



Effects of Odours and Decomposing Materials in the Respiratory Tracts of Scavenging Practitioners and Waste Management Personnel in Enugu State.

Oguwike F.N¹, Emenuga V.N², Nwobodo H.A³, Imanyikwa O.E.I⁴, Onyinta O.I⁴, Usige E⁵, Igwedibia C.I¹

- Department of Physiology, Faculty of Basic Medical Sciences, COOU Uli Campus, Anambra State.
- Department of Med. Lab. Sciences and Technology. Faculty of health Sciences and Technology. University of Nigeria Enugu Campus, Enugu.
- Department of Med. Lab. Sciences and Technology. Faculty of health Sciences and Technology Enugu State university of Sciences and Technology, Enugu.
- Department of Anatomy, Faculty of Basic Medical Sciences, Chukwuemeka Odumegwu Ojukwu University Uli Campus, Anambra State.

ARTICLE INFO

Article No.: 010421004

Type: Research

Accepted: 08/01/2021

Published: 21/01/2021

*Corresponding Author

Dr V.N Emenuga

E-mail: veranuga@yahoo.com

Phone: 08035506341

Keywords: Odours; decomposition; scavengers; dust bins; waste managers; fungi; culture; material

ABSTRACT

Scavenging profession and waste management services have become a standing means of livelihood despite the odours or smell that ensues from the material being handled.

The effect of odours and decomposing materials in the respiratory tract of scavenging practitioners and waste management personnel's was studied using 30 subjects divided into three(3) groups A,B and C. Each group consist of 10 persons.

Group A is the control, Group B is the scavenging professionals, and Group C is the waste management personnel's. The aim of the study is to know if the daily odour or smell from the dust bins and waste materials actually have effect in their respiratory tract and the possible bacteria or fungi that can be found in their system. Culture media test, coagulase test, catalase test and Gram stain were the bacteriological tests used to identify the bacteria and fungi in the nasal and throat swabs collected from the subjects while the lung volumes and capacities of the subjects were measured using spirometer. The results of this research showed that bacteria such as salmonella species, streptococcus species, klebsiella species, staph. aureus, pseudomonas, Bacillus subtilis, E. Coli and fungi were isolated from the specimens.

The lung volumes and capacities of the scavengers and waste management personnels were not affected by the odours they are exposed to. The result of the study showed no significant change ($p>0.05$) hence the respiratory passages of the scavengers and waste management personnels are safe despite the bad and nauseating odours they face on daily basis during their work. It can be deduced from this study that the commonest organism the professionals contract is fungi and salmonella organism.

INTRODUCTION

An odour is a distinctive smell especially an unpleasant one. It can be caused by one or more volatilized chemical compounds that are generally found in low concentrations that humans and animals can perceive by their sense of smell (* de march et al, 2015). An odour is also called a 'smell' or a 'scent' which refer to either a pleasant or an unpleasant odour.

In Nigeria and European countries scavenging profession and waste management personnels face both pleasant and unpleasant odour in their daily activities.

A scavenger is a person who searches through and collects items from discarded materials. The persons engaged in scavenging practice must have considered it as an additional means of livelihood especially in third world countries such as ours where hygiene is not so much considered.

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 signalling 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 nerves 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 recognised by many receptors. Different odourants are recognized by combinations of receptors. A single odourant is usually recognized by many receptors. Different odourants are recognized by combinations 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 identify 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, 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 folds (cords). The lower airways or lower respiratory tract includes the portion of the larynx below the vocal folds, trachea, bronchi and bronchioles. 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.

The role of scavengers and waste management personnels in our society cannot be over emphasized, they not only help to keep our environment clean and habitable, they also help us to recover discarded

materials that can still be used to keep life going. To know the bacterial load they can contract in the process of their duty; to know the effect of this bacterial associated with the odour in their respiratory passages such as the nose, the throat and the effect of this odours in their lung volumes and capacities are what prompted our curiosity to embark on this study.

MATERIALS AND METHODS

Subjects

The study consists of 30 persons divided into three (3) groups which include the control group A (10 subjects) (those who are neither scavengers or waste management personnel), Group B (10 subjects) scavenging practitioners, and Group C (10 subjects) waste management personnels.

This study was carried out using Male subjects only.

