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Microbiological quality assessment of some brands of cosmetics powders sold within Jos Metropolis, Plateau State

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ABSTRACT

The study was aimed at determining the microbiological quality of some brands of cosmetic powders sold within Jos metropolis. Staphylococcus aureus, Clostridium tetani, Pseudomonas aeruginosa, Candida albicans were specifically targetted. A total of 60 samples; 20 each of three different brands of cosmetic powders were analyzed. The mean aerobic plate counts obtained were 1.6 x 10^4 cfu/g, 2.3 x 10^4 cfu/g and 4.5 x 10^5 cfu/g while the mean yeast and mould counts were 1.1x 10^4 cfu/g, 1.4 X 10^4 cfu/g and 2.7 X 10^4 cfu/g. Thirty (50 %) of the samples analyzed were contaminated with Staphylococcus aureus, twelve (20 %) were contaminated with Clostridium tetani and four (7 %) were contaminated with Candida albicans. Bacillus spp was also isolated from four (7 %) samples while Pseudomonas aeruginosa was not isolated from any of the samples analyzed. The moulds isolated from the cosmetic powders include; Aspergillus niger, Apergillus fumigatus, Penicillium spp., Rhizopus oligosporus, Fusarium spp.

Key words: Microbiological Quality assessment, Cosmetics Powders, Sold, Jos Metropolis.

INTRODUCTION

The ability of microorganisms to grow and reproduce in cosmetic products has been known for many years. Microorganisms may cause spoilage or chemical changes in cosmetic products and injury to users. Cosmetic products are topical applications for diverse dermatological uses [8]. These groups of products are widely useful and therefore a description of their functions can vary from decorative to protective. A powder is a decorative cosmetic product used by both men and women to improve their looks and also inhibit the growth of bacterial pathogen which may cause unpleasant odour and sometimes skin infections [8]. Many ingredients such as zinc oxide,

titanium dioxide, essential oils e.t.c. are added to provide the characteristics of a good powder, talc help it to spread easily [13].
Cosmetic powder comes packaged either as a compact powder or in a loose powder container which is used for make-up. It can also be reapplied throughout the day to minimize shinning of oily skin. It can be applied with a sponge, brush or powder puff. Because of the wide variation among human skin tones, there is a corresponding variety of colours of cosmetic powder. Besides toning the face, most make-up powders are available with sun protection fraction (SPF) that helps prevents pigmentisation of the skin under the sun [1]. Cosmetic powders have some positive effects on a person's appearance which include; reducing wrinkles and puffiness, it hides the blemishes and the dark circles, it helps in reducing the fine lines, it also give beautiful and clean appearances to the skin [17]. However, the critics have also pointed out the negative effects of cosmetic powders on a person's appearance which include; that the powder can not put a stop to the ageing process as the wrinkles return after a certain period of time, also, it was established that some cosmetic powders are contaminated with moulds and other micro-organisms [9].

Cosmetic powders are sometimes contaminated with micro-organisms such as *Staphylococcus aureus, Psuedomonas aeruginosa, Clostridium tetani,* yeasts and moulds, which can either be from the raw materials or during manufacturing, processing, breakage or damage of the cosmetic powder container, at the retail market due to the presence of dust, also during usage of product [16]. Contamination of cosmetic powder by micro-organisms such as *Clostridium tetani, Staphylococcus aureus,* moulds and yeast e.t.c. may cause serious disease of the skin and mucous membrane which are difficult to cure in several cases [16]. It is also reported that some of these cosmetic powders are contaminated with spores of micro-organisms and can support their growth when they are poorly preserved [8].

It is against this background that the microbiological quality of some brands of cosmetics powders sold parts of Jos metropolis was analysed to determine their safety.

MATERIALS AND METHODS

Sample Collection

A total of 60 samples, 20 each of three different types cosmetic powders two commonly used by adults and one for babies) designated sample A, sample B and sample C were purchased from different parts of Jos metropolis, transported to the laboratory and analyzed.

Media Used

Blood agar was used for the isolation of *Clostridium tetani* and *Pseudomonas aeruginosa*. Mannitol Salt agar was used for the isolation of *Staphylococcus aureus,* Plate count agar (PCA) was used to determine the bacterial load of the cosmetic powders and Sabauroud's Dextrose agar (SDA) was used for the isolation and enumeration of yeasts and moulds. All of the media mentioned above were prepared under aseptic conditions according to the manufacturers specifications.

Aerobic Plate Count of the Cosmetic Powders
A stock sample of each cosmetic powder was prepared. A five-fold serial dilution was made and aliquots of the last two dilutions were inoculated on Plate Count agar (PCA) in duplicates using the pour plate method. All the plates were incubated at 37 ^{0}C for 24 hours followed by colony count. Results were expressed as colony forming unit per gram (cfu/g).

