RESEARCH ARTICLE

ARE COSMETIC PRODUCTS HARBORING BACTERIAL GROWTH?

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ARTICLE INFO	ABSTRACT
	Microorganisms can grow almost anywhere! And these tiny organisms carry with them some unpleasant product changes or even disease. Cosmetic must be harmless for user so the aim of this study Determine the degree of bacterial contamination among different types of cosmetic products. Methods: a total of 70 samples of different cosmetics products were collected, 78.5% were found to be contaminated. The contaminants including bacteria such as *Staphylococcus aureus*, *Staphylocoocus epidermidis*, *Escherichia coli*, Bacterial contamination was found to be more among high water content products because it act as agood media for their growth. Finally in all kinds of cosmetics (eye liner, lipstick ,mascara…etc) the bacterial growth had been increased with the time, it's more common among those opened for more than 3 months.

INTRODUCTION

Cosmetics which Includes (foundations, compact powder, Lipstick, eye liner, eye shadow and brush) (http://dx.doi.org/ 10.20510/ukjpb/3/i5/89498). Females apply it for beautifying, cleansing, promoting attractiveness, or modifying appearance, for that reasons cosmetics are becoming very important; they are used daily, frequently and regularly by increasing numbers of the people and the amounts consumed are increasing each year (Huda J. Muhammed, 2011) Makeup can do amazing for women, but the majority of them do not know that makeup can pose a hazard to their health because of harboring bacteria and spreading an infection (Mwambete and Simon, 2010). Cosmetic contaminations lead to several types of infections that range in severity from mild to serious (Huda J. Muhammed, 2011). Many female even share applicators and makeup with friends and family, increasing their chances of contamination. Others do not replace makeup until it's completely finished despite how long ago they purchased it. (Peter G Hugbo *et al*., 2003; Abdelaziz *et al*., 1989) Most cosmetics contain a lot of components which are considered as good environment for microbial growth and the production of cosmetics is not a sterile process and at least the storage temperature is nearly optimal for microbial growth (Huda J. Muhammed, 2011). So that the types of the starting materials will determine the quality of cosmetic products. The rule of excellent manufacturing practice for cosmetic products (GMPC) has

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clearly described the need of the starting materials to fulfill with qualification (Mwambete and Simon, 2010; http://www. amstat.org/education/posterprojects/projects/2008/8-Grades10-12-HM.pdf). Therefore, cosmetics starting materials should be protected against microbial contamination during the sequence of transport, storage and use in production (Peter G Hugbo *et al*., 2003; Abdelaziz *et al*., 1989). The introduction of contaminated raw materials into manufacture can severely load up, the preservative ability of the products, so as to leave it ineffective, so the inclusion of preservatives aids in lowering microbial loads within the product to acceptable levels during shelf life. There are two main reasons you need preservatives: to prevent microbes from spoiling the products and to prevent microbes from causing disease. (Perry, Brian 2001) An excellent preservative is one that is capable of slow down immediate post production contaminants as well as subsequent low inocula and thereby conserves tolerable small numbers of microorganisms in the preparation (http://www.amstat.org/ education/posterprojects/projects/2008/8-Grades10-12-HM. Pdf; Perry, Brian 2001)

As the makeup gets older than 3 months, preservative systems can lose their effectiveness (Sneha Sunil Sawant and Varsha Kelkar-Mane, 2015; http://microchemlab.com/cases_of_ cosmetic_and_beauty_product_contamination; Campana *et al*., 2006) Microbial contamination are less likely occur in cosmetics that contain above 10% w/w of ethanol, propylene glycol or glycerol, and those in self-pressurized bottles, are commonly self- preserved and are doubtfully to have microbial contamination (http://microchemlab.com/cases_of_cosmetic_

and_beauty_product_contamination; Journal compilation, 2006)

Aim of the study

Determine the degree of bacterial contamination among different types of cosmetic products.

MATERIALS AND METHODS

 A total of (70) samples had been included in this study. For sampling, each type of makeup (Lipstick, eye liner, foundation, eye shadow, brush and compact powder) were mopped up with sterilized cotton swabs moistened with normal saline solution. Each sample obtained was inoculated separately into tubes contain brain heart infusion (BHI) broth. Inocula in Brain Heart infusion broth (BHI broth) were incubated at 37°C for 24 hours. Obtaining an inoculums from the incubated BHI broth the inoculum were obtained and streaked on blood agar, MacConkey's agar, manitol salt agar for bacterial isolation. Plates were then incubated at 37°C. A negative cultures were considered if growth was not identified within 2days of incubation. Bacterial culture achieved was classified using Gram's staining, on the basis of culture diagnosis by growing on selective media and carried out biochemical test including catalase coagulase, and oxidase. If the organism showed positive reaction with catalase test, coagulase test is used to differentiate Staphylococcus aureus (coagulase Positive) from coagulase negative staphylococcus. Negative result for catalase test would investigate further test to Classify streptococci. Gram negative organisms were identified using biochemical tests such as Triple Sugar Iron agar, Sulfur Indole, Motility test medium, Methyl Red test, Citrate utilization test and urease test. Statistical analysis of the results had been done by using frequency values and chi square x2.

