

A Cross-Sectional Survey on Self-Prescribing and Over-The-Counter Use Practices of Antimicrobials in the Outpatient Services at a Tertiary Care Hospital

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Abstract: ***Introduction:** Antimicrobial resistance is a growing public health concern, and inappropriate antibiotic use remains an important contributor to this problem. **Aim & objectives:** This cross-sectional study assessed self-prescription and over-the-counter antibiotic use among 172 adult outpatients attending six departments of a tertiary care hospital in Hyderabad, India. **Material and methods:** Data were collected through a validated 10-item questionnaire and analysed using descriptive statistics and the Pearson Chi-square test. **Results:** Antibiotic self-medication was reported by 70.9% of participants, including 8% who relied on self-prescription, 26% who obtained antibiotics over the counter, and 37% who followed both practices. Influenza-like illness was the leading reason for antibiotic use, followed by genital and gastrointestinal symptoms. Azithromycin, ampicillin, amoxicillin, and ciprofloxacin were among the commonly used antibiotics. Age and gender showed no statistically meaningful association with self-medication, whereas socioeconomic status and literacy were strongly associated with these practices. Knowledge of correct dosage, frequency, and treatment duration was generally poor, and many participants failed to complete the prescribed course. Nearly 64% of those who self-medicated later sought medical care because treatment was unsuccessful. **Conclusion and recommendations:** The high level of unguided antibiotic use calls for stronger control over non-prescription antibiotic sales, better public awareness, and wider studies to guide measures aimed at reducing inappropriate antibiotic use and antimicrobial resistance.*

Keywords: self-medication with antibiotics, self-prescription, over the counter use, antimicrobial resistance, misuse and overuse of antibiotics

1. Introduction

Global Context of Antimicrobial Resistance

Antimicrobial resistance (AMR) has emerged as a major global health threat, primarily driven by the misuse and overuse of antimicrobial agents. [1,2] According to the World Health Organization (WHO), multidrug-resistant organisms currently cause approximately 13 million infections and 1.47 million deaths annually, a figure projected to rise to 10 million annual deaths by 2050. [1,2] Self-medication, defined as using drugs to treat self-diagnosed symptoms or the unguided continuation of prescriptions and the widespread availability of over the counter (OTC) drugs significantly exacerbate this "silent pandemic". [3,4]

Study and Objectives

India faces some of the highest global levels of OTC access to antimicrobials, which often leads to incomplete treatment courses and accelerated resistance. [3,4] To address the burden of this problem in a local setting, a cross-sectional survey was conducted at a tertiary care hospital in Hyderabad, India. The study's primary objective was to determine the prevalence of self-prescription and OTC antimicrobial use among outpatients and to evaluate the influence of knowledge and demographic factors on these practices.

Aims and Objectives

The primary objective of this study was to estimate the prevalence of self-prescription and over the counter (OTC) antibiotic use among patients attending key outpatient departments including ENT, pulmonology, dermatology and venereology, urology, general medicine, and gynaecology at a tertiary care hospital. The study was timed to coincide with World Antimicrobial Awareness Week (WAAW) 2025.

Secondary objectives included:

- Determining the influence of demographic factors, such as age, gender, socioeconomic status, and literacy, on antibiotic intake practices.
- Assessing participant knowledge regarding antibiotic therapy, specifically focusing on dosage, administration frequency, treatment duration, and annual intake frequency.

2. Materials and Methods

Study Design and Setting

This study was a cross-sectional survey conducted at a tertiary care facility. Prior to commencement, institutional ethical clearance was obtained (Approval No: IEC NO.2025/63/033).

Sample Size and Selection

The sample size was determined using the formula $N = Z^2 \cdot P \cdot (1-P) / E^2$, based on reported Indian prevalence rates ranging from 40% to 70%. Using a 0.4% prevalence rate at a 95% confidence interval and a 5% adjustment for type I error, the initial size was calculated at 369. After a 10% adjustment to account for potential incomplete data, the final target sample size was 405 subjects. Participants were selected via convenience sampling.

