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A CROSS SECTIONAL STUDY ON ASSESSMENT OF COSMETICS UTILIZATION AND SELF REPORTED ADVERSE REACTIONS AMONG WOLLO UNIVERSITY DESSIE CAMPUS FEMALE STUDENTS, DESSIE, NORTH EAST ETHIOPIA.

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ABSTRACT

Background: Cosmetics are chemicals applied to the human body for cleansing, beautifying, promoting attractiveness or altering appearance. In recent years, the consumption of cosmetics and associated adverse effects are increasing. Hence studying their utilization pattern and impact would be important.the purpose of this study is to assess cosmetics utilization pattern and common cosmetics related adverse reactions among Wollo University, Dessie campus female students.

Method: A cross-sectional study was carried out on cosmetics utilization pattern and related adverse reactions, among Wollo University Desssie campus female students, from January to June, 2014. The study participants were selected by stratified simple random sampling technique from all colleges of the university. Data were collected by using self administered, semi-structured questionnaire and analyzed using SPSS version 16. **Result:** The study showed that 97.3% of the participants had a habit of using cosmetics. The most frequently used cosmetic products were lotions (89.7%) and hair cosmetics (88.8%). Cosmetics related adverse reactions were encountered by 31.8% of cosmetics users. Use of more than five cosmetics (OR=6.538, 95% CI=1.173−36.439), sharing cosmetics (OR=1.950, 95% CI=1.606−6.105), adding water or saliva (OR=2.365, 95% CI=1.052-5.885), traditional

cosmetics users were associated with high incidence of adverse effects (OR=2.127, 95% CI= 1.334-6.036). In contrast, buying cosmetics from drug retail outlets was associated with less incidence of adverse effects than buying from super markets and local shops (OR=2.127, 95% CI= 1.334-6.036). **Conclusion:** According to the study, significant proportion of the users suffered from cosmetics related adverse reactions.

KEYWORDS: *Cosmetics, Utilization, Adverse reactions, Wollo University.*

1. INTRODUCTION

The Food, Drug and Cosmetics Act (FDCA) defines cosmetics as articles intended to be applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance without affecting the body's structure or functions. Included in this definition are products such as skin creams, lotions, perfumes, lipsticks, fingernail polishes, eye and facial make-up preparations, shampoos, permanent waves, hair colors, tooth pastes, deodorants, and any material intended for use as a component of a cosmetic product.[1,2,3,4]

Documented evidence proves that the skill of hair dressing and makeup has its roots in ancient times. Women are known for being particular about the way they groom themselves. The first recorded evidence of the usage of hair-coloring agents was henna, in 3000 BC. The women of Mesopotamia were the first to invent lipstick; they would crush gemstones and wear the mixture on the lips. Cleopatra, the famous Egyptian Queen, would use the extraction made from crushed ants and carmine beetles as lipstick.[5]

Cosmetic products have become everybody’s daily grooming habit, particularly the fashion following groups, young females who reside in higher institutions.[3, 4]

An undesirable effect of a cosmetic product is a harmful reaction attributable to its normal or reasonably likely use. However, knowledge about undesirable effects at the population level is limited by the absence of formal and reliable adverse effect reporting systems, which nevertheless are characterized by under reporting.[6] In many parts of the world, more than 20% of the adult population is suffering from contact allergy. The profile of sensitizations may differ in each country. However, body creams containing different ingredients are the most prevalent allergen practically everywhere.[7] Different types of adverse effects can occur among cosmetics users. Adverse effects from cosmetics can happen immediately after application or on long-term usage. The adverse reactions from cosmetics include dermatitis,

tissue damage, infection, discoloration, bleeding, nervousness, respiratory system reactions, vomiting, diarrhea, urogenital reactions and flammability induced death.[4]

Regulatory authorities tried to minimize the unwanted effects of cosmetics, by setting criteria for safety, efficacy and quality of cosmetics. But selling products without the authorities' approval, presence of multiple ingredients, adding any ingredient to their brand without any approval and absence of adverse effect reporting system for cosmetics in developing countries were practiced. All the above can be considered as factors for increased incidence of adverse effects.[8,9]

Females and those consumers that do not follow safety tips are the most affected because they tend to use more cosmetic products inappropriately.[4, 10] Several studies revealed the fact that cosmetics use is highly related with self-confidence[11, 12, 13] and providing educational programs for promotion of self-esteem can be beneficial to minimize unnecessary cosmetics use.[14]

Despite the absence of adequate studies on cosmetics utilization pattern and common cosmetics related adverse reactions, available evidence shows that there is an increase habit of sharing of cosmetics and use of large number of different cosmetics together without following any kind of safety tips. Therefore the aims of this study were to assess cosmetics utilization pattern and related adverse reaction and to create an association between the determinants of cosmetics use and related adverse reactions among Wollo University, Dessie campus female students.