Yeasts and Moulds Count of the Cosmetic Powders
One ml of the last two dilutions mentioned in prepared above were inoculated on SDA plates using pour plate method. The plates were then incubated at 25 ^{0}C for 24 hours. Colonies were counted after three days. Results of colony count was expressed as yeasts and moulds counts per gram.

Identification of Bacterial Isolates
All bacterial isolates were identified based on their Gram reaction and biochemical reactions as described by U.S.FDA manual online [19], [7, 6].

Identification of fungal Isolates
All fungal isolates were identified based on their macroscopic and microscooic appearance with reference to mannuals of Barnett and Hunter, [4], [14, 10].

RESULTS

The results obtained shows that the bacterial load of cosmetic powder A ranges from 4.6X10^3 to 1.3X10^4 cfu/g with a mean bacterial load of 4.5 X 10^5 cfu/g. The bacterial load of cosmetic powder B ranges from 4.6 X 10^3 to 1.1 X 10^4 cfu/g with a mean bacterial load of 2.3 X 10^4 cfu/g while that of cosmetic powder C ranges from 4.2 X 10^3 to 1.3X10^4 cfu/g with a mean bacterial load of 1.6 X 10^4 cfu/g (Table 1).

Cosmetic powder C had the highest mean count of yeasts and moulds of 2.7 X 10^4 cfu/g followed by Cosmetic powder B with mean count of 1.4 X 10^4 cfu/g and the least was Cosmetic powder A with mean count of 1.1 X 10^4 cfu/ml (Table 2).

Out of the 60 samples of cosmetic powders that were analyzed *Staphylococcus aureus* was isolated from 30 (50 %) samples, *Clostridium tetani* was isolated from 24 (20 %) samples, *Candida albicans* was isolated from 8 (7 %) samples (Table 3). Moulds such as *Aspergillus niger*, *Penicillium spp*, *Aspergillus fumigatus*, *Rhizopus oligosporus*, *Mucor plumbeus*, *Fusarium spp* were isolated from the cosmetic powders with *Aspergillus niger* having the highest frequency of occurrence of 14 (47 %), followed by *Rhizopus oligosporus* of 10 (17 %) samples and the least being *Aspergillus fumigatus*, *Mucor plumbeus* and *Penicillium spp* which were isolated from two samples each (Table 4).

Table 1: Aerobic Plate Count (APC) of the Cosmetic Powders (cfu/g)

Cosmetic Powder	Range of APC	Mean
A	1.3 X 10^4 – 4.6 X 10^3	4.5X10^5
B	1.1 X 10^4 – 2.4 X 10^4	2.3X10^4
C	1.3 X 10^4 – 2.6 X 10^4	1.6X10^4
TOTAL MEAN 1.6 X 10^5		

Other organisms isolated from the cosmetic powders were *Bacillus species* from 4 (7 %) samples, *Pseudomonas aeruginosa* which was one of the target organism was not isolated from any sample.

Table 2: Yeasts and Moulds Count of the Cosmetic Powders (cfu/g)

Cosmetic Powder	Range of APC	Mean
A	$0.0 – 2.0 \times 10^4$	1.1×10^4
B	$3.8 \times 10^3 – 2.6 \times 10^4$	1.4×10^4
C	$3.5 \times 10^3 – 2.6 \times 10^4$	2.7×10^4
TOTAL MEAN 1.7 X 10^4		

Table 3: Frequency of the Occurrence of the Target Organisms in the Cosmetic Powders

Sample	No. analyzed	No. positive for *S. aureus*	No. positive for *Cl. tetani*	No. positive for *C. albicans*
A	20	12 (60%)	2 (10%)	2 (10%)
B	20	8 (40%)	4 (20%)	-
C	20	10 (50%)	6 (30%)	4 (10%)
Total	60	30 (50%)	12 (20%)	4 (20%)

DISCUSSION

Based on the findings of this work, the cosmetic powders analyzed are more contaminated with fungi than with bacteria. In a similar study, [11] and [15] also reported more of bacterial than fungal contamination. Fungal and bacterial contaminants in unused cosmetic powder are common because of the environment in which the powders are manufactured, packed and the ingredients themselves [8, 15]..

The guidelines on microbiological quality of finished cosmetic products have defined cosmetic powders into two categories; Category 1 Cosmetic powders specifically intended for children under 3 years and Category 2 for other cosmetic powders [3].

