Prevalence of Cardiovascular Risk Factors Among Factory Workers in the Beverage Industries in Edo State, Nigeria

[1]*Awunor NS,* [2]*Isah EC*

ABSTRACT

Introduction: This study sought to determine the prevalence of hypertension, diabetes mellitus, obesity and other cardiovascular risk factors among factory workers in beverage industries in Edo State, Southern Nigeria.

Materials and methods: An analytical cross sectional study was carried out among 349 respondents (201 respondents in the bottling Industry and 148 respondents in the brewing Industry), using researcher-administered questionnaires, observational checklist and an in-depth interview guide. Data was analyzed using SPSS version 16.0 and STATCALC with results presented in tabular form.

Results: Majority of the respondents fell within the age range 25-34 years. The mean ages of respondents for respective industries were; bottling 30.2 (±7.9) and brewing 39.8 (±12.2) years. Majority of respondents were male (92.8%). This survey reported a prevalence of hypertension as 98 (28.1%), diabetes mellitus 5 (1.4%) and obesity 29 (8.3%). One hundred and seventy one (49%) respondents regularly took alcohol, 5.4% of respondents smoked cigarettes while 56.2% were involved in regular exercise. Pre-employment medical examination was reported by 53.0% of respondents. Recreational facilities were absent in both industries.

Conclusion: This study has highlighted the prevalence of hypertension, diabetes mellitus and obesity in the beverage industries in Edo State, Nigeria; and the need to implement NCD control strategies in the beverage industry.

Keywords: *Hypertension, diabetes mellitus, obesity, beverage Industries, Benin City*

Correspondence: *Awunor NS [1]Department of Community Medicine, College of Health Sciences, Delta State University, Abraka, Nigeria;*

INTRODUCTION

The increasing prevalence of non-communicable diseases (NCDs) in developing countries in addition to the unsatisfactory level of control of infectious diseases should be a cause for grave concern to the health authorities in Nigeria. The World Health Organisation has increasingly brought to the fore the rising global prevalence of NCDs and which has become the leading cause of death in some western countries[1].

NCDs such as cardiovascular diseases, diabetes mellitus and obesity cannot be conveniently wished away as simply a problem of developed economies. The adoption of western lifestyles and diet, increasing physical inactivity, alcohol consumption and a poor culture of health checks predispose the populace to an increased risk of developing cardiovascular diseases[2-5]. This becomes increasingly worrisome given the weak state of the health delivery systems in Nigeria, poor disease surveillance activities especially for NCD and a slowly responsive national health management information system to integrate health information[6,7].

The prevalence of hypertension as reported by various surveys in Nigeria according to a review by Ogah et al[8] ranges from 8-46.8% depending on the study target population, type of measurement and cut off values. Other studies also fall within this range [9-10]. The prevalence of obesity in Nigeria ranged from 8.1- 22.2%[11,12] while that of diabetes mellitus ranged from 2.2-6.8%[13,14].

Most control programmes using the framework of primary health care target communities where

the people live, however, a significant segment of the population can best be reached where they work. The industrial workplace, therefore, offers an opportunity for appropriate health initiatives to be carried out and these targeted health promotional activities can help to reduce the burden of non- communicable diseases within the workforce[15]. Published studies in the beverage industry on prevalence of non-communicable diseases are scarce and baseline data will be needed to adequately plan for the health needs of these factory workers.

This study sought to determine the prevalence of hypertension, diabetes mellitus, obesity and other cardiovascular risk factors among factory workers in the beverage industries in Edo State.

Materials and methods

The study was carried out in Benin City, Edo State, Southern Nigeria. Factory workers in a bottling (Nigerian Bottling Company PLC) and a brewing (Bendel Breweries Limited) industry in Edo state were studied. The survey was an analytical cross-sectional study. The total population of respondents available and who consented to the study was used.

Data was collected using a pre-tested, structured questionnaire. Anthropometric measurements was done for height using a portable light weight stadiometer measuring range 6-78 inches (15-195cm) and graduations in 1/8 inch (1mm) with respondent barefoot, feet together and looking ahead. Body weight was measured in kilograms using weighing scale with maximum capacity of 150kg in divisions of 100 grams with respondents standing upright, without shoes and in light clothing after standardizing. Body mass index was computed as weight in kilogram divided by height in metres squared. Indices were categorized as underweight (<18.5), normal weight (18.5-24.9), overweight (25.0-29.9) and obese (≥ 30.0)[15].