Inclusion and Exclusion Criteria

- **Inclusion:** Adults (18 years and older) attending the six specified outpatient departments during WAAW who completed the questionnaire in full.
- **Exclusion:** Individuals under 18, inpatients, those attending departments not included in the study, and participants providing incomplete data.

Data Collection

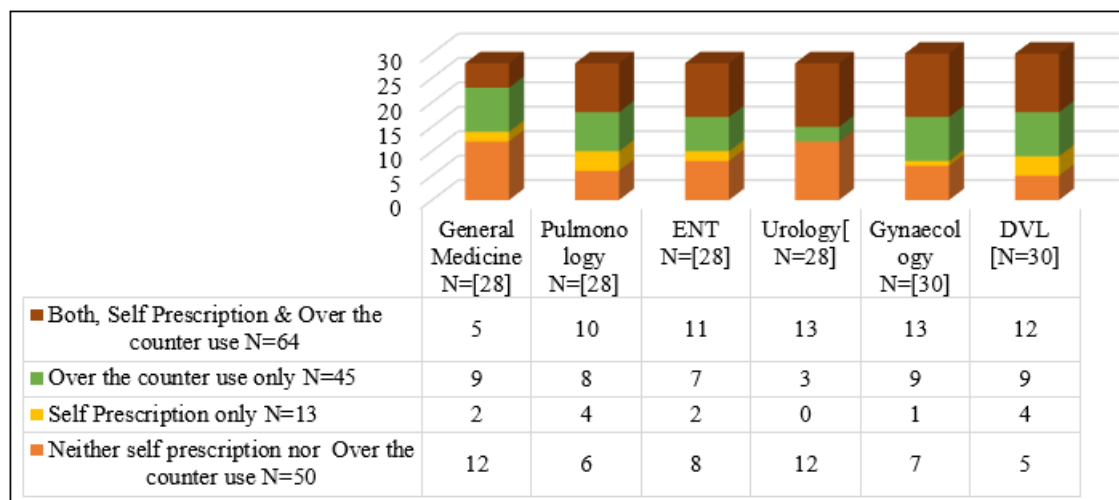
Medical students administered a validated 10-item questionnaire printed in the local language. To ensure anonymity, patient identities were protected; only demographic data (age, gender, socioeconomic status, and literacy) and details regarding antimicrobial practices were recorded. Collected data focused on the ailments treated, types of agents used, sources of medication, and the participants' technical knowledge of therapy (e.g., dose and duration).

Statistical Analysis

Data were analysed using descriptive statistics, including frequencies and proportions. The Pearson Chi-square test was employed to determine the level of significance for the categorical variable studied.

3. Results

Study Population and Prevalence Of the approximately 200 patients who volunteered for the study, 172 provided complete data and were included in the final analysis. The overall prevalence of antibiotic self-medication was 70.90% (122/172). Specifically, 8% (13/172) practiced self-prescription alone, while 26% (45/172) purchased antibiotics over the counter (OTC) based on a pharmacist's advice. Notably, 37% (64/172) of participants utilized both self-prescription and OTC methods depending on their perceived medical needs. Approximately 29% (50/172) of participants did not engage in any form of antibiotic self-medication. The departmental split of the study participants and the proportion of the individuals who self-medicated with antibiotics is shown below in graph -1.

