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Prevalence of Parasitic Eggs and Parasites Cysts on Computer Mouse and Keyboard in School of Science and Computer Studies of Federal Polytechnic, Ado-Ekiti, Nigeria

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Prevalence of Parasitic Eggs and Parasites Cysts on Computer Mouse and Keyboard in School of Science and Computer Studies of Federal Polytechnic, Ado-Ekiti, Nigeria

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Abstract – The prevalence of parasitic eggs and parasite cysts on computer mouse and keyboard in School of Science and Computer Studies, Federal Polytechnic, Ado-Ekiti, Nigeria was investigated. The total number of samples examined was one hundred and eighty (180) of which twenty nine (29) were positive. The result showed that the samples collected during the first, second, and third weeks had 13, 10, and 6 numbers of cysts and ova respectively. The highest incidence was observed during the first week. Some bacteria such as *Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas aureginosa* and *Enterococcus faecalis* were also isolated from the sample with the highest incidence found in *Staphylococcus aureus*. It was concluded that the mouse and keyboards could be a source of disease transmission and should be disinfected appropriately and often.

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I. Introduction

Parasite is an organism that lives in or on a second organism, called a host, usually causing it some harms. It is generally smaller than the host and of different species (Yusuf, 1990). Parasites are dependent on the host for some or all of their nourishment (Martins *et al*, 1980). Parasite can also be seen as an organism that has a deleterious symbiotics relationship with another organism or host species. A flea or tick is a parasite, bacteria can be parasitic, mistletoe is a parasite (Tanko *et al*, 1999). Parasite sometimes cause the eventual death of the host although not always and this can lead to the parasites demise if it cannot leave or find a new host (Kramer, 2006). Parasites are just about everywhere in our environment, so it's easy to become infected (World Health Organization).

In the 1993, world development report intestinal helminthes rank first as the main cause of disease burden in children aged 5 – 4 years and also rank highly as the disease that can be efficiently control by cost effective intervention (Lawande, 1983). Multiple infectious with several different parasites e.g. hookworms, roundworms and amoebae are common, and their harmful effects are often aggravated by co-existence malnutrition or micronutrient deficiencies (Akogun, 1989).

In America, parasitic infections are not as widespread but these infections are on the rise for various reasons. For example people bring parasites with them when they migrate to the U.S and soldiers often return to the U.S bringing parasites with them from overseas (Kucik *et al*, 2006). Parasitic infections are common in rural or developing areas of Africa, Asia, and Latin America and less common in developed areas. A person who visits such an area can unknowingly acquire a parasitic infection when the person returns home. In developed areas, parasite infections may also affect immigrants and people with a weakened immune system (such as those who have AIDS or who take drugs that suppress the immune system).

The infections may occur in places with poor sanitation and unhygienic practices. Parasites increase their fitness by exploiting host for resources necessary for the parasites survival i.e. food, water, heat, habitat, soil and dispersal. Parasites reduce host fitness in many ways, ranging from general or specialization pathology such as parasitic castration, impairment of secondary sex characteristic, to the modification of host behaviour (Rufala, 2006).

The Nigeria environment has been described as poor, based on personnal, community and environmental hygiene (Akogun *et al*, 1989). This poor state of hygiene is accounted for by the presence of immature stages of parasite (egg and cysts) in the soil (Ali, 1993), in the air (Lawande, 1983) on toilet door handles, on water closet handles (Nock and Geneve, 2003), on becks and legs of domestic chicken (Abuja, 1997) and on the sole of shoes (Tanko, 1999) demonstrating the indiscriminate nature of faecal disposal system. As these show the dynamic transmission network that exist in the Nigeria

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environment, through which parasites infect human and animal hosts; because once they are introduce into the soil, parasites eggs and cysts can be transported on contact with any subject. This accounted for the high prevalence and incidence of parasitic infection in both humans and animals (Hopkins, 1992).

The internet is progressively becoming an effective means of communication in Nigeria, thus there is an upsurge of people visiting the internet cafes, some reason to browse. During the use of the computer, the keyboard and mouse are used for input of commands with the fingers and palms of the hands, thus acting as points of contact between the internet and its users. The internet café is proposed, as a suitable model to test the role it plays in the transmission of parasite cysts and eggs in Federal Polytechnic, Ado-Ekiti, Nigeria.

