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Assessment of awareness and attitude towards counterfeit medicines among pharmacy professionals working in community drug retail outlets in Harar town, Ethiopia

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Abstract

Background: Counterfeit medicines are drugs which are deliberately and fraudulently mislabeled with respect to identity and/or source. According to the WHO 2017 report, about 1% of prescribed medicines in the developed world and about 10-50% in parts of the developing world are estimated to be counterfeits. Objective: The objective of this study was to assess the knowledge and attitude of pharmacy professionals towards counterfeit medicines in Harar town.

Method: A cross sectional study was conducted among pharmacy professionals found in Harar town, East Ethiopia. All pharmacy professionals working in community drug retail outlets of Harar town was included in the study. Accordingly, 92 pharmacy professionals were included in the study. The data was collected by using self-administered questionnaire. The questionnaire was prepared in English language. Data was coded, entered and analyzed by using Statistical Package for Social Science version 22. Then chi-square(χ^2) test was performed to determine there exists association of socio-demographic characters, profession and year of service towards awareness and attitude about counterfeit medicines was investigated using.

Result: A total of 92 respondents were included in the study. The majority, 76 (82.6%), of the study participants had information about counterfeit medicine. The 26(28.3%), 42(45.7%) and 24(26%) of the respondents replied that counterfeit medicines have problem of efficacy, safety and cause economic problem on sellers of genuine drugs respectively. Majority of the study of the study participants were not aware of a way of identification of counterfeit medicines, with only 18(19.6%), 47(51.1%) and 27(29.3%), replied that counterfeit medicines can be identified by its effect, inspection and cost respectively. Majority of the respondents, 60(65.2%), responded that pharmacy professional that knowingly dispense counterfeit medicine are business man /women. Most of the respondents, 66(71.7%), replied that pharmacy professionals carry out the business of counterfeit medicines transaction because of big profit obtained from such an activity. gender, profession and year of service in serving as pharmacy professional was found to be significantly associated with awareness towards counterfeit medicines, ($p < 0.05$).

Conclusion: Significant proportion of the study participants were not aware of the problems associated with counterfeit medicines as efficacy, safety and economic problems. Majority of the respondents still are unaware about ways of identification of counterfeit medicines as inspection, by efficacy and cost.

Keywords: Counterfeit medicines; Awareness; Attitude; Professionals; Drug retail outlets

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Introduction

Poor quality drugs are worldwide problem with high prevalence in low- and middle-income countries [1,2]. Poor quality medicines include substandard and counterfeited medicines. WHO report of 2017 estimates that the rates of substandard and falsified (i.e. counterfeited) medical products in low- and middle-income countries is approximately 10.5% with an estimated spend of US\$ 30.5 billion [2]. Substandard medical products are authorized medical products that fail to meet either their quality standards or their specifications or both [2]. Counterfeit medicines (CFM) are medicines which are deliberately and fraudulently mislabelled with respect to identity and/or source and may include products with correct or wrong ingredients, without active ingredients, with insufficient or inadequate quantities of ingredient(s) or with fake packaging [3-5]. According to the WHO 2017 report, about 1% of prescribed medicines in the developed world and about 10– 50% in parts of the developing world are estimated to be counterfeits [1]. Poor quality pharmaceuticals invade health care system because of a number of problems starting from manufacture to final use by patients. Non adherence to good practices in manufacturing, storage, distribution and dispensing, weak enforcement of pharmaceuticals regulatory laws, open borders, poor coordination of police and customs, corruption, double standards during production of pharmaceuticals i.e. better standards for manufacture of drugs to be exported rich countries and the poor standard for to be exported to poor countries as Sub-Saharan African countries and low educational

