EVALUATION OF SOME SELECTED COSMETIC POWDERS OF TALCUM COMPOSITION FOR BACTERIAL AND FUNGI OF CLINICAL SIGNIFICANCE

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Submission Date: 25th Apr., 2024
Date of Acceptance: 13th Dec., 2024
Publication Date: 31st Mar., 2025

ABSTRACT

Introduction: **The desire to wear a charming, customized and captivating look like a fashion ambassador does not comes easily, but with a tag attached. Consciously or unconsciously, cosmetic powders have cast a spell over culture throughout century and its possible health implications on the consistent wearers remain a subject of controversy. This study solely aimed at evaluating bacteria load and fungi presence in some selected talcum composed powder and compare, if it had exceeded standard threshold of microbial load capable of causing infection.**

Methodology: **A stock solution was prepared by dissolving exactly 1 gram of each sample into 9 ml of sterile distilled water and was diluted in 10-fold serially. Selected dilution factors (10^{-3}, 10^{-5}, 10^{-7}) were subculture on bacteriological media for the isolation of bacteria and fungi of clinical significance. The pH of each powder was determined by weighing 3gram into 10mL of sterile distilled water and were measured with handheld pH meter. Macroscopic and microscopic identification of mould isolates was done by placing pieces of a colony from Saboraud Dextrose Agar to clean microscopic slide and thereafter stained with lactophenol -in -cotton blue. A cover slip was placed on each preparation, followed by observation under the objective lens of Olympus microscope. Distinct similarly looking representative isolates were harvested for Gram reactions, followed by conventional biochemical characterization for confirmation.**

Results: **Variation in pH range between 3.2 and 5.2 were recorded, the average bacteria count obtained from all the powder sampled range between 3.5×10^8 and 8.3×10^8 which exceeded 1×10^3 microbiology threshold standard for cosmetic powders. *Rhizopus spp, Candida spp* and *Epidermophyton spp* were also isolated.**

Conclusion: **There is need for regular testing of these products to assure safety compliance and promote awareness on the potential harmful effects of using microbial-laden powder on users.**

Keywords: Cosmetic powder, Talcum fortified, Bacteria, Fungi, Bacterial loads.

INTRODUCTION

Powder is a cosmetic product applied to the face and body children and even adults particularly ladies typically use it to enhance, alter appearance of the face or fragrance and texture of the body. Although, adult men and the aged do apply powder for a purpose, since there is no gender restriction in the use of cosmetic powder. Face powder are made up of mixtures of chemical compounds from natural or synthetic source are designed to be applying to the face and body. According to recent data, as of 2017, over 70% of powder users within the age range of 18-29 years, 30-59 years, 60 years and above applied powder on daily basis[1].

Face powder had different social uses across cultures and in modern times, it is typically used to set make

up, brighten the skin and contour the face, communicates desires, most especially for the ladies. Face powders generally come in two major types. One of which is loose powder, which is used to assist with oily skin in absorbing excess moisture and mattifying the face to reduce shininess. The other type of face powder is pressed powder which conceals blemishes and maximizes coverage. The use of face powder has contributed to beauty standards throughout history in ancient Europe and Asia, a whitened face with a smooth complexion signaled a woman of high status[2]. When people apply powder under the guise of making up in places like public toilets, bath rooms, cars, trains, plane and untidy places, the chances of applying potentially harmful bacteria are maximized due to their ubiquity. Consciously or unconsciously, cosmetic powder have cast a spell over culture throughout century and its possible health implications on the consistent wearers remain a subject of controversy[3].

A study conducted by several scientists from the School of Life and Health Sciences at Aston University in Birmingham, United Kingdom have recently found that many makeup products that have passed their expiry dates, improperly preserved, as well as many beauty tools particularly, makeup sponges not periodically clean, habour potentially dangerous bacteria such as *Staphylococcus aureus* and *Escherichia coli.* This corroborates the findings of Akon et.al.,2005 on demonstration of in vitro antibacterial activity of cosmetic items used by the Daka locality.[4] Talcum laden powder is second to none as beauty enhancers sequel to its ability enhance softness, lubricates, absorb moisture and enforce shining to the face of the users.[5]

The chemical composition of talcum can be metabolize and degraded by bacteria and fungi thereby turn the powder to vehicle of infection transmission. Talcum powder is made from talc, a mineral made up mainly of the elements magnesium, silicon and oxygen. Chemically it is a hydrated magnesium silicate with the assigned formula 3MgO2.4SiO2.H2O, and is found in Italy, France, Norway, India, Spain, the USA, Australia, China, Egypt and Japan. As a powder, it absorbs moisture well and help cut down on friction, making it useful for keeping skin dry and helping to prevent rashes[6].

