

Patient Knowledge and Practice on Antimicrobial Use and Resistance in Felege Hiwot Hospital, Bahir Dar, Ethiopia

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ABSTRACT

Rationale: Emergence of worldwide antimicrobial resistance in recent years has been major problem for public health globally. Ensuring patients' adequate knowledge and proper use of antimicrobials is one of the strategies to control resistance. This study was conducted to evaluate patients' knowledge and practice regarding antimicrobial use and resistance; as such a study has not been conducted previously in Ethiopia. Cross-sectional study was conducted on 378 patients visiting Felege Hiwot hospital located in the city of Bahir Dar, Northwest Ethiopia, from April 1 to 30, 2014. Data was collected on patients' knowledge and practice regarding antimicrobial use and resistance using questionnaire, prepared by native language, consisting close ended questions. **Results:** The participants scored values ranging from 1 to 9 out of 10 with mean value of 4.95 ± 1.88 . About 3% of the participants had very good knowledge while 18.8% had good knowledge, 36.0% had average knowledge and 42.3% had poor knowledge about antimicrobial use and resistance. Female patients (AOR=1.838, 95% CI, 1.068, 3.165), those who completed elementary school (AOR=5.286, 95% CI, 1.405-19.883), high school (AOR=20.695, 95% CI, 5.479-78.161 and higher education (AOR=80.682, 95% CI, 18.670-348.663) were associated with higher knowledge. Among 372 subjects who had ever taken antimicrobials, 56.2% had history of discontinuing antimicrobials before the full dose; 62.6% had ever taken antimicrobials without prescription; and 73.4% had ever missed doses. **Conclusion:** The findings of the study showed the

presence of knowledge gap and malpractice regarding antimicrobial use which will accelerate the rate of development of antimicrobial resistance.

Key words: Antibiotic use, antimicrobial use, antimicrobial resistance, drug resistance, Felege Hiwot hospital

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INTRODUCTION

Effective treatment of bacterial infections requires the availability of effective antimicrobial agents. The management of infectious diseases has been dramatically improved since the discovery of antimicrobials, increasing the quality and length of life of the global population. However, the emergence of worldwide antimicrobial resistance in recent years has been major problem for public health globally.^[1,2] The consequences of antimicrobial resistance could be medical or pharmacoconomics. Medical consequences are manifested as treatment failure, progression into more severe form of a disease, whereas pharmacoconomics challenges include increase in healthcare costs caused by the need of alternative, more expensive treatment options to eradicate resistant strains.^[3] The World Health Organization (WHO) has identified antimicrobial resistance as one of the greater dangers of public health.^[4]

Among the major causes of development of resistance is inappropriate use of antimicrobials by patients including discontinuing medication before completing the full dose, skipping doses, reusing leftover and expired medication and obtaining and use of antimicrobials without prescription. Particularly in developing countries, antimicrobials can be obtained without prescription from community pharmacies, drugstores or even from commodity shops.^[5] Studies conducted in different African and Asian countries showed that self-medication is commonly practiced in those continents.^[6-9] Similar findings were also found in different settings in Ethiopia, which indicates high prevalence of self-medication in the country.^[10-12] Self-medication practice leads to inadequate choice of drugs, inadequate doses and/or length of treatments, and, of course, a more common use of antibiotics where they were not necessary.^[13] These practices of antimicrobial misuse are affected by factors such as incompetence of health professionals, inaccessibility of healthcare facilities and patients' knowledge, beliefs and perceptions towards antimicrobial use.^[14]

Huge portion the population of developing countries like Ethiopia lack

access to adequate healthcare facilities.^[12] This fact, together with high incidence of infectious diseases, forces patients to seek medical care at facilities with inadequate diagnostic services and treatment options, or else try self-medication. In a study conducted in northern part of the country, patients mentioned inaccessibility of health facilities as a factor for their malpractice.^[10]

Even though emerging antibacterial resistance is threatening the management of bacterial infections, the prevention and containment has received far too little attention. Immediate measures should be taken to promote appropriate use of antimicrobials and prevent the further development of antimicrobial resistance. Ensuring patients' adequate knowledge and proper use of antimicrobials is one of the strategies to control resistance.^[15] However, no studies were conducted in Ethiopia before to assess patients' knowledge and practice on antimicrobial use and resistance. This study was conducted to evaluate patients' knowledge and practice regarding antimicrobial use and resistance.

