

## MICROBIAL ASSESSMENT OF SANITARY PADS SOLD AT EKEONUWA MARKET, OWERRI, IMO STATE

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### ABSTRACT

Microbial assessment of sanitary pads sold at Ekeonuwa market was carried out, samples of sealed sanitary pads bought from the market were used. Samples were cultured on Nutrient agar, MacConkey agar, Mannitol salt agar, and SDA agar using the streaking method and incubated at appropriate temperature and time interval. The total heterotrophic bacteria count ranged from  $3.0 \times 10^1$  to  $2.4 \times 10^2$ , there was no isolated coliform and there was no fungal growth as well and the Total Staphylococcal Count for the samples ranged from  $3.0 \times 10^1$  to  $3.1 \times 10^2$ . Table 2 and 3 shows the morphological and biochemical characteristics and the identification reveals that the bacterial isolates belong to the *Bacillus* spp and *Staphylococcus aureus*, The analysis showed that some of the sanitary pads which were used as sample sources were devoid of contaminations and contaminating organisms while some of them had minimal level and it is a plus to the manufacturers because it simply means that aseptic techniques were maintained during their manufacturing and the contaminations are spore formers that can persevere in the environment for a long period of time so it is necessary that those with contamination should step up their aseptic techniques so that their products are protected from contamination from harmful microorganisms.

**Keyword:** Microbial contamination, sanitary pads, feminine hygiene, public health, hygiene practices.

### INTRODUCTION

Sanitary pads for the most basic reason are worn by menstruating women to absorb menstrual discharge in their reproductive phase (Nyoni, et al., 2014).

Women have throughout history used different types of menstruation protection and before the 1900s, napkins of various kinds were mostly used (Larsson and Olsson, 2014). Today, sanitary napkins

are available in a wide variety of designs that not only put into consideration women's comfort but also style and fashion sensibilities. The pads also come in individual wrappers so they are easy to carry and can be wrapped when soiled before disposal in appropriate trash cans to ensure proper sanitation (Das et al., 2015). Sanitary pad, which is also known as sanitary napkin or menstrual pad, is a thin pad made of absorbent material that absorbs the menstrual fluid during menstruation. The materials used as absorbents vary from, reusable towels (clothes torn from dresses of women and cotton fabric) to commercially disposable pads (Nyoni, et al., 2014). The preference of sanitary protection material (pads) is based on personal choice, cultural acceptability, economic status and availability in local market.

Menstruation is a natural feminine function that occurs every 21–28 days with a duration of five days in a menstrual cycle (Woeller and Hochwalt 2015) and plays a significant role in the reproductive system for women (Crofts 2012). Women typically experience a menstrual period between ages of 11 and 50 years, and regular menstrual periods are usually 3–7 days, with a menstrual average blood loss of 35 millilitre (ml) where the blood loss (10–80) ml is considered normal (Nyoni et al., 2014).

In particular, at the start of the early menstrual day the rate stays high, but the flow rate is declining slowly from the second day of the cycle to the last few days (Nyoni et al. 2014). Menstrual fluid consists of approximately 50–60% of blood with mixtures of uterine, cervical and vaginal secretion and mucous materials (Fraizer 2006; Chakwana and Nkiwane 2014).

In the developing world, women in all societies (i.e. upper, middle and lower classes) are not sufficiently aware of menstrual hygiene management, resulting school absenteeism, infections and various diseases to women's health, embarrassment and barriers to work in women that cause low productivity (Bharadwaj and Patkar 2004). In order to collect and retain menstrual fluids, poor and unconscious women generally use dirty cloths, rags that are unhygienic for their health. Moreover, poor women are not used to wearing underwear as a consequence of which they are not interested in using commercial sanitary napkins although panty or other underwear is essential to use commercial sanitary napkin. Because of lack of awareness, product costs and their socio-economic structure, the scenario requires designing such a form of hygienic sanitary napkin that can be generated at very low expense and environmentally friendly.

## **AIM OF STUDY**

To determine the microbial assessment of sanitary pad sold in the market

## **OBJECTIVES OF THE STUDY**

The objectives of the study are:

- a) To determine the microbial load of sanitary pad
- b) To isolate microbes associated with sanitary pad
- c) To characterize the microbes associated with sanitary pad

## **MATERIALS AND METHODS**

### **STUDY AREAS**

The study area used was Ekeonuwa market Owerri, in Owerri municipal area of Imo state. Owerri municipal is one of the Local Government in the capital city of Imo state. Imo state is a state in the Southeastern part of Nigeria is the homeland of the Igbo people. It is characterized by the diverse igbo culture and the equally diverse igbo language (Chigere, 2006). Owerri is made up of three Local Government area, namely Owerri west, Owerri North and Owerri Municipal. Owerri has an estimated population of about 750,000 as of 2006 and is approximately 100 square kilometres (40 sq mi) in area it has a population of 215,038 is located at Latitude: 5° 29' 1.07" N and Longitude: 7° 01' 59.70" E

## **SOURCE OF SAMPLE**

### **COLLECTION**

Four samples of sanitary pad were used. The samples consisted of lady care, virony, always and dry love sanitary pads randomly purchased.