Blood pressure measurement was done using an OMRON M2 basic digital automatic blood pressure monitor with accuracy of calibration at ±3mmHg and a range of measurement of 0-299mmHg. Two measurements were taken at least 15minutes apart (first at the start of the interview between 3-5 minutes of the respondent sitting for the interview and then towards the end of the interview at the point when other physical measurements were taken). The lower cuff was approximately 2cm above the elbow, measurement was taken with the cuff covering about three quarters of the left arm. Two blood pressure readings were taken and the mean of the two readings recorded as the individual's blood pressure measurement. The respondents were classified using the WHO-ISH criteria for grading blood pressure. Elevated blood pressure was taken as ≥140 / ≥90 mmHg following the American Heart Association recommendation to determine prevalence[16] of hypertension. Random blood glucose measurements was taken from the eligible respondents all of whom gave their consent (as the researcher could not guarantee a fast among the factory workers during the course of the survey) using the ACCU CHEK^{R} Active blood glucose monitoring system with a measuring range from 10-600mg/dl (0.6-33.3mmol/L) and following standard precautions. The test strip was inserted with the silver coloured bars facing up and toward the meter (meter would turn on automatically). The researcher and his assistants wore disposable latex hand gloves then verified that the code on the meter display matched the code on the test strip vial. A sample was obtained by pricking the side of the finger tip, after cleaning the site with methylated spirit and cotton wool, gently with a lancet using standard precautions until a drop of blood formed. When the blood drop symbol flashed on the display the drop of blood was touched and held to the edge of test strip (to make sure all the yellow area was filled). The result was then read. Sharps were disposed in a safety box while disposable hand gloves and spirit swab was disposed in a lined plastic bin. Respondents were then classified using the WHO criteria into normal (<140mg/dL), impaired glucose tolerance (141-199mg/dL) and diabetes mellitus (≥200mg/dL).

Data was analyzed using SPSS version 16.0 and STATCALC. Results were reported in statements and frequency tables. Statistical significance was set at $p<0.05$, the odds ratio for presence of risk

factors for cardiovascular disease in both industries were significant where the 95% confidence interval was not inclusive of 1.0.

An in-depth interview was conducted with respective human resources managers in both Industries using an interview guide. An observational checklist was used to inspect the workplace. A written informed consent form was attached to each of the questionnaires which was signed by respondents after full explanation of the purpose of the study by the researcher or research assistant. Respondents were duly informed on the voluntary nature of participation in the study. No token or inducement was given to respondents who agreed to take part in the study. Permission was sought and obtained from the management of the respective beverage industries who participated in the study. Institutional clearance was obtained from the University of Benin Teaching Hospital Ethics and Research Committee. All respondents voluntarily agreed to participate in screening for hypertension, diabetes mellitus and obesity. Respondents with abnormal readings were counseled and promptly referred to the Industry clinic or the University of Benin Teaching Hospital for further medical care.

Results

Three hundred and forty nine respondents drawn from the bottling (201) and brewing (148) Industry participated in the study. Most respondents fell within the age range 25-34 years (41.0%). Majority of respondents were male (92.8%), most were married (51.9%), most had a tertiary level of education (55.6%). (Table 1)

Table I: Socio-demographic characteristics of respondents

Variable	Industry		Total	χ^2 / p-value
	Bottling N=201 n (%)	Brewing N=148 n (%)	(N=349) n (%)	
Age (years)				
15-24	49 (24.4)	20 (13.5)	69 (19.8)	
25-34	113 (56.2)	30 (20.3)	143 (41.0)	
35-44	22 (10.9)	43 (29.1)	65 (18.6)	85.25/ 0.001*
45-54	15 (7.5)	31 (20.9)	46 (13.2)	
>55	2 (1.0)	24 (16.3)	26 (7.4)	
Mean(SD) (t/pvalue)	30.19(±7.9)	39.83(±12.2)		t= 0.59/ 0.553
Sex				
Male	190 (94.5)	134 (90.5)	324 (92.8)	
Female	11 (5.5)	14 (9.5)	25 (7.2)	2.04/ 0.153
Marital status				
Single	117 (58.2)	51 (34.5)	168 (48.1)	19.26/ 0.001*
Married	84 (41.8)	97 (65.5)	181 (51.9)	
Level of education				
Primary	12(6.0)	22 (16.3)	34 (9.7)	
Secondary	54 (26.9)	66 (45.2)	121 (34.7)	26.82/ 0.001*
Tertiary	135 (67.1)	58 (39.2)	194 (55.6)	

*Significant

Among respondents, the prevalence of hypertension was 98 (28.1%), the prevalence of diabetes mellitus was 5 (1.4%), while that of obesity was29 (8.3%). (Table 2)

The survey showed that 18 (5.4%) of respondents were smokers, 171 (49%) took alcohol regularly while 196 (56.2%) were involved in regular exercise/ sporting activity (i.e jogging, brisk walking and football).(Table 2).

