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(RESEARCH ARTICLE)

Lipid profile, blood pressure and body mass index of male waste pickers in Osogbo, Nigeria

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Abstract

Waste pickers are exposed to various harmful substances capable of altering many physiologic processes. The aim of this study is to determine whether waste picking can result in dyslipidemia or abnormal blood pressure. The study was carried out in Osogbo, where 30 waste pickers and another 30 age-matched males who have not been in waste disposal business that served as control group were recruited. Body Mass Index (BMI) as well as systolic and diastolic blood pressure (BP) of each participant was obtained. The sera obtained from 5 mL of blood after an over-night fast were utilized to determine the lipid profile using standard photometric methods. Data were analyzed using Student's t-test and Pearson's correlation coefficient. The level of statistical significance was $p \leq 0.05$. Data obtained revealed that there were no significant differences between waste pickers and control with respect to the levels of total cholesterol, triglycerides, high density lipoprotein-cholesterol (HDL-C), and low density lipoprotein-cholesterol (LDL-C). Of all the components of lipid profile, only HDL-C was negatively correlated with systolic BP ($r = -0.416$, $p = 0.022$) and diastolic BP ($r = -0.386$, $p = 0.035$). While it is generally accepted that waste picking may result in many pathological conditions, abnormal lipid profile and altered blood pressure were not detected in waste pickers in Osogbo (Nigeria).

Keywords: Waste picking; Lipid profile; Blood pressure; Body mass index

1. Introduction

Human activities create wastes and it is the way these wastes are processed (i.e. handled, stored, collected and disposed), which can pose risks to the environment and to public health [1]. Waste picking at waste dumpsites occurs all over the world and particularly in Africa, Asia, Latin America and parts of Europe. Dumpsites are the workplace of thousands of men, women and children who sort through the waste in search of valuable materials. In Nigeria, as a result of rapidly growing population, many cities (e.g. Osogbo) are encumbered with large amount of solid wastes; these wastes serve as a means of livelihood for various categories of waste workers e.g. waste pickers. A waste picker (also known as solid waste scavenger) is a person who salvages reusable or recyclable materials thrown away by others, either for sale or personal consumption [1-2]. Forms of waste picking have been carried out since antiquity, but modern traditions of waste picking took root during industrialization in the nineteenth century [3]. Over the past 50 years, the practice of waste picking has increased immensely in the developing world due to urbanization, toxic colonialism and the global waste trade [4].

Evidence from the study of Kudaeva and Rukavishnikov [5] shows that occupational exposure to chemicals resulted in sequence of cholesterol metabolism disorders associated with pro-atherogenous features. Various chemicals have been

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identified in solid waste, with some of them being capable of causing dyslipidemia and elevated blood pressure [6-7]. Furthermore, while air pollution has been linked with dyslipidemia [8] and high blood pressure [9] in certain category of human subjects and it is common knowledge in many developing countries that many waste pickers work at dumpsites where constant burning of solid waste takes place and are therefore exposed to polluted air. Yet there is dearth of information on how waste picking affect lipid metabolism and blood pressure. The objective of the study is to investigate the lipid profile and blood pressure of waste pickers in Osogbo.

2. Material and methods

2.1. Ethical consideration

Ethical clearance was obtained from the Ethical Committee of Ladoke Akintola University of Technology Teaching Hospital, Osogbo (Nigeria), before the commencement of the study.

2.2. Study design

This is a cross-sectional comparative study.

2.3. Study population and sampling technique

Study population consisted of 30 male waste pickers and 30 control subjects. All recruited participants were randomly selected and informed consent was obtained from each of them. Questionnaire was administered to obtain information on the following items: age, gender, lifestyles, health history, and work duration/degree of contact with waste (number of years in the occupation) as well as hours of occupational physical activity per day. Participants were notified that all information obtained would be kept in strict confidentiality.

2.4. Inclusion and exclusion criteria

Apparently healthy males who had no history of diseases related to abnormal lipid profile as well as high blood pressure prior to their embarking in this occupation. They had been involved in waste picking for more than 12 months and had done this averagely 4 times per week. They were not involved in any other occupation capable of exposing them to waste. Waste pickers not up to 12 months on the job, as well as those that did not give consent were not recruited for the study. Controls were age and gender matched with test subjects and had not been waste pickers. In addition, they had not been involved in solid waste-related occupation. All participants who met all necessary criteria for inclusion into their specific groups (waste pickers and control) but did not fast for at least 10 hours were also excluded from the study.

2.5. Anthropometric and blood pressure measurements

Blood pressure was measured on the left arm by medically trained personnel using mercury sphygmomanometer and stethoscopes as described by Egbi et al. [10] Height (meter) and weight (kg) were measured with the aid of meter rule and standardized scale respectively as described by Afolabi et al. [11] BMI was calculated by using the formular: BMI (kg/m^2) = weight (kg)/height^2 (m^2).