## **COLLECTION OF SAMPLES**

Samples were collected in sterile sample containers, labelled properly and were sent to the lab for microbiological analysis within 30minutes after collection.

## **MICROBIOLOGICAL ANALYSIS OF SAMPLES**

Sample each were inoculated on the agar media using the streaking method of inoculation on the surface of sterile solidified plates of freshly prepared molten Nutrient agar, Mac Conkey agar, Mannitol salt agar and Sabouraud dextrose agar after which the media were incubated for 24hrs at 37°C for bacterial isolation and 72hrs for fungi isolation.

After the incubation period, the plates were observed and colonies counted, and the discrete colonies were sub-cultured into a freshly prepared Nutrient agar plate to get a pure culture. The sub-cultured plates were incubated for 24hrs, and examined for pure culture. The pure

culture growth were used for gram staining, motility test and biochemical characterization of the organisms like Oxidase tests, Citrate utilization test, Indole test, Methyl-red test, Voges proskauer test, Coagulase test, Sugar fermentation and Catalase test. A stock culture was prepared using a bijou bottle: this stock culture was used in storing the organisms for further characterization.

### IDENTIFICATION OF BACTERIAL AND FUNGAL ISOLATES

The isolates were identified based on their colonial morphology, Gram Staining, lactophenol cotton staining and biochemical test such as Catalase test, Citrate Utilization test, Indole test,

Methyl-Red test, Coagulase test, Sugar test and Urease test.

### RESULTS

Table 1 showed the microbial load of the various samples according to the days when they were taken. The various samples were represented with alphabets A, B, C and D. the total heterotrophic bacteria count ranged from  $3.0 \times 10^1$  to  $2.4 \times 10^2$ , there was no isolated coliform and there was no fungal growth as well and the Total Staphylococcal Count for the samples ranged from  $3.0 \times 10^1$  to  $3.1 \times 10^2$ . Table 2 and 3 shows the morphological and biochemical characteristics and the identification reveals that the bacterial isolates belong to the Bacillus spp and Staphylococcus auerus,

TABLE 1: MICROBIAL LOADS OF SAMPLES

SAMPLES	THPC (Cfu/ml)	TCC (Cfu/ml)	TFC (Cfu/ml)	TSC (Cfu/ml)
A	$3.0 \times 10^1$	N.G	N.G	$3.0 \times 10^1$
B	N.G	N.G	N.G	N.G
C	$2.4 \times 10^2$	N.G	N.G	$3.1 \times 10^1$
D	N.G	N.G	N.G	N.G

THPC= Total Heterotrophic Plate Count

TCC= Total Coliform Count

TFC= Total Fungal Count

TSSC= Total Staphylococcal count

N.G= No Growth A=

lady care,

B= Virony,

C= Always

E= Dry love

TABLE 2 COLONIAL AND MORPHOLOGICAL CHARACTERISTICS OF BACTERIAL ISOLATES

S/N	Colour	Elevation	Surface	Shape	Probable organism
1	Yellow	Raised	Glassy	Round	Staphylococcus aureus
2	Creamy	Flat	Transparent,	Entire	Bacillus spp
3	Milky	Raised growth	Smooth ,Opaque and dry	Entire	Lactobacillus spp
4	Pink	Raised growth	Slimy	Short Rods	Klebsiella spp

TABLE 3: PHYSIOLOGICAL PROPERTIES OF BACTERIAL ISOLATES

Isolates	Bacteriological tests		Biochemical tests											Probable organism
	Gram reaction	Cellular arrangement	Motility test	Catalase test	Citrate test	Indole test	Oxidase test	Coagulase test	Voges Proskauer test	Methyl red test	Glucose test	Lactose test	Sucrose test	
1	+	Cocci	-	+	-	-	+	+	+	+	A	A	A	Staphylococcus aureus
2	+	Rods	+	+	+	-	+	-	+	-	A	-	A	Bacillus spp
3	-	Rod	+	+	+	-	-	-	+	-	A/G	A/G	A/G	Klebsiella spp.
4	-	Rod	+	-	+	-	-	-	-	-	A/G	-	A/G	Lactobacillus spp

#### KEY

- = Negative

+ = Positive

A = Acid

A/G = Acid and Gas production

### DISCUSSION, CONCLUSION AND RECOMMENDATION

#### DISCUSSION

Microbial assessment of sanitary pads sold in the market was carried out and the analysis showed that some of the sanitary pads which were used as sample sources

were devoid of contaminations and contaminating organisms and the ones that were contaminated showed minimal level of contamination.