The presence of risk factors for developing cardiovascular disease was lower in the bottling industry, this was statistically significant [OR s) (95%CI)] for; Obesity 0.42 (0.19-0.91), Age (>45 years) 0.16 (0.09-0.28) and regular alcohol intake 0.31 (0.19-0.47). (Table 2).

One hundred and eighty five (53.0%) of respondents had a pre-employment medical examination. Twenty (5.7%) of the respondents claimed to have been previously diagnosed (past medical history) as being hypertensive, diabetic or both.

There were no recreational facilities observed in both industries.

Table II: Hypertension, diabetes mellitus, obesity and select risk factors for cardiovascular diseases among respondents

Risk factor	Industry				Total		Odds Ratio
	Bottling (n=201)		Brewing (n=148)		(N=349)		(95% CI)
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	
Hypertension	53 (26.3)	148 (73.3)	45 (30.4)	103 (69.6)	98 (28.1)	251 (71.9)	0.82 (0.51-1.31)
Diabetes mellitus	1 (0.5)	200 (99.5)	4 (2.7)	144 (97.3)	5 (1.4)	344 (98.6)	0.18 (0.02-1.62)
Obesity	11 (5.5)	190 (94.5)	18 (12.2)	130 (87.8)	29 (8.3)	320 (91.7)	0.42 (0.19-0.91)*
Age (>45years)	17 (8.5)	184 (91.5)	55 (27.4)	93 (72.6)	72 (20.6)	277 (79.4)	0.16 (0.09-0.28)*
Alcohol intake	74 (36.8)	127 (96.0)	97(66.9)	51 (33.1)	171(49.0)	178(51.0)	0.31 (0.19-0.47)*
Cigarette smoking	8 (4.0)	193 (96.0)	11 (7.4)	137 (92.6)	18 (5.4)	330 (94.5)	0.52 (0.20-1.32)
Exercise	116 (57.7)	85 (42.3)	80 (54.0)	68 (46.0)	196 (56.1)	153(43.8)	1.16 (0.76-1.77)

**Significant*

Discussion

The rising prevalence of non-communicable diseases in middle and low income countries remains a cause for concern. In the midst of weak health systems and low budgetary allocation to health care, the industrial workforce could be better served by strengthening occupational health services especially in the area of health promotion and disease control. The beverage industry offers an insight into the burden of hypertension, diabetes mellitus and obesity in workplace settings with a closer relevance to the general population. The national policy on occupational health and safety seeks to create a framework for the improvement of working conditions and working environment in Nigeria[15]. However, in the absence of health screening programmes and periodic surveys it will be near impossible to adequately plan for the health of the working population.

Barely above half (53%) of the factory workers had a pre-employment medical examination. Pre-employment medical examination provides a baseline on workers' health and can serve to alert on major deviations over time in worker's health.

The prevalence of hypertension in this study was similar to that derived from a systematic review of previous surveys in Nigeria[8-10].The prevalence of diabetes mellitus[13] and obesity[11] in the beverage industries, however, was lower than the national prevalence. The healthy worker effect would predict a lower prevalence for hypertension, diabetes mellitus and obesity in this group compared to the general population.

Both industries lacked recreational facilities, the presence of recreational facilities though not a guarantee of their use, is simply a step in the right direction for workplace health promotion, this is a culture still lacking in the planning and design of industries in developing countries like Nigeria. Whereas adequate nutrition, regular exercise and recreation all play a role in reducing the prevalence of cardiovascular diseases; cigarette smoking, physical inactivity, alcohol and obesity are known risk factors for son developing cardiovascular diseases. Interventions should thus target these risk factors. Inter industry comparison showed that the brewing industry with a higher mean age, proportion of respondents who took alcohol, level of inactivity and obesity (all risk factors to developing cardiovascular diseases) had a higher proportion of respondents screened as hypertensive. Further studies could establish factors determining interindustry variation to make interventions more specific.