level results in invasion of the health care system with poor quality pharmaceuticals [6-8]. The problem of poor-quality medicines affects almost all categories of drugs. Antibiotics and anti-malarials are most commonly reported poor quality drugs [2,9,10]. Treatment with poor quality medicines, counterfeited medicines, causes deleterious problems as treatment failure, increased morbidity and mortality, wastage of budget of family and government and emergence of drug resistance [11-13]. A standard dose kills drug susceptible strains of microbes and suppresses multiplication of the drug resistant microbes. Substandard medicines selectively kill the susceptible strain and leaves resistant strain to multiply [1,14]. Micro-organisms that have developed resistance transmits resistance gene through exchange of genetic material. An estimated 700,000 Africans die annually from consuming fake anti-malarial or tuberculosis drugs [13]. In Panama, cough syrup with deliberately mislabelled ingredient-Diethylene glycol instead of glycerin killed about 200 people [15]. In Sub-Saharan Africa an estimated 400,000 children are exposed to malaria are treated with poor quality anti-malaria medicines [15]. In Ethiopia, there exists poor co-ordination of police and custom, a factor that results in invasion of the health care system by counterfeited pharmaceuticals and hence in exposure of the patients, community and the government to the deleterious impacts of such poor-quality pharmaceuticals [16]. Counterfeited medicines can easily circulate in Harar town because of the close proximity of the town to the border, shortage of medicine in the town and weak enforcement of law and legislation prohibiting the circulation and use of

counterfeited medicines (CFM) [16]. Pharmacy professionals play a key role in protecting patients from CFM. This can be ensured when the pharmacy professionals have adequate awareness and attitude on CFM. The awareness and attitude of pharmacy professionals plays a critical role in reducing the circulation and use of CFM in the town and reducing the burden posed by CFM on the health care system of the town and the country at large. Therefore, this study assessed the awareness and attitude of pharmacy professionals towards CFM in Harar town.

Methodology

Study area and period: The study was carried out among pharmacy professionals working in community drug retail outlets located in Harar town, Harari regional state, Ethiopia. The study was conducted from March 10-April 10, 2019.

Study design: A cross sectional study was conducted among pharmacy professionals found in Harar town.

Population

Source of population: All pharmacy professionals of Harar town.

Study population: All pharmacy professionals who work experience are greater than 3 months.

Sample size: All pharmacy professionals working in community drug retail outlets of Harar town was included in the study. Accordingly, 92 pharmacy professionals were included in the study.

Data collection method: The data was collected by using self-administered questionnaire. The questionnaire was prepared in English language.

Data quality control: Before starting data collection, pre-test was done on 5% of community pharmacy professional to ensure the completeness, validity and reliability of the questionnaire with the objective of the study and after that necessary correction was done on the questionnaire.

Data analysis

Data was coded, entered and analyzed by using SPSS (Statistical Package for Social Science) version 22. Then chi-square(χ^2) test was performed to determine there exists association of socio-demographic characters, profession and year of service towards awareness and attitude about counterfeit medicines was investigated using.

Ethical consideration

The study was conducted after ethical clearance was obtained from school of Pharmacy. Informed consent was obtained from each participant after explaining the objective of the study.

Operational Definitions

Attitude: degree of agreement or disagreement with respect to safety, efficacy quality and cost of counterfeit drugs with regard to genuine drugs.

Knowledge: respondents' level of awareness towards CFM, with respect it is information and circulation of CFM deliberately/fraudulently misrepresent their identity, composition or source.

Druggists: Pharmacy professionals whose educational level is diploma.

Pharmacists: Pharmacy professionals whose educational level is degree.

Pharmacy professionals: Individuals having degree and diploma in in pharmacy department and involved in giving pharmaceutical care.

Poor quality drugs: Drugs that include substandard and counterfeit medicines.

Quality: The degree to which a set of inherent properties of a product, system or process fulfills requirements.

Results

Socio demographic characteristics

Ninety two, 92, study participants was included in the study. The, 60(65.2%) and 32(34.8%) of the respondents were males and females respectively. The 5(47.4%) and thirty-eight, 38(41.3%) of the respondents were married and single. The majority of the respondents, 69(75%), were druggists, while 23(25%) were pharmacists (Table 1).

