ASSESSMENT OF PARASITES OVA AND CYSTS ON AUTOMATED TELLER MACHINES, CELL PHONES, KEYBOARDS AND MOUSE OF COMPUTER SYSTEMS IN FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE.

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ABSTRACT

The present study was conducted to isolate and identify parasites ova and cysts present on the external surface of Automated Teller Machine (ATMs), Cell phone, Keyboard and Mouse of Computer systems. A total of one hundred and eighty (180) samples were collected from different locations in Federal University of Technology Minna, Niger state, Nigeria. The samples were examined for parasites ova and cysts using centrifugation technique. The contamination rate of parasites ova found are *Ascaris lumbricoides* (35.13%), *Enterobius vermicularis* (16.21%), *Trichuris trichiura* (21.62%), Hookworm (10.81%), *Taenia* spp.(5.40%), *Paragonimus westermani* (5.40%) and *Fasciola* sp. *Ascaris lumbricoides* had the highest contamination followed by *Trichuris trichiura*. The presence of parasites ova on these objects indicates that they might act as environmental vehicles for the transmission of potentially pathogenic organisms.
Keywords: Cysts, Automated Teller Machine, parasites ova

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INTRODUCTION

The computer is a power-driven machine equipped with keyboards, electronic circuits, storage compartments, and recording devices for the high speed performance of mathematical operations (Tayo *et al.*, 2009). 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 machine and its users (Ajenifuja and Ajibade, 2012).

Parasite is an organism that lives in or on a second organism, called a host, usually causing some harms. It is generally smaller than the host and ofdifferent species (Yusuf, 1990). Parasite can also be seen as an organism that has a deleterious symbiotic relationship with another organism or host species. A flea or tick is a parasite, bacteria can be parasitic, and mistletoe is a parasite (Tanko *et al.*, 1999). Parasites sometimes cause the sudden death of the host although not in all cases and this can lead to the parasites demise if it cannot leave or find a new host. Parasites are just about everywhere in our environment, so it's easy to become infected. Contamination of environmental objects and surfaces is a common phenomenon (Tanko *et al.*, 1999).

Pathogens spread among people with direct or indirect contact on hands or on inanimate objects (Mehmet *et al.*, 2012). Eighty percent (80%) of infections are

spread through hand contact with hands or other objects (Reynolds *et al.,* 2005). The infections may occur in places with poor sanitation and unhygienic practices. Parasites increase their fitness by exploiting host for resources necessary for its survival i.e. food, water, heat, habitat, oil and computer. The Nigeria environment has been described as poor, based on personal, 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 air (Lawande, 1983), on toilet door handles, on water closet handles (Nock and Maley, 2000), on the sole of shoes (Tanko, 1999) and on computers (Ajenifuja and Ajibade, 2012). All these show the dynamic transmission network that exists in Nigeria. One such inanimate object in the environment that is currently in frequent contact with the hands is the interface of a computer system or an Automated Teller Machine (ATM). The use of hardware interfaces such as the keyboard, mouse and ATM keypad has greatly expanded over the past few years with the development of various forms of computer-based management applications. Bank ATMs are the essential requirements of our social life. They are frequently localized in city centers, trade areas, and around the hospitals. Hundreds of people whose socio-economic levels and hygienic status are quite different with each other use ATMs, cell phones, private laptops and computer keyboards and mouse daily. Customers contact with their hand the surfaces of key-pad and/or screen of these devices. However, the present study was aimed at isolating and identifying the parasites ova and cysts present on Automated Teller Machines, Cell phones.

MATERIALS AND METHODS

Study Area

The study was carried out in Minna, the capital of Niger State, North Central of Nigeria. It is located approximately on 9°36'50"N and 6°33'25"E in Sudan Savannah. It covers a land area of 88km with an estimated human population of approximately 1.0 million. The area has a tropical climate with a mean annual temperature, relative humidity and rain fall of 30, 20°C, 61.00% and 1334.00mm respectively. Federal University of Technology Minna (FUTMINNA) has two campus; Bosso and Gidan Kwano. The residents are predominantly Fulanies, Nupes, Hausas and Gwaries, and students most of which solely depend on ATM around the school premises for money withdrawer, Cyber café and Business center around for their registration, Laptops and Cell phones for personal purposes. E-Center is mainly used for writing exams (Remedial, 100 levels, Joint Admission Matriculation Board).

