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Effect of Cash Odour and Bacterial Organisms of Overstayed Cash in the Respiratory Regions of Bank Cashiers in Enugu State

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ABSTRACT

Twenty Eight (28) subjects consisting of bank cashiers were Grouped into 2 groups. Group 1 (10 subjects) is the control subject and group 2 (18 subjects) is the study group. The study was carried out to know the effect of cash odours in the respiratory region of cashiers who stays in bank handling cash and also to investigate the possible bacteria and fungi that can be found in overstayed cash and in the respiratory regions of cashiers. Culture media test, coagulase test, catalase test and Gram stain where the bacteriological tests used to identify the bacteria and fungi in the nasal and throat regions of the subjects using the swab samples collected while the lung volumes and capacities were measured using spirometer. The result of this work showed that the commonest bacteria found in the bank cashiers is staphylococcus epidermidis (62%) which is non-pathogenic followed by staphylococcus aureus (15%) E. Coli (10%), streptococcus pyogenes 5%, Bacillus (5%) and corynbacerium (3%). The results obtained from measurement of the lung capacities and volumes to see if odour can affect them showed no significant variation (P>0.05). Hence the respiratory passages of bank cashiers are safe despite the cash odour they inhale every day.

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INTRODUCTION

Cash refers to physical currency such as Bank notes also called paper bills and coins. Cash is a medium of exchange allowing individuals and businesses to make transactions for goods and services. It is widely accepted as long as it is a legal tender and recognized among nations. It can be used for various purposes such as payments, purchases savings and transactions. Cash can also be a liquid fund that can be transferred electronically. Those who handle cash in the bank system are called cashiers, bank teller or customer service agent. They work in a bank and interacts with customers to provide various financial services which includes: handling customer transactions such as deposits and withdrawals, providing account information and assistance, processing transactions such as cashing cheques etc, assisting with banking products and services and maintaining customer relationships. They play a crucial role in banks, serving as the primary point of contact for many customers.

Cash odours refers to the unpleasant smell that can develop on bank notes, often due to accumulation of dirt, sweat, bacteria and other substances. This smell can be particularly noticeable on older or heavily circulated notes.

Bacteria can contribute to the development of cash odour. When bank notes are handled extensively, they can pick up bacteria from people's hands, skin cells, and moulds can develop on them when they are stored. These bacteria can then feed on the organic materials present on the notes such as sweat, dirt or other residues producing compounds with strong odors. (Habip et al, 2013).

The perception of odours or smell is mediated by the olfactory nerve. The olfactory receptor cells are neurons present in the olfactory epithelium which is a small patch of tissue at the back of the nasal cavity. There are millions of olfactory receptor neurons that act as sensory signaling cells. Each neuron has cilia in direct contact with the air. Odourous molecules bind to receptor proteins extending from cilia and acts as a chemical stimulus, initiating electric signals, that travel along the olfactory nerve axons to the brain (de March, 2015).

Odour sensation usually depends on the concentration (number of molecules) available to the olfactory receptors. A single odourant is usually recognized by many receptors. Different odourants are recognized by combination of receptors. The patterns of neuron signals help to identify the smell. The perception of an odour effect is a two-step process. First there is the physiological part. This is the detection of stimuli by receptors in the nose. The stimuli are recognized by the region of the human brain. The ability to identity odour varies among people and decreases with age. Studies show there are sex differences in odour discrimination and women especially pregnant women usually outperform men (Doty et al, 1985). The respiratory tract is divided into the upper airways and lower airways. The upper airways or upper respiratory tract includes the nose and nasal passages, paranasal sinuses the pharynx and the portion of the larynx above the vocal fold`s (cords). The lower airways or lower respiratory tract includes the portion of the larynx below the vocal folds, trachea, bronchi and branch roles. The lungs can be included in the lower respiratory tract or as separate entity and include the respiratory bronchioles, alveolar ducts, alveolar sacs and alveoli.