MATERIALS AND METHODS

Cross-sectional study was conducted on 378 patients visiting Felege Hiwot hospital located in the city of Bahir Dar, Northwest Ethiopia, from April 1 to 30, 2014. Patients aged 18 years or older who visited the hospital during the study period and were willing to participate were included in the study by convenience sampling technique.

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Letter of ethical approval was obtained from ethical review board of School of Pharmacy, College of Health and Medical Sciences, University of Gondar as well as from the administrative body of Felege Hiwot hospital.

The data was collected using a semi structured closed ended questionnaire prepared by local language (Amharic). The questionnaire consisted of socio-demographic section, knowledge section and practice section. The knowledge sections consisted of 10 correct and incorrect statements about antimicrobial use and resistance, and closed ended answers: 'Yes', 'No' and 'I don't know'. The practice section contained questions about experience of antimicrobial use, antimicrobial self-medication, and other questions related to appropriate antimicrobial use.

The collected data was entered into SPSS software version 20. Descriptive analysis was carried out on antimicrobial use and resistance knowledge, and the practice of antimicrobial use separately. Findings of the research were summarized using tables and graphs. Furthermore, association between predictor variables and knowledge of antimicrobial use and resistance was analyzed using binary logistics and analysis of variance (ANOVA) tests.

RESULTS

Socio-demographic characteristics

Out of more than 412 individuals approached, 378 were willing to participate in the study; producing a response rate of 91.8%. Of the participants, 222 (58.7%) were males. The participants' age ranged from 18 to 80 with mean age of 34.7 ± 10.9 . More than nine tenth of the participants came from Amhara ethnicity [Table 1].

Knowledge of antimicrobial use and resistance

Each participant answered 10 knowledge questions, which include

Table 1: Socio-demographic characteristics of study participants

Variables	Frequency (%)
Gender	
Male	222 (58.7)
Female	156 (41.3)
Age (Mean \pm SD)	
18-25 years	63 (16.7)
26-35 years	170 (45.0)
36-45 years	101 (26.7)
46-55 years	24 (6.3)
56-65 years	12 (3.2)
\geq 65 years	8 (2.1)
Educational level	
Illiterate	50 (13.2)
Elementary	81 (21.4)
High school	117 (31.0)
Higher education	105 (27.8)
Religious education	25 (6.6)
Ethnicity	
Amhara	343 (90.7)
Oromo	15 (4.0)
Tigre	12 (3.2)
Other *	8 (2.1)
Distance from health facilities	
\leq 10 km	225 (59.5)
11-20 km	81 (21.4)
21-30 km	21 (6.9)
\geq 30 km	46 (12.2)

* Other – Agew (4), Guraghe (1), Somali (1), Hadiya (1), Shinasha (1), SD – Standard deviation

correct and incorrect statements about the use of antimicrobials, side effects of antimicrobials, and resistance to antimicrobials. The participants scored values ranging from 1 to 9 out of 10 with mean value of 4.95 ± 1.88 .

The first of the knowledge assessment questions was whether different antimicrobials are used for different diseases. For this question, 78.6% of participants gave correct answer whereas the rest either answered incorrectly or stated they did not know the answer. Other questions included whether antimicrobials are effective against bacteria, which was correctly answered by 53.4% of the participants; whether antimicrobials are effective against viruses, for which correct answer by given by only 22.2%; as well as seven more questions which are listed in Table 2.

