African Journal of Biotechnology Vol. 5 (11), pp. 1118-1121, 2 June 2006
Available online at http://www.academicjournals.org/AJB
ISSN 1684–5315 © 2006 Academic Journals

Full Length Research Paper

Evaluation of microorganisms transmissible through handshake

ONIYA M. O.*, OBAJULUWA S. E., ALADE E. T. and OYEWOLE O. A.

Department of Biology, Federal University of Technology, PMB 704, Akure.

Accepted 3 May, 2006

Microorganisms transmissible through handshake were experimentally isolated from samples collected from primary and secondary school students as well as undergraduates and staff of the Federal University of Technology, Akure. Bacteria isolated include *Staphylococcus aureus, S. epididimis, Bacillus subtilis, Escherichia coli,* and *Actinobacillus* sp while fungi isolated include *Penicillum notatum, Aspergillus niger* and *Cladosporium* sp. The prevalence of these microorgansims was higher in the primary and secondary school students than in the undergraduates and staff of the university. The significance of the findings to public health in general is discussed.

Key words: Microorganisms, transmission, handshake, isolation.

INTRODUCTION

Microorganisms are ubiquitous in nature (Wellington and Trevors, 1997). They grow profusely under suitable conditions of temperature, moisture and relative humidity (Bloomfield, 1990). Microorganisms have so many beneficial and harmful effects. Some of their beneficial effects include in the cycle of elements, food source for man and other animals (Prescott et al., 2005) and transformation of organic materials to mineral and modification of substances for use by other organisms (Wellington and Trevors, 1997). On the other hand, their harmful effects are seen in the destruction of plantation, decay of food, and agents of diseases and epidemics (Stainer, 1988).

All vertebrates and most invertebrates are endowed with a large and varied microbial biota (Hentages, 1993). These bacterial population may be dense as in the mouth or large intestine, of moderate size as on the skin or virtually absent as in deep tissues. Although most of these organisms are harmless commensals, or even participate in symbiotic relationship, many of them can turn on the host and cause diseases (Prescott et al., 2005). The present study is a preliminary survey carried out to identify microorganisms associated with the hands and possibly transmissible through handshake in other to view its public health importance among staff and students of the Federal University of Technology, Akure.

MATERIALS AND METHODS

Collection of samples

A total of 100 samples were collected in all. 40 samples from primary school students, another set of 40 samples from secondary school students and 20 samples were collected from staff and undergraduates of the Federal University of Technology, Akure. Samples were collected in two different ways. In the first instance, both hands were washed with sterile water into a sterile cellophane nylon. These were labelled A. In the second instance, surface sterilization was done using toilet soap before the hands were washed with sterile water into a sterile cellophane nylon labelled B. Thus samples were collected from each subject twice. All subjects were recruited at random. 20 students from the primary school, 20 students from the secondary school, 6 undergraduate students, and 4 members of staff.

Preparation of media

The media used were Nutrient Agar and Potato Dextrose Agar for

*Corresponding author. E-mail: aladetoyin12@yahoo.com

Table 1. Bacterial count and fungi isolates of samples collected from primary school students in Federal University of Technology.

Subject I.D	A (cfu/ml)	B (cfu/ml)	Bacteria	Fungi
P1	$2.0x10^2$	$3.0x10^1$	*S. aureus*	*A. niger*
P2	TNTC	$8.7x10^2$	*S. epididimis*	*A. niger, P. notatum*
P3	$9.8x10^2$	$2.0x10^2$	*S. aureus*	Nil
P4	$1.0x10^3$	$8.5x10^2$	*B. subtilis*	*A. niger*
P5	$3.8x10^2$	$1.2x10^2$	*S. aureus*	Nil
P6	$1.0x10^2$	$3.0x10^1$	*E. coli*	*A. niger*
P7	$5.8x10^2$	$1.3x10^2$	*S. aureus*	*A. niger*
P8	$1.6x10^2$	$4.0x10^1$	*S. epididimis*	*A. niger*
P9	$2.3x10^2$	$2.0x10^1$	*B. subtilis*	Nil
P10	$1.3x10^2$	$4.0x10^1$	*E. coli*	Nil
P11	$1.4x10^2$	$2.0x10^1$	*S. aureus*	*P. notatum*
P12	$2.3x10^2$	$4.0x10^1$	*E. coli*	*A. niger*
P13	TNTC	$1.5x10^2$	*Actinobacillus*	Nil
P14	$2.6x10^2$	$1.0x10^2$	*S. aureus*	Nil
P15	$1.4x10^2$	$5.0x10^1$	*B. subtilis*	*A. niger*
P16	$2.8x10^2$	8.0x1o^1	*E. coli*	*A. niger*
P17	$8.0x10^2$	$2.6x10^2$	*S. aureus*	*A. niger*
P18	$5.0x10^1$	$1.0x10^1$	*E. coli*	*A. niger*
P19	$2.7x10^2$	$1.0x10^1$	*S. aureus*	*A. niger*
P20	$1.0x10^3$	$2.7x10^1$	*Actinobacillus*	*P. notatum*