II. Materials And Methods

a) Collection of Samples

A total number of 180 samples were collected from keyboard and mouse in School of Science and Computer Studies of Federal Polytechnic, Ado-Ekiti, Nigeria, over a period of three weeks. Sixty (60) samples were collected in each of the three weeks, 10 samples in the morning and 10 samples in the afternoon, which made up of 20 samples for each week.

b) Preparation of Culture Medium

2.8g of Nutrient Agar was dissolved in 100ml of distilled water and heat to melt. The conical flask was plugged with cotton wool and it was wrapped with foil paper and autoclave for 15mins. It was allowed to cool to between 45°C – 50°C after autoclaving it was poured into sterile Petri dishes and allowed to solidify. It was also poured into McCartney bottles which was half filled and the bottles were placed slantingly on the bench tops to allow the agar to set inform of slopes. The plates were labeled with Date and Name of the organisms to be inoculated. The swab samples collected from computer accessories were inoculated into the various grow media by streaking each nutrient agar plate and the plate were incubated at 30°C for 2 days. The plates were observed after incubation.

c) Preparation of Unstained Wet Mount

A sterile swab stick moistened with normal saline solution was moved over the keyboard and the buttoms of computer mouse. Special attention was given to the swabbing of the most commonly used keys for examples 'Enter', 'Spacebar', 'Delete', 'Shift key', etc. These swabs were taken to laboratory in sterile test tube containing 10ml of normal saline and each samples were labeled Day 1, 2, 3, etc. Each sample was further centrifuged at 2000rpm for 3 minutes. The supernatant was discarded and the sediment re-suspended. Little quality was taken with a Pasteur pipette and placed on a clean microscope glass slide. A drop of lugol's iodine solution was added and a clean cover slip was placed on the surface and examined under florescent microscope x400 magnification.

d) The Gram Staining

The bacterial smear was taken from the prepared Nutrient agar plates into the slide. The slide was placed on the staining rack and a drop of distilled water was added and mixed with the bacterial smear. The smear was flooded with crystal violet stain and leaf for 60secs. The smear was flooded again with Gram iodine and leaf for 60secs, after which the iodine was washed off with distilled water. Acetone-alcohol was added until no more colouration is seen to come up; it was washed immediately with distilled water and left for 10 – 15secs. The slides were flooded with carbol fuchsin and left for 1 minute, it was then washed off. It was gently dried between sheets of clean blotting paper and allowed to air-dry. It was examined under the florescent microscope x100 oil immersion.

Organisms isolated are;

- Staphylococcus aureus
- Streptococcus pyogenes
- Pseudomonas aeruginosa
- Enterococcus feacalis

e) Catalase test

A loopful of the isolate was placed on a clean sterile slide and a drop of hydrogen peroxides was added. The effervescence of gas is shown by bubbling.

f) Oxidase test

An oxidase strip (i.e. a strip that has been impregnated in the reagent) was smeared with the test organism and left for 10 seconds. Purple colouration is a sign of oxidase.

III. Results And Discussion

Table 1 : Prevalence of parasite eggs and cysts on keyboard, and mouse for three days per week in the first week

Days	Number of samples	Positive No.
1	20	6
2	20	3
3	20	4
Total	60	13

Table 2 : Parasite eggs and cysts on keyboard, and mouse for three days per week in the second week.

Days	Number of samples	Positive No.
1	20	4
2	20	3
3	20	3
Total	60	10

Table 3 : Parasite eggs and cysts on keyboard, and mouse for three days per week in the third week.

Days	Number of samples	Positive No.
1	20	3
2	20	3
3	20	0
Total	60	6

Table 4 : Bacterial encountered during the study.

Bacterial isolated	No (%)
Staphylococcus aureus	8 (57)
Streptococcus pyogenes	2 (14)
Pseudomonas aeruginosa	3 (21)
Enterococcus feacalis	1 (7)

Table 5 : Characteristic of the test bacteria.