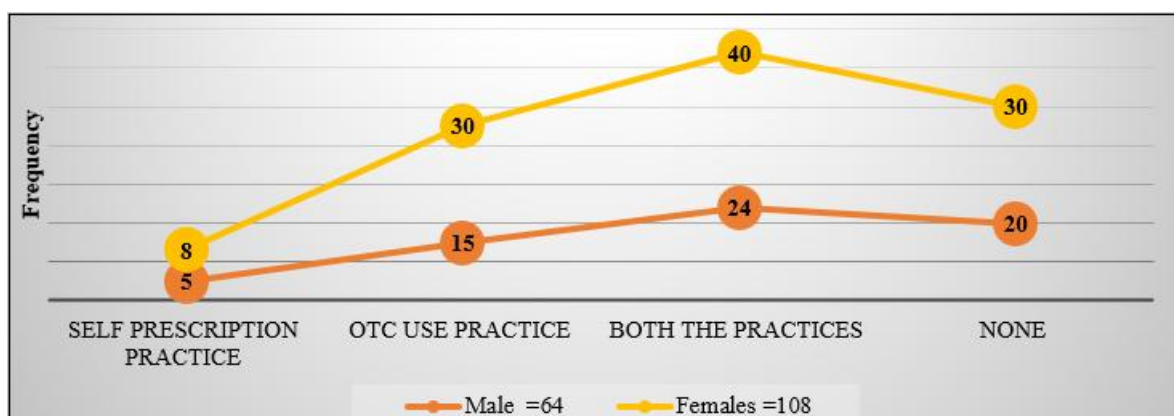


Graph 1: Showing Outpatient department wise antibiotic usage practices among the participants

Departmental and Demographic Trends

Self-prescription was most frequent among patients attending Pulmonology (14.28%) and DVL (13.33%) clinics, while no instances were recorded in the urology department. OTC practices were slightly higher in General Medicine (32.14%) followed by Gynaecology and DVL (30% each). Combined

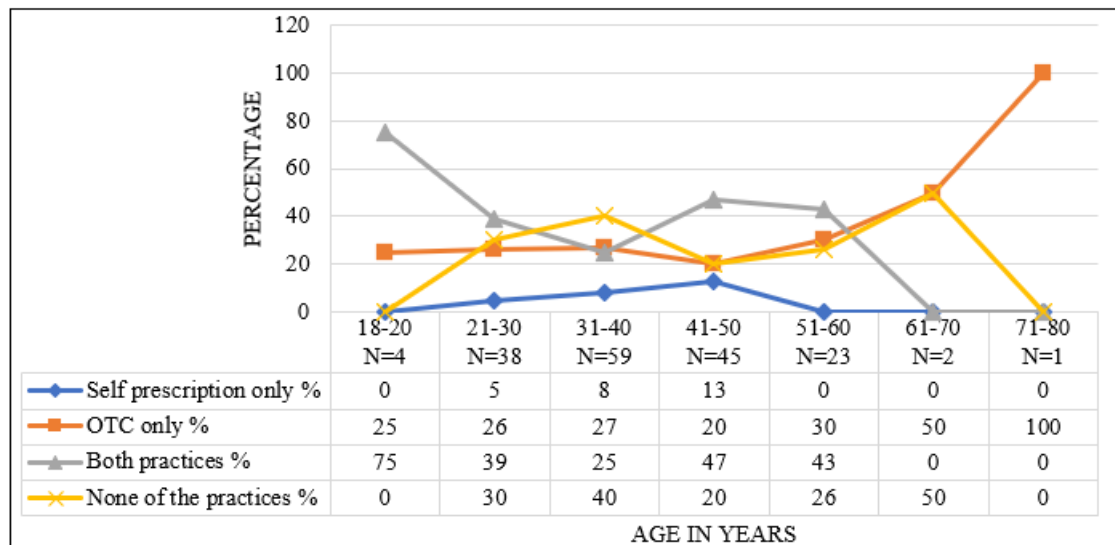
practices (both self-prescription and OTC) were most prevalent in urology (46.42%) and Gynaecology (43.33%) as seen in graph 1 above. These departmental variations, however, were not statistically significant Pearson Chi square test value of 17.6, df=15 and p value of 0.31.



Graph 2: Showing gender wise distribution of self-medication with antibiotic among the participants

The participant age range was 20–80 years, with a mean age of 37.02 ± 10.28 years. Males had a higher mean age than females (39.42 vs. 35.60 years). The study's male-to-female ratio was 0.6:1 (64:108). Females reported a higher

prevalence of self-medication (72.22%) compared to males (68.75%), though this difference was statistically insignificant X^2 test value of 0.47, df=3, and P value of 0.93 as seen in the graph 2 above.



Graph 3: Showing agewise distribution of the self-medication with antimicrobial agent practices among the participants

Self-Medication Patterns by Age and Gender

Self-medication was most frequent in the 21–50 age group. Self-prescription alone peaked in the 41–50 age group (13%), while OTC use reached 100% in the 71–80 age group. In the youngest cohort (18–20 years), 75% practiced both methods. Gender-specific analysis showed that self-prescription was

most common in males aged 31–40 (13.63%) and females aged 41–50 (18%). OTC use was universal (100%) among males aged 61–70, whereas in females, it was most common in those aged 21–40 as (30%) seen in graph 3 above & table 1 below.