A- Before Sterilization
B- After Sterilization
TNTC- Too Numerous To Count

the isolation of bacteria and fungi, respectively. The media were prepared according to the manufacturer's instruction and were sterilized using autoclave at 121^0C for 15 min while glassware were sterilized using hot air oven at 160^0C for 90 min

Isolation of microorganisms

The bacteria were isolated using pour plate method. 0.1 ml and 1.0 ml of the each sample was aseptically inoculated in a Nutrient Agar and incubated for 24 h at 37^0C for the isolation of the bacteria while the same 0.1 ml and 1.0 ml of each sample was inoculated into the Potato Dextrose Agar for the isolation of fungi at 27^0C for 5 days. The microorganisms were subcultured into freshly prepared media for pure culture isolation.

Identification of Isolates

The bacteria isolates were identified by cultural and biochemical characterization using Gram staining, catalase, indole, Voges Proskauer and sugar fermentation tests. The fungi isolates were identified using cultural and microscopic observation.

RESULT AND DISCUSSION

Bacteria isolated include *S. aureus, E. coli, S. epididimis, B. subtilis,* and *Actinobacillus* sp (Tables 1-3). *S. aureus* was isolated in all plates for all subjects sampled. The bacterial load was generally higher in samples A than in samples B in all categories of subjects, with the highest load recorded in the primary school pupils. Fungi isolated from primary school pupils include *Aspergillus niger* and *Penicullium notatum. A. niger* and *Cladosporium* were isolated from secondary school students while only *A. niger* was isolated form the undergraduates and staff of the University. However, no fungi growth was recorded in sample B (after surface sterilization of hands with toilet soap) in all categories of subjects sampled.

The results showed a drastic decrease in the bacterial counts in B compared to A. This should be due to the effect of surface sterilization in the process of hand washing with toilet soap. The bacterial count in Table 1 exceeds the bacterial counts in Tables 2 and 3. This corresponds with the reports of Antai (1988), who stated that children are more liable to bacterial load due to their restlessness than the adults. Prescott et al. (2005) have also observed the incidence of *S.aureus, B. subtilis, E. coli, Lactobacillus* and *Actinobacillus* in human palms. Of all species of microorganisms isolated, *S. aureus, E. coli,* and *S. epididimis* are capable of assuming allergenic/pathogenic roles if swallowed in considerable amounts. *S. aureus* produce enterotoxins which may

Table 2. Bacterial count and fungi isolates of samples collected from secondary school students in Federal University of Technology Akure.

