

Short Communication

**Incidence of Human Skin Pathogens from Cosmetic Tools used in Beauty Saloons from Different Areas of Lahore, Pakistan**

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**Abstract**

With the surprising development across the cosmetic and personal care companies the re-utilization of cosmetic tools is of a common practice. Isolation and detection of human skin pathogens from 100 samples of beauty salon tools i.e., blusher brush, face sponge and wax has been done. All the samples were examined microbiologically for the contamination of *Staphylococcus aureus*, *Pseudomonas aeruginosa*, yeast and fungus. It was observed that the percentage of *Staphylococcus aureus* was higher (100% in sponge, 100% in brush, 88% in wax) in the tools than *Pseudomonas aeruginosa* (69.6% in sponge, 81.8% in brush and 73.5% in wax), where counts obtained for fungus was 51.5% in sponge, 30.3% in brush and 20.5% in wax. It was observed that the major cause of contamination of saloon tools is repetitive usage on all costumers without considering the hygienic conditions.

**Keywords:** Human skin pathogens; Cosmetic contamination; *Pseudomonas* in cosmetics; *S.aureus* in cosmetics.

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**1. Introduction**

The cosmetics industry achieved stupendous growth within a short span of time and is now a multi-billion dollar industry. It would continue to grow as long as people are ready to spend a fortune to look their best. Realizing the potential in the cosmetics industry, more and more players are now joining the cosmetics bandwagon to get a slice of an ever-growing pie. The result of which is large number of brands and twice the number of cosmetic products in both hair and skin care. Cosmetics are defined by the U.S. Food and Drug Administration (FDA) as an “articles intended for beautifying, cleansing, promoting attractiveness or altering appearance”.

Makeup can do wonders for women, but it can be dangerous to their health, if not handled properly [1, 2]. Cosmetic contamination leads to several types of infections that range in severity from mild to serious [3]. Cosmetic contamination awareness is even

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worse among the younger age. Many women even share makeup and applicators with friends and their family, increasing their chances of facial infection. Makeup can easily be contaminated by the repetitive use to the skin using an applicator, or finger and also by poor handling procedures during manufacturing that can cause defects in the preservative capacities [2]. The rich texture of cosmetic creams are mainly due to moisture content, presence of essential minerals and growth factors, which provides a broad spectrum of inorganic and organic compounds and a suitable environment for the growth of microorganisms [4,5].

Cosmetician uses a variety of beauty accessories like tweezers, scissors, and variety of brushes sponges for makeup application and for skin care treatments [6]. Body waxing enhances a risk of infection transmission both to the esthetician and clients. Quality and inappropriate label description of makeup also controls the contamination [7]. Skin pathogenicity due to repetitive use of salon tools has gained tremendous intimidation over the past several years. Microbial spoilage can be caused by bacteria, fungi and yeast which are extremely versatile in their metabolic activity. In spite of this relatively few accounts of microbial degradation of cosmetic or pharmaceutical has been published [8]. The present study focuses on isolation and detection of human skin pathogens, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and fungi on selective media for the assessment of microbes contaminating the tools used in beauty salons [9].

## 2. Material and Methods

**Sampling:** Total 100 samples of makeup sponge, brush and wax was taken from 33 different beauty salons of Lahore City from April to June, 2010. All the samples were analyzed for microbial contamination at Zoology Science Research Lab of Lahore College for Women University Lahore, (LCWU).

**Media:** Mannitol salt agar (Merck), Cetrimide agar (Lab M) and Potato dextrose agar (Merck) were used for the enumeration of *S. aureus*, *Pseudomonas aeruginosa*, and fungi. Media were prepared according to manufacturers details. A serial dilution for each sample was spread on respective media plates and later incubated at 37°C for overnight. CFU/ml of sample was calculated as described by [10].

**Statistical Analysis:** For statistical analysis, Analysis of variance (ANOVA) was applied using SPSS version 13.0 using 0.005 level of significance.

## 3. Results and Discussion

In the present study, 100 samples of in use makeup sponge, blusher brush and wax were observed for microbial contamination of *Staphylococcus aureus*, *Pseudomonas aeruginosa*, yeast and fungus. Sponge and brush samples had 100% *S. aureus* contamination, while 88% contamination for the similar pathogen from the wax samples was observed (Fig.1, Table 1).

The percentage of *P. aeruginosa* contamination among all areas in the makeup sponge, brush and wax samples was 69.6, 81.8 and 73.5%, respectively (Fig. 1, Table 1). Almost 51.5% of the total sponge samples revealed fungal and yeast colonies, while 30.3 and 20.5% contamination was observed in brush and wax samples, respectively. Sponge

samples studied from different saloons showed high *Staphylococcus aureus* contamination ( $24.24 \times 10^4$  CFU/ml) from all the areas studied.

Table 1. Percentage of *S. aureus*, *P. aeruginosa* and fungus in total samples.