Among 378 participants, 160 (42.3%) gave correct answers to less than a half of the knowledge questions; hence designated to have poor knowledge whereas the remaining 218 (57.7%) participants correctly answered at least half of the questions, lying in categories labeled as average, good or very good knowledge, depending on the number of questions they correctly answered [Figure 1].

Practice of antimicrobial use

Out of 378 participants, six never had taken antimicrobials, giving as antimicrobial use rate of 98.4% among study subjects. Among 372 subjects who had ever taken antimicrobials, 209 (56.2%) had history of discontinuing antimicrobials before the full dose, 14 of which did it every time they had a course antimicrobial administration. Feeling free of symptoms was a reason identified by most subjects for discontinuation of antimicrobials followed by forgetfulness and intolerable side effects.

Nearly two-third (62.6%) of the participants with exposure to antimicrobials had ever taken antimicrobials without prescription. Different factors including lack of money for diagnostic procedures,

Table 2: Knowledge about antimicrobial use and resistance

	Yes	No	I don't know
A. Use			
Correct statements			
1. Different antimicrobials are used to treat different diseases	297	72	9
2. Antimicrobials are effective against bacteria	202	91	85
3. Antimicrobials can kill bacteria that normally live on our skin and gut	186	154	38
Incorrect statements			
4. Antimicrobials speed up the recovery from most coughs and colds	254	119	5
5. Antimicrobials are effective against viruses	261	84	33
B. Side effects			
6. If you get side effects during a course of antimicrobials treatment you should stop taking them as soon as possible	91	216	71
7. If you get some kind of skin reaction when using an antimicrobial, you should not use the same antimicrobial again	138	161	79
C. Resistance			
8. The unnecessarily use of antimicrobials can increase the resistance of bacteria to them	270	49	59
9. The use of antimicrobials among animals can reduce the effect of antimicrobials among humans	76	168	134
10. Resistance to antimicrobials is a worldwide problem	282	81	15

perceived self-awareness of the condition and lack of access to health facilities were listed by respondents. Community pharmacies were sources of antimicrobials for most (63.9%) of the patients obtaining them without prescription [Table 3]. Out of 372 participants who had ever taken antimicrobials, 273 (73.4%) had ever missed doses. Out of these, 41.0% reported that they took the missed dose as soon as they remembered. Others either took the missed dose together with the next dose or simply continued taking the next dose, and few informed that they discontinued the medication altogether.

Factors associated with knowledge of antimicrobial use and resistance

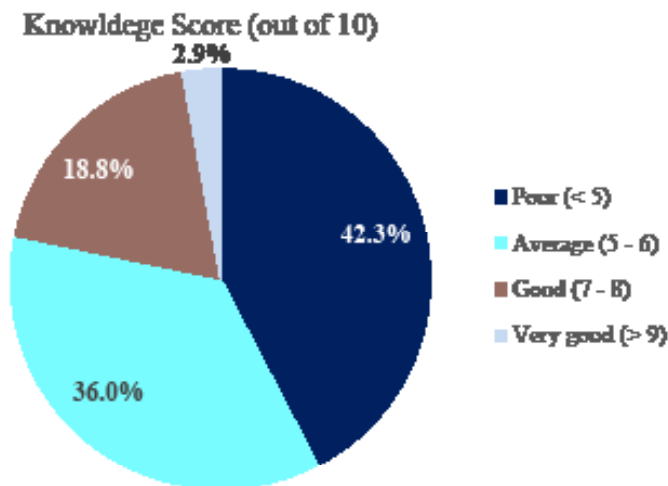


Figure 1: Percentage of patients with corresponding knowledge score about antimicrobial use and resistance

