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Aspect of Microbiology and Heavy Metal Composition of in use and not in Use Cosmetics in Nnewi, Anambra State, Nigeria.

*[1]Dimejesi, S. A., [2]Umennadi, P. U. and [1]Umeoduagu, N. D.

[1]Department of Microbiology, Tansian University, Umunya.
[2]Department of Chemistry, Tansian University, Umunya.

ABSTRACT

Aspect of microbiology and heavy metal contents of selected cosmetics in Nnewi was studied. The in use and not in use samples were aseptically taken from the handlers and cosmetics shops respectively and analyzed using standard microbiological and chemical methods. There was higher bacterial counts in the in use samples (5.6×10^4 cfu/g to 9.0×10^4 cfu/g) than in the not in use samples (3.0×10^4 cfu/g to 5.0×10^4 cfu/g). The result revealed presence of *Streptococcus* spp, *Staphylococcus aureus*, *Bacillus* spp and *Escherichia coli* with *Escherichia coli* found only in the in use samples. This study reveals the potential danger associated with prolonged use of cosmetics. The levels of some heavy metals lead and cadmium (1.1 and 1.2 mg/kg) respectively are higher than the permissible limit.

Keywords: Cosmetics, Microbiology, Heavy metals, Nnewi.

INTRODUCTION

Cosmetics, also known as make-up, are substances or products used to enhance the appearance or fragrance of the body [1]. They are mixture of chemical compounds some of which are derived from natural sources while others are produced from synthetic materials. Cosmetics commonly found include eye shaw, lipsticks, skin cleaners, foundation, perfumes, skin lotions, lip gloss, eye pencil, eye shadow just to mention but a few. Most of these cosmetics contain essential nutrients such as protein, carbohydrates, vitamins, oil and water and these provide optimal medium for microbial contaminants. These organisms may cause allergic reactions and skin irritations [2].

Heavy metals such as lead, mercury, cadmium, arsenic, nickel and aluminium are often detected in cosmetics. These metals are harmful when they occur in excessive amounts and as a result poses a great danger to the users of cosmetics.

MATERIALS AND METHODS

Ten different samples of the following cosmetics (lipstick, eye shadow, lip gloss and foundation were obtained from cosmetics shops and from the users in Nnewi, Anambra State. The samples were collected aseptically and analyzed using standard methods.

The bacteria isolated were enumerated, characterized and confirmed using standard microbiological methods as described by [3]. The samples were equally extracted and the heavy metal determined and quantified spectrophotometrically using different kit for each heavy metal.

RESULTS

Table 1 shows the total bacterial counts of the samples.

Table 2 shows the characteristics of the bacterial isolates.

Table 3 shows the heavy metal contents of the samples.

Table 1: Total viable bacterial count

Sample	***Total Viable Count (cfu/g)***	
	Not in Use 9 (x 10^4)	*In Use 9 (x 10^4)*
A	3.0	5.6
B	3.6	6.5
C	4.5	8.2
D	5.0	8.9
E	4.6	9.0

Table 2: Characteristics of Bacterial Isolates

Isolates	Cultural Morphology	Microscopic Morphology	Gram Reaction	Catalase	Citrate	Coagulase	Oxidase	Methyl Red	Nitrate	Indole	Voges Proskauer	Urease	H_2S	Motilitty	Lactose	Maltose	Glucose	Sucrose	Xylose	Manitol	Sorbitol	Probable organism
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1	Colonies are yellowish, moist and have smooth glistering surface on nutrient agar, appears pinkish on MacConkey agar and about 1-2mm in size.	Cocci in grape-like cluster with some singe and paired	+	+	-	+	-	+	+	-	+	+	-	-	A	+	A	A	+ A	A	A	*Staphylococcus* aureus
2	Low convex discrete colonies about 0.5-1.0mm in diameter	Spherical cocci in short chains	+	-	-	-	+	-	-	-	-	+	-	-	+	+ A	+ A	+ A	A	-	-	*Streptococcus* spp
3	Colourless to greyish smooth colonies on	Rod shaped	-	+	-	-	-	+	+	+	-	-	+	+	+	A	+	+	A	+	-	*Escherichia*

	nutrient agar, rose pink, large colonies of MacConkey agar about 2-3mm in diameter																	A		A	-		A		*coli*
4	Large, greenish, raised, wide-spreading with irregular fingerlike edges and opaque about 2-3mm in diameter	Long straight rods in single, some in pairs	+	+	+	-	+	-	+ -	-	+	-	-	+	-	+ A	+ A	+ A	A	A	A		*Bacillus* spp		

Key: A = Acid production, G = Gas production

Table 3: Heavy metal contents of the samples

	Heavy Metal Contents (mg/kg)									
	A		B		C		D		E	
	NI	I	NI	I	NI	I	NI	I	NI	I
Cadmium	0.6	0.60	0.8	0.80	0.5	0.5	0.7	0.7	1.2	1.0
Lead	0.3	0.30	ND	0.45	0.42	0.4	0.6	0.6	1.1	1.1
Zinc	0.32	0.31	2.4	1.80	2.00	1.9	2.2	2.0	0.8	0.9

DISCUSSION

There is higher bacterial count in the in use than not in use samples. The high bacterial counts in the in use cosmetic samples may be as a result of poor hygienic practices by the handlers. The isolation of *Bacillus* spp, *Streptococcus* spp, *Escherichia coli* and *Staphylococcus aureus* agrees with the findings of [4]. The high bacterial counts in samples was also observed by [5]. The heavy metal contents fall within the acceptable limit except in sample E, where lead and cadmium exceeds the maximum limit (1.00 mg/kg).

CONCLUSION

Microorganisms that can contaminate cosmetics have been identified. Heavy metals can be found in excessive amounts in cosmetics. It is therefore recommended that cosmetics should be provided under the most hygienic condition and long acting anti-microbial agent be incorporated in cosmetic formulation.

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