Table 1: Socio-demographic status of the study participants, Harar town, 2019.			
Variable	Category	Frequency	%
Gender	Male	60	65.2
	Female	32	34.8
Marital status	Single	38	41.3
	Married	45	48.9
	Widowed	9	9.8
Ethnicity	Oromo	35	38
	Amhara	35	38
	Harari	22	24
Profession	Druggist	69	75
	Pharmacist	23	25
Year of service	<5 years	67	72.8
	>5 years	25	27.2
%Percentage			

Awareness towards CFM

The majority, 76 (82.6%), of the study participants had information about CFM. Most of the respondents, 75(81.3%) had information on circulation of CFM in the pharmaceutical market. Half, 46(50%), of the study respondents described CFM as medicines with correct packaging with incorrect identity or quantity of active ingredient but only 25(27.2%), 11(12%) and 10(10.1%) of the respondents described CFM as medicines with fake packaging but with correct identity and quantity of active ingredient, products which with toxic impurities and fake packaging with fake active ingredient respectively. More than half of the respondents were not aware of problems associated with CFM. Only 26(28.3%), 42(45.7%) and 24(26%) of the respondents replied that CFM have problem of efficacy, safety and cause economic problem on sellers of genuine drugs respectively. Majority of the study of the study participants were not aware of a way of identification of counterfeit medicines, with only 18(19.6%), 47(51.1%) and 27(29.3%), replied that CFM can be identified by its effect, inspection and cost respectively (Table 2).

Table 2: Study participants' awareness towards CFM Harar town, 2019.

Variable	Awareness towards CFM	Frequency	%
Information about CFM	Yes	76	82.6
	No	16	17.4
Description about CFM	Correct packaging but incorrect identity or quantity of active ingredient	46	50
	Fake packaging but correct identity and quantity of active ingredient	25	27.2
	Product with toxic impurities	11	12
	Fake packaging and active ingredient	10	10.1
Information on circulation of CFM in the market	Yes	75	81.5
	No	17	18.5
Drug at high risk for counterfeiting	Antibiotic	42	45.7
	Analgesics	32	34.8
	Vitamins	10	10.9
	Steroids	1	1.1
	Hormones		
Percentage of drugs that are counterfeit	<30%	50	54.3
	30%-40%	21	22.8
	40%-50%	17	18.5
	>50%	4	4.3
Problem that occurs if counterfeit drug is consumed		26	28.3
	Efficacy problem	42	45.1
	Safety problem	24	26
	Economic problem	18	19.6
Way to identify counterfeit drugs	By its effect		

	By inspection	47	51.1
	By its cost	27	29.3
CFM: Counterfeit medicine		% Percentage	

Attitude towards CFM

Most of the study respondents, 84(91.3%) replied (i.e., strongly agreed or agreed that prescribing and dispensing CFM is unethical. With regard to efficacy of counterfeit drugs, 53(57.6%), of the respondents responded (i.e., strongly disagreed or disagreed) with the statement that there is no difference in efficacy between CFM and their genuine counterpart drugs. From the study participants, 51(55.4%), replied (i.e., strongly agreed or agreed) that CFM are cost effective drugs as compared to genuine counterparts. Fifty-two, 52(56.6%), of the respondents responded (i.e., strongly disagreed or disagreed) with the statement that CFM are as safe as genuine counterpart drugs. Majority of the respondents, 60(65.2%), responded (i.e., strongly agreed or agreed) that pharmacy professional that knowingly dispense counterfeit medicine are business man /women. Most of the respondents, 66(71.7%), replied (i.e., strongly agreed or agreed) that pharmacy professionals carry out the business of CFM transaction because of big profit obtained from such an activity. With regard to the law to control CFM, 71(77.2%), responded (i.e., strongly agreed or agreed) that the law against CFM should be strengthened (Table 3).

Table 3: Respondents attitude towards CFM Harar town, 2019.

