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Bacteriological Analysis Of Lipsticks

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ABSTRACT

Microbial contamination of cosmetic products is a matter of great importance to the industry and it can become a major cause of both product and economic losses. Moreover. the contamination of cosmetics can result in their being converted into products hazardous for consumers. The objective of the study was to evaluate the degree of bacterial contamination in lipsticks. Fifty eight (58) samples of used lipsticks were included in the study. Each sample was inoculated on MacConkey's agar and nutrient agar plates for the isolation of bacteria. Twenty eight (28) bacterial strains were isolated belonging to 6 different species or Gram positive bacteria viz.. Bacillu.s. spp. (8; 28.6%). *Micrococcus sedentarius* (6; 21.4%), *Streptococcus spp.* (1: 3.6%), *Staphylococcus saprophyticus* (8:28%) *S. aureus* (2: 7.1%) and *S. epidermidis* (3: 10.7%). It was concluded that lipsticks often contains preservatives but some are still subject to microbial contamination.

Key words:

Lipsticks, *Bacillus subtilis, Micrococcus sederaarius, Streptococcus spp., Staphylococcus aureus*

INTRODUCTION

According to the European Commission, 1993 “Cosmetics” have been defined as “any substance or preparation intended to be placed in contact with the various external parts of the human body (epidermis. hair system. nails, lips and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance and/or correcting body odors and/or protecting them or keeping them in good conditions (*Pieroni cal al.,* 2004).

Microbial contamination of cosmetic products is of great importance to the industry. It not only cause economic loss rather also results in the conversion of cosmetics into hazardous products for consumers. Presence of water and nutrients in cosmetics favours the growth of microorganisms, although very few cases of human injury have been reported due to contaminated cosmetics. Furthermore, microorganisms also cause alterations in organoleptic properties, such as offensive odors. and changes in viscosity and color (Orus and Leranoz, 2005).

Preservatives used in cosmetics should be effective enough to prevent the multiplication of microorganisms with in the product. Complete sterility is not feasible but it should not contain viable human pathogenic bacteria or fungi or cosmetic products must be inhibitory to pathogenic and nonpathogenic microorganisms. Actively viable microorganisms can be deleterious to both the esthetics and to the functional characteristics of cosmetic products. Microorganisms can affect on color. odor, emulsion stability, foaming, and clarity of cosmetics. Ideally, cosmetics should be self-sterilizing against all microbes encountered during production, packaging. and usage. During

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production common sources of microbial contamination in cosmetic products are raw materials, equipment and air. Water for batch-making can also be the major source of contamination, therefore, control over the sanitary quality of this water will be emphasized. Under summer temperature storage conditions, demineralized or deionized water can easily support bacterial populations. In a few cases as many as 10^6 bacteria/m1 have been observed. To prevent gross pollution of the batch water supply, the propagation of micro flora coming from the undeionized water, therefore, deionizer units and the storage tanks must be controlled (Olson, 1967).

Methods to detect microbial contamination in cosmetics and their raw materials are usually based on traditional plate counts (Orus and Leranoz. 2005). Lipsticks often contain preservatives but some are still subject to mould 'blooms'. Mould grows on the lipstick while it is inside the lipstick case, often after the product has become moistened by breath during use (Smart and Spooner, 1972). Keeping in view. the present study was undertaken to evaluate the degree of bacterial contamination in lipsticks.

MATERIAL AND METHODS

Samples

Fifty eight (58) samples of used lipsticks were included in the study.

Collection of samples

A sterile cotton swab was rotated and rubbed over the surface of each lipstick and then rotated and subjected to qualitative analysis.

Media for primary isolation

Nutrient agar medium (Oxoid) and MacConkey's agar medium (Oxoid) were used for primary isolation.

Inoculation

Each swab was streaked onto the surfaces of 1 nutrient agar and 1 MacConkey agar.

Incubation

Inoculated plates were incubated for 24 h at 37°C.

Maintenance of cultures

After incubation, different types of colonies were picked and transferred to nutrient agar slants to get pure cultures.

Characterization and identification of organisms

All pure cultures were subjected to characterization by using different tests confirming to required standard diagnostic criteria (Baron el al. 1994; Cheesbrough. 2000).

RESULTS

A total of fifty eight (58) samples of used lipsticks were included in the present study. Of these. 40 (69%) samples yielded no growth while only 18 (31%) samples yielded the growth of only Gram-positive bacteria (Table 1).

Table 1: Lipstick samples positive for growth.

Total number of lipsticks	58
No growth	40
Growth	18

The bacterial profile of eighteen lipstick samples is presented in Table 2. Total twenty eight (28)

bacterial strains were isolated belonging to 6 different species of gram positive bacteria viz.. Bacillus spp. (8; 28.6%), *Micrococcus sederuarius* (6; 21.4%). Streptococcus. spp. (1: 3.6%), *Staphylococcus saprophyticus*. (8: 28.6%). *Staphylococcus aureus* (2; 7.1%), and *Staphylococcus epidermidis* (3; 10.7%).

