



Evaluation of virulent bacteria and fungi contaminants on the palm of toddlers and the potential gastro intestine infections.

Emenuga V.N¹, Chukwueze C.M², Ekekwe V.N³, Achukwu N.O⁴, Oguwike F.N⁵

1. Department of Medical Lab. Science Faculty of Health Sciences and Technology, University of Nigeria Nsukka
2. Department of Medical Laboratory Science, Faculty of Allied Health Sciences, Enugu State University of Science and Technology, Enugu Nigeria
3. Department of Medical Microbiology and Public health Nnamdi Azikiwe University, Nnewi Campus Anambra State
4. Department of Medical Laboratory Science, Faculty of Health Sciences and Technology, University of Nigeria Enugu Campus Enugu
5. Department of physiology, faculty of Basic Medical Sciences, Chukwuemeka Odumegwu Ojukwu University uli Campus Anambra State

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*Corresponding Author

Dr. Mrs N.O Achukwu

E-mail: Ngozika.achukwu@unn.edu.ng

Phone: 08035057702

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ABSTRACT

Virulent bacteria and fungi in soil and floors are pathogens introduced through environmental contamination such as human/animal waste or tract-in from outside. Thirty six (36) children consisting of 24 toddlers (1-3 years) and 12 kids (5-7 yrs) were used in this study to evaluate virulent bacteria and fungi organisms that contaminate the palm of toddlers. Culture media tests, coagulase test, catalase test, Gram stain and Germ tube tests where the bacteriological and fungal tests used to identify the bacterial and fungi in the palms of the subjects using swab samples collected. The result of this study showed that the commonest bacteria found in the palms of toddlers are staphylococcus aureus (50%) virulent E. coli (20%), streptococcus specie (10%), salmonella enterica (7%), pseudomonas aeruginosa (5%) klebsiella pneumococci (3%), Enterococcus faecalis (3%) and clostridium difficile (2%). The commonest fungi isolated from their palm are Aspergillus specie (60%), penicillium specie (20%), cladysporium specie (15%) and fusarium specie (5%). The study also reported that the most potential infections that these bacteria and fungi that contaminates their palms in their gastrointestinal system are yeast infection (20%) Diarrhea (60%), common cold (7). Ascariasis (4%). Giardiasis (3%) coxsackievirus (3%) Pin worm infestation (2%) and influenza (1%). Most of the outbreak of diaorhea and yeast infection could be attributed to this contamination on the palms of toddlers.

INTRODUCTION

In the development of human, from birth to adulthood, a toddler is a child between the ages of 1 and 3 years (12-36 months). At this stage, the child learns how to stand, balance himself and walk upon the earth, in that state also children are learning to explore their environment, the galaxy, often putting objects in their mouths which makes them liable to infections.

Bacteria are a type of micro-organisms that are prokaryotic, hence they lack a true nucleus and other membrane band organelles. They can be classified into the following type of cell; the ovoid or spheroid called coccus, the red or cylindrical bacillus, the curved vibrio, the spiral shaped spirillum and coil shaped spirochaetes (Ebede et al, 2021).

The characteristics of bacteria include single celled prokaryotic, lacking a true nucleus cell wall, has metabolic diversity and reproduces by binary fission

Types of bacteria include Gram-positive bacteria that stain positive with Gram stain such as staphylococcus and Bacillus, Gram-negative bacteria that stain negative with Gram stain such as Escherichia and Pseudomonas, spiral bacteria that have a spiral shape such as helicobacter and camphylobacter and lastly rod shaped bacteria that have a rod-like shape such as Bacillus and Clostridium.

Barri in 1836 helped to establish that microorganisms could cause disease when using a heat sterilized pin, he transmitted a disease from the silk worm infected with a fungus to a healthy silkworm

Virulent bacteria in soil and on floors include both indigenous soil microorganisms and pathogens introduced through environmental contamination such as human/ animal waste or track in from outside.

Floors act as reservoirs for bacteria particularly in areas with high traffic, pets or livestock with soil borne bacteria often being tracked indoors.

Some bacteria such as staphylococcus aureus are found on the floors. They are a dominant, often

antibiotic- resistant bacterium. They can be found in the house dust. Others such as Escherichia coli are highly prevalent especially on dirt or soil floors often linked to faecal contamination. Streptococcus specie, klebsiella pneumonia, salmonella enteric, psaidomonas, aeruginosa and Enterococcus faecalis are found in soils and by extension on indoor surfaces while clostridium difficile are frequently identified on floor surfaces in hospital environments. (Kotz, 2017).