Table 3: Practice of participants regarding antimicrobial use

Questions	Responses	
Have you ever taken antimicrobials?	Yes	372
	No	6
Have you discontinued taking antimicrobials before finishing the full dose? (n=372)	Always	14
	Sometimes	195
	Never	163
Reasons for discontinuing medication before finishing full dose (n=209)	Feeling free of symptoms	135
	Due to side effects	25
	To use it for other time	7
	Forgetfulness	33
	Other reasons	9
Took antimicrobials without prescription? (n=372)	Always	23
	Sometimes	210
	Never	139
Reasons for taking antimicrobials without prescription. (n=233)	Lack of access to health facilities	57
	Recommendation by other individuals	24
	Don't have money for diagnostic procedures	76
	I had sufficient knowledge on my condition	69
	Other reasons	7
Where did you get antimicrobials without prescription? (n=233)	Community pharmacies	149
	From family/ friends	35
	Left over drugs from previous similar condition	30
	Commodity shops	19
Ever missed doses while taking antimicrobials? (n=372)	Yes	273
	No	99
Actions taken after missing doses (n=273)	Took as soon as I remembered	112
	Took along with the next dose	48
	Continued taking the next dose	91
	Discontinue the medication altogether	22

Binary logistic analysis was performed to identify associated factors for participants' knowledge of antimicrobial use and resistance. Up on univariate analysis, age (COR=0.82, 95% CI, 0.678-0.995); those who completed Elementary (COR=5.042, 95% CI, 1.395-18.226), High school (COR=18.667, 95% CI, 5.233-66.583) and Higher education (COR=62.667, 95% CI, 16.110-243.766); and living within 10 kilometers of health facilities (COR=3.857, 95% CI, 1.989-7.480) were shown to be associated with having good knowledge.

Using multivariate analysis, Age, ethnicity and distance from health facility did not show significant association with knowledge. In contrast, female patients (AOR=1.838, 95% CI, 1.068, 3.165), those who completed elementary school (AOR=5.286, 95% CI, 1.405-19.883), high school (AOR=20.695, 95% CI, 5.479-78.161) and higher education (AOR=80.682, 95% CI, 18.670-348.663) were more likely to have better knowledge [Table 4].

In addition to logistic regression, one way ANOVA test was performed to investigate the presence of significant difference in knowledge score between different age groups. One way ANOVA test showed that there was significance difference of mean knowledge score among different age groups (F=2.923, p=0.013). Furthermore, post hoc analysis was performed to examine which particular age groups have different mean scores from other groups [Table 5].

Study participants in age range of 26 to 35 years showed the highest positive mean difference compared to other those in other age groups, suggesting that they have better knowledge about antimicrobial use and resistance. Figure 2 shows the mean knowledge score plotted against each age group.

DISCUSSION

Although studies on patterns of antimicrobial resistance reported high prevalence of resistance in Ethiopia,^[16,17] there are no published studies

Tesfaye Z: Patient Knowledge and Practice on Antimicrobial Use and Resistance in Felege Hiwot Hospital, Bahir Dar, Ethiopia

Table 4: Factors associated with knowledge of antimicrobial use and resistance

Variables	Knowledgeable		Odds Ratio (95% CI)	
	Yes	No	Crude	Adjusted
Gender				
Male	120	102	1.00	1.00
Female	98	58	1.436	1.838 (1.068, 3.165)
Age			0.822 (0.678, 0.995)	1.206 (0.936, 1.555)
Educational level				
Illiterate	4	46	0.638 (0.131, 3.098)	0.611 (0.116, 3.216)
Elementary	33	48	5.042 (1.395, 18.226)	5.286 (1.405, 19.883)
High school	84	33	18.667 (5.233, 66.583)	20.695 (5.479, 78.161)
Higher education	94	11	62.667 (16.110, 243.766)	80.682 (18.670, 348.663)
Religious education	3	22	1.00	1.00
Ethnicity				
Amhara	196	147	0.190 (0.023, 1.565)	0.295 (0.031, 2.847)
Oromo	7	8	0.125 (0.012, 1.282)	0.145 (0.011, 1.904)
Tigre	8	4	0.286 (0.026, 3.196)	0.696 (0.047, 10.217)
Other	7	1	1.00	1.00
Distance from health facilities				
≤ 10 km	156	69	3.857 (1.989, 7.480)	1.296 (0.573, 2.931)
11-20 km	39	42	1.584 (0.755, 3.322)	1.911 (0.809, 4.514)
21-30 km	6	20	0.512 (0.172, 1.524)	0.825 (0.224, 3.043)
>30 km	17	29	1.00	1.00