Subject I.D	A (cfu/ml)	B (cfu/ml)	Bacteria	Fungi
S1	$6.0x10^1$	$1.0x10^1$	*S. aureus*	*A. niger*
S2	TNTC	$1.0X10^2$	*E. coli*	Nil
S3	$3.0x10^2$	$1.4x10^2$	*S. aureus*	*A. niger*
S4	$3.8x10^3$	$1.6x10^2$	*S. epididimis*	Nil
S5	TNTC	$1.5x10^2$	*S. aureus*	*A. niger*
S6	$1.7x10^1$	$9.0x10^1$	*E. coli*	*Cladosporum*
S7	$2.3x10^2$	$1.5x10^2$	*S. aureus*	Nil
S8	$3.2x10^2$	$8.0x10^1$	*E. coli*	*A. niger*
S9	$5.6x10^2$	$3.5x10^2$	*S. aureus*	*A. niger*
S10	$1.0x10^1$	$6.0x10^1$	*S. epididmis*	Nil
S11	$6.0x10^1$	$2.0x10^1$	*E. coli*	*A. niger*
S12	$3.4x10^3$	$3.0x10^1$	*S. aureus*	*Cladosporum*
S13	NG	NG	Nil	Nil
S14	$2.3x10^2$	$1.2x10^2$	*E.coli*	*A. niger*
S15	$4.8x10^2$	$1.3x10^2$	*S. epididimis*	Nil
S16	$1.0x10^1$	NG	*E. coli*	Nil
S17	$2.0x10^2$	$1.8x10^2$	*S. aureus*	*A. niger*
S18	$1.5x10^2$	$1.2x10^1$	*E. coli*	Nil
S19	$2.2x10^2$	$8.0x10^1$	*E. coli*	*A. niger*
S20	$2.6x10^2$	$1.0x10^1$	*S.aureus*	Nil

C- Before Sterilization
D- After Sterilization
TNTC- Too Numerous To Count
NG- No Growth

Table 3. Bacterial count and fungi isolates of samples collected from undergraduates and staff of the Federal University of Technology, Akure.

Subject I.D	A (cfu/ml)	B (cfu/ml)	Bacteria	Fungi
U1	$1.0x10^1$	NG	*S. epididimis*	*A. niger*
U2	$4.0x10^1$	$2.0x10^1$	*E. coli*	*A. niger*
U3	$8.0x10^1$	$1.0x10^1$	*B. subtilis*	*A. niger*
U4	$1.0x10^2$	$3.0x10^1$	*B. subtilis*	*A. niger*
U5	$6.0x10^1$	$4.0x10^1$	*S. aureus*	*A. niger*
U6	$6.0x10^1$	$1.0x10^1$	*S. aureus*	*A. niger*
T1	$3.0x10^1$	NG	*S. aureus*	*A. niger*
T2	NG	NG	Nil	Nil
T3	$3.0x10^1$	NG	*S. aureus*	*A. niger*
T4	$2.4x10^2$	NG	*S. aureus*	*A. niger*

E- Before Sterilization
F- After Sterilization
NG- No Growth

provoke vomiting; *E. coli* and *S. epididimis* are capable of provoking intestinal disorders when swallowed. The latter may even result to bacterial meningitis (Prescott et al., 2005). Although results from the present study revealed that it was not possible to attain a complete depletion of the bacterial load from the palms after surface sterilization, it is important to raise the level of consciousness of school aged children to the effects of these microorganisms, so that care should be taken when eating. Apart from this, these microorganisms may be easily transmitted through handshaking thereby making them endemic also on the human palms. Surface sterilization with toilet soap reduced bacterial load in subjects considerably, stronger detergents may even be more effective, above all the culture of washing hands with soaps before eating is indeed essential from the foregoing.

ACKNOWLEDGEMENTS

The authors would like to thank the head, staff, and students of FUTA Staff primary and secondary schools. Gratitude also go to the undergraduate and staff volunteers for their cooperation during sampling.

REFRENCES

Antai SP (1988). Study of *Bacillus* flora of Nigerian Spices. Int. J. Food Microbiol. *6*(2): 259-261

Bloomfield SF (1990). Microbial Contamination, Spoilage, and Hazard. Guide to microbial. control in pharmaceuticals. Ellis Horwood, New York: 30-46

Hentages DJ (1993). The anaerobic microflora of the human body. Chin. Infect. Dis. 16(suppl.14):175

Prescott LM, Harley JP, Klein DA (2005). *Microbiology* 6th ed. McGraw-hill Company, Inc. NY: p. 960

Stainer RT (1980). General Microbiology. 5th ed. Macmillan education pubs. pp.10-11

Wellington JT, Trevors JD (1997): Modern Microbiology. 4th ed. Marcel Dekker, Canada. pp. 70-75.