% age	<i>S. aureus</i>	<i>P. aeruginosa</i>	Fungus
Sponge	100%	69.6%	51.5%
Brush	100%	81.8%	30.3%
Wax	88%	73.5%	20.5%

For *Pseudomonas aeruginosa*  $22.96 \times 10^4$  CFU/ml was obtained while for yeast and fungus maximum contamination was estimated as  $26.57 \times 10^4$  CFU/ml. Low temperature and moist conditions are favorable to *Staphylococcus aureus* growth and since majority of the functions are arranged mostly during winter season, cosmeticians repeated use of sponge applicator and other tools causes the surging growth of these pathogens [11, 12].

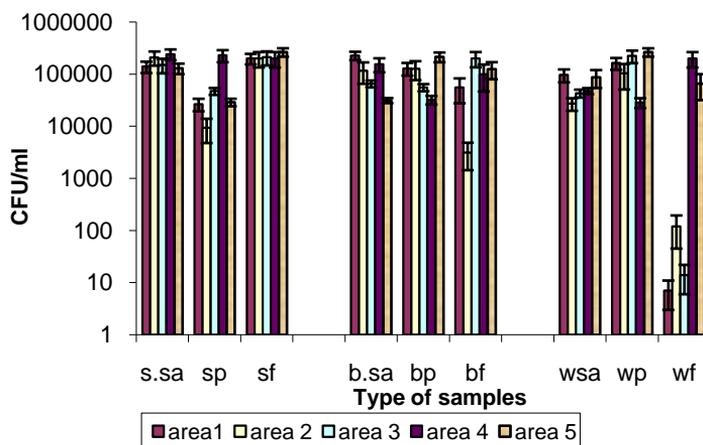


Fig. 1. Comparison of sponge, brush and wax samples for the contamination of *S. aureus*, *P. aeruginosa* only, fungal and yeast collected from different areas of Lahore. In figure s is for sponge sample, b-brush, w-wax, sa- *Staphylococcus aureus*, p- *Pseudomonas aeruginosa* and f- fungal growth.

When salon makeup brush samples were analyzed for microbial contamination it was seen that for *Staphylococcus aureus* CFU/ml was  $22.76 \times 10^4$ . While the maximum contaminants of *Pseudomonas aeruginosa* was estimated to be  $21.52 \times 10^4$  CFU/ml. Yeast and fungal growth were  $20.06 \times 10^4$  CFU/ml. Cosmeticians have to treat a large number of costumers in a limited time, the repeated use of same brush to apply facial makeup causes spread of microbial contamination as these pathogens are reported to adhere to the poly

(ethylene oxide)-PEO brush coatings very well [13]. In the wax samples the estimated contamination of *Staphylococcus aureus* was  $25 \times 10^3$  CFU/ml. While for *Pseudomonas aeruginosa* counts obtained were  $26.55 \times 10^4$  CFU/ml but yeast and fungal contamination obtained was  $120 \times 10^4$  CFU/ml.

In the present study *S.aureus* contamination was seen in large number for all three types of salon tools that are frequently used. Many authors have reported the isolation of pathogens from different parts of the face, in one such study [14], *Staphylococcus aureus* counts obtained from eyelashes ranged from  $0 \pm 0$  to  $(8 \pm 0.43) \times 10^4$  CFU/ml and for *E.coli* ranged from  $(1 \pm 0.13) \times 10^4$  to  $(7 \pm 0.12) \times 10^4$  CFU/ml. It was also reported that cosmetics items in possession of persons harbor *Staphylococcus aureus* in foundation samples ranged from 0 to  $(6 \pm 0.7) \times 10^4$  CFU/ml and for *E.coli* it ranged from  $0 \pm 0$  to  $(9.2 \pm 0.52) \times 10^5$  CFU/ml. Similarly on eye shadow samples, *Staphylococcus aureus* presence ranged from  $0 \pm 0$  to  $(1.9 \pm 0.47) \times 10^6$  CFU/ml and *E.coli* from  $0 \pm 0$  to  $(8.6 \pm 4.2) \times 10^5$  CFU/ml. Inadequate preservation or outdated products can lead to microbial deterioration and also favors growth and proliferation of skin pathogens after use [15, 16]. Many authors have reported the presence of coagulase-positive *Staphylococcus* in unpreserved cosmetic products after use, lending importance to adequate preservation [17, 11]. Ashour *et al.* [3] have reported several pathogens such as *S. aureus* and *P. aeruginosa*, as well as coliforms, recovered from some of the toothpastes. *Staphylococcus* spp. contamination in the samples of both talcum powders and body lotions were detected in refs. [18] and [19]. Behravan *et al.* [20] have reported the incidence of contamination by Gram-positive bacteria, *Bacilli* and *Staphylococcus aureus* was higher for used cosmetic creams which was 54%, 38% and 8%, respectively. Many other authors have also reported contamination of cosmetic products with skin pathogens [16, 21]. Cosmetic applicators can be an instrument of accidental trauma that introduces potentially hazardous microorganisms [22]. It was also reported from the examination of cosmetics after microbial spoilage that *P. aeruginosa* and *Enterobacter gergoviae* were the most predominant bacteria in large number [23, 24].

From the present study it can be concluded that repetitive use of saloon tools harbors large number of pathogens that can cause serious skin infections. By adapting the proper preventive precautions such as sterilization and proper washing of these tools the microbial contamination from one person to other can be controlled.

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