Table 5: Post Hoc analysis of each age groups' mean knowledge score with other age groups

Age group (A)	Age group (B)	Mean difference (A-B)	Standard error	p-value	95% CI	
					Lower boundary	Upper boundary
18-25	26-35	-0.573*	0.273	0.036	-1.11	-0.04
	36-45	0.118	0.297	0.691	-0.47	0.70
	46-55	0.304	0.444	0.495	-0.57	1.18
	56-65	0.345	0.583	0.554	-0.80	1.49
	>65	0.512	0.695	0.462	-0.85	1.88
26-35	18-25	0.573*	0.273	0.036	0.04	1.11
	36-45	0.692*	0.233	0.003	0.23	1.15
	46-55	0.877*	0.404	0.030	0.08	1.67
	56-65	0.919	0.553	0.097	-0.17	2.01
	>65	1.085	0.670	0.106	-0.23	2.40
36-45	18-25	-0.118	0.297	0.691	-0.70	0.47
	26-35	-0.692*	0.233	0.003	-1.15	-0.23
	46-55	0.185	0.420	0.660	-0.64	1.01
	56-65	0.227	0.565	0.688	-0.88	1.34
	>65	0.394	0.680	0.563	-0.94	1.73
46-55	18-25	-0.304	0.444	0.495	-1.18	0.57
	26-35	-0.877*	0.404	0.030	-1.67	-0.08
	36-45	-0.185	0.420	0.660	-1.01	0.64
	56-65	0.042	0.655	0.949	-1.25	1.33
	>65	0.208	0.756	0.783	-1.28	1.69
56-65	18-25	-0.345	0.583	0.554	-1.49	0.80
	26-35	-0.919	0.553	0.097	-2.01	0.17
	36-45	-0.227	0.565	0.688	-1.34	0.88
	46-55	-0.042	0.655	0.949	-1.33	1.25
	>65	0.167	0.845	0.844	-1.49	1.83
>65	18-25	-0.512	0.695	0.462	-1.88	0.85
	26-35	-1.085	0.670	0.106	-2.40	0.23
	36-45	-0.394	0.680	0.563	-1.73	0.94
	46-55	-0.208	0.756	0.783	-1.69	1.28
	56-65	-0.167	0.845	0.844	-1.83	1.49

*The mean difference value is significant

related to patients' knowledge and practice regarding antimicrobial use and resistance. It is essential to evaluate certain population's

knowledge and practice on antimicrobial use since inappropriate use of antimicrobials is the major cause of development of antimicrobial

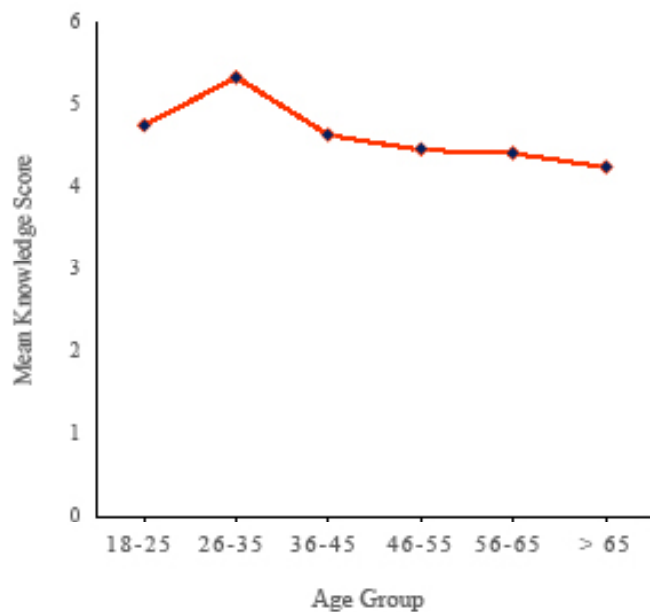


Figure 2: Mean knowledge score about antimicrobial use and resistance documented in different age groups