2. Objective

2.1 General objective

To assess cosmetics utilization pattern and self reported adverse reactions among Wollo University Dessie campus female students.

2.2 Specific objectives

- To assess cosmetic utilization pattern among Wollo University Dessie campus female students.
- To determine factors that can affect cosmetics utilization among Wollo University Dessie campus female students.

- To determine the occurrence of self reported cosmetics adverse reactions among Wollo University Dessie campus female students.

3. METHODS AND MATERIALS

3.1 Study area and period

The study was conducted in Dessie campus of Wollo University in South Wollo Zone, from January to June 2014. Wollo University is found in Dessie town located 406 Kms from Addis Ababa to the North East of Ethiopia which is one of the new and recent Universities in Ethiopia. It has two campuses namely, Dessie and Kombolcha campus, which are further, classified in to five colleges, two schools and three institutes. Dessie campus had a total of 6455 students during the study period, of which1959 were females.

3.2 Study design

A cross-sectional study design was used to assess cosmetics utilization pattern and related adverse reactions among Wollo University female students.

3.3 Population

3.3.1 Source population

All Wollo University Dessie campus female students were the source population.

3.3.2 Study population

All female students who were captured by the sampling technique and gave their informed consent constituted the study population.

3.3.2.1 Inclusion criteria

All female students in Dessie campus of Wollo University who gave their consent to participate in the study were included.

3.3.2.2 Exclusion criteria

Students who had sight problem (blind) or unable to read and/or write, students absent during data collection after three visits and male students were excluded from the study.

3.4 Sample size determination

Single population proportion formula was used to calculate the minimum sample size required for the study. Taking the proportion of students experiencing adverse effects from cosmetics as 18.4% from previous study conducted in Mekele University; standard normal

deviation of 1.96 (at 95% confidence interval) and 5% degree of freedom. The final sample size was adjusted to 227.

3.5 Sampling procedure

The participating female students were selected by using systematic random sampling. The source population was first stratified by colleges. One department was selected from each college by using lottery method. Samples were taken from each selected department proportional to the total number of female students in each selected department. A separate sample was taken independently from selected departments by using systematic random sampling technique accordingly to represent all batch students.

3.6 Data collection

Pre-tested, semi-structured questionnaire (English version) was used for the data collection. The questionnaire had three main parts. Part one was on general information (Socio-demographic data) of the study population. Part two addressed cosmetics utilization pattern of the study population. The last part had questions that address the issue of cosmetics related adverse effects in the study population. The questionnaires were distributed to selected students. Then, the students filled the distributed questionnaires and finally the filled questionnaires were collected back from the students by data collectors. Data was collected by four 5th year Pharmacy students of Wollo University who are trained in data collection.

3.7 Data quality control

Pretest was done on 5% (11 students) of the final sample size of the population that was similar to but not included in the study population to verify the validity and reliability of our study. Orientation was given to the students about objectives of the study, care full filling of the questions and benefits of the study findings for the university and students in order to get accurate and reliable data. Each data collector checked the questionnaires for completeness before leaving the study participants. Finally the filled questionnaires were checked for completeness and accuracy by the principal investigators before the data processing and analyzing.

3.8 Variables

The dependent variables of the study were cosmetics utilization and self reported adverse reaction where as the independent variables of the study include: age, marital status, year of

study (batch), religion, ethnicity, adding water or saliva, income, number of cosmetics applied per day, source of cosmetics, sharing cosmetics and traditional cosmetics use.

3.9 Data processing, analyzing and interpretation

Data obtained from the study participants were recorded and documented. The collected data were entered to SPSS version 16 window software computer programme for analysis and the analyzed data were presented by using tables and figures.