Talcums fortified powder includes; Candid, Get me, China, Enchanteur, My love, Caro fresh, Pond's, Tracia eternal, Levinia style, Sleek perfection, Sweet heart, Milani, Cacatin, IMAN, Sleek care, Robb, Pears, Candem, Agnesia, Rising raving, Cusson's, St. Lukes, Candid cotrimomazole, Baby day's, Passion, Baby and me, Johnson & Johnson, Curash, Nycil, Fissan, Unique and others. Some talcum in its natural form contains asbestos, a substance known to cause cancers in and around the lungs when inhaled. Therefore, talc used in cosmetic products should be free from detectable amount of asbestos[7].

Talcum powder can be contaminated with bacteria and fungi spores when poorly preserved, which could lead to biodegradation of the products, hence risk of microbial contamination to the users. The ingredients used in making commercial face powder cut through organic and non organic products to serves as a lubricant and softener and these components are metabolisable and degradable especially by non-nutritionally exacting microbes[8]. Therefore, this study evaluated some selected cosmetic powder of talcum composition for bacteria and fungi of clinical significance

MATERIALS AND METHODS

Sample collection

A total of five (5) samples of talcum powder perfectly sealed, were purchased from selected cosmetic boutiques within Sagamu and Ikorodu axis of Ogun and Lagos state of Nigeria and transported to the department of pharmaceutical microbiology of the Olabisi Onabanjo University, for bacteriological analysis. The powders selected had at least one or two years shelf-lifebefore expiration.

Sample preparation

A stock solution was prepared by dissolving exactly 1 gram of each powder sample into 9 ml of sterile distilled water and was diluted in 10-fold serially. Thereafter, selected dilution (10^{-3}, 10^{-5}, 10^{-7}) were cultured on bacteriological media for the isolation of bacteria and fungi of clinical significance. Aerobic plate count from Geiger Mueller colony counters were recorded and the results were expressed in colony forming unit per gram.

Determination of pH

The pH of each powder was determined by weighing three gram 3g into 10mL of sterile distilled water. Handheld pH meter (HANNA Instruments) fortified with microprocessor was used to determine the pH.

Bacteriology

Culture of bacterial isolates

Selected dilutions factors were spread plated on manitol salt agar, nutrient agar and cetrimide nutrient agar for the isolation of targeted bacterial capable of causing skin infection, and thereafter incubated aerobically at 37^0C for 24-48hrs.

Culture of fungal isolates

Fungal growth obtained by culture selected dilution on Saboraud Dextrose Agar medium (Oxoid Basingstoke, England) fortified with 0.05mg of chloramphenicol and 0.2mg of cyclohexidine to prevent bacterial growth and thereafter incubated anaerobically at 28^0C for 72 hrs and were biochemically differentiated.

Microscopic Examination

Microscopic identification of mold isolates was carried out by forcep-placing pieces of a colony from SDA to clean microscopic slide and thereafter stained with lactophenol -in -cotton blue. A cover slip was placed on each preparation, followed by observation under the objective lens of Olympus microscope.

Biochemical identification

Distinct similarly looking representative isolates were harvested for Gram reactions and biochemical characterization conventional for the isolation of *Pseudomonas spp, Staphylococcus spp,* and *Bacillus spp* and biochemical tests were done on fungi obtained.

RESULTS

Table 1: Identity of powder samples analyzed

SN	Product type	Brand name	Manufacture date	Expiry date.
1	Talcum	(MDP)	04/2022	04/2025
2	Talcum	(PTP)	05/2022	05/2025
3	Talcum	(SCF)	07/2022	07/2024
4	Talcum	(PHP)	12/2022	12/2025
5	Talcum	(RBP)	02/2021	02/2025