resistance.^[18]

In this study the average knowledge score of the study population was found to be 4.65 ± 1.88 out of 10, and the median was 5.00. The median value indicates that half of patients lie below average knowledge regarding antimicrobial use and resistance. This fact can have also been proven by the fact that only 21.7% were found to have 'good' to 'very good' knowledge of antimicrobial use and resistance (knowledge score >7) in our study. Poor knowledge of patients towards antimicrobial use and resistance can be attributed to the absence of regular community health education programs in the study area as well as the fact that many patients tend to accept information they obtain from people close to them, which are more likely to be based on society beliefs, rather than reliable facts from health professionals.

The present study revealed that there is a gap in the public regarding knowledge of antimicrobial use and resistance. This low level of knowledge may have been the main reason for high prevalence of inappropriate antimicrobial use seen in the study subjects. Similar gaps of knowledge and practice on antimicrobial use and resistance have been reported by studies in different countries.^[6,7,19] Launching awareness creation campaigns may be necessary to close the knowledge gap identified among patients and help reduce subsequent consequences. Involving influential figures of communities in awareness creation programs will be of great importance.

Female patients were found to have better knowledge of antimicrobial use and resistance in the current study (AOR=1.838, 95% CI, 1.068, 3.165). Moreover, a trend of increasing knowledge with higher educational levels was observed in the study. This implies the absence of all-inclusive awareness creation programs in the community, rather knowledge about antimicrobials may be acquired through academic education or self-acquisition. It was able to identify that age group 26-35 had higher mean knowledge score. This can be explained by the fact that this age group consists of larger proportion of better educated individuals. This has been proven by logistic analysis in which the effect of age on knowledge was eliminated after adjusting for confounding factors including educational level.

In our study, 98.4% of the study participants allegedly have ever used antibiotics, out of which 56.2% had a history of discontinuing medication before full dose. This figure is very high when compared

to similar study in Kuwait where 36% had not finished the full dose.^[6] This difference may be explained by the fact that the study from Kuwait reported participants' 12 months experience whereas our study was not limited by time.

About 63% of respondents had a history of taking antibiotics without prescription. This figure is significantly high as no antimicrobial is registered as over-the-counter medication in Ethiopia.^[15] The fact that most of these patients obtain antimicrobials from community pharmacies and drugstores shows lack of routine control of retail outlets by regulatory bodies. The practice of dispensing antimicrobials without prescription is common among community pharmacies of developing countries such as Ethiopia,^[5] and should be given higher attention by regulatory bodies.

Indicators of inappropriate antibiotic use have been observed in high proportions among participants of this study. These include self-medication, discontinuation of antimicrobials before full dose and skipping doses. Since inappropriate antimicrobial use is among the major factors for the development of antimicrobial resistance,^[5] preventing antimicrobial misuse in the community would be helpful to delay the development of resistance.

CONCLUSION

The findings of the study showed the presence of knowledge gap and malpractice regarding antimicrobial use which will accelerate the rate of development of antimicrobial resistance. Female patients and those with higher education were found to have better knowledge about antimicrobial use and resistance. Awareness creation programs should be planned to improve community's knowledge of appropriate antimicrobial use and measures should be taken to eliminate the practice of dispensing antimicrobials without prescription.