3.10 Ethical consideration

The study protocol was reviewed and approved by the Ethical Review Committee of the College of medicine and health sciences, Wollo University. Official letter was submitted to college registrars to get information and verbal permission was obtained from participating students after explaining the objectives and benefit of the study.

4. RESULTS AND DISCUSSION

4.1 Results

Among 227 questionnaires distributed to the study participants, all of them were collected back, of which 7 were discarded due to incompleteness, resulting in a response rate of 96.9%. The age of the study participants ranged from 19 to 26 years with a mean of 22.5 years. Among the respondents 205(93.2%) were unmarried and 15(6.8%) were married. Many of them were third year students; followed by second year, first year and fourth year students, 86 (39.1%), 66 (30%), 58(26.4%) and 10(4.5%) respectively. Their ethinicity profile showed that 108 (49.1%) were Amhara, 43 (19.5%) were Tigrea, 41(18.6%) were Oromo and 28 (12.7%) were other different ethinic groups. One hundred fourty one (64.1%) of the respondents were Orthodox Christians; while 44 (20%) and 34 (15.5%) respondents were Protestants and Muslims, respectively.The income profile of the students showed 116(52.7%) of them receive 500 birr and above per month while 104(47.3%) were earning less than 500 birr.

Of the total study participants, 214 (97.3%) had a habit of using one or more cosmetics. The number of cosmetics used per day was different among respondents. Out of a total respondents that use cosmetics, more than half of the respondents (55.2%) use more than two cosmetics per day as shown in **Table 1**. The mean number of cosmetic products used per day was found to be 3.34 and lotion and hair cosmetics being the top to be utilized on daily basis. The major source of cosmetics for Dessie campus female students of Wollo University was

local/ordinary shops (88.8%), followed by supermarkets (45.8%) and drug retail outlets (24.8%).

Among total number of students who use cosmetics, the main reasons for using cosmetics were for protection (91.1%) and for beautification (90.2%) as shown in **Figure 1**.

As shown in **Figure 2**, assessment of the commonly utilized cosmetic products showed that lotions, hair cosmetics and deodorants were used by most of the users: 192 (89.7%), 190 (88.8%) and 134 (62.6%), respectively.

Some cosmetics utilization related practices were also assessed. As a result, the use of traditional cosmetics (26.6%), Adding water/saliva to cosmetics (79.9%) and sharing of cosmetics (77.1%) were commonly practiced among Dessie campus female students of Wollo University. In contrast, only 33.2% of the respondents read labels on cosmetic containers and 8.4% of the users reported testing for allergy prior to use.

Of the total cosmetics users, about 96.3% of students apply the cosmetics in the morning and the rest 11.2% and 36.4% and apply it in the afternoon and evening, respectively. Almost half of the students (52.8%) spent one day on average before they clean the applied cosmetics. On average, 30.4 % of the students cleanse the applied cosmetics within two to four days. The rest 16.8% of the students spent more than five days before cleansing.

Adverse effect Assessment: It was found that 68(31.8%) of the users complained different forms of adverse effects from cosmetics. The most adverse effect reported types of cosmetics were lotions (75%) and body creams (72.1%) as shown in **Figure-3**.

The adverse effects seen include itching, acne, discoloration, brittleness and breakage/loss of hair, sore on skin and face, bleeding on scalp, stinging, darkening of armpits and others. Among self reported adverse effects, itching (79.4%) and acne (77.9%) were common. During assessment on students response on observed adverse effects, 89.7% of affected individuals quit the products until the symptoms of the injuries get disappeared; 8.8% consulted health professionals and 3(4.4%) were completely avoiding the suspected cosmetics similar products.