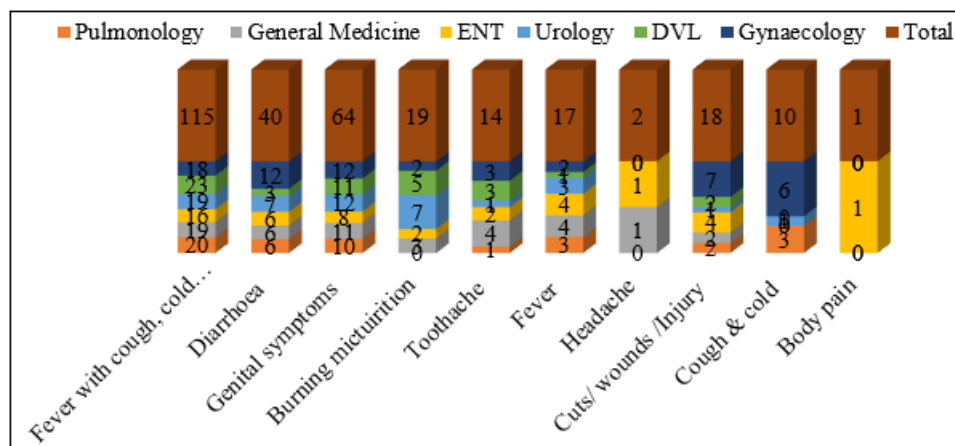
Table 1: Showing age and gender relationship with various self-medication practices among the participants

Age in years	Total males	Total females	Self-prescription only		OTC use practice only		Both the practices		None of the practices	
			Male	Female	Male	Female	Male	Female	Male	Female
18-20 N=4	1	3	0 [0]	0	0 [0]	1 [25%]	1 [100%]	2 [75%]	0 [0]	0 [0]
21-30 N=38	11	27	1 [9.09%]	1 [3.7%]	3 [27.27%]	8 [30%]	4 [36.36%]	10 [37%]	3 [27.27%]	8 [30%]
31-40 N=59	22	37	3 [13.63%]	2 [5%]	5 [22.72%]	11 [30%]	5 [22.27%]	10 [27%]	9 [40.90%]	14 [38%]
41-50 N=45	17	28	1 [5.88%]	5 [18%]	2 [11.76%]	7 [28%]	10 [58.82%]	11 [39%]	4 [28.57%]	5 [18%]
51-60 N=23	12	11	0 [0]	0 [0]	4 [33.33%]	3 [2%]	4 [33.33%]	6 [54.5%]	4 [33.33%]	2 [18%]
61-70 N=2	1	1	0 [0]	0 [0]	1 [100%]	0 [0]	0 [0]	1 [100%]	0 [0]	0 [0]
71-80 N=1	0	1	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	1 [100%]
Total N=172	64 [37.20%]	108 [62.79%]	5 [7.8%]	8 [7.4%]	15 [23.43%]	30 [27.77%]	24 [37.5%]	40 [37.03%]	20 [31.25%]	30 [27.77%]

Socioeconomic Status and Literacy

A significant majority of participants (88%) belonged to the lower middle-income class (LMIC), where self-medication prevalence was 74.83%, significantly higher than the 42.85% observed in the upper middle-income class (UMIC) (p value = 0.002, OR = 3.96). Literacy also played a critical role; 85%

of participants had education below the higher secondary level. This group showed a much higher prevalence of antibiotic misuse (78.08%) compared to participants having degree course as (30.76%), a statistically significant finding (p < 0.001, OR = 8.2).

