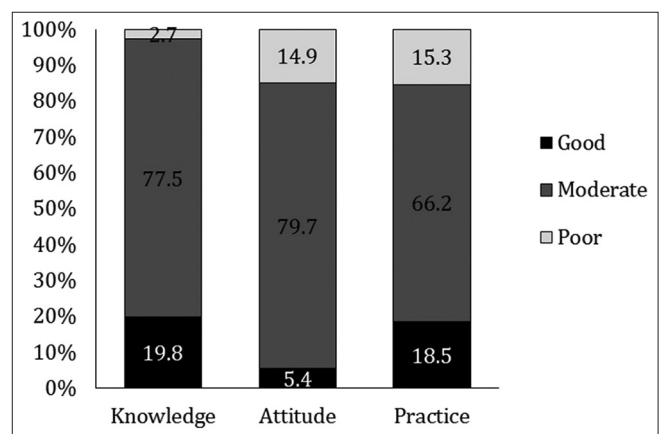
**Figure 1:** Percentage distribution of gender among participants of different courses



**Figure 2:** Percentage distribution of level of knowledge among participants of different courses



**Figure 3:** Percentage distribution of level of attitude among participants of different courses
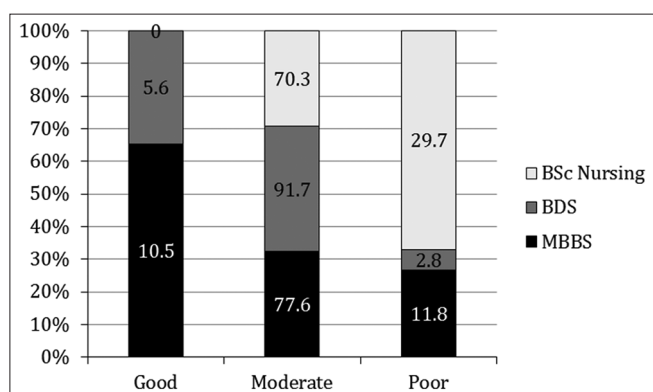


**Figure 4:** Percentage distribution of level of practice among participants of different courses



**Figure 5:** Percentage distribution of level of knowledge, attitude, and practice within different courses

The correct response on some important highlighted individual statements given by MBBS, BDS, and BSc Nursing students has been shown in Table 1.

## DISCUSSION

The present study was undertaken to address the issue of KAP of antibiotic use, self-medication, and resistance in Indian teaching hospitals from an academic as well as practical point of view. In our study, the average of KAP came out to be moderate (74.4%) which was though much more than a similar study to be 53.8%.[16] These results are inconsistent with that of recent studies in other developing countries that showed an inadequate knowledge regarding antibiotic use and resistance, in addition to a lack of formal training about antibiotics during the undergraduate level.[11] The results of study showed that overall knowledge is good in MBBS students, but practice was better in BDS and BSc Nursing students as depicted in Table 1. The latter may be due to more independent professional exposure in terms of patient dealing in the final-year students of BDS and BSc nursing, while less in the final-year students of MBBS. Our study revealed that majority of the students were well versed with theoretical knowledge about the irrational use of antibiotic use and antibiotic self-medication can lead to antibiotic resistance. The scoring showed that overall KAP is just moderate which means the medical education needs a formal training to address especially the lacking attitude and practice regarding the rational antibiotic use and discouraging the antibiotic self-medication. Other works argue that providing clear guidelines for medical practitioners may provide a

**Table 2:** KAP scores in different courses.

| Course | Mean±SD | | |
|---|---|---|---|
| | Knowledge score | Attitude score | Practice score |
| MBBS | 13.59±2.733 | 5.47±1.685 | 6.33±2.036 |
| BDS | 13.33±2.654 | 5.6±1.307 | 6.83±2.056 |
| BSc Nursing | 12.59±2.947 | 4.51±1.746 | 6.46±2.277 |
| F | 2.582 | 10.211 | 1.113 |
| P | 0.078 | 0.078 | 0.33 |

KAP: Knowledge, attitude, and practice

**Table 3:** KAP scores in gender within MBBS group

| Gender | Mean±SD | | |
|---|---|---|---|
| | Knowledge score | Attitude score | Practice score |
| Male | 12.96±3.092 | 4.96±2.01 | 6.04±1.886 |
| Female | 13.92±2.498 | 5.74±1.44 | 6.48±2.112 |
| T value | −1.416 | −1.946 | 0.896 |
| P value | 0.349 | 0.019 | 0.54 |

KAP: Knowledge, attitude, and practice

quicker and more effective route to prudent and rational use of antibiotics, eventually reversing the current trend.[17]