Determinants of cosmetics utilization and adverse reaction occurrence

Effort was made to investigate factors that could affect cosmetics utilization and occurrence of cosmetics related adverse reactions among the respondents and the result is summarized in **Table-2**. Accordingly, the proportion of students using cosmetics increased with their study year, but the relationship didn't show statistically significant association. Cosmetics utilization increased about two times among students having monthly income of 500 birr and above as compared to those getting less than 500 birr per month. Monthly income had a statistically significant association with cosmetics utilization (OR=2.280, 95% CI=1.169−7.638). The occurrence of cosmetics related adverse reactions was observed to increase by a factor of greater than six for students who were using more than five cosmetics per day as compared to those who were using one or two cosmetics only, and the difference was significant (OR=6.538, 95% CI=1.173−36.439). The sources of cosmetics showed an association with the occurrence of adverse reactions. The proportion of students suffering from adverse reactions decreased by a factor of two for students buying their cosmetics from drug retail outlets relative to those who were getting from super markets and local shops (OR=1.740, 95% CI=1.088−2.954). Chances of getting adverse reaction had a significant association with sharing of cosmetics as well. The proportion of respondents complaining of adverse reactions doubled among students who were sharing cosmetics as compared those that were not sharing (OR=1.950, 95% CI=1.606−6.105). Adding water or saliva had a significant association with occurrence adverse reactions (OR=2.365, 95% CI=1.052-5.885). There was increased prevalence of adverse reactions among traditional cosmetics users relative to non-users, that shows a statistically significant difference (OR=2.127, 95% CI= 1.334-6.036).

4.2 DISCUSSION

The cosmetics use prevalence (97.3%) was similar to studies done in Mekele University of northern Ethiopia and Hamedan University of Iran [15, 16]. This might be due to students' age when they spent more time in beautifying themselves. More over the students were forced to use more cosmetic products due to the cold and dusty condition existing in Dessie campus.

Cosmetics utilization showed a significant progressive increment with seniority. Second year and above students had high prevalence for cosmetic utilization. This might be due to the fact that adaptation to the university environment would increase with seniority and the seniors

might have lesser perceived educational tension so that they might be more concerned about their look and beauty. Cosmetic utilization might also be increased along with increased monthly income. This study showed a statistical significant association with cosmetics utilization and monthly income (OR=2.280, 95% CI=1.169−7.638) which is similar to study done in Mekele and Isfahan University female students.[16, 17]

The most commonly used cosmetics were lotions (89.7%) and hair cosmetics (88.8%) but lipsticks, mascara and liners were in Hamedan University of Iran and lotions and deodorants were in Mekele University. The main claimed purpose of cosmetics use were protection (91.1%) and beautification (90.2%) which is similar as compared to a study done in Iran and Mekele University.[15, 16] But, the percentage of students was greater than twice as compared to these universities. Beautification can be shared purpose for cosmetic utilization among University female students. This might be due to their adulthood age and unmarried status. But protection was higher in Dessie campus, Wollo University due to the cold environment.

In terms of self-reported adverse effects, 31.8% of the students from Wollo University Dessie campus complained different forms of adverse effects from cosmetics; it is a greater as compared with other studies in Denmark, North America, UK and Mekele University.[16,18, 19, 20] This is more likely due to their inappropriate cosmetics use habit. Use of traditional cosmetics (26.6%), Adding water/saliva to cosmetics (79.9%) and sharing of cosmetics (77.1%), don't read labels including expiry date (66.8%) and 91.6% don't practice testing for allergy. High percentage of students (80.8%) who obtained their cosmetics from sources other than drug retail outlets might also be another possible explanation for increased self-reported adverse effect as compared to female students in Mekele University.[16] The quality and safety of cosmetics in shops are likely to depreciate from storage inconveniences. Hence, they are liable to direct exposure to sun light, commonly expire due to nonprofessional handling, microbial growth and cause successive infections as compared to that of cosmetics from drug retail outlets. In addition the study design was liable to memory bias and it was not time bounded. Reading labels was relatively higher as compared to a study in Jimma in which nearly all of the respondents (99.2%) do not pay attention to what is written on the labels of cosmetic products. This might be due to variation in study participants where study done in Jimma includes the whole population than the university female students only. This shows how much significant will be in the general population.[21]

The most complained cosmetics were lotions (75%) and body creams (72.1%) but body creams, deodorants and eye care products were complained in Sweden; deodorants and perfumes in UK and deodorants and lotions in Mekele University.[6,16, 22] Lotions and body creams are highly enriched with alpha and beta hydroxyl acids. These acids are known to make human skin susceptible to UV-radiation, thereby facilitating sun burn, cancer and other undesirable effects.[19] In addition toxicological evaluation in brand lotions and body creams products in Jimma, south western Ethiopia resulted almost all products caused skin trritation under sun exposure for five consecutive days exception was Dove.[21] It has been identified that application of cosmetics on abraded skin under sunny condition worsens the irritation. The most frequently reported adverse reactions were itching (79.4%) and acne (77.9%) but itching, dryness, burning and prickling sensations in Sweden and inflammation, acne, discoloration and loss/brittleness and breakage of hair in Mekele University.[16, 22]