2.6. Collection and preparation of samples

After an overnight fast of 10 hours, following aseptic procedures, 5 mL of blood was collected from the cubital vein of each participant into anti-coagulant free bottles. Samples were centrifuged (bench centrifuge (Rotofix 32A) at 2000 g for 10 minutes and the sera were kept at -20 °C until the time of analysis.

2.7. Estimation of serum profiles

Estimation of serum triglycerides was based on modified Trinder Reaction [12]. Estimation of serum total cholesterol was as described by Allain *et al*. [13] Precipitation method of Lopes-virella *et al*. [14] was used to assess HDL-C while determination of serum LDL-C was as described by Friedwald et al. [15]

2.8. Statistical analysis

Results obtained from the biochemical estimations were analyzed with Statistical Package for Social Sciences (SPSS) version 15. Data were expressed as mean ± Standard Deviation (SD). The difference among the means was analyzed by Student's t test. Pearson's correlation coefficient was employed to find relationship between lipid profile and BMI as well as blood pressure. p-value ≤ 0.05 was considered significant.

3. Results

Results of the study are presented below. In figure 1 the results of lipid profile are summarized graphically.

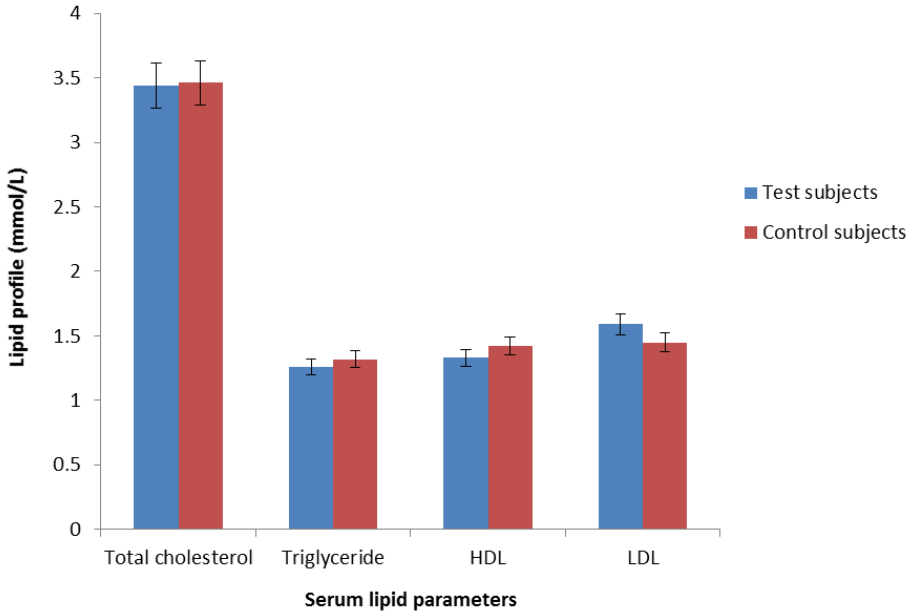

Figure 1 The lipid profile level of waste pickers and control

Table 1 shows the deviation of anthropometric parameters (height, weight) and lipid profile. There were no significant differences in the mean value of systolic BP (blood pressure), diastolic BP, BMI (body mass index), total cholesterol, triglyceride, HDL-C (high density lipoprotein-cholesterol), and LDL-C (low density lipoprotein-cholesterol) of waste pickers when compared to that of control group ($p>0.05$).

Table 1 Anthropometric and serum lipid profile parameters of test and control subjects

Parameters	Test subjects (n=30)	Control subjects (n=30)	p-value
Systolic BP (mmHg)	104.67±10.74	106.0±11.62	0.646
Diastolic BP (mmHg)	65.67±9.35	64.33±6.78	0.530
BMI (kg/m^2)	20.60±2.12	21.27±2.06	0.221
Total cholesterol (mmol/L)	3.44±0.94	3.46±0.92	0.910
Triglyceride (mmol/L)	1.26±0.55	1.32±0.44	0.599
HDL-C (mmol/L)	1.33±0.23	1.42±0.27	0.224
LDL-C (mmol/L)	1.59±0.92	1.45±0.93	0.563

Data presented as mean ± standard deviation.
BP-Blood pressure; BMI-Body mass Index; HDL-High density lipid; LDL-Low density lipid.

Correlation study did not reveal any relationship between components of lipid profile and BMI, systolic BP or diastolic BP. Except that HDL-C was negatively correlated with systolic BP ($r=-0.416$, $p=0.022$) and diastolic BP ($r= -0.386$, $p=0.035$). Among the components of lipid profile, there was positive correlation between total cholesterol and triglyceride ($r= 0.474$, $p< 0.008$); as well as between total cholesterol and LDL-C ($r= 0.871$, $p< 0.001$). On the other hand, a negative significant correlation between LDL-C and HDL-C ($r= -0.382$, $p=0.040$) was observed among waste pickers.

