



RESEARCH ARTICLE

Microbial Assessment of Some Common Indian Brands of Talcum Powder

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ABSTRACT

A total of three samples of talcum powders were examined for their total aerobic bacterial counts. A serial dilution technique was carried out and plating was done by using standard spread plate technique. The bacterial load of talcum powder Boroplus ranges from 1.5×10^7 to 2.1×10^8 cfu/g with a mean bacterial load of 1.8×10^8 cfu/g, in Dermicool ranges were 1.6×10^9 to 2.8×10^7 cfu/g with a mean bacterial load of 2.3×10^8 cfu/g and in talcum powder Navratna colonies were uncountable. Bacteria isolated from talcum powder were *Staphylococcus* spp. 40% and *Bacillus* spp. 60%. In conclusion, the talcum powders studied showed to be more heavily contaminated. This may be as a result of poor manufacturing process, poor hygiene and contaminated raw materials.

KEYWORDS

Talcum powder, Bacterial load, *Bacillus* and *Staphylococcus*

INTRODUCTION

Talcum powder is a cosmetic product used by both men and women to improve their looks and avoid the growth of bacterial pathogen which may cause unpleasant odor and sometimes skin infections. One of its most common uses is in baby care, to reduce irritation from diapers. The field of cosmetics and microbiology had not come into contact much before the 1930s and cosmetic microbiology became more important in 1940s.¹ Talcum powders have positive effects on adult and babies skin, which mainly used to smooth the appearance of skin but negative effects also occur if they were contaminated. It was reported that some of these talcum powders are contaminated with spores of microorganism and can support their growth when they are poorly preserved and causes several disease.²

The warm and rather humid climatic conditions would tend to support the survival and growth of many microorganism, so rapid growth and multiplication would be expected. This could lead to biodegradation of the product and hence the risk of microbial contamination to consumers of the product.³

In 2014 Omorodian and his coworker isolated bacteria from the baby powder were *Staphylococcus* spp., *Bacillus* spp., *Streptococcus* spp., *Micrococcus* spp., and *Escherichia coli*, while bacterial isolates from adult powder were *Staphylococcus* spp., *Bacillus* spp., *Streptococcus* spp., and *Micrococcus* spp.

Escherichia coli were not isolated from any of the adult powders. This possibly is due to over confidence in the traditionally good hygienic conditions under which such products are manufactured and also because it is assumed that added preservative will prevent microbial growth upon storage and during use.⁴

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The objective of this study is to assess the microbial quality of some selected brands of commonly used adult powder to recommend the possibility of some health risk to consumers. To overcome from this problem the packaging of talcum powder must be done in aseptic condition and dry places, and machinery used for grinding must be free from microbial contamination and to avoid the skin problem caused by the contaminated talcum powder, antibiotic must be used. Antibiotic are used to fight against bacterial infections. Kirby–Bauer antibiotic testing (KB testing or disc diffusion antibiotic sensitivity testing) is a test which uses antibiotic-impregnated wafers to test whether bacteria are affected by antibiotics.⁵

MATERIAL AND METHODS

Sample Collection

A total of 3 commercial sample of talcum powder brand name Navratna, Boroplus and Dermicool were purchased from shop of Roorkee, Haridwar (Uttarakhand). For precaution, check the seal of product and transported to the laboratory and analyzed.

Bacteriological Counts of the Cosmetic Powders

A stock solution was prepared by dissolving 1gm

of sample into 9 ml of sterile distilled water. A tenfold serial dilution was made and last three dilutions transferred into NAM plates using spread plate method. The plates were allowed to solidify and incubated at 37⁰C for 24-48 h.

Identification of Bacterial Isolates

All bacterial isolates were identified based on their Gram reaction and biochemical reactions (Table 2).

RESULTS

The results obtained shows that the bacterial load of talcum powder Boroplus ranges from 1.5x10⁷ to 2.1x 10⁸ cfu/g with a mean bacterial load of 1.8x10⁸ cfu/g.

The bacterial load of talcum powder Dermicool were ranges from 1.6x10⁹ to 2.8x10⁷cfu/g with a mean bacterial load 2.3x10⁸ cfu/g and in talcum powder Navratna colonies were uncountable (Table 1). Out of 3 samples of talcum powders that were analysed, bacteria isolated from Boroplus powder were *Staphylococcus* spp. 15%, *Bacillus* spp. 85% while bacterial isolates from Navratna powder were *Bacillus* spp. 100%, *Staphylococcus* spp. were not isolated from this powder and bacterial isolates from Dermicool powder *Staphylococcus* spp. 40% and *Bacillus* spp. 60%.