RESULTS

Out of 70 samples included 55 (78.5%) found to be contaminated and give positive microbilegrowth, the rest of them which represnted 15 sample only (21.42%) gave no microbile growth.

Table 1. The frequency and the types of microorganism among samples

Types of microorganism	Frequency	%
S.epidermidis	17	24.2%
Diphtheroid sp.	5	7.1%
S. aureus	8	11.4%
Bacillous sp.	15	21.4%
E.coli	1	1.4%
Micrococcus	2	2.8%
Fungus sp.	2	2.8%
Mixed infection	5	7.1%
No growth	15	21.4%

The types and the frequency of microorganism which had been isolated from different types of makeup samples were shown in Table 1. *S.epidermidis* 17 24.2%, *Diphtheroid sp.* 57.1%, *S. aureus* 8 11.4%, *Bacillous sp.* 21.4%, *E.coli* 1.4%, *Micrococcus* 2.8%, fungal infection 2.8%,mixed infection

7.1%and no bacterial growth represented 21.4%. The most prevalent microorganism was *S.epidermidis*.

Table 2. The frequency of bacterial growth in the 2 groups of makeup

Type of make up	Positive growth	No growth	Total
Dry type	17	9	26
	24.2%	60%	
Wet type	38	6	42
	54.2%	40%	
Total	55	15	70

The frequency of microorganism which had been isolated from the 2 groups of samples (dry or wet type)were presented in table 2, which showed that 54.2% of the bacterial growth were found in the wet type, While positive bacterial growth were found in 24.2% of the wet type.

Table 3. Relation between bacterial growth and duration of makeup

Types of makeup	Bacterial growth Positive	negative	
New and in used	19	11	30
	23.57%	6.42%	
>3months	36	4	40
	31.42%	8.57%	
Total	55	15	70

X^2= 7.23 Degree of freedom= 1 P < 0.05

Table 3 shows that65.4% % of bacteria had been isolated from the makeup which had been used for more than 3 months, while only 23.57%-had been isolated from the in used one. This difference was Statistically significance (P<0.05).i.e. There is significant relation between type of makeup and bacterial growth.

DISCUSSION

Many female are unaware of the potential risks that can affect their health while using cosmetics and the majority of them using the cosmetics past their expiration dates (Campana *et al*., 2006). Researchers from previous studies concluded that cosmetics such as lipsticks, shampoos and old facial and eye makeup had the ability to promote microbial growth and possibly cause infections (Peter *et al*., 2003; Abdelaziz *et al*., 1989; Sneha Sunil Sawant and Varsha Kelkar-Mane, 2015; Journal compilation, 2006). In this study we found that there was a high prevalence of bacterial growth among cosmotic products of different types, but its more among the wet (liquid type) this in agree with other researches and study the most common bacteria was *Staphylococcuse spp*. The usage of such of products which is contaminated with bacteria eg. *Staph spp*. can transfer these microbes to the eye and increase the risk of blepheritis (Journal compilation, 2006). Bacterial contamination was found to be more among high water content products because it act as a good media for their growth and this may   altered their composition and pose a risk for customers.

The warm and   humid climatic conditions that exist in most Middle East countries, including Iraq, would be likely to support the survival and growth of many microorganisms

Bacterial growth were found more among the used type of cosmetics more than the original or the in use one   its due to sharing the products or due to un proper sanitation of the makeup container and sponge or due to the used beyond the expire date (Mwambete and Simon, 2010; Peter *et al*., 2003; Perry, Brian, 2001). In all kinds of cosmetics (eye liner, lipstick,   mascara…etc) the bacterial growth had been increased with the time, it's more common among those opened for more than 3 months that's mean the preservative stuff were no longer work in because the bacteria with the time lead to   destruction   and inhibited their function (Campana *et al*., ?). So in order to reduce the risk of getting infection by makeup we have to inform female to reduce the reapplying lipstick after eating: if the female reapply the lipstick immediately after eating food stuff, they're pressing extra food particles into their lips, and into the lipstick and lip liner itself. Bacteria can then survive on the surface of lipstick, or within the container of lip gloss, which will ultimately be spread onto the consumer's   lips in the subsequent use (http://microchemlab.com/cases_of_cosmetic_and_beauty_pro duct_contamination, Campana *et al*., 2006).

Mascara and other eyes make up products   merit special attention because of the proximity and contact with this region and thus the higher probability of causing irritation or ophthalmic infection Putting that mascara onto their stick and into the eye (Abdelaziz *et al*., 1989), then back and forth again, passes germs from the eye to the tube, where they'll continue to survive   because moist dark environment within the container is an ideal place for nasty bacteria to proliferate especially after the 3 months when most of cosmetics products getting expired.

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