Table 2: Bacteria isolated from lipsticks.

ORGANISMS	No.	%
Bacillus spp.	08	28.6
Micrococcus sedentarius	06	21.4
Streptococcus spp.	01	3.6
Staphylococcus saprophyticus	08	28.6
Staphylococcus aureus	02	7.1
Staphylococcus epidermidis	03	10.7
Total	28	100

DISCUSSION

Microbial spoilage of cosmetics is significant both from health and economic viewpoints and obviously should be prevented. It is clear that disease-causing organisms must be excluded, although some times it may be difficult to decide if an opportunistic pathogen will be troublesome in a specific product (Smart and Spooner. 1972). However. infections caused by contaminated cosmetics are relatively rare today, and the reported cases are all from hospitalized persons (Lundov *et al.,* 2009).

In the present study, the aim was to study the lipstick samples that were used before and that have not an expiry date report in case of microbial contamination and preservative activity. Fifty eight (58) samples of used lipsticks were included in the present study . The bacterial profile of eighteen lipstick samples is presented in Table 2. Total twenty eight (28) bacterial strains were isolated belonging to 6 different species of Gram positive *bacteria viz., Bacillus spp., M. sedentarius,. Streptococcus spp., S. saprophyticus, S.aureus,* and *S. epidermidi*s. In a past study, microbiological quality control of lipsticks has been investigated. In 81 samples, we found that 34 of them (42%) had total aerobic plate count and 19 of them (23.5%) were found to consist of mold and yeast which are not allowed by the cosmetic regulations. Pathogen microorganisms such as *S. aureus. P. aeruginosa. E. coli, Salmonella spp.* and *Shigella spp.* were not detected from any of the samples (Akin and Altanlar. 1989). However, further literature about the bacteriological analysis of lipsticks is lacking.

In the present study, *Bacillus* spp. were found as predominant organism with an overall incidence rate of 28.6 % (Table 1). Most of the species of *Bacillus* are air and soil contaminant: however, *B. subtilis* have also been reported to be involved in food poisoning (Ostensvik *et al.,* 2004).

In addition to above mentioned Gram-positive a species of *Micrococcus* were also isolated in the present study. *Micrococcus* species are commensal organisms colonizing the body surfaces of humans and are usually considered normal inhabitants of the skin (Selladurai *et a1.,* 1993). In the present study, among *Micrococcus species*, *M. sedentarius* was observed with higher incidence rate i.e. 21.4% (Table I). They have been well recognized as opportunistic pathogen especially in immunocompromised patients (Yang *et al.,* 2001) and have been reported to cause infections like endocarditis (Old and McNeill. 1979). abscess (Selladurai *et al.,* 1993), localized cutaneous infections (folliculitis) (Smith *el al.,* 1985), meningitis (Fosse *et al.,* 1985), pneumonia (Adang *et al.,* 1992) and bacteremia (Altuntas et al., 2004).

Streptococci spp. were also isolated in the present study. However, the overall incidence rate of Streptococci was low i.e. 3.6% (Table 1). Streptococci are also associated with infective endocarditis (Budzik and Schneewind, 2006), orthopedic infections (Arciola *et al.*, 2007), neuro infections (Benca *et al.*, 2007), sepsis (Maschieto *et al.*, 2004), wound (Heggers *et al.*, 1998), genital infections (Coque *et al.*, 1995) and blood stream infections (Routsi *et al*., 2000).

The clinical significance of *S. saprophyticus* in urinary tract infection has been well documented in the literature (Elmanama *et al.*, 2006). In the present study. *Staphylococcus saprophyticus* was also found as predominant organism with an overall incidence rate of 28.6% (Table 1). *S. epidermidis* another coagulase negative Staphylococcus. was isolated with the incidence rate of 10.7% (Table 1). However, *S. haemolyticus* and *S. saprophyticus* are opportunistic bacterial pathogens that colonize human skin.

Beside *S. saprophyticus* and *S. epidermidis*, *Staphylococcus aureus* a coagulase positive Staphylococcus, was also isolated in the present study with the low incidence rate i.e. 7.1% (Table 1). Though *S. aureus* are the normal flora of the skin and mucous membranes (Pour *et al.*, 2007) their high incidence has clinical significance and they are considered well-recognized pathogen. A number of studies have documented the clinical significance of *S. aureus* as a causative agent of urinary tract infections. *S. aureus* have also been reported to cause conjunctivitis (Everitt *et al.*, 2006). *S. aureus* can also cause bacteremia which may be complicated by endocarditis, matastatic infection or the sepsis syndrome (Shurland *et al.*, 2007). Furthermore. *S. aureus* is also associated with toxic shock syndrome (Naidu et at . 1991), Fournier's gangrene, genital infections (Kalorin and Tobin. 2007), skin infections e.g. frunculosis (Miller *et al.*, 2007) and respiratory tract infections (Yamaguchi et al., 2006).

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