REFERENCES

1. Spellberg B, Powers JH, Brass EP. Trends in Antimicrobial Drug Development: Implications for the Future. *Clinical Infectious Diseases* 2004;38:1279-86.
2. Laxminarayan R, Duse A, Wattal C. Antibiotic resistance-the need for global solutions. *Lancet Infect Dis* 2013;13:1057-98.
3. Center for Disease Dynamics Economics and Policy. State of the World's Antibiotics. Washington DC. CDEP;2015.
4. Leung E, Weil DE, Raviglione M. The WHO policy package to combat antimicrobial resistance. *Bulletin of the World Health Organization* 2011;89:390-2.
5. Okeke IN, Klugman KP, Bhutta ZA. Antimicrobial resistance in developing countries. Part II: strategies for containment. *Lancet Infect Dis* 2005;5:568-80.
6. Awad AI, Aboud AE. Knowledge, Attitude and Practice towards Antibiotic Use among the Public in Kuwait. *PLoS ONE* 2015;10:8-15.
7. Dhadwal D, Sachdeva A. Knowledge, attitudes and behavior towards antibiotic usage and its resistance among the general public of Shimba city: A pilot study. *International Journal of Community Health and Medical Research* 2015;1:9-16.
8. Al Flaiti M, Al Badi K, Hakami WO, Khan SA. Evaluation of self-medication practices in acute diseases among university students in Oman. *Journal of Acute Disease* 2014;1:249-52.
9. Osemene KP, Lamikanra A. A Study of the Prevalence of Self-Medication Practice among University Students in Southwestern Nigeria. *Tropical Journal of Pharmaceutical Research* 2012;11:683-9.
10. Abay SM, Amelo W. Assessment of Self-Medication Practices among Medical, Pharmacy, and Health Science Students in Gondar University. *J Young Phar* 2010;2:306-10.
11. Gutema GB, Gadisa DA, Kidanemariam ZA. Self-Medication Practices among Health Sciences Students: The Case of Mekelle University. *Journal of Applied Pharmaceutical Science* 2011;1:183-9.
12. Eticha T, Mesfin K. Self-Medication Practices in Mekelle, Ethiopia. *PLoS ONE* 2014;9:e97464.
13. Koley M, Gosh A, Saha S. Self-medication practices among the undergraduate homeopathic students in West Bengal, India. *Spatula DD* 2014;4:55-62.
14. Okeke IN, Lamikanra A, Edelman R. Socioeconomic and behavioral factors leading to acquired bacterial resistance to antibiotics in developing countries. *Emerging Infectious Diseases* 1999;5:18-27.
15. Drug Administration and Control Authority. Antimicrobial Use, Resistance and Containment Baseline Survey Syntheses of Findings. Addis Ababa, Ethiopia: DACA 2009;158.
16. Kejela T, Bacha K. Prevalence and antibiotic susceptibility pattern of methicillin-resistant *Staphylococcus aureus* (MRSA) among primary school children and prisoners in Jimma Town, Southwest Ethiopia. *Annals of Clin Mic Biology* 2013;12:1-11.

Tesfaye Z: Patient Knowledge and Practice on Antimicrobial Use and Resistance in Felege Hiwot Hospital, Bahir Dar, Ethiopia

17. Molla B, Mesfin A, Alemayehu D. Multiple antimicrobial-resistant Salmonella serotypes isolated from chicken carcass and giblets in Debre Zeit and Addis Ababa, Ethiopia. *Ethiop J Health Dev* 2003;17:131-49.
18. Céspedes A, Larson E. Knowledge, attitudes, and practices regarding antibiotic use among Latinos in the United States: Review and recommendations. *Am J of Infec Control* 2006;34:495-502.
19. Suaifan G, Shehadeh M, Darwish D. A cross-sectional study on knowledge, attitude and behavior related to antibiotic use and resistance among medical and non-medical university students in Jordan. *Afr J Phar & Pharmacol* 2012;6:763-70.