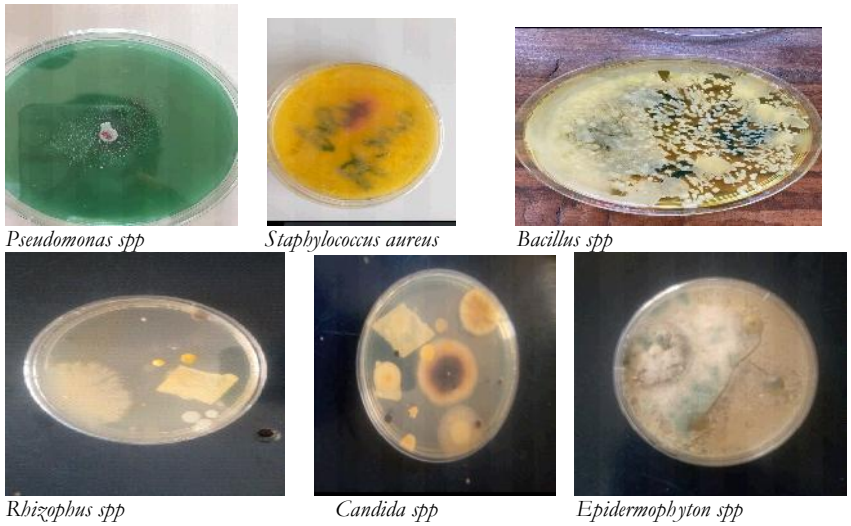

Figure 1: Isolates of bacteria and fungi from the studied samples

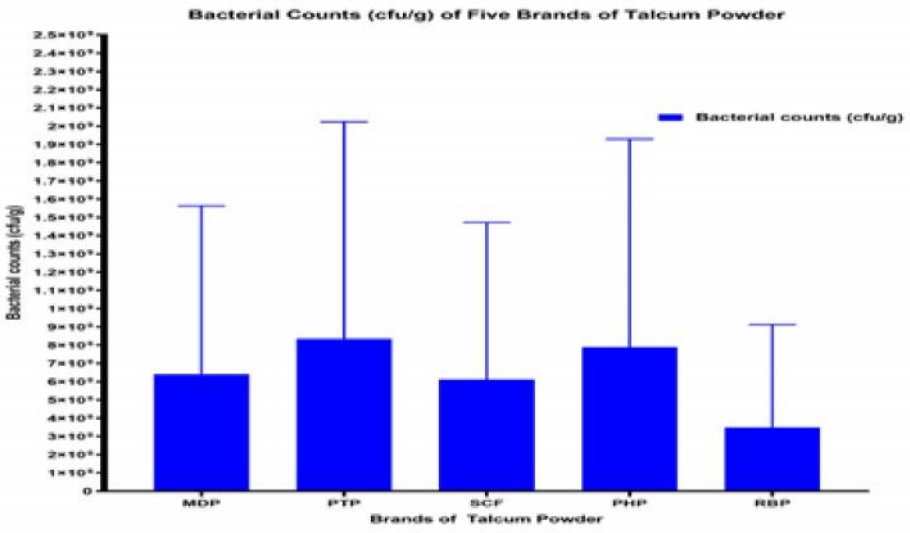

Figure 2: Average Bacteria counts (standard mean deviation) from five powder samples

DISCUSSION

Talc powder is widely used for different purposes worldwide. Effects of talc on the human health is a concern as it has many chemical components metabolisable by non-nutritional exacting bacteria and fungi. Three different bacteria *Pseudomonas aeruginosa, Staphylococcus aureus and Bacillus spp* isolated and characterized based on bacteriological media provided and three different fungi were also isolated as shown in Figure 1. Bacteria are ubiquitous and could easily survive and adapt to any environment due to their genetic variation. The number of bacteria count and fungi present in the studied samples could be attributed to poor storage facilities, human unhygienic practice within the market environment and other inherent factors under which the products are managed since these are standard products that had not expired[8].

The average of total aerobic bacteria counts as reflected in mean standard deviation from the from graphical illustration in Figure 2 in this present study exceeded the average microbial concentration of approximately 10^3 cfu/g the international microbiology standard recommended limit for bacteria contaminants in cosmetic products. This corroborates the study of Whala and Kasana (2015) on microbial assessment of some common India brands of Talcum powder. Fungi of epidemiological importance were isolated which could be attributed to the same factors that gave birth to varied bacteria isolated[9].

A total of five selected branded powder were obtained from uninformed(unschooled) retailers operating local boutiques within the metropolis namely; mentholated dustin powder, passion talcum dustin powder, siperco caro fresh, prickly heat powder and raving baby powder as shown in Table 1 were sampled based on their ease of accessible within the metropolis and aesthetic packages.

The pH of the first three powder (MDP, PTP and SCF) range between 3and 4 which is relatively acceptable to inhibit acidophobic and non acid tolerant bacteria and fungi, while PHP and RBP exhibited pH range of 4 and 5 respectively seemingly less acidic than the first three, variation in the pH parameters in each powder sample recorded are dependent upon their purpose, the purpose of pH is maintain natural barrier, keep skin healthy and hydrated as shown in Table 2.0 The shift in pH could occur sequel to exposure of the users to daily challenging demanding task or external insult which will surely be expressed via body temperature (homoestasis). This corroborates the findings of Barbara Nieradko-Iwanicka *et.al* (2017) on the effect of the pH content of cosmetic we use[10].

The microbial load of selected topical powders bacteria and fungi in this study elicited evidences of contaminants, an indication that talcum powder are degradable by bacteria and fungi if the products are mishandled, manufacturer errors via equipment and personnel from production line could initiate quick degradation and deterioration of these products.

CONCLUSION

The protective feature and aesthetic appealing of powder samples does not always protect the user most especially when contaminated above the threshold limit values of (1×10^3cfu/g) microbial loads for cosmetic powder and could pose a health hazard for the users. Awareness of harmful effect microbial laden powder can cause to the users is hereby advocated.

Conflict of Interest Statement

The authors affirm that they have no conflict of interests to declare.

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