The total heterotrophic bacteria count ranged from  $3.0 \times 10^1$  to  $2.4 \times 10^2$ , there was no isolated coliform and there was no fungal growth as well and the Total



Staphylococcal Count for the samples ranged from  $3.0 \times 10^1$  to  $3.1 \times 10^2$ . Table 2 and 3 shows the morphological and biochemical characteristics and the identification reveals that the bacterial isolates belong to the *Bacillus* spp and *Staphylococcus aureus*,

Sanitary pads are considered low risk (class 1) medical devices by the FDA, which recommends that they are subjected to pre-clinical microbiological tests to show that they are not contaminated with pathogenic microorganism of public health importance such as *Staphylococcus aureus* and alter the growth of normal vaginal microflora as they come in direct contact with the vagina (Aboh et al., 2021). Following that microorganisms are ubiquitous, lack of proper storage of sanitary pads could lead to their contamination. The use of poorly stored (ergo, contaminated) sanitary pads and products raises concerns due to the sensitivity of the vagina. The physiology of the vagina makes it a significant route through which causative organisms of various UTIs, Pelvic Inflammatory Disease (PID), sexually transmitted disease (STDs), bacterial vaginosis and other vaginal infections gain entry. The vagina is a complex organ with an essential microbiota (most notably, *Lactobacillus* sp.) that protects it from infections (Petrova et al., 2015)

These, whilst being potential pathogens, do not represent a real health risk, unless their concentrations increase in a non-proportional manner, attributable to imbalances due to various causes. Given the lack of sterility, potential inadequate measure of hygiene during the insertion, anatomical proximity of the genito-urinary system and intestinal apparatus, the use of internal tampons could be a potential vehicle for microorganisms. Some of these, whilst being potential pathogens, do not represent a real health risk, unless their concentrations increase in a non-proportional manner, attributable to imbalances due to various causes. Given the lack of sterility, potential inadequate measure of hygiene during the insertion, anatomical proximity of the genito-urinary system and intestinal apparatus, the use of internal tampons could be a potential vehicle for microorganisms

(Briancesco et al., 2018). Some of these, whilst being potential pathogens, do not represent a real health risk, unless their concentrations increase in a non-proportional manner, attributable to imbalances due to various causes. Given the lack of sterility, potential inadequate measure of hygiene during the insertion, anatomical proximity of the genito-urinary system and intestinal apparatus, the use of internal tampons could be a

potential vehicle for microorganisms (Briancesco et al., 2018).

Any external factors that tamper with the environment created by this microbiota in the vagina exposes it to adverse events ranging from immune responses to infertility (Smith and Ravel, 2017).

The result of the work did not tally with the work carried out by Aboh et al., (2021) who did not isolate any organism from sealed sanitary pads that they worked with.

There could be chances of sanitary pad contamination after they have been unsealed and these contaminations are usually from the environment and not from manufacturers and examples of contaminating microorganisms include *Bacillus* spp, *S. aureus*, and *Mucor* spp. Species of the *Bacillus* genus are generally known for their ubiquity in nature, spore production and ability to survive harsh conditions. While they are usually not indicated in pathological conditions, some species including *B. licheniformis* and *B. pumilus* have been known to cause diseases in immunocompromised patients (Aboh et al., 2021). *Staph. aureus* is another microorganism commonly found as a normal human flora, it is a commensal bacterium that asymptotically colonizes the human body. It however in

some cases, causes serious infections like bacteremia, endocarditis and skin and soft tissue infections particularly when a mucosal barrier has been breached (Tong et al., 2015). Species of the *Mucor* genus are filamentous fungi chiefly found in the soil, plant and decaying fruit. Usually, they do not cause diseases as they mostly do not survive temperatures as high as 37°C. However, some species are more adapted to surviving such conditions and cause diseases in endothermic animals collectively known as zygomycosis or mucormycosis. It commonly affects the sinuses, eye, brain or the lungs after inhalation leading to facial swelling, blurred vision, blindness and thrombosis especially in individuals with immunodeficiency.

## CONCLUSION AND RECOMMENDATION

The analysis showed that there should be a more comprehensive survey of sanitary pads available in Owerri to determine the brands and types that are mostly used. Also analyze the microbial content of these sanitary pad using standard microbiological methods, such as aerobic plate count, coliform count and yeast and mold count and finally compare the microbial content of different brands and types of sanitary pads to determine if there are any differences in microbial load or contamination.



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