Collection of Samples

Samples were collected from keyboard and mouse of Electronic center, business centers, Automated Teller Machine (ATM), cyber café, student laptop, and cell phones randomly from GidanKwano (GK) and Bosso campuses of FUTMINNA. One Hundred and Eighty (180) samples were collected for parasites ova and cysts identification.

Sample Analysis of Parasites ova and cyst

A sterile swab stick moistened with normal saline solution was moved over the keyboard and the mouse of computer systems (Anderson and Palombo, 2009). A sterile swab stick was also moved over the external surface of Automated Teller

Machine (ATM). 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 sample was labelled 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 and a clean cover slip was placed on the surface and examined by light microscopy at magnifications of x10 and x40, for species identification (Micheal *et al.,* 2009; Ajenifuja and Ajibade, 2012). The microscopic work was done in the Department of Biological Sciences, Federal University of Technology, Minna, Niger State.

RESULTS

Parasites Ova on the Different Interfaces

The distribution of parasite ova on the user interfaces examined is presented in Table 1. The results showed six different parasites ova including: *Ascaris lumbricoides, Enterobius vermicularis, Trichuris trichura, Hookworm, Taenia spp, Paragonimus westermani,* and *Fasciola spp.* The occurrence of the parasite ova on the surface interface were 13 (35.13%), 6 (16.21%), 8 (10.81%), 4 (10.81%), 2 (5.40%), 2 (5.40%), and 2(5.40%) respectively. The distribution pattern of the parasites ova between the surface interfaces showed that a total of 6(16.21%) parasites ova were obtained from Business center, 4(10.81%) from private laptops, 6(16.21%)from E-center2(5.40%) from Cell phones, 9 (24.32%) from Cybercafés and 10 (27.0%) parasites ova were obtained from Automated Teller Machines (ATMs).

Table 1: Distribution of Parasites Ova Contaminant on the Different Interfaces Number of Contaminant % of Contaminant.

Parasites	Business center	Laptops	E-center	Cell phones	Cyber café	ATM	TOTAL%
Ascaris lumbricoides	2(15.38)	2(15.38)	3(23.07)	1(7.69)	3(23.07)	2(15.38)	13(35.13)
Enterobius vermicularis	2(33.33)	1(16.66)	0(0.00)	1(16.66)	0(0.00)	2(33.33)	6(16.21)
Trichuris trichura	2(25.00)	1(12.50)	2(25.00)	0(0.00)	2(25.00)	1(12.50)	8(21.62)
Hook Worm	0(0.00)	0(0.00)	1(25.00)	0(0.00)	0(0.00)	3(75.00)	4(10.81)
Taenia spp	0(0.00)	0(0.00)	0(0.00)	0(0.00)	2(100)	0(0.00)	2(5.40)
Paragonimus westermani	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	2(100)	2(5.40)
Fasciola spp.	0(0.00)	0(0.00)	0(0.00)	0(0.10)	2(100.00)	0(0.00)	2(5.40)
Total	6(16.21)	4(10.81)	6(16.21)	2(5.40)	9(24.32)	10(27.0)	37(100)

DISCUSSION

The detection of parasites ova in the study areas has a significant public health implication. Little or no work has been reported on fungi and parasites ova contamination on interfaces like Automated Teller Machine (ATMs) , cell phones, private laptop, keyboard and mouse of computer systems etc. therefore, the findings from this study may be pioneering in this regard.

Parasites are organisms that live in a close relationship with other organisms (hosts) and are capable of causing harm to their host (Awodi, et al., 2000). In the present study, six different parasites ova including: Ascaris lumbricoides, Enterobius vermicularis, Trichuris trichiura, Hookworm, Taenia spp., Paragonimus westermani and Fasciola spp. were isolated from user interfaces in Minna. These parasites are mainly of faecal origin, their presence on these interfaces could be attributed to improper hygienic condition of the users of these interfaces, for instances when hands used in cleaning up the anus after passing out faeces are not properly washed and are used for cell phones, laptops, ATMs etc. In any way, the tendency is contamination with the trophozoite of the developed parasite, eggs, cysts or even the oocyst. Ascaris lumbricoides (35.13%) and E. vermicularis (16.21%), recorded the highest occurrence. The occurrence of A. lumbricoides with the highest frequency has been reported earlier by other workers (Chukwuma et al., 2009; Eke et al., 2014). They attributed this to resilience of the ova. The embryonated eggs of A. lumbricoides are known to withstand environmental extremes (Hotez et al., 2003). The mucopolysaccharide that coats the eggs render them adhesive to a wide variety of surfaces, a feature responsible for their adhesiveness to most objects, including the interface investigated in this study.