The assessment on the way students solved the adverse effects revealed that only 6(8.8%) of the affected individuals consult health professionals which is lower than other studies in Sweden, Denmark and Mekele University.[16, 18, 22]

Most of the respondents shared cosmetics with their friends. Sharing had a statistically significant association with the occurrence of adverse reactions which is comparable with a study conducted in Mekele University.[16] Sharing is known to make cosmetic products prone to microbial contamination, which in turn causes acne and possibly may responsible for increased itching adverse effect in Wollo University.

The use of traditional cosmetics, like avocado, *uda* (herbal preparation) and small stem branches of plants as tooth brush, the safety of which is least known, was significantly associated with high prevalence of adverse effects unlike a study in Mekelle University.[16] This might be due to the increased cosmetics burden and possible interaction among the multiple cosmetics ingredients. In this study, the occurrence of cosmetics related adverse reactions increased by a factor of greater than six for students who were using more than five cosmetics per day as compared to those who were using only one or two cosmetics. This might be due to increased cosmetics burden, and cosmetics interaction. Specific interactions of the mentioned preparations need further studies.

Students in this study had unacceptable habits concerning like not cleansing body parts applying cosmetics might increase cosmetics-skin contact time and so does adverse

effects.[5,6,16] The other undesirable habit observed was addition of water/ saliva to some of their cosmetics. Water and saliva are suitable media for bacterial growth, by virtue of decreasing the concentrations of the preservatives in one way or another.[4] This might be one of the possible reasons for the unpleasant injuries reported by the students.

Table 1: Number of cosmetics used per day by female students of Dessie campus, Wollo University, North East Ethiopia.

No of cosmetics used per day	Frequency	Percent
1	26	12.1
2	68	31.8
3	39	18.2
4	30	14.0
5	23	10.7
≥6	28	13.1
Total	**214**	**100**

Table 2: Determinants of cosmetic utilization and adverse drug reaction occurrence by Dessie campus female students, Wollo University, North East Ethiopia.

Variables		**Cosmetics utilization**			
		Yes (%)	**No (%)**	**OR**	**95% CI for OR**
Year of study	First year	54(96.4)	2(3.6)	1.000	----------
	Second year	67(98.5)	1(1.5)	2.481	(1.387-4.438)[a]
	Third year	85(98.8)	1(1.2)	3.148	(1.763-13.126)[a]
	Fourth year	8(80)	2(20)	1.509	1.160-1.963
Monthly income(birr)	<500	100(96.2)	4(3.8)	1.000	----------
	≥ 500	114(98.3)	2(1.7)	2.280	(1.169-7.638)[a]
		Adverse reaction experience			
		Yes (%)	No (%)	OR	95% CI for OR
Number of cosmetics used per day	One and two	26(27.7)	68(72.3)	1.000	----------
	Three to five	40(43.5)	52(56.5)	2.012	(1.061-3.815)[a]
	>five	20(71.4)	8(28.6)	6.538	(1.173-36.439)[a]
Source of cosmetics	Drug retail outlets	11(26.8)	30(73.2)	1.000	----------
	Super markets and local shops	57 (32.9)	116 (67.1)	1.740	(1.088-2.954)[a]
Traditional cosmetics use	No	40(25.5)	117(74.5)	1.000	----------
	Yes	24(42.1)	33(57.9)	2.127	(1.334-6.036)[a]
Sharing cosmetics	No	10(20.4)	39(79.6)	1.000	----------
	Yes	55(33.3)	110(66.7)	1.950	(1.606-6.105)[a]
Adding water/saliva	No	8(18.6)	35(81.4)	1.000	----------
	Yes	60(35.1)	111(64.9)	2.365	(1.052-5.885)[a]

[a]significant association; Reference categories are indicated by value of 1.000; OR=Odds Ratio, CI=Confidence Interval.