Table 1: Enumeration of bacteria from talcum powder

S.No	Sample	Dilution	Dilution factor	No. of colonies	C.F.U./g	Mean ± SD
1.	Boroplus	10 ⁻⁴ 10 ⁻⁵ 10 ⁻⁶	10 ⁴ 10 ⁵ 10 ⁶	154 216 172	1.5 X10 ⁷ 2.1 X10 ⁸ 1.7 x 10 ⁹	1.8±3.18x10 ⁹
2.	Navratna	10 ⁻⁴ 10 ⁻⁵ 10 ⁻⁶	10 ⁴ 10 ⁵ 10 ⁶	TNTC TNTC TNTC	TNTC TNTC TNTC	TNTC
3.	Dermicool	10 ⁻⁴ 10 ⁻⁵ 10 ⁻⁶	10 ⁴ 10 ⁵ 10 ⁶	280 252 162	2.8X10 ⁷ 2.5X10 ⁸ 1.6X10 ⁹	2.3±6.16x10 ⁹

TNTC = Too numerous to count

Table 2: Morphological and biochemical characteristics of bacterial isolates from talcum powder

Characteristics	Bacterial Isolates	
	B1	B2
Grams staining	Gram	Gram
Colony	White, irregular margin	Yellow, smooth margin
Cell shape	Rod	Cocci
Cell arrangement	Single	In cluster
Catalase	+ve	+ve
Lactose	-ve	A
Sucrose	A	A
Dextrose	A	A
Starch hydrolysis	+ve	-ve
Nitrate reduction	-ve	+ve
MR	-ve	+ve
VP	-ve	-ve

-ve=Negative

+ve=Positive

A=Acid

Antibiotic Test

Antibiotic sensitivity study of different antibiotics on *Bacillus* spp. and *Staphylococcus* spp. shown result that *Bacillus* sensitive for all antibiotics of multidisc but resistant for antibiotic Roxythromycin and *Staphylococcus* spp. was sensitive only for antibiotic Erythromycin, while resistant for all other antibiotics of multidisc.

Table 3: Showing the order of drug susceptibility in *Bacillus* spp.

Antibiotic	Content (mcg)	Zone of inhibition (mm)
Ampicillin (AS)	20	9
Co-Trimoxazole (BA)	25	2
Cephalexin (PR)	30	15
Tetracycline (TE)	30	25
Cefotaxime (CF)	30	10
Ciprofloxacin (RC)	5	31
Levofloxacin (QB)	5	24
Linezolid (LZ)	30	28
Cloxacillin (CX)	1	1
Roxythromycin (AT)	15	R
Lincomycin (LM)	2	4
Gentamicin (GM)	10	3

R = Resistance

Table 4: Showing the order of drug susceptibility in *Staphylococcus* spp.

Antibiotic	Content (mcg)	Zone of inhibition (mm)
Amoxycillin (AM)	10	R
Cefazolin (CF)	30	R
Cephalexin (CP)	30	R
Roxythromycin (TH)	30	R

Cefadroxil (CD)	30	R
Erythromycin (E)	15	19
Ciprofloxacin (CL)	5	R
Vancomycin (Vn)	30	R
Ofloxacin (OF)	5	R
Sparfloxacin (SP)	5	R
Ampicillin (I)	10	R
Cloxacillin (V)	5	R

R = Resistance

DISCUSSION

Based on the findings of this work, the talcum powders analyzed were contaminated with Gram positive bacteria. In a similar study, Hugbo *et al.*, (2003)⁶ isolated *Staphylococcus spp.* and other Gram positive cocci were the most predominant, Gram negative isolates were hardly found Nasser (2008)⁷ also reported more of bacterial than fungal contamination. Dashen *et al.*, 2011² isolated *Staphylococcus aureus*, *Clostridium tetani*, *Bacillus spp.* and (Ashour *et al.*, 1989)⁸ isolated *Escherichia coli*, *Enterobacter agglomerans*, *Staphylococcus aureus*, and *Citrobacter freundii*.

The International Microbiological standard recommended limit for bacteria contaminants in cosmetic products is 1.0×10^3 CFU/g for bacteria. It was observed in our study the total bacterial counts were above the recommended limits. High microbial quality was observed in this study could be caused by poor manufacturing practice and improper storage. Bacterial isolates from adult powder were *Staphylococcus spp.* 48%, *Bacillus spp.* 6%³ but from talcum powders in our study we found two dominating bacteria

Staphylococcus spp. and *Bacillus spp.* In present study we found 40% *Staphylococcus spp.* and 60% *Bacillus spp.*

The frequency of occurrence of bacteria in the total sample shows that all the samples are contaminated with bacteria which indicating that talcum powders can permit the growth of bacteria. It was also observed that Gram positive organisms were the predominant contaminants in the powders. The high bacterial counts obtained may be due to poor storage, manufacturing practice or handling. *Bacillus* and *Staphylococcus spp.* in talcum powder causes skin irritation. Generally, the results obtained from this study showed that these talcum powder were highly contaminated.³

CONCLUSION

The conclusion drawn from this study shows that all the three samples of talcum powder have capable of causing health hazards due to high microbial loads. The microbial loads are above standard. This may be as a result of poor manufacturing practices, poor hygiene, contaminated raw materials or the susceptibility of the ingredients contained in the talcum powders. The presence of organisms such as *Bacillus spp.* and *Staphylococcus spp.* in the talcum powders implies that they can serve as vehicles for the transmission of disease.

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