While the physical nature of the factory work might offer some protection in preventing cardiovascular diseases, unhealthy lifestyle choices such as excessive alcoholic intake and cigarette smoking can counter-balance the erstwhile benefits derivable from exercise. Hypertension like most non-communicable diseases is insidious in onset and unless screened for might only be detected when complications and end organ damage sets in. Industries and other corporate organizations should deliberately create awareness on the need for periodic health checks. The national policy on occupational health and safety advocates the setting up a health and safety committee in each industry, this should be enforced[15]. A day, three days or one week in a year, as deemed appropriate by the respective industries could be set aside for occupational health and safety awareness programmes. These Industries by adapting such health promotion programmes will be proactive in detecting (and controlling) these non-communicable diseases of public health importance; thereby improving the health and productivity of the workforce.

Pre-employment, periodic, post-illness medical examination and health promotion activities should be the norm in both industries. Appropriate preventive and disease control measures should be put in place to maintain a healthy and productive workforce. Health surveillance activities by state health authorities could also target workplace health service settings to obtain relevant health information where available for proper occupational health planning.

References

1. World Health Organisation. Factsheet: Non communicable diseases. March 2013.
2. Ogunleye OO, Ogundele SO, Akinyemi JO, Ogbera AO. Clustering of hypertension, diabetes mellitus and dyslipidemia in a Nigerian population: a cross sectional study. *Afr J Med MedSci* 2012; 41(2): 191-5.
3. Oladapo OO, Salako L, Sodiq O, Shoyinka K, Adedapo K, *et al.* A prevalence of cardiometabolic risk factors among a rural Yoruba South Western Nigerian population: a population based survey. *Cardiovasc J Afr.* 2010; 21 (1): 26-31.
4. Akinboboye O, Idris O, Akinboboye O, Akinkugbe O. Trends in coronary artery disease and associated risk factors in Sub-Saharan Africans. *Journal of Human Hypertension.* 2003; 17: 381-7
5. World Health Organisation. Obesity: prevention and managing the global epidemic. Report of a *WHO Technical Report Series.* 894. Geneva: World Health Organisation. 2000.
6. Federal Ministry of Health. National policy on integrated disease surveillance and response (IDSR). Abuja, FMOH.
7. Ofili AN, Ugwu EN, Ziregbe A, Richards R, Salami S. Knowledge of disease notification among doctors in government hospitals in Benin City, Edo State Public Health. 2003; 117: 214-217.
8. Ogah OS, Okpechi I, Chukwu II, Akinyemi JO, Onwubere BJC,*et al.* Blood pressure, prevalence of hypertension and hypertension related complications. *World J Cardiol.* 2012; 4(12): 327-340.
9. Ekwunife OI, Aguwa CN. A meta-analysis of prevalence rate of hypertension in Nigerian populations. *Journal of Public Health and Epidemiology*. 2011; 3 (13): 604 607.
10. Ofili AN, Omuemu VO. The Knowledge and prevalence of risk factors for hypertension among workers in the banking Industry in Benin City, Edo State, Nigeria. *The Tropical Journal of Health Sciences.* 2005; 12 (1): 26 30).
11. Chukwunonye II, Chukwu A, John C , Ohagwu KA, Imoh ME, *et al.* Prevalence of overweight and obesity in Nigerians- a systematic review. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy* 2013; 6: 43-47.
12. World Health Organisation. Obesity: prevention and managing the global epidemic. Report of a WHO Technical Report Series. 894. Geneva: World Health Organisation. 2000.
13. Mbanya J, Ramiaya K. Diabtes mellitus disease and mortality in Sub-Saharan Africa. 2003.Available @Http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi? book=dmssa&part=A1764 accessed on 19/06/10.
14. Nyenwe EA, Odia OJ, Ihekwaba AE, Ojule A, Babatunde S. Type 2 diabetes in adult Nigerians: a study of its prevalence and risk factors in Port Harcourt, Nigeria. *Diabetes Res ClinPract.* 2003; 62(3): 177-85.
15. Federal Ministry of Labour. National policy on occupational safety and health. 2006
16. National health and nutrition examination survey (NHANES) III. Body measurements (anthropometry) manual available from: www.cdc.gov/nchs/data/nhanes3/cdrom-/nchs/manual/anthro.pdf (cited 14/09/2010 1400hrs)
17. Pickering TG, Hall JE, Appel W, Falkner BE, Graves J, *et al.* Recommendations for blood pressure measurements in humans and experimental animals: part 1: blood pressure measurements in humans: a statement for professional and public education of the American Heart Association Council on high blood pressure research. Hypertension. 2005; 45: 142 61.

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