This result is in line with the study of Elom et al., (2012), who reported that Ascaris lumbricoides had the highest frequency of parasitic contaminant on Nigerian Currency in Ebonyi state. Ascaris lumbricoides are common roundworms infecting more than 700 million people worldwide. Adult worms in the intestine cause abdominal pain and may cause intestinal obstruction especially in children. Larvae in the lungs may cause inflammation of the lungs (Loeffler's syndrome) pneumonia-like symptoms (Hotez et al., 2003). Also in this study, parasites cyst were not present, this may be attributed to the fact that there might be a level of personal hygiene among the people present in and around the school environment.

CONCLUSION

In conclusion, user interfaces were found to be contaminated with potentially pathogenic parasite. These interfaces are therefore environmental vehicles for the transmission of clinically important pathogens. Public awareness, hand hygiene and Cleaning regimen aimed at reducing the numbers and presence of these organisms from the hands and objects surfaces should be developed using appropriate sanitizers and disinfectants and also to reduce the risk of pathogenic infections.

REFERENCES

Ajenifuja, O. A. and Ajibade, V. A. (2012). 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. *Global Journal of Science Frontier Research*, (1·2), 1-29.

Akogun, O. B. (1989) .Some social aspects of helminthiasis among the people of Gumaru district, Bauchi State. *Nigerian Journal of Tropical Medicine and Hygiene*, 92(3), 193-196.

Chukwuma, M. C., Ekejindu, I. M., Agbakoba, N. R., Ezeagwuna, D. A., Anaghalu, I. C. and Nwosu, D. C. (2009). The Prevalence and Risk Factors of Geohelminth Infections among Primary School Children in Ebenebe Town, Anambra State, Nigeria. *Middle-East Journal of Scientific Research*, 4 (3), 211-215.

Eke, S. S., Omalu, I. C. J., Otuu, C. A., Hassan, S. C., Ibrahim, S. and Boyi, A. A. (2014). Hookworm infection among humans in Panda, Panda Development Area, Karu LGA of Nasarawa State, Nigeria. *International Journal of Applied Biological Research*, 6(1), 66 – 73

Elom, M. O., Alo, M. N., Ezike, A. C., Okeh, E. N. and Anyim, C. (2012). Parasitic Helminthes on Nigerian Currency: A public health jeopardy. *Prime Journal of Microbiology Research*, 2(6), 165-169.

Lawande, R. V. (1983).Recovery of soil amoeba from the air during the harmattan in Zaria, Nigeria. *Annals of Tropical Medicine and Parasitology*, 77(1), 45-49.

Mehmet, S. T., Yusuf, Y., Baris O., Yucel D. and Nilay, G. (2013). Bacteria found on banks' Automated Teller Machines (ATMs). *African Journal of Microbiology Research.* 7(16), 1619-1621.

Micheal, J. C., Lawrence, B. N. and Darlyl, B. W. (2009). A public health officers guide to assisting laboratory and medical officers. *Diagnosing Medical Parasites*, 57-143.

Nock, I. H. and Geneve, A. I. (2002). Public health significance of parasite cysts and egg on water closet handles. *The Nigeria Journal of Parasitology.*(17), 1 – 94.

Reynolds, K. A., Watt, P. M., Boone, S. A. and Gerba, C.P. (2005). "Occurrence of Bacteria and Bacterial Markers on Public Surfaces," *International Journal of Environmental Health Research*, (15)3, 225-234.

Tanko, D. (1998). Isolation of parasite ova and cysts from sole 'of shoes. Department of Biological Sciences, Ahmadu Bello University Zaria, 13-51.

Tayo, B., Ajibade, A. and Ojedokun, O. (2009).Uses of Computer and its Relevance to Teaching and Learning in Nigerian Educational System. *Academic Journals of*

Educational Research and Review, 4(10), 443 -447.

Yusuf, M. and Hussein, A. M. Z. (1990). Sanitation in rural communities in Bangladesh. Bulletin of World Health Organization, 68 (5), 619 – 624.