Experimental Design

The culture media for isolation of the organisms and the wire loops for plating of the samples in the culture were prepared aseptically. The media prepared following standard bacteriological techniques are sabouroid agar, blood agar, nutrient agar and mackonkey agar.

Collection of Samples

Samples for study were collected with swab sticks from the nose (Nasal swab) and the throat (throat swab). Only male subjects were used as the scavenging profession and waste management personnels are only seen practiced among males. Swab samples were collected aseptically and were cultured in salbouroid agar, blood agar and mackonkey agar. The inoculum were incubated at 37° c 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 samples.

Bacteriological Tests

- Culture tests using blood agar, nutrient agar, sabuoreid agar and mackonkey agar were done 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 with the procedure described by Baker et al, 1998.

Physiological Analysis

The lung volumes and capacities of the subject were measured using the spirometer. Spirometry was carried using the method described by Andrew,1972.

Statistical Analysis

The results of the investigations carried out on the subjects and with swab samples were represented in tables and figures using student test for analysis.

RESULT

Table 1: Indicates the effect of odours on the lung volumes in scavenging practitioners and waste management personnels.

Groups	LUNG VOLUME			
	Tidal Value L ± S.D	IRV L ± S.D	ERV L ± S.D	RV L ± S.D
Control Group A (n=10)	500 ± 0.2	3.0 ± 0.6	1.0 ± 0.3	1.2 ± 0.5
Scavenger Group B (n=10)	501 ± 0.16	3.0 ± 0.24	1.0 ± 0.4	1.22 ± 0.8
Waste Management Personnel Group C (n=10)	500 ± 0.12	3.0 ± 0.5	1.0 ± 0.3	1.2 ± 0.4
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: shows the effect of odours on the lung capacities of scavenging practitioners and waste management personnels.

Groups	LUNG CAPACITIES			
	I.C L ± S.D	FRC L ± S.D	V.C L ± S.D	TLC L ± S.D
Control Group A (n=10)	3.5± 32	2.2 ± 14	4.8 ± 21	6.0 ± 0.22
Scavenging practitioners Group B (n=10)	3.49 ± 0.22	2.2 ± 0.17	4.97± 0.12	6.0 ± 0.4
Waste Management Personnels Group C (n=10)	3.51 ± 0.18	2.15 ± 0.24	4.8 ± 0.5	6.0 ± 0.6
P. Value	P>0.05	P>0.05	P>0.05	P>0.05

I.C= Inspiratory Capacity, FRC= Functional residual capacity, V.C= Vital capacity, TLC= Total lung volume.