Fungi are a group of organisms that belong to the kingdom fungi. They are heterotrophic hence they obtain nutrients by decomposing organic matter or forming symbiotic relationship with other organisms. Virulent fungi that can be found in the floors of homes are Aspergillus specie, Pencillium specie, cladysporium specie, fusarium specie and Alternaria specie flannigem et al (2016)

Factors affecting the presence of these virulent bacteria and fungi at home are moisture and Temperature; wet, poorly drained soils and warm damp conditions promote the survival and growth of these bacteria and fungi, soil-borne bacteria and fungi are readily transferred into buildings via feet traffic, high levels of E Coli, other bacteria and fungi are directly associated with the presence of animals especially chickens, ducks, dogs, cats and other pets and their faces in the home environment.

Also while all floors can harbor bacteria, carpets and porous materials often hold higher concentrations than tile which are easier to disinfect. The commonest route of transmission of virulent fungi and bacterial into the gastro intestinal system of toddlers are through their contaminated unwashed hand which they, after falling and crawling on the floor (Picking the germs unknowingly) with their palms, uses the same hand to put into their mouth with objects, food or materials they pick from the floor.

This research study can provide valuable insights into infection transmission and prevention strategies in toddlers. We embarked on this research

study with the aim of delving into some causes of sudden outbreak of gastrointestinal diseases among children (Toddlers) especially in dry seasons when floors are packed with dusts inside homes.

MATERIALS AND METHODS

Study design

This study is a cross sectional study to evaluate the prevalence of virulent bacteria and fungi on toddlers palms and their potential association with gastro intestinal infections.

Study population:

The study consists of control group and test group 2. A total of 36 subjects were used in this study. The control subjects mainly children between 5 to 7 years are 12 while the test groups consist of 24 toddlers (1 to 3 years). Samples were collected from the palms of toddlers living in villages of Emene Enugu State.

Collection of samples

The samples for study were collected with sterile swab sticks from the palms of toddlers and from the control subjects. They were cultured in saboreid dextrose agar, blood agar and mackonkey agar. The inoculum

were incubated at 37°C for 24-48 hrs to allow colony formation of bacteria (Aguoru et al, 2015). Pure cultures were prepared from the primary cultures of the bacteria and after wards, Gram staining coagulase and catalase tests were performed to identifying the different bacteria present in these samples (Oguwike et al, 2021).

Bacteriological studies and identification

Culture tests were carried out by plating the swab samples collected on saboreid dextrose agar, blood agar and mackonkey agar by the method described by Baker et al, 1998.

Catalase and coagulase tests were done using the procedure described by Baker et al 1998.

Gram Staining test was done using the procedure described by Baker et al, 1998

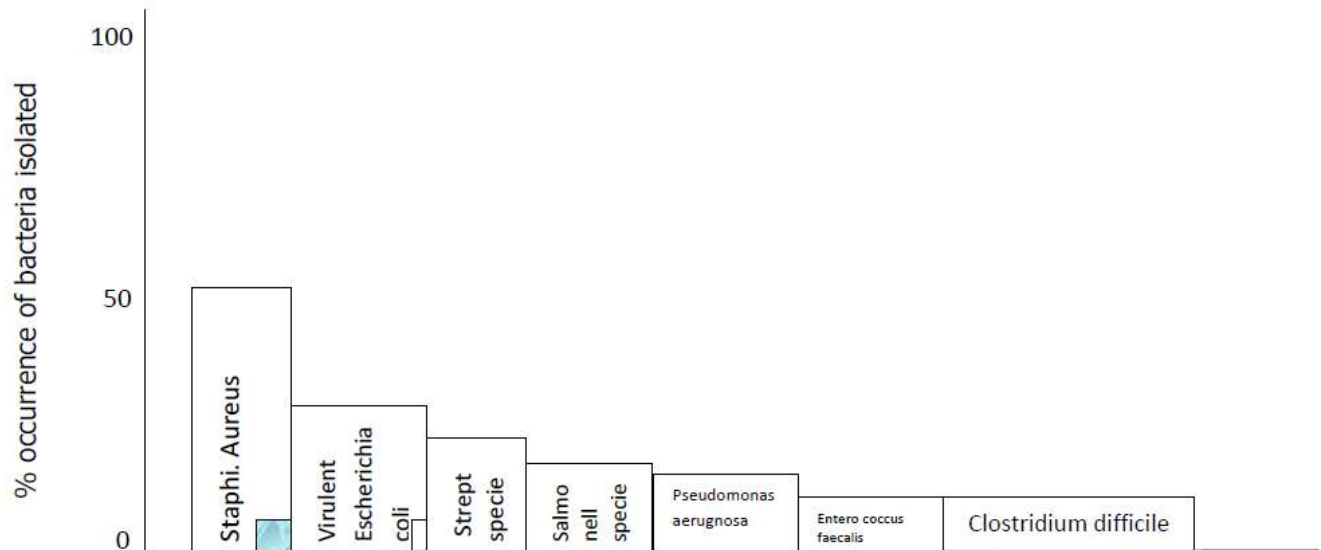
Germ tube Test by Larone 2011.