Test bacteria	Shape	Size (μm)	Motility	Gram reaction	Appearance	Temperature (^{o}C)	Characteristic
S. aureus	Cocci	0.7-1.0	+ve	+ve	White, yellow	37	Anaerobic
Str. pryogenes	Cocci	0.6-1.0	–ve	+ve	Greenish	37	Anaerobic
P. aeruginosa	Rod shape	0.6-1.0	+ve	–ve	Pink-red	37	Aerobic
Ent. feacalis	cocci	1 – 2	–ve	+ve	Yellow pigment	37	Aerobic

IV. Discussion

Overall samples examined were one hundred and eighty (180) and twenty nine (29) of the samples were positive. The results show that first week samples had (13) highest occurrence number of positive samples having eggs and cysts, then followed by second week samples has (10), followed by third week samples which had (6) with the lowest prevalence. Bacteria encountered during the study are; Staphylococcus aureus (08) with the highest occurrence number, then followed by Pseudomonas aeruginosa (3), followed by Streptococcus pryogenes (2) and Enterococcus feacalis (1) with the lowest occurrence number.

Computer technology for the management of individual has become an essential part in all aspect of modern medicine (Fukatat *et al*, 2008). Consequently, the computer keyboard and mouse in the Departments of School of Science and Computer Studies' laboratory in Federal Polytechnic may act as a reservoir for microorganisms. And contribute to the transfer of pathogens from one individual to the other unknowingly. (Hartman *et al*, 2004).

Most of the keyboards examined in the study were contaminated with non pathogenic microorganisms such resident skin flora or environmental bacteria. Long survival time of potentially pathogenic microorganism, particularly on desks, contribute to the hypothesis of computers acting as reservoir of pathogenic (Kassem, 2007). Hence, the process of correct hand disinfection is still the main stay of any preventive measure for the reduction of infections. Hand disinfection policy should not be reserved to student or internet users (Nock and Geneve, 2002). Beside to improve hand hygiene compliance, improvement of cleaning service could admonished as an infective infection control measure (Nock and Brown, 1994). Disinfectant including chlorine, alcohol, phenol and quarternary ammonium are all effective against Staph. aureus and Enterococcus spp. Species on keyboards of computers and even sterile water is effective to remove more than 95% bacteria (Rutala, 2006). Although keyboard can be safety and successfully disinfected, the need to clean computer interface surface as routine practice is generally accepted, no specific cleaning and disinfection frequency and procedure for computer accessories has been defined. Daily cleaning and hygiene regularly for using computer is of great significance and could help in the reduction of parasite eggs/cysts and pathogenic bacteria and also reduce keyboard contamination (Williams, 2006).

Computer should be disinfected daily and well visibly soiled, Health care workers should not touch computer keyboard and mouse with contaminated hands. Preventive measure should be adopted particularly when the number of people visiting the operating room daily are considered.

The isolation cysts from samples collected on keyboard is an indication that it could be source of transmission of pathogens Krammer *et al*, 2006). These findings correlate with that of (Hartman *et al*, 2004) where it was observed that keyboard houses a lot of parasites.

Staphylococcus aureus which are antibiotic-resistant are found to be predominance bacteria found on keyboard and mouse because they are normal floral of humans found on nasal passage, skin and mucurs membrane, pathogen of humans, causes a wider range of superlative infections, as well as food poisoning and toxic shock syndrome.

The isolation of some bacteria from the keyboard and mouse is an indication that they could be a source of the transmission of diseases. The predominance of Staphylococcus aureus explains the

long standing believe that the skin houses Staphylococcus aureus. The isolation of Streptococcus pyogens which is found in nasal passages is an indication that the bacteria could have been dispersed through droplets from the mouth.

V. Conclusion

This study showed that a fairly large number (i.e. 95%) of the computer keyboard and mouse devices which are in use in various areas of the school is contaminated and the discovery of Staphylococci on computer keyboards draw much needed attention to good sanitary habit after utilizing the keyboard and mouse. Additionally, touch of the mouth or the nose while operating the keyboard could have contributed to the contamination because humans can transport staphylococci from the nasal passage.

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