Variable	Attitude towards CFM	Frequency	%
Dispensing and prescribing CFM is unethical	Strongly agree	67	62.2
	Agree	17	18.8
	Neutral	3	3.26
Dispensing and prescribing CFM is illegal	Disagree	3	3.26
	Strongly disagree	2	2.22
	Strongly agree	60	62.2
	Agree	26	28.3
	Neutral	2	2.2
	Disagree	2	2.2
There is no difference in efficacy between counterfeit and genuine counterparts	Strongly disagree	2	2.2
	Agree	15	16.3
	Neutral	22	23.9
	Disagree	17	18.5
	Strongly disagree	36	39.1
Using CFM is cost effective	Strongly agree	24	26.1
	Agree	27	29.8
	Neutral	10	10.9
	Disagree	22	23.9

	Strongly disagree	9	9.8
Consumption of CFM is as safe as their genuine drugs	Strongly agree	2	2.2
	Agree	12	13
	Neutral	26	28.3
	Disagree	26	28.3
	Strongly disagree	26	28.3
Pharmacy professional Knowingly dispense CFM are good business man/women	Strongly agree	39	42.4
	Agree	21	22.8
	Neutral	6	6.5
	Disagree	12	13
	Strongly disagree	14	15.2
Pharmacy professional decide to carry out CFM transaction for big profit	Strongly agree	40	43.3
	Agree	26	28.3
	Neutral	6	6.5
	Disagree	6	6.5
	Strongly disagree	14	15.2
The law against CFM should Be strengthened	Strongly agree	40	43.5
	Agree	31	33.7
	Neutral	13	14.1
	Disagree	1	1.1
	Strongly disagree	7	7.6
CFM: Counterfeit medicines			%; Percentage

Factors significantly associated with awareness towards CFM

The association of socio-demographic character, profession (i.e., druggist or pharmacist), year of service in serving as pharmacy professional on awareness and attitude status towards counterfeit medicines was investigated using chi-square(χ^2) test. Accordingly, gender, profession, year of service in serving as pharmacy professional was found to be significantly associated with awareness towards CFM, ($p < 0.05$) (Table 4).

Table 4: Association of selected characteristics of the respondent's awareness towards counterfeit medicines, Harar town, 2019.			
Variable	Awareness towards CFM	Category Freq.*	chi-square test(χ^2)
Gender	Information about CFM	Yes 76	$\chi^2(1,92) = 29.689$, $p=0.00$
		No 16	

Profession*	CFM have efficiency problem	Yes 66 No 26	$\chi^2(1,92) = 52.112$, p=0.00
	CFM have safety problem	Yes 42 No 50	$\chi^2(1,92) = 30.900$, p=0.00
Profession*	CFM are identified by their effect	Yes 18 No 74	$\chi^2(1,92) = 11.143$, p=0.002
	CFM are identified by inspection	Yes 45 No 47	$\chi^2(1,92) = 15.790$, p=0.000
	CFM are identified by their cost	Yes 27 No 65	$\chi^2(1,92) = 56.779$, p=0.000
Profession*: druggist And Pharmacist		Freq*: Frequency	

Discussion

The majority of the study participants, 76(82.6%) had information about CFM. The finding of the current study is slightly better than study result of the done in Jordan, in which 76(76%) of the study respondents had information about CFM [17]. The proportion of study respondents who had information about CFM is lower than study the other study report of a study done in Lebanon in which, 422(93%), had heard (i.e., had information) of CFM [18]. The difference may be due to differences in educational status of the study participants on the studies. In the study done in Lebanon, 164(36.8%) and 62(13.9%) had bachelor and postgraduate (graduate) degrees respectively, while in the current study only 23(25%) of the study participants are pharmacists (i.e. have bachelor degrees). In this study, the socio-demographic characteristic, gender, was found