Urease Test by the method described by Baker et al, 1998

Statistical analysis

The results obtained from the bacteria logical and fungal analysis were represented in figures and histogram.

RESULTS



Bacteria organisms isolated from the palms of toddlers

Figure 1: Histogram representing bacteria organisms isolated from the palms of toddlers

Key: control very poor growth, isolated bacteria
 Isolated bacteria

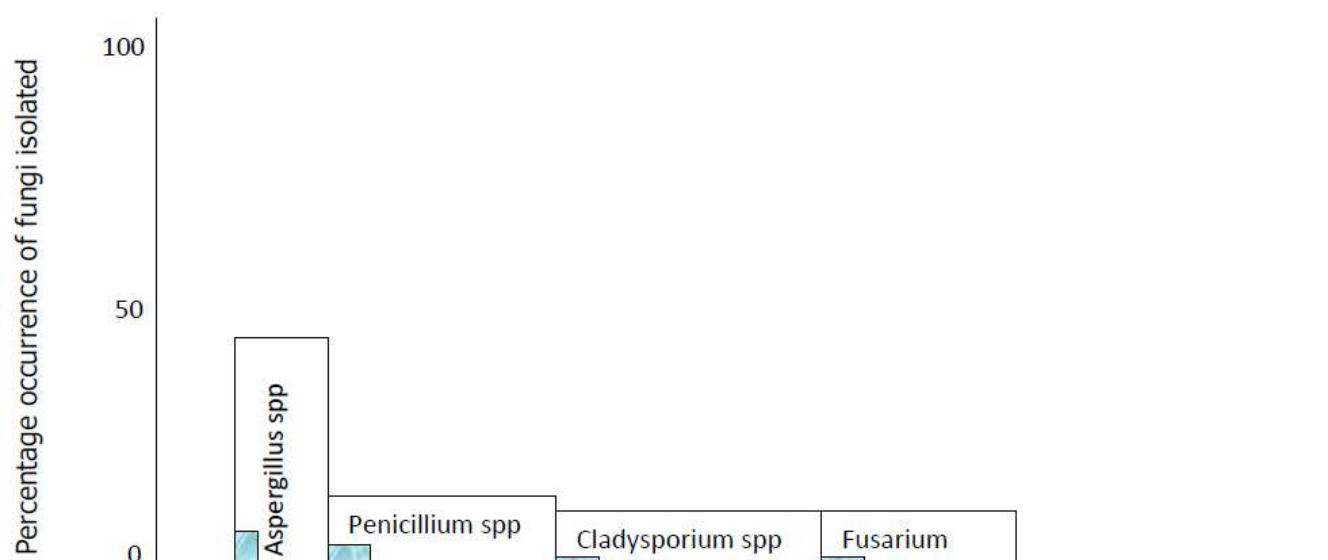


Figure 2: fungi organism isolated from the palms of toddlers

Key:

- control very peer group fungi organisms isolated from
- Isolated fungi the palms of toddlers