Types of micro organisms found on bank notes include staphylococcus aureus which can cause skin infections, Escherichia coli (E.coli) which can cause urinary tract infections; Bacillus a spore forming bacteria can cause infections in immunocompromised individuals, corynebacterium which causes respiratory and skin infections.

Fungi organisms such as Clavispora lusitaniae which can cause meningitis and fungemias in immune compromised persons, penicillium spp which can cause infections in immunocompromised persons, Aspergillus niger causes which can also cause infections in immunocompromised individuals and lastly rhodotorula mucilaginosa which can cause catheter-related fungemia and other infections when contracted from bank note.

The role of cashiers handling funds in the bank cannot be over emphasized. This research study is aimed at knowing the effect of cash odour in their respiratory regions, to know the very bacteria and fungi organisms that can survive in overstayed cash, improperly kept cash and which can also be found in the bank cashiers.

MATERIALS AND METHODS

Subjects:

The research consists of control group 1 and test subjects Group 2. All the persons used in the study are 28 persons. The control group 1 subjects are 10 subjects while the group 2 subjects are 18 cashiers handling cash in first bank and Eco bank respectively. Female subjects were mostly used.

Collection of samples

The samples for study were collected with swab sticks from the nose (Nasal swabs) and the throat (Throat swab) asceptically from the control and test subjects. They were cultured in saboureid agar, blood agar and mackonkey agar.

The innoculum were incubated at 37^0C for 24-48hrs to allow colony formation of bacteria (Aguoru et al, 2015). Pure cultures were prepared from the primary cultures of the bacteria and afterwards Gram staining, coagulase and catalase tests were performed to identify the different bacteria present in the sample (Oguwike et al, 2021).

Bacteriological Tests:

Culture tests were carried out by plaiting the swab samples collected on saboureid agar, nutrient 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 Stain test was done using the procedure described by Baker et al, 1998.

Physiological Tests:

The lung volumes and capacities of the subjects were determined using the spirometer. Spirometry was carried out using the method described by Andrew 1972.

Statistical Analysis

The results obtained from the physiological analysis were represented in tables using student's t-test while the results obtained from bacteriological tests were represented in figures and histogram

RESULTS:

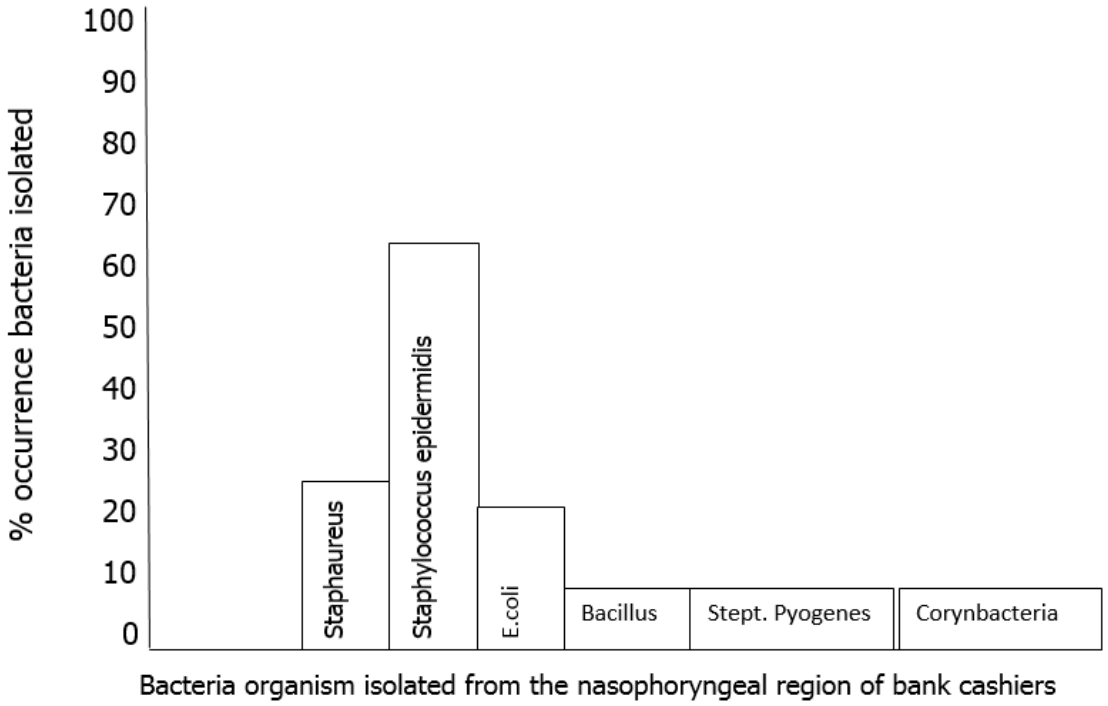

Figure 1: Histogram representing bacteria organisms isolated from the nasopharyngeal region of cashiers

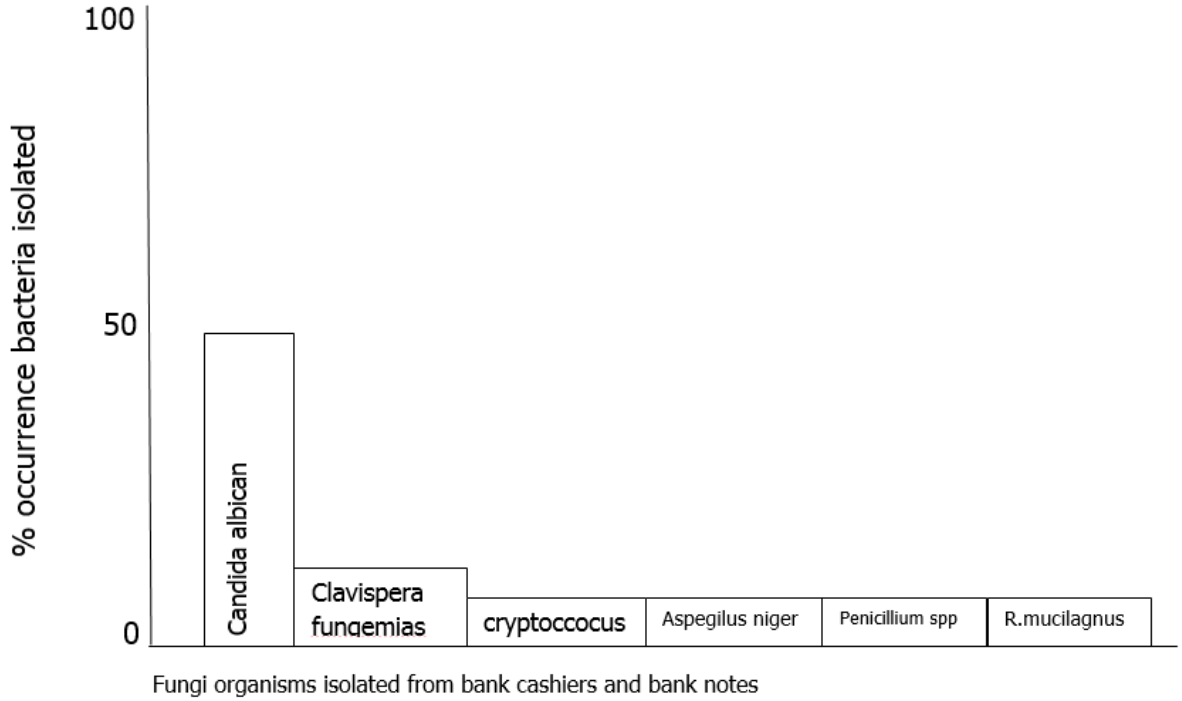

Figure 2: Represents Fungi organisms isolated from the nasopharyngeal region of back cashiers

Table 1: shows the effect of cash odours in the lung volumes of bank cashiers

Groups	Tidal volume M ±S.D	RV ML±S.D	ERV ML±S.D	ML±S.D
Control Group 1 1 n=10	650±57	2,800± 140	1,100 ±80	1,100 ± 100
Bank cashiers Group 2 n=18	700±35	3,000 ± 200	1,110 ± 26	1,105 ± 19
P value	P>0.05	P>0.05	P>0.05	P>0.05