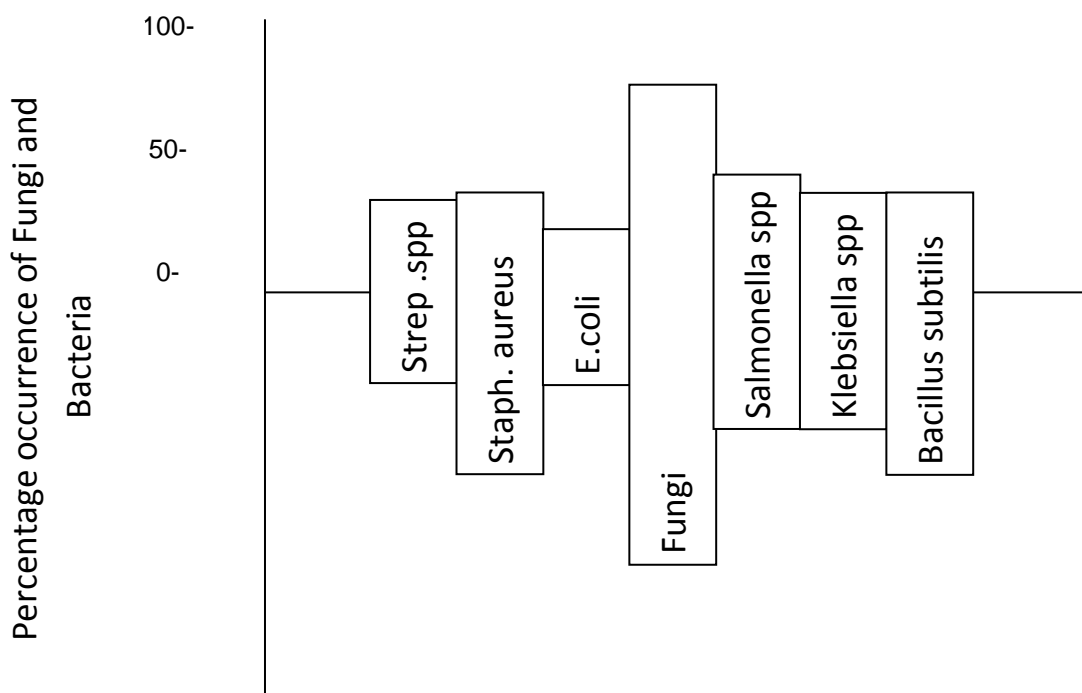


Figure 1: shows the bacteria and Fungi isolated from the throat swab of scavengers and waste management personnels.

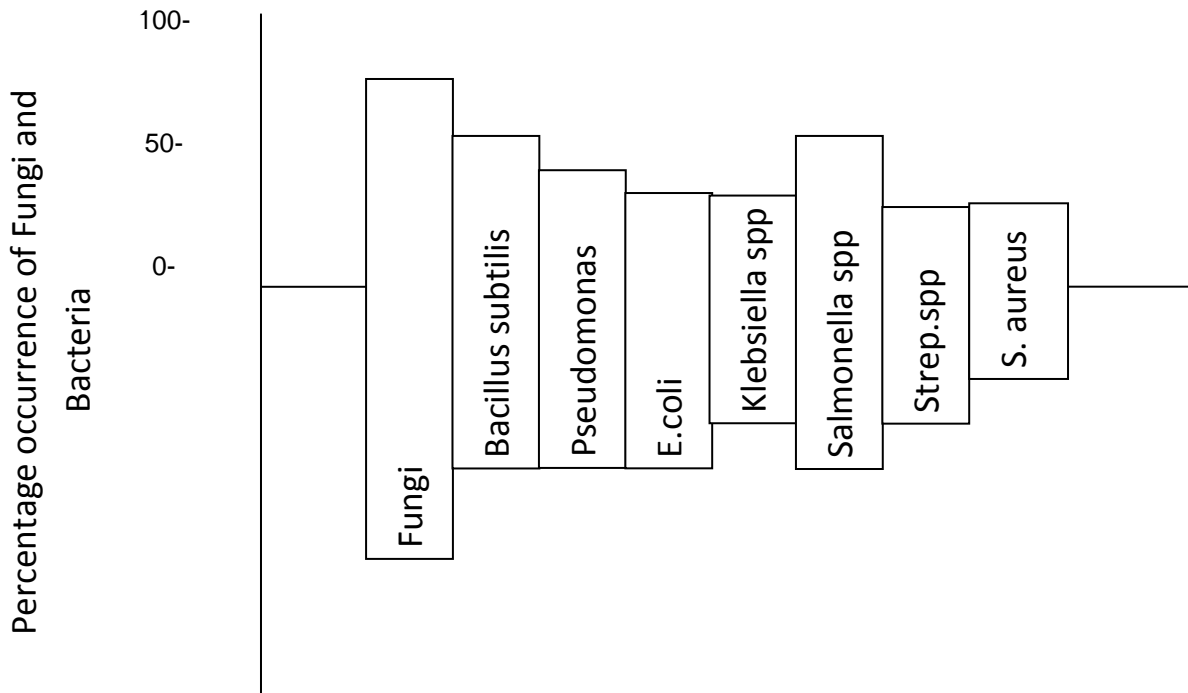


FIGURE 2: shows the bacteria and fungi organisms isolated from nasal swab of scavengers and waste management personnels.

DISCUSSION

The effects of odours and decomposing materials in the respiratory tract of scavenging practitioners and waste management personnels in Enugu state has been studied.

The result of this showed in tables 1 and 2 that odours and decomposing materials do not actually affect the respiratory tract of scavenging practitioners and waste management personnels when their respiratory volumes and capacities were measured using a spirometer. When the result of respiratory volume of scavengers and waste management personnels is checked with their control subjects, it will be noticed that there is no significant change ($P > 0.05$), likewise the respiratory capacity is normal in the scavenging practitioners and waste management personnels compared to their corresponding control.