Waste pickers reported of physical activity of at least 8 hours, any day they embarked on waste picking. Of the waste pickers, 40% were smokers and 10% indulge in alcohol consumption.

4. Discussion

Substances capable of altering lipid metabolism abound in solid waste [16-17]. Examples of which include Cd As, and Pb- containing materials; which specifically have been identified as modulators of HDL-C and LDL-C [17]. The non-significant difference in the serum levels of triglycerides, total cholesterol, HDL-C, and LDL-C between waste pickers and control suggest that the amount of such materials in solid waste (to which these pickers were in contact with) may not be sufficient to elicit altered lipid levels. The possibility of inadequate duration of contact with waste cannot be discounted also. That the degree of exposure can be of significance when assessing the severity of damage that can result from contact with waste has been highlighted by Adienbo et al. [18] According to them, solid waste impact negatively on the markers of heart and lung diseases and that the degree of damage was influenced by duration of exposure. Aside inadequate quantity, it can also be speculated that municipal waste in Osogbo may be lacking in substances with potential to modulate lipid metabolism. Currently, there is dearth of data about chemical composition of solid waste in Osogbo.

With respect to BMI and blood pressure, the results of the present study are not in accord with that of Ukachi et al. [19]. Ukachi et al. [19] reported that BMI of solid waste disposal workers was lower, and their diastolic and systolic blood pressure higher compared with control. In this study, both parameters (blood pressure and BMI) were not significantly different in waste pickers compared with control. Aside the observation of Ukachi et al. [19], Adienbo et al. [18] also reported a significant increase in the systolic and diastolic blood pressures, pulse rate as well as a decrease in peak expiratory flow rate of the municipal solid waste workers when compared with the control subjects.

While all test subjects for the three studies Adienbo et al. [18]; Ukachi et al. [19] and present study were involved with solid waste, those of Ukachi et al. [19] and Adienbo et al. [18] were not entirely waste pickers. Their study participants consisted of all categories of workers in solid waste management. In many parts of the developing world, waste pickers more than any other category of waste workers, undergo intense occupational physical exercise, since waste picking is done manually and it involves trekking long distances moving from one dumpsite to another. Data obtained from the study portray that waste pickers trekked for an average of 8 hours per each working day. The intense occupational physical activity commonly associated with waste picking may be the basis of the difference in the result outcomes of earlier studies [19-18] and the present one.

According to Ignarro et al. [20] energy expenditure of about 1000 kcal (4200 kJ) per week (equivalent to walking 1 h 5 days a week) can positively impact on cardiovascular risk parameters (e.g. BMI, lipid profile, blood pressure), even in individuals with tendency that predispose to increase risk. This observation was recorded either through structured or non-structured physical activity, even when it was for short bouts most days of the week. It is not surprising if physical exercise also played a role in the blood pressure [systolic BP- 104.67±10.74 mmHg; diastolic BP- 65.67±9.35 mmHg] and BMI [20.60±2.12 kg/m^2] of waste pickers which were in the normal range despite constant exposure to solid wastes and its inherent danger. That duration of contact to waste might have been the basis in differences in report emanating from different studies can be substantiated by comparing the study of Ukachi with the present study. Although the duration of exposure for the study of Ukachi et al. [19] ranged from 6 months to 15 years, no participant for the present study has been in waste picking occupation for up to 8 years.

Lifestyle also could have been responsible for differences in result outcomes for various studies. While for the present study only 10% indulge in alcohol consumption, data obtained from the study of Ukachi et al. [19] showed that nearly 60% of waste workers maintain alcohol consumption as lifestyle. According to Odendaal et al. [21] alcohol can significantly alter blood pressure especially in combination with smoking; over 70% of waste workers in the study of Ukachi et al. [19] indulged in both lifestyles. It can then be assumed that both smoking and alcohol consumption might have been the combined predisposing factor to elevated blood pressure reported for that study. Smoking affects blood pressure through alterations in hemostatic factors and endothelial functions ultimately altering systolic and diastolic blood pressure.

5. Conclusion

The study demonstrates that abnormal lipid profile and elevated blood pressure are not parts of the hazards associated with waste picking in Osogbo. There may be the possibility that intense occupational physical exercise might have played a role in the present result outcome.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

There is no conflict of interest *among all* authors.