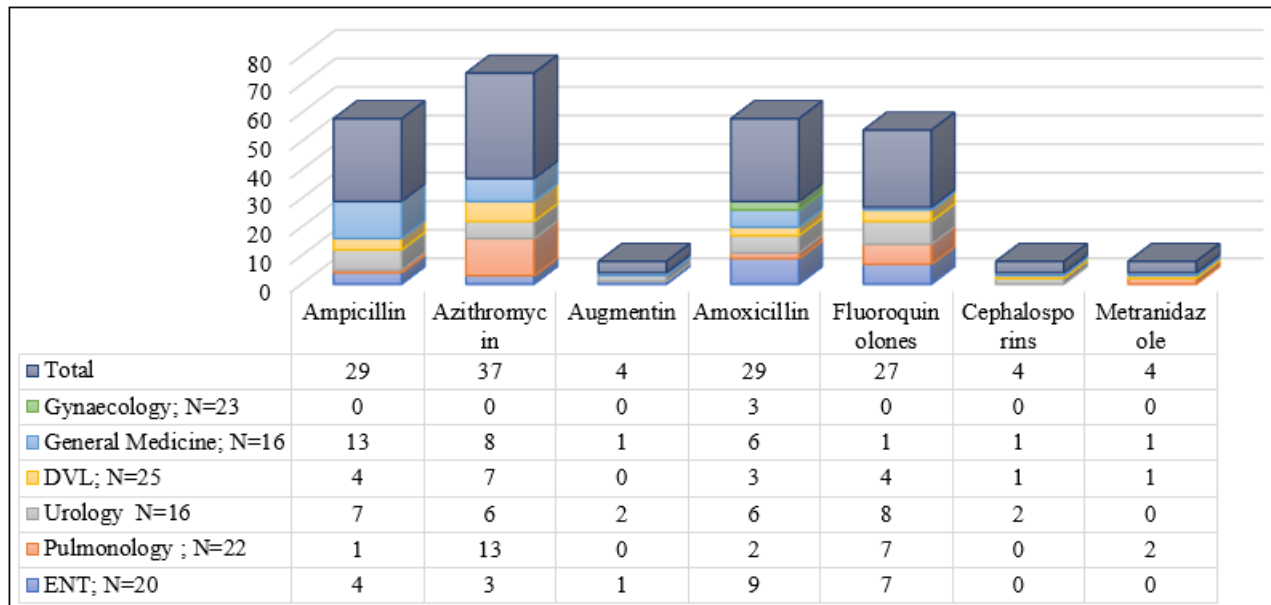


Graph 5: Showing the commonest reasons for which antibiotic was taken by the participants

Clinical Indications and Antibiotic Choice

The most common indication for self-medication was influenza-like illness (ILI) characterized by fever, cough, and sore throat as reported by 94.26% of users. Other reasons included genital symptoms (52.45%), diarrhoea (32.78%), and urinary symptoms (17.21%) etc. The less frequent indications noted were headache and body pains where antibiotics were used as seen in graph 5 above. In general Azithromycin was the most frequently misused antibiotic as 30%, followed by ampicillin, amoxicillin, as 24% each and

fluoroquinolones like ciprofloxacin as 22%. With respect to OPD services and class of antibiotic used, azithromycin was most used by participants attending pulmonology department and DVL clinic for ILI symptoms as 59% & 28% respectively. Ampicillin was used by 81% of the individuals attending general medicine OPD services. Ciprofloxacin was specifically preferred by 50% of participants in the urology department, while amoxicillin was favoured in ENT department (45%) as seen in graph 6 below.



Graph 6: Showing the use of various antimicrobial agents among the participants department wise

Knowledge and Usage Behaviour: Only 35.24% of participants possessed adequate knowledge regarding antibiotic dosage; the majority (64.75%) relied entirely on pharmacist advice. Knowledge regarding the frequency of intake was notably poor, with 56.55% taking antibiotics twice daily regardless of guidelines. Regarding duration, 53.27% used antibiotics for 3–5 days, while 36.06% used them for less than two days. Furthermore, 57.37% of participants failed to complete the full treatment course, and 63.93% eventually required a physician's consultation due to self-medication failure. Over half of the participants (57%) reported using antibiotics at least once every six months.