Pulmonary volumes and capacities in scavenging practitioners and waste management personnels is the volume of air that moves into and out of the lungs under different conditions during their field work (Oyebola 2002). The safe keep of their respiratory passages such as their lungs, the nasal cavity, the trachea and larynx despite their exposition to foul smelling odours enables them to keep up with the profession.

It should be recalled that the perception of odours is mediated by the olfactory nerve (De March, 2015). When an electrical signal reaches a threshold, the neuron fires which sends a signal travelling along the axon to the olfactory bulb, a part of the limbic system of the brain. Interpretation of the smell begins there, relating the smell to past experiences and in

relation to the substance(s) inhaled. 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 behaviour as well as basic thought processes (Axel, 1995). There is likelihood that the sense of smell in the scavengers and waste management personnels has become used to the day to day odours they face.

It must be emphasized that bacteria or fungi diseases are not transferred or contracted by odour or smell rather these diseases can be contracted by person to person contact, through contact of infected materials, or decomposing materials as in the case of scavengers going round the waste bins to search and pick discarded materials. Bacteria play an important role in decomposition of organic materials, especially in the early stages of decomposition when moisture levels are high.

The result of this study in figures 1 and 2 shows the bacteria and fungi organisms isolated from the throat swab and nasal swab samples of both the scavenging professionals and waste management personnels.

The bacteria isolated in the nasal swab (Fig.2) samples of both the scavenging practitioners and waste management personnels are *Bacillus subtilis*, *Pseudomonas*, *E. coli*, *Klebsiella spp*, *Salmonella spp*, *Streptococcus spp*, *Staph.aureus* and fungi.

In the throat swab sample (Fig 1) the bacteria and fungi organisms isolated in both the scavenging professional and waste management personnels are *Bacillus subtilis*, *Pseudomonas*, *Escherichia coli*, *Klebsiella spp*, *Salmonella spp*, *Streptococcus spp*,

Staph.aureus Lactobacillus and fungi. Fungi organisms were more in occurrence in the nasal swab and throat of the practioners in this work followed by Samonella species and then Staph.aureus. this organisms could have been contracted by touching their nose and wiping their faces with their palms during perspiration. It could be deduced from the study that scavenging professional and waste management services is a safe profession as no diseases or harmful bacteria can be contracted.

REFERENCES

- Andrew B.L, Ingram C.G, Taylor J.H, (1972). Measurement of Lung volumes and Capacities. Experimental physiology published by Churchill Living Stone Ltd. Great Britain ISBN 0443008760 pg 58-76.
- Baker F.J, Silverton R.E (1998): Microscopic examination of bacteria. Introduction to Medical Lab. Technology 6th edition. Butterworth-Heinemahn publications, Linacre House, 225 wildwood Avenue Woburn M.A 01801-2041.
- C.E Aguoru, S. Maaji and J.O Olasan (2015): Bacteria contaminants on surfaces of some edible fruits sold in Markurdi Metropolis, Benue state Nigeria. International Journal of Current Microbiology and Applied Sciences. ISSN: 2319-7706. Vol.4 number 6 p334-340.
- De March Claire A, Ryu Sangeun, Sicard Gilles; Moon Cheil, Golebiowski Jerome (2015). Structure-odour relationships reviewed in the postgenomic era. Flavours and Fragrance Journal 30(5): 342-361. Doi: 10.1002/ffj.3249.
- Doty Richard L, Applebaum Steven, Zusho Hiroyuki, Settle R. Gregg (1985): sex differences in odour identification ability; 'A cross- cultural analysis'. Neuropsychologia, 23 (5): 667-672. Doi: 10.1016/0028-3932 (85) 90067-3. PMID. 4058710.S2CID 43729693.
- Oyebola D.O, (2002). Pulmonary volumes and Capacities. Essential physiology published by Nihort Press ISBN 978-3211-8-6. Pg 99-200.

Cite this Article: Oguwike FN; Emenuga VN; Nwobodo HA; Imanyikwa OEI; Onyinta OI; Usige E; Igwedibia CI (2021). Effects of Odours and Decomposing Materials in the Respiratory Tracts of Scavenging Practitioners and Waste Management Personnel in Enugu State. *Greener Journal of Medical Sciences*, 11(1): 8-12.