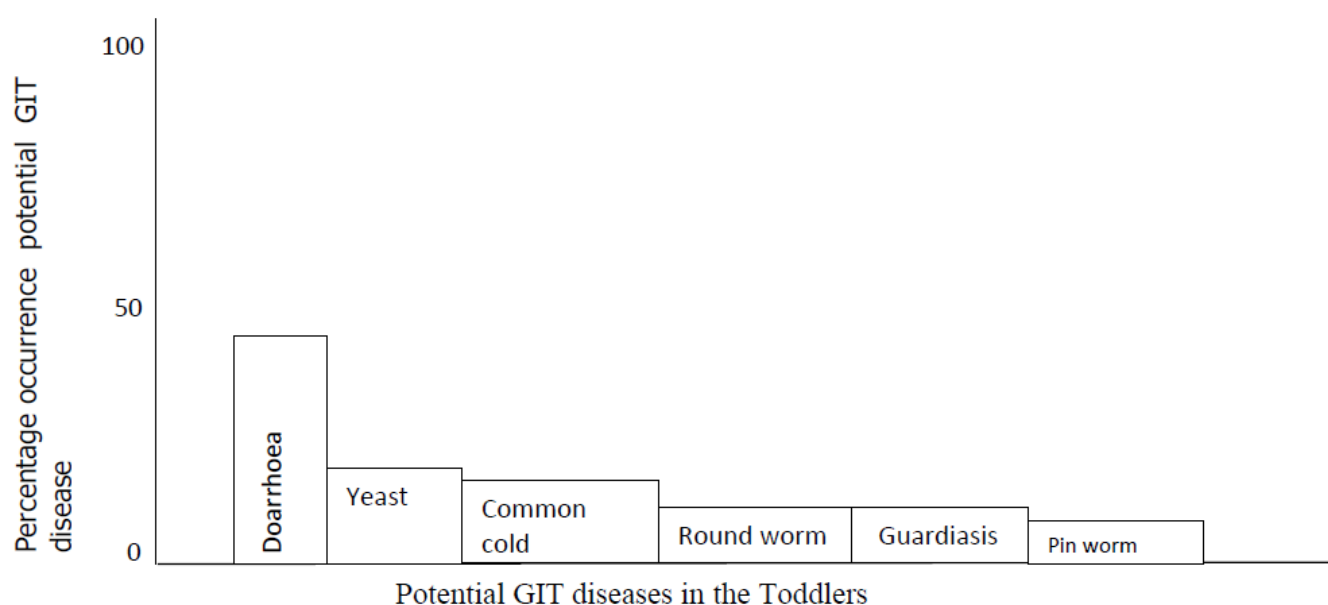


Figure 3: potential gastro intestinal infections that results from contaminations of the palm of toddlers

DISCUSSION

The curiosity to walk in our space, the earth we live by toddlers to master body balance and control has mandated them to keep on making effort to move. In the process of trying to stand and walk, they fall, sometimes unwillingly. As they fall they hit their palm on the floor, on the ground, on the carpet, wherever they find themselves. This fall gives micro organisms the chance to contaminate their palms and then they may fortunately be transferred into the gastro intestinal system when they eat or place their fingers or palm in their mouth without washing.

Evaluation of virulent bacteria and fungi contaminants on the palms of toddlers and the potential gastro intestinal infections was carried out

using 36 subjects. The result showed in figure 1 that there was no significant growth in figure 1 viz staphylococcus aureus, virulent Escherichia coli, streptococcus specie, klebsiella pneumonia, salmonella enteric, pseudomonas aeruginosa, Enterococcus forecalis and clostridium difficile in the palms of the control subjects Group aged 5-7 years while in the test subjects (Group 2) there were growth and identifications of various bacteria.

The highest and commonest bacteria that contaminates the palm of toddlers is staphylococcus aureus (50%) and it is followed by virulent Escherichia coli (20%) others that were isolated are streptococcus specie (10%), klebsiella pneumonia (3%), salmonella enteric (7%) pseudomonas aeruginosa (5%),

Enterococcus faecalis (3%) and *Clostridium difficile* (2%).

Figure 2 indicates the isolated group of fungi that commonly contaminates the palm of toddlers. The figure showed zero or no significant growth of fungi in the palm of the control subjects at the age range of 5-7 years (Group 1)

The fungi isolated and identified in the palm of toddlers (Group 2) are namely *Aspergillus* specie (60%) which contaminates their palm commonly. This is followed by *penicillin* specie (20%) *cladysporium* specie (15%) and *fubarium* specie (5%) The study also identified the potential infections that this contaminations can cause in the gut system of the toddlers in figure 3.

The result in figure 3 shows that diarrhea (60%) is the commonest infection that toddlers do contract from falling on the ground or floor with their palms.

Diarrhea infection is followed by yeast infection (20%), common cold (7%), round worm (*Ascaris*) Infection (4%), coxsackie virus (3%), *Giardiasis* infection (3%), Pin worm infection (2%) and lastly influenza infection (1%) shoe sales have been shown to transfer infectious micro organisms to floor and ground surfaces (Alam, 2014) where toddlers learn to walk and fall.

Pathogenic strain of *E. coli* can cause diarrhea, abdominal pain and some times bloody stools (Nadro & Kaper, 1998).

Yeast infection can cause oral thrush, diaper rash, diarrhea, and abdominal pains in toddlers especially with risk factors (Kanfman et al, 2001).

Giardia infection (*Giardiasis*) causes abdominal cramps and bloating in toddlers (Ankarklev, 2010).

Diarrhea in toddlers can occur when the pathogens which could be bacteria or viruses get to the mouth through the palms and fingers into the gut system. The gut linings get inflamed, disrupting normal absorption. The gut of the infant loses fluids, electrolytes such as sodium, potassium and nutrients. This increase in fluids more than the gut can absorb results to watery stools, abdominal pain, vomiting and dehydration (Guerrant, 2001) the hand and palm of toddlers should be thoroughly washed with soap and disinfectant always. Mummies and Nannies should be properly thought on how to keep their toddlers clean and keep in a neat environments to keep them away from contaminating their palms.

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