T.V = Tidal volume, IRV = inspiratory reserved volume, ERV=Expiratory reserved volume, RV= Reserved volume

Table 2: Indicates the effect of cash odours in the lung capacities of bank cashiers

Groups	Vital capacity ML ±S.D	Inspiratory Capacity ML ± S.D	Functional residual capacity ML±S.D	Total lung capacity ML ±S.D
Control Group 1 n=10	4,500 ± 250	3,600 ± 300	2,200 ± 76	6,000±250
Bank Cashiers Group 2 n=18	4,800 ± 107	3,720 ± 205	2,240 ± 54	6,180±153
P value	P>0.05	P>0.05	P>0.05	P>0.05

DISCUSSION

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The search for means of livelihood and to sustain ourselves has mandated people to secure jobs wherever possible in our country. Hence the employment as a cashier in bank gives joy to the job seeker despite the environment.

The effects of cash odour and bacterial organisms of overstayed cash in the respiratory regions of bank cashiers have been elucidated. The result displayed in figure I showed that various bacteria organisms were isolated from the nasopharyngeal region of bank cashiers. Among the bacteria organisms isolated, staphylococcus epidermis occurred most (62%) followed by staphylococcus aureus (15%) Bacillus (5%) and corynbacterium (3%). It is well known that staph. Epidermidis is a normal flora that thrives in the skin of individuals, therefore their presence in bank cashiers does not pose any threat to their health. Staphylococcus aureus and Escherchia coli are pathogenic organisms that can initiate infection in the carriers when they get to the urinary tract and the pelvis. They may cause urinary tract in the pelvis. They may cause urinary tract infection or pelvic intravascular disease in the bank cashiers. The disease is transmissible when they have sex with their friends or life partners ignorantly without treating it first. Bacillus organism and corynbacterium organisms can cause infections in immune compromised individuals.

Figure 2 also showed various fungi organisms isolated from cashiers. In all the organisms isolated, candida albicans occurred most (50%) followed by clavispora fungemias (20%) crytoccocus (10%) Aspergillus niger (8%) penicillin species (8%) and R. Mucilagnus (4%) candida albicans can cause candidiasis infection in immunocompromized persons and also if the fungi leaves the location of the body where it is living as a normal flora and gets to the genital system of the carrier it turns to infection in that region.

The results obtained with spirometer from the bank cashier in Tables 1 and 2 shows that cash odours poses no harmful effect in the bank cashiers. When the results are examined, the lung volumes and capacities of the bank cashiers gave normal values compared to their corresponding controls. Bank cashiers (Group 2) and Tidal volume 700ml±35, compared to their corresponding control 650ml±57 (P>0.05), inspiratory reserved volume 3,000±200 as against their corresponding control 2,800ml± 26, compared to their corresponding control 1,100ml ± 80 (P>0.05) and lastly the reserved volume gave 1,105±9 compared to their corresponding control 1,100ml±100.

There is no significant change (P>0.05) in both the lung volume and lung capacities of both the tests and control group. Pulmonary volumes and capacities in the bank cashiers is the volume of air that moves into and out of the lungs under different conditions during their work (Oyebola, 2002). There is safe keep of their respiratory passages such as their lungs, the nasal cavity, the trachea and larynx despite their exposition to cash odours. This enables them to keep up with their bank work. It should be noted that the perception of odours is mediated by the olfactory nerve (De March, 2015) when an electrical signal reaches a threshold, the neuron fires and sends a signal to the olfactory bulb. The olfactory bulb acts as a relay station connecting the nose to the olfactory cortex in the brain. Olfactory information is further processed and forwarded to the central nervous system (CNS) which controls emotions and behaviours as well as basic thought processes (Axel, 1995).

Lung volume and capacities are not affected by cash odour rather inherited diseases, miasms and

genetic problem can predispose one to changes in lung volumes and capacities.

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