4. Discussion

The study reveals a high prevalence of antibiotic self-medication (71%), which, while significant, falls within the 7.3–85% range reported in a systematic review performed over one year period during the year 2018 by Nepal G et al. [5] The author has recorded data from 19 selected studies conducted in the southeast Asian region WHO SEAR of the globe where the burden of AMR is high according to WHO report.[5] The study included nine different countries like Bhutan, Bangladesh, India, Indonesia, south Korea, Nepal, Sri Lanka, & Thailand [5]. The geographic variations observed in the prevalence rate of self-medication practices with antibiotics has been attributed by him to be differences in determinants of health, tradition, culture, economic status and developmental status. He has also pointed out differences in study methodology, study setting, sample size and recall

time as also relevant reasons for the variations observed in the prevalence rate. In developed countries like Europe where the over-the-counter use of antibiotics is strictly prohibited the prevalence is found to be low between 1–4%.[5] The present study is unique in identifying that a substantial portion of the population (37%) simultaneously employs both self-prescription and OTC purchase methods.

The mean age of the present study participants was noted as 37.02 ± 10.28 , which is less when compared with participants in the study by U Ashok et al where he reported it as 40 years [6]. And it is slightly higher when compared to the study by Adelaide et al as 35.6 ± 13.6 and one reported by Elvis T Amin et al as 33.37 ± 17.85 and one reported by Ashraf A et al as 35.8 ± 11.9 [7,8,9]. The male to female ratio in the present study was 0.6:1 which is exactly like the findings of Adelaide et al as 127/192 equivalent to 0.6:1.0; but completely different from the findings of the study by Ashraf et al where male dominance was reported as 4.5:1 and 1.6:1 reported by U Ashok et al [6,7]. The female preponderance observed in the present study may be attributed to the inclusion of the Gynaecology department, a factor often omitted in similar research. Further we have noticed gender variations in antibiotic use practices. The subtle variation observed between male and female gender for various subtypes of self-medication practices with antibiotic as 5 [7.80%] vs. 8 [7.4%] for self-prescription alone, OTC use only as 15 [23.43%] vs. 30 [27.77%] and both practices as 24 [37.5%] vs. 40 [37.03%] seen in the graph 3 were however, statistically

insignificant with Pearson X^2 test value of 0.47, $df=3$, and p value of 0.93.

Age and gender together when examined showed self-medication practices to be most common in the age group 21–50 years as 99/122 [81%]; 34/44 males as 77.27% and 65/78 females as 83.33% which is similar to the findings of ET Amin as 81.8 % in 30-39 years of age group, VD Phalke as 63% in 36-55 years, and more when compared with study done by Akram Ahmed et al as 40% in 36-60 years of age group and also the study done by U Ashok et al where he reported prevalence as 18.95% in 36-45 years [6,8,9,10]. Self-prescription alone was noted to be higher in females in the age group 41-50 years as 13.63% on the contrary in males it was higher in the age group 31-40 years as 18%. OTC was at peak in the age group 61-70 years in males as cent percent while in females it was noted in the age group of 21-40 as 60%. Both practices were noted in greater proportion of participants in the age group 18-20 years as 100% and 75% each. Participants in the age group 71-50 years of both the sexes didn't engage in any self-medication practice at all. However, the findings were insignificant on analyses using Pearson X^2 test with value of 17.27, $df=18$ and p value as 0.50. The specific motivations for misuse varied by department. For instance, high rates of misuse in DVL (83%) and Gynaecology (77%) suggest that stigma associated with genital tract ailments, alongside limited affordability and knowledge, may drive patients toward self-treatment rather than professional consultation [5,6,7,8].

The overwhelming use of antibiotics for ILI (94.26%) is particularly concerning. Because ILI is predominantly viral, these antibiotics are often unnecessary, directly contributing to the rising burden of antimicrobial resistance (AMR). [1,2]. When compared to previous studies the proportion of people who self-medicated with antibiotics for ILI symptoms has dramatically increased over the past decade from 13- 62% to present 94% which indirectly reflects the increasing trend or burden of overuse of antibiotics for ILI symptoms [5,6,7,8,9,10]. The next common ailment for self-medication with antibiotic in our study was genital symptoms which is like the findings of ET Amin et al as 15.11% [8]. Gastrointestinal symptoms was the third common reason for self-medication in our study which is like the findings of G. Nepal et al & ET Amin et al as 22% and Ahmed et al as 13.66% [5,8,9].