Statement of ethical approval

Ethical clearance was obtained from the Ethical Committee of Ladoke Akintola University of Technology Teaching Hospital, Osogbo (Nigeria), before the commencement of the study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Zurbrügg C. (2002). Urban Solid Waste Management in Low-Income Countries of Asia: How to Cope with the Garbage Crisis. Proceeding of the Scientific Committee on Problems of the Environment (SCOPE). Urban Solid Waste Management Review Session, Durban, South Africa,

[2] Srinivas H. (2011). Solid Waste Management and the Global Development Research. Journal of Tropical Medicine, 2, 569-571.

[3] Martin M. (2007). The World's Scavengers: Salvaging for Sustainable Consumption and Production 5th ed. New York, Altamira Press.

[4] Wilson DC, Velis C and Cheeseman CR. (2006). Role of informal Sector recycling in waste management in developing countries. Habitat International, 30, 797-808.

[5] Kudaeva IV and Rukavishnikov VS. (2014). Pathogenetic aspects of occupationally related disorders of lipid metabolism in workers exposed to chemicals. Meditsina Truda I Promyshlennaia Ekologiia, 4(4), 13-19.

[6] Enetimi IS and Tariwari CAN. (2018). Bioavailability of Some Heavy Metals Associated With Municipal Solid Waste Dumpsites in Yenagoa Metropolis, Nigeria. Journal of Medical Toxicology Research, 1, 2.

[7] Ilchenko I, Kotova M, Sharov K, Lyapunov S, Seregina I and Sechenov IM. (2011). Heavy metals exposure and blood pressure levels of Russian children. Journal of Epidemiology and Community Health, doi: 10.1136/jech.2011.142976i.56

[8] Wang M, Zheng S, Nie Y, Weng J, Cheng N, Hu X, Ren X, Pei H and Bai Y. (2018). Association between Short-Term Exposure to Air Pollution and Dyslipidemias among Type 2 Diabetic Patients in Northwest China: A population-based study. International Journal of Environmental Research and Public Health, 15(4), 631.

[9] Chuang KJ, Yan YH and Cheng TJ. (2010). Effects of air pollution on blood pressure, blood lipids, and blood sugar: a population based approach. Journal of Occupational and Environmental Medicine, 53(3), 258-262.

[10] Egbi OG, Rotifa S and Jumbo J. (2015). Prevalence of hypertension and its correlates among employees of a tertiary hospital in Yenagoa, Nigeria. Annals of African Meicine, 14, 8-17.

[11] Afolabi SI, Chinedu SN, Iweala EMJ, Ogunlana OO and Azuh DE. (2015). Body mass index and blood pressure in a semi-urban community in Ota, Nigeria. Food and Public Health, 5(5), 157-163.

[12] Fossati P and Prencipe L. (1982). Serum triglycerides determined colorimetrically with an enzyme that produces hydrogen peroxide. Clinical Chemistry, 28(10), 2077-2080.

[13] Allain CC, Poon LS, Chan CS, Richmond W and Fu PC. (1974). Enzymatic determination of total serum cholesterol. Clinical Chemistry, 20(4), 470-475.

[14] Lopes-virella MF, Stone P, Ellis S and Codwell JA. (1977). Cholesterol determination in high density lipoproteins separated by three different methods. Clinical Chemistry 23, 882-884.

[15] Friedwald WT, Levy RI and Fredricksn DS. (1972). Estimation of the concentration of low-density lipoprotein cholesterol in plasma, with the use of preparative ultracentrifuge. Clinical Chemistry, 18, 499-502.

[16] Anake WU, Adie GU and Osibanjo OO. (2009). Heavy metal pollution at municipal solid waste dumpsites in Kano and Kaduna states Nigeria. Bulletin of Chemical Society of Ethiopia, 23(1), 281-289.

[17] Sharma SV, Kumar P, Atam V, Verma A and Murthy RC. (2012). Lipid profiles with increase blood lead level: risk of cardiovascular disease in battery workers of Lucknow city. Journal of Indian Academy of Forensic Medicine, 34(4), 328-331.

[18] Adienbo OM, Njoku B and Azibalua A. (2013). An assessment of some cardiovascular and lung function parameters of municipal solid waste workers in Port Harcourt, south-south Nigeria. Greener J Human Physiology and Anatomy, 1, 1-6.

[19] Ukachi EE, Wachukwu CK, Ollor AO and Amuh FU. (2016). Indices of cardiovascular diseases and malaria parisitemia amongst solid waste disposal workers in Port Harcourt Nigeria. British Journal of Medicine and Medical Research, 12(6), 1-13.

[20] Ignarro LJ, Balestrieri ML and Napoli C. (2007). Nutrition, physical activity, and cardiovascular disease: An update. Cardiovascular Research, 73, 326–340.

[21] Odendaal HJ, Steyn DW, Elliot A and Burd L. (2009). Combined effects of cigarette smoking and alcohol consumption on perinatal outcome. Gynecology and Obstetrics Investigation, 67, 1-8.

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