to be significantly associated with information about circulation of CFM in the pharmaceutical market ($p < 0.05$). With respect to the problems caused by CFM, only 26(28.3%), 42(45.7%) and 24(26%) of the respondents replied that CFM have problem of efficacy, safety and cause economic problem on sellers of genuine drugs respectively. The participants status of awareness about a problem caused by CFM is similar to study result of a study done in Iran [19]. The magnitude of respondents who were aware about problems caused by CFM is significantly lower than study report of a study done Egypt among 175 respondents, in which 66.8% of the study respondents perceived as CFM as inactive, 61.7% as harmful and 28.6% as less effective/less expensive [20]. Pharmacy professional's unawareness about dangerous effects of CFM causes negligence on the professionals about CFM and hence results in a wide spread circulation of CFM in the health

care system, which results in exposure of patients to CFM and hence to its deleterious effects as treatment failure, increased morbidity and mortality, increased treatment cost and drug resistance [21]. In the current study, profession was found to be significantly associated with respondent's awareness about problems caused by CFM ($p < 0.05$), with majority of the Pharmacists being aware of the problems caused by CFM. With regard to awareness on a way for identification of CFM, majority of the study participants were not aware of the correct way of identification of CFM. Only 18(19.6%), 47(51.1%) and 27(29.3%) of the respondents replied that CFM can be identified by its effect, inspection and cost respectively. The respondent's awareness on ways of identification of CFM was lower than the study report of a study performed in Egypt. The deference may be due to difference in educational status of study participants in the studies; in which 50% of study participants of the study performed in Egypt were pharmacists (i.e., have bachelor degree) [20]. Pharmacy professionals who are not aware of a way of identification of CFM cannot contribute positively for protection of patients from CFM for identification of CFM is perquisite to prevent circulation of CFM in the pharmaceutical market and hence for protection of patients from the dangerous effects of CFM. Eighty-four, 84(91.3%), responded (i.e., strongly agreed or agreed) that prescribing and dispensing CFM is unethical. The result is better than a study result of a study performed in Lebanon, in which 320(83.1%), from 385 of the study respondents agreed that dispensing CFM is unethical [18]. Pharmacy professional's adherence to professional code of conduct is vital for protection of the patients from CFM and hence from its deleterious impacts. Majority, 60(65.2%) of the study respondents replied (i.e., strongly agreed or agreed) that pharmacists that knowingly dispense CFM are good business man/woman. The result is in opposite to other study results [18]. This shows that it is so critical to control

those who are involved in dispensing of CFM so that dispensers of genuine drugs not to be attracted to transaction of CFM by looking on profit gained from it. For profit gained from counterfeiting is one key pushing force for dispensing of CFM, it is critical to control such activities by making available drugs that are likely to be counterfeited in sufficient amount in the pharmaceutical market and teaching and punishing those involved such activities in lesson bearing extent [22]. In this study, 71(77.2%) of the study subjects responded (i.e., strongly agreed or agreed) that the law against CFM should be strengthened. Weak pharmaceutical regulation is one of key cause for high prevalence poor quality pharmaceuticals (i.e., both counterfeit and substandard quality medicines) in developing countries [7,8,15]. For the law to control CFM is one of key mechanisms to prevent invasion of pharmaceutical market by CFM, it should be strong enough to punish those who are engaged in transaction of CFM so that other genuine professionals shall not be pushed to such activity. The law that promotes pharmacovigilance activity to be done regularly to control transaction of CFM need to be strengthened [6,23].

Conclusion

Significant proportion of the study participants were not aware of the problems associated with counterfeit medicines as efficacy, safety and economic problems. Majority of the respondents still are unaware about ways of identification of counterfeit medicines as inspection, by efficacy and cost.

Recommendation

Responsible bodies should provide educational training to the study respondents to increase awareness and attitude about CFM.

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Declarations

Author's contribution: Author EA involved in the conception and design of the study, participated in the literature searches, supervised data collection and analyzed data. Author FA and MY participated in the design of the study, supervised data collection and the overall research, and commented the manuscript. Author TS and BH involved in the conception and design of the study, participated in the literature searches, analyzed data and wrote the manuscript. All the authors approved the final manuscript.

Availability of data and materials: The supporting documents for this study can be available from the corresponding author upon request.

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