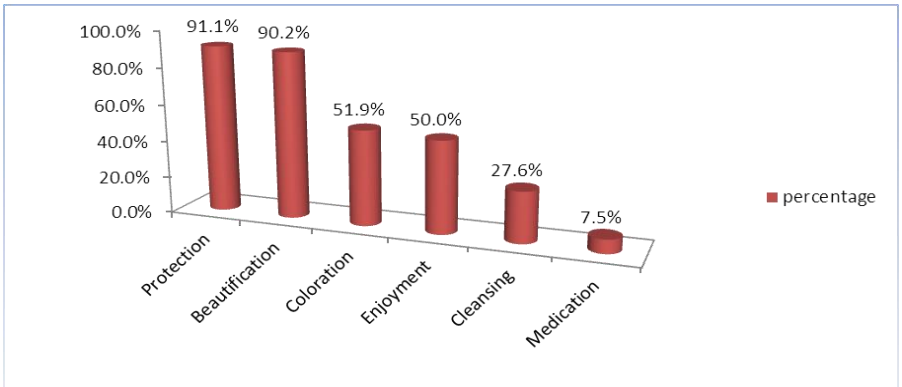

Figure 1: Reasons for using cosmetics as claimed by female students of Dessie campus, Wollo University, North East Ethiopia.

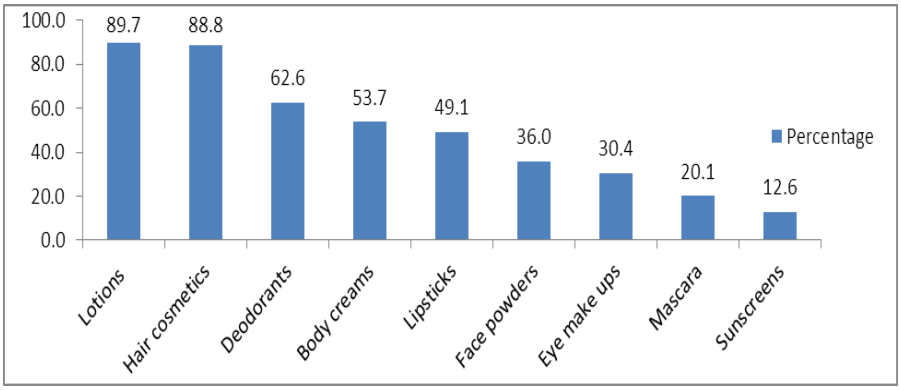

Figure 2: The type of cosmetics used by female students, Dessie campus, Wollo University, North East Ethiopia.

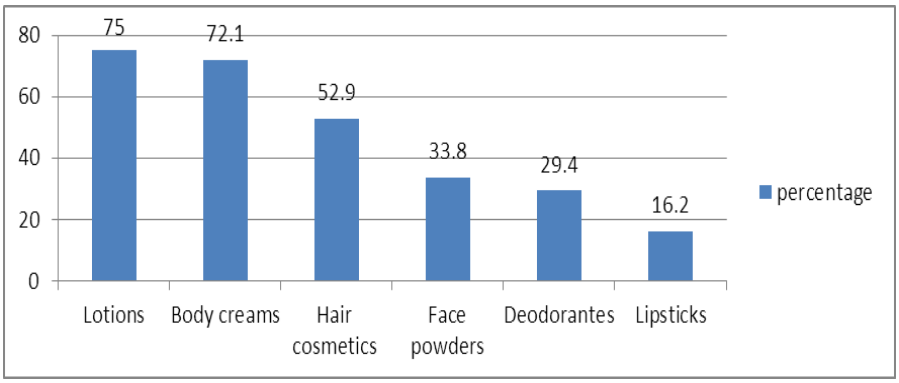

Figure 3: Types of cosmetics and reported adverse reactions by female students, Dessie campus, Wollo University, North East Ethiopia.

5. CONCLUSION

The study showed that cosmetics burden among the students was comparable to other countries' reports. However, inappropriate practices on label reading, testing cosmetics, sharing, traditional cosmetics use and addition of water/saliva to cosmetics were observed.

The frequently complained undesirable effects were itching and acne. The top complained cosmetics were lotions and body creams. Statistically significant association was observed between the injuries complained and irrational practices related to cosmetics use.

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

BGM conceived and coordination of the study, participated in data collection and analysis. ASA participated in data collection and analysis. YMT participated in the design of the study and performed the statistical analysis. SAA participated in its design and helped to draft the manuscript. All authors read and approved the final manuscript.

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Endnotes

[a]in Table 2 shows significant association between compared groups.

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