In the present study the antibiotics misused by the participants were azithromycin, amoxicillin, ampicillin, fluoroquinolones, cephalosporins and metronidazole which is like the findings of G Nepal et al [5]. Azithromycin was the most misused antibiotic agent as 37/122 [30%] which is less when compared with the findings of U Ashok et al as 38.8% but more when compared with the study by Biswas et al as 20.75%, Akram et al as 4.8%, and ET Amin as 1.8%. The use of ampicillin and amoxicillin by participants was in second place in the present study as 29 /122 [23.7%] each which is less when compared to the report by Kurniawan et al as 68.3% and ET Amin as 32.4% followed by Ganesan et al, Widyavati et al & Hadi et al who all has reported penicillin group of antimicrobial agents as the most misused agents [5, 12,13,14]. The use of fluoroquinolones such as ciprofloxacin was in third place in our study 27/122 [22%] but was reported in less

percentage by Akram A et al as 16.16% and Biswas et al as 11.53%. Use of metronidazole by the participants was very low as 4/122 [3%] in the present study but was very high in the participants reported by Biswas et al as 50.43% in his study. The use of cephalosporins and beta lactam with beta lactamase inhibitors [BLBLI] combination was minimal in the present study as 3.2%. However, it was reported in higher percentage of participants as 24.16% by Ahmed et al. [9] These varied findings in antibiotic use preferences could be due to clinician prescribing habits and regional availability, which in turn influence patient behaviour as they attempt to replicate previous successful treatments or follow pharmacist suggestions.[5]

With respect to departments the most used antibiotic for ILI like illness was ampicillin as 13/16 [81.25%] in general medicine followed by azithromycin in patients attending pulmonology and DVL OPD as 13/22 [59%] and 12/25 [48%]. In urology it was ciprofloxacin as 8/16 [50%]. In the ENT department it was amoxicillin as 9/20 [45%]. Which has not been looked by previous authors. [5-14] And it reflects once again the practice of replicating physician prescribing habits by the common man for most significant reason of previous successful experience with that antibiotic and several other reasons quoted by the authors [5-14].

In the present study socioeconomic status of the participants showed significant association with the self-medication practice with antibiotics with a p value of 0.002 and a OR of 3.96 which is like the findings of U Ashok et al with almost same p value of 0.001.[6] However, some authors have reported higher self-medication practice in people from upper income class e.g. Adelaide et al. [7]. Majority of the subjects belonging to LIC or LMIC or unemployed had opted for self-medication, and socio-economic status has been found to be a significant reason for self-medication with antibiotics to cut the cost of consultation fees for lack of affordability to avail health care facilities in previous studies [6-14].

Similarly, literacy level of the subjects also had a positive correlation with self-medication practice with antibiotics in the present study with a p value of 0.001 and OR of 8.02 which is like the findings of Ahmed et al as 46% in illiterate and 48% in individuals with education below 10th standard.[9]. On the contrary some authors have shown positive association of higher education with self-medication with antibiotics with a reason of having more knowledge about antibiotics as 57% by Adelaide et al & ET Amin as 70% [7,8]

Furthermore, the widespread lack of knowledge regarding dosage 64.8%, frequency 100% , and duration 46.7% of antibiotic therapy in the present study irrespective of the guidelines provided by ICMR and WHO in the national list of essential medicines [NLEMS] is alarming. And it is one of the crucial reasons for growing AMR due to overuse and misuse of antibiotics.[5] Suboptimal therapy, such as taking antibiotics for less than two days or failing to complete a course creates selection pressure that facilitates the development of resistant microbial strains [1-3]. The fact that most participants eventually required professional medical intervention [63.9%] underscores the inefficiency and danger of these practices.

5. Conclusion

These findings underscore a significant burden of antibiotic self-medication within the studied population. While localized, the results highlight a critical need for larger, multicentric studies to fully understand the national scope of the problem. To combat the rising threat of AMR, stakeholders must implement stricter regulations on the OTC sale of antibiotics and launch public education campaigns emphasizing the risks of self-medication and the importance of adhering to professional medical advice.

Conflict of interest -None

Funding– nil

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