The percentage of correct responses to some of the important statements/questions has revealed the difference in KAP among the three specialties which has been shown in Table 1. The statement 2A "use of broad-spectrum antibiotics are better than narrow-spectrum ones" was disagreed more by BDS and least by BSc Nursing students. Agreeing on 2D statement that "antibiotic usage disturbs the gut flora and causes diarrhea" was more by MBBS and less and similar by both BDS and BSc Nursing students and the response NO to question 6B "Do you think that antibiotics should be used in any case, once you have fever" was more by MBBS and least by BSc Nursing students, although the response was very poor (<25%) in all groups, which was supported by a study that the higher education level was clearly associated with better knowledge.[18] Question 11B "Do you give the leftover antibiotics to your friend/roommate if they get sick?" was responded by ticking never more by BSc Nursing and least by MBBS students which was moderate (50%). In a similar study where sharing medication with other people and keeping part of the course for another occasion are some factors which led to misuse of antibiotics.[19] The response always to question 12 "Do you complete the full course of treatment?" was good among all groups, in which BDS (76.38%) students scored the highest and least by BSc Nursing (66.16%) students. However, the latter response was less compared to one study where 91% always completed the full course of the prescribed treatment.[1] Statement 15E "Indiscriminate and injudicious use of antibiotics can lead to additional burden of medical cost to the patient" was agreed

upon more by MBBS and least by BDS students, which is supported by an another study.[20] The open-ended question 18 "what was (were) your reason(s) of self-medication with antibiotics? Our study revealed that overall convenience was more important factor than cost saving which is similar to another study that stated self-medication appears to be more driven by convenience factor followed by economic factor.[14] For Question 19, "Have you ever treated yourself (self-medicated) with antibiotics?" with response NO to be highest among BSc Nursing (41.89%) and least by MBBS (23.64%) students, the overall response was poor (<50%). In one study a majority (>70%) always consulted a doctor before starting on an antibiotic and always completed the full course of the prescribed treatment and showed least self-medication practice among medical undergraduates,[10] while in another study, 34% students took antibiotics for various reasons and out of them only 27% of students completed the entire course.[21] For Question 20 "If option above is marked yes, then for which of the following complaint(s) did you use antibiotics?" the majority treated themselves (self-medication) for common cold and diarrhea among MBBS and BSc Nursing students and for fever and dental infection among BDS students. Self-medication for common cold and fever is in practice among medical undergraduates as per data, where 42.03% of them reported that antibiotics should be taken on developing a cold to avoid serious illness and 57.24% of them believed that taking antibiotics on having a cold/fever made them feel better more quickly.[10,11] The open-ended question 23 on spread of resistant microorganisms in the presence of antimicrobials which is facilitated by irrational use of drugs, self-medication, and misuse of drugs was considered to be more by BDS students, while irrational use of drugs was least by MBBS and self-medication and misuse of drugs was least by BSc Nursing students. One of the studies stated that the antibiotic resistance has been attributed to misuse.[22] Question 24 "Do you know that medicines with a red line on the strip should never be consumed without doctor's prescription?" was agreed more by BDS and least by MBBS students. Appreciating the need for raising awareness about antibiotics, "medicines with the red line" media campaign at the function creates awareness regarding rational usage of medicines which carry a red line on their strip.[23] For theQuestion 26 "Do you think that the overuse of antimicrobials in food production is also contributing to increased drug resistance?" the response of yes was seen to be higher among MBBS (65.78%) students and least by BSc Nursing students. One similar study also states that 54.6% of medical undergraduates know that excessive antibiotic use in livestock.[11] Moreover, the use of antibiotics in animal feedstocks has also exacerbated the spread of resistance.[24] Question 30 "Do you use broad-spectrum antibiotic in every infectious disease?" was responded as never more and similarly by both BSc Nursing and dental students, while least by MBBS students. Based on clinical and bacterial epidemiological data, the germs responsible for the infectious process are suspected, and treatment is decided on

a presumptive basis, fundamental on probabilistic reasoning, and as a result of the above, broad-spectrum antibiotics are typically prescribed by dental doctors.[25]

The strength of our study is that it gives us the insight of KAP in the budding health-care professionals, which guides us to know the pattern and will help us to narrow down the gap between academic knowledge and professional practice. Moreover, we can improve the KAP of these students by giving practical pharmacology sessions every 6 months to make them updated on medicines, especially antibiotics, not only in the final year but also in internship.

Here, the limitation of our study was that we did not include the interns since they were practically not available due to their busy schedule in the hospital. However, we expect that we will come up with more information regarding KAP if we take interns for this type of study as they have full real-time professional exposure in their respective fields.

While knowledge enlightens and provides an insight into the problems faced, behavioral change solely depends on the beliefs and attitude.[10] The ultimate aim of all these interventions is to bring out attitude and behavioral changes at the very grass-root level.

## CONCLUSION

The present study focused on different aspects of undergraduate teaching which are relevant to rationale prescriptions of antibiotics and prevention of resistance like knowledge, for which the response showed the students were well versed with theoretical knowledge about irrational use of antibiotic use and antibiotic self-medication can lead to antibiotic resistance. When it comes to practice, it was better in BDS and BSc Nursing students when compared to MBBS students which was due to more independent professional exposure in terms of patient dealing in the final-year students of BDS and BSc Nursing while less in the final-year students of MBBS. An overall average of KAP came out to be moderate. The first part for a rationale prescription and to prevent antibiotic resistance is the knowledge which has been adequately imparted. However, for implementation and to bring it in practice, our study brought into picture the need for concerned and focused effort by formal training for changes to occur in practice.

A broader picture would have emerged if the study was done in multiple institutes pan India and included interns. Hence, the study leaves lacunae for further research.

## ACKNOWLEDGMENT

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