

## **Bacteriological Quality of Infant Powdered Formula Sold In Maiduguri Monday Market**

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### **ABSTRACT**

*The aim of this work was to ascertain the quality from bacteriological perspective of the infant powdered formula that are sold to the mothers that cannot meet up with the breast feeding requirements. therefore, Bacteriological quality evaluation of formulated infant milk powders sold in Maiduguri Monday Market was carried out using six (6) different sample labeled A,B,C,D,E,F The samples were prepared using standard method. It was then inoculated into prepared growth media at various dilutions and incubated for 24hours at 37°C. Various colony formed was sub-cultured on blood agar, MacConkey agar and EMB for various growth characteristics. The isolates were identified and further biochemical test was conducted to ascertain the particular bacterial isolates. The colonies earlier formed were read  $1 \times 10^3$ ,  $0 \times 10^3$  and  $0 \times 10^3$ ,  $0 \times 10^3$ ,  $0 \times 10^3$ ,  $0 \times 10^3$  while the only bacteria isolated was *Bacillus subtilis* The bacterial count observed in this study might be attributed to factors of infant powder milk to air, personal hygiene at the milk powder handlers, environmental improper disinfection and cleanup is likely to increase the counts of the bacteria as virtually most of the bacteria milk such as infant powdered milk could have been contaminated from the poor handling practice of the milk producers as the machine may mistakenly not be cleaned very well before production commences.*

### **Introduction**

The most excellent source of babies feeding is through breast feeding. But in few cases the mother naturally fails to fulfill the breast feeding requirement of baby due to disease factor of hormonal imbalance (Imran et al 2009). Milk is essential part of daily nutrition for the mothers as well as growing children because it is an important source of many of the nutrients vital for the proper development and maintenance of the human body. The working class women cannot provide proper feeding of their baby in rare cases, similarly, some do not feed their babies just to

maintain their beauty. So, they look for an alternative from infant formula (available in market) suggested by their nutritionist or doctor, no doubt the infant milk powder are generally considered as product of good microbiological quality with no risk of spoilage but several factors may contribute properties which reduce shelf- life and thus its commercial value (Cousins et al 1987). Milk and other dairy related products comprise of a major chunk of food products for their nutritive values, however, the rich source of proteins and vitamins in them turns out to be a very good growth medium for several pathogenic micro-organisms

Several members of the family *enterobacteriaceae* have been isolated from powdered infant formula like *E.coli*, *Enterobacter agglomerans*, and many others (Carneiro et al 2003). PIF products have been also shown to contain enterobacter sakazakil and have been epidemiological linked to several clinical cases (Van Acker et al, 2001) (Himel et al, 2002) and (Food Safety Authority of Ireland, 2006). Although the micro –organisms in infant milk cannot grow due to its low moisture content and do not play any direct role in the spoilage. But their occurrence in infant milk powder is of great significance and serves as an index of hygienic standards maintained during protection processing and handling the infant milk provides as highly nutritious substrate that can support the wide variety of bacteria as well as yeast and molds for their growth and reproduction (Phillips and Griffiths, 1990)

The existence of heat-resistant pathogens such as *Enterobacter sakazakii* in powdered infant formula has been identified by the joint FAO/WHO codex alimentareus commission (FAO/WHO 2003). The thermophiles can have important economic implications as they go above specific limits which may result in low quality products (Ronimus et al 2005).

### **Sample Collection**

The sample were randomly selected and bought from Maiduguri Monday Market.

### **Procedure**

The working sample was prepared according to Loralyn and Robert (2009) each of the infant powdered milk formula was dissolved and 1ml of the sample was pipetted and added to 9ml of sterile normal saline to make tenfold serial dilution, 0.1ml was inoculated from first (10<sup>0</sup>) second (10<sup>1</sup>) third (10<sup>2</sup>) fourth (10<sup>3</sup>) plate into the surface of nutrient agar and incubated at 37°C for 24 hours the colony was counted using an electric colony counter and recorded appropriately.

### **Identification of Microorganism**

The isolates were identified by conventional methods as described by (Entis et al 2003). A portion of the colony was picked and sub-cultured on the blood agar, EMB and MacConkey

agar and then incubated at 37<sup>0</sup>c for 24hours. The organisms were identified based on their cultural characteristics. Further biochemical test was conducted to ascertain the isolates.

## Result and Discussion

### Result

SAMPLES	MICROBIAL LOAD (CFU/ML)	BACTERIAL ISOLATE
Sample A	1x 10 <sup>3</sup>	<i>Bacillus subtilis</i>
Sample B	0x 10 <sup>3</sup>	No growth
Sample C	0 x 10 <sup>3</sup>	No growth
Sample D	0 x 10 <sup>3</sup>	No growth
Sample E	0 x 10 <sup>3</sup>	No growth
Sample F	0 x 10 <sup>3</sup>	No growth

### Discussion

From the results of microbial load of the different powdered milk formula analyzed. It could be observed that sample A has the highest bacteria count of 1 x 10<sup>3</sup> cfu/ml while all other samples recorded no microbial load ( 0 x 10<sup>3</sup> cfu/ml), overall result shows that all the powdered infant milk formula examined, has no contamination except Sample A. according to food and agricultural organization (FAO, 1979), standard limit for microbial load should be less than 10<sup>5</sup> cfu/ml. also U.S standard (2003) limited for microbial load should not be more than 10<sup>4</sup> cfu/ml. European union (E.U 1992) standard limit for microbial load should not be more than 10<sup>5</sup> cfu/ml. however, all of the samples bacterial load are less than standards, the *bacillus subtilis* may be pathogenic under some certain condition. The bacillus, toxin causes food- poisoning. The toxin is produced when the bacilli sporulate usually in rice and/or other cereal that have been cooked and stored in warm temperature ( Monica, 2004)

The bacterial count observed in this study might be attributed to factors of infant powder milk to air, personal hygiene at the milk powder handlers, environmental improper disinfection and cleanup is likely to increase the counts of the bacteria as virtually most of the bacteria milk such as infant powdered milk could have been contaminated from the poor handling practice of the milk producers as the machine may mistakenly not be cleaned very well before production commences.

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