The limit for cosmetic powder classified in category 1 is that viable count for aerobic mesophillic micro-organisms should not be more than 10^2 cfu/ml or g in 0.5 g or millitre of the powder [2]. Based on this limits, the aerobic plate count of all cosmetic powder B (a baby powder) analyzed were above the acceptable limit with a total mean count of 2.3×10^4 cfu/g. The high count may be due to environmental contamination during mining or processing of the talc (main ingredient) used or during manufacturing of the baby powders itself. The limit for cosmetic powder classified in category 2 is that the total viable count for aerobic mesophillic micro-organism should not be more than 10^3 cfu/g or ml in 1 g or millitre of the product [2]. Based on this information, the aerobic plate cont of both cosmetic powders A and B (use by adults) were above the acceptable limit which also agrees with the findings of Ashour *et al*., [1]. The isolation of *Staphylococcus aureus* as the most predominant contaminant tallies with the findings of Ashour *et al*. [1].

Clostridium tetani was isolated from 20% of the cosmetic powders analysed which also agrees with the findings of Ashour *et al*. [1] who also reported the isolation of *Clostridium spp*. in cosmetic powders. The presence of the organism poses a serious danger to the user, because the tetanus toxin produce by the organism is lethal to human (at dose of approximately 1 ng.kg) especially neonatal cases. A serious tetanus neonatorum outbreak from talcum powders contaminated with *Clostridium tetani* in New Zealand was reported by Brazier *et al*. [5]. The organism gain entrance into the body through cuts on the skin thereby causing infection. The organism is an inhabitant of the soil, which may contaminate the main raw material (talc) of the talcum cosmetic powder [18].

The isolation of *Candida albicans* from the cosmetic powders though at low frequency is also of concern because when these powders contaminated with *Candida albicans* are used on genital areas and sanitary napkins it may lead to vaginal candidiasis and also oral candidiasis when the powder mistakenly gets into the mouth of user [12].

Contamination of cosmetic powders may derive from a variety of sources such as raw materials, manufacturing, storage and packaging or use. Cosmetics powders are not expected to be aseptic; however, the must be completely free of high – virulence microbial pathogens, and the total number of aerobic microorganisms per gram must be low [12, 11].

CONCLUSION

It can be concluded from the findings of this research work that all the cosmetic powders analyzed are of poor microbiological quality since their bacterial load are above standards. The presence of organisms such as *Clostridium tetani*, *Staphylococcus aureus* and *Candida albicans* in the cosmetic powders implies that they can serve as vehicles for the transmission of these pathogenic organisms.

REFERENCES

[1] MSE Ashour; AA Abdelaziz and Hefni, H. **2008**. *Journal of Clinical Pharmacy and Therapeutics*, 14: 207-212.
[2] AOAC International. **2001**. *Official methods of analysis*, 17th edition method. 998. 10. AOAC International, Gaithersburg, MD. Pp 1-14.
[3] AOAC International. **2002**. *Journal of AOAC International* 84(3): 671-675.
[4] HL Barnett and BB Hunter **1972**. *Illustrated Genera of Imperfect fungi.* Burgess Publishing Company, Minneapolis, Pp 62 – 63.
[5] JS Brazier; BI Duerden; V Hall; JE Salmon; J Hood; J Brett; M.M Mclauchlin; George, R.C. **2002**. *Journal of Medical Microbiology.* 51: 985-989.
[6] M. Chessbrough **2005** *Distinct Laboratory Practice in Tropical Countries*. 2: 62-70.
[7] B.A Cunha **2002**. *Semin Respiratory Infection*, 17: 231-239.
[8] MA Duke, **1978**, *Journal of Applied Bacteriology.* 44: SXXXV- SXIII.
[9] B Elane, **1989**, *The hazards of Cosmetics*, New York, Hasrper and Row. 1-5.
[10] D Ellis, **2006**, Mycology online. The University of Adelaide, Australia.
[11] S Hashim, **2003**, *Microbiological Aspect* 47: 37-48.

[12] AD Hitchins; , TT Tranand; JE MCCaron, **2001**, *Bacteriological Analytical Mannual. Microbiological methods for Cosmetics.*
[13] R Josh **2006**, *Health-and-Fitness Beauty*. Bantan Dell Pulishers. 1:105
[14] DC Larone **1995**, *Medically Important Fungi: A guide to identification*. American Society of Microbiology. Washington, DC. 3rd Ed.
[15] L Nasser **2008**, *Saudi Journal of Biological Sciences*, 15 (1) : 121-128.
[16] M Pollack **2000**. *Pseudomonas aeruginosa*. principles and practice of infectious diseases. 5th edition New York. Churchill Livingstone. Pp. 2310-2327.
[17] T Stabile **1984**, *Journal of Cosmetic formulation* 1: 1-5.
[18] K Todar **2005**, Pathogenic clostridia. Ken Todar's microbial world. University of Wisconsin-Madison press.
[19] United States Food and Drug Administration, **2001**, *Bacteriological Analytical Mannual Online*: *Staphylococcus aureus.* FDA/Center for Food Safety and Applied Nutrition.