ORIGINAL ARTICLE

Non-communicable diseases among prison inmates in North-West Nigeria

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ABSTRACT

Background: There is paucity of data on prevalence of non-communicable diseases in prison inmates. The aim of the study was to determine the prevalence and pattern of non-communicable diseases in inmates of Sokoto Central Prison, North-West Nigeria.

Methodology: Cross-sectional descriptive study was carried out. Interviewer-administered questionnaire was used to obtain demographic data. Height, weight and blood pressure were measured following standard guidelines, and casual blood glucose was obtained in all the inmates.

Results: The mean (SD) age was 31.2 (9.7)years with age range 18-82years. Of the 373 inmates screened, 60 (16.1%) inmates were found to have systemic hypertension, 2 (0.5%) diabetes mellitus, 16 (4.3%) obesity and 24 (6.4%) underweight.

Conclusion: The prevalence of non-communicable diseases, especially hypertension in Nigerian prison is high. There is the need for health policy makers and other stakeholders to come up with strategies aimed at reducing the burden of diseases in Nigerian prisons.

Keywords: *Health policy, males, systemic hypertension, underweight*

DISCLOSURES: NONE

INTRODUCTION

Prisons are most often characterized by overcrowding and poor environmental hygiene.[1,2] Prison inmates are known to have increased rates of infectious diseases such as hepatitis, *Human Immunodeficiency Virus (*HIV), skin diseases, etc.[3,4,5] This can be attributed to overcrowding, poor environmental hygiene and delay in medical treatment.[6] They are also reported to have high levels of psychiatric disorders such as schizophrenia and substance abuse.[6] However, there is paucity of data on prevalence of non-communicable diseases (NCD) in prison inmates in Nigeria. The prevalence of NCD in prisons varies widely across the world.[7,8] High income countries like United States of America, USA and United Kingdom, UK have high prevalence of NCD in the prisons while low income countries like Cambodia and Bangladesh have low prevalence of NCD in the prisons.[8]

The aim of the study was to determine the prevalence and pattern of NCDs in inmates of Sokoto Central Prison, North-West Nigeria.

METHODOLOGY

This is a cross-sectional descriptive study that was carried out at the Central Prison Sokoto, North-West Nigeria, during a free medical screening exercise organised by the Nigerian Medical Association. All inmates were eligible for enrolment for the study. Trained research assistants consisting of doctors, medical students and laboratory technologists administered the questionnaires and obtained the measurements, including collection of blood samples.

The interviewer-administered questionnaire was used to obtain demographic data. Physical measurements were done following standard guidelines, and these included weight (to the nearest 0.1kg) and height to the nearest centimetre. Body mass index (BMI) was appropriately derived.[9] Blood pressure was recorded using WHO guidelines by means of an automatic blood pressure machine (*OMRON Healthcare Co; Ltd. Japan*). Capillary blood for casual blood glucose was obtained by finger pricking in all inmates, whereas, blood for assessment of levels glucose was obtained in 373 subjects. The cooperation and consent of the Prison authorities and the inmates were both obtained prior to commencement of the exercise.

Operational Definitions: Participants were diagnosed to have diabetes mellitus (DM) if they had fasting plasma glucose level (FPG) ≥7mmol/L or casual blood glucose level (CBG) ≥11.1mmol/L.[10] Overweight and generalized obesity were defined as body mass index (BMI) ≥25-29.9kg/m^2 and≥30kg/m^2 respectively.[9] Underweight is defined as BMI ≤18.5kg/m^2. Systemic hypertension was defined as systolic blood pressure ≥140mmHg and/or diastolic blood pressure ≥90mmHg.[11]

Data Management and Statistical Analysis

Statistical analysis was performed using Epi-Info version 3.3.4. Results were expressed as either mean values (standard deviation) or proportions, and comparison for statistical significance was by *t*-test for continuous variables. The level of significance was set at $p \leq 0.05$.

RESULTS

Anthropometry

Three hundred and seventy-three inmates participated in the study, consisting of 371 (99.5%) males and 2 (0.5%) females. The mean (SD) age was 31.2 (9.7) years with age range was 18-82years.

For the anthropometric characteristics and plasma glucose values of the inmates, *see Table 1*.

Table 1. Anthropometric characteristics and plasma glucose values of the inmates

Variable	**Mean (SD)**			
	All	**Male**	**Female**	***p-value***
Number(%)	373 (100)	371 (99.5)	2 (0.5)	
Weight (*kg*)	67.4 (10.2)	67.2 (10.0)	97.5 (9.1)	<0.001
Height (*cm*)	170.6 (6.1)	170.6 (6.0)	158.5(3.5)	<0.001
BMI (*kg/m^2*)	23.4 (3.6)	23.3 (3.4)	39.1(5.8)	<0.001
SBP (*mmHg*)	127.8(16.6)	127.8(16.6)	140.5(9.2)	0.28
DBP (*mmHg*)	72.5(12.4)	72.0(12.2)	82.5(3.5)	0.23
Plasma glucose (*mmol/l*)	5.7 (1.9)	5.7 (1.8)	6.94 (0.6)	0.361

BMI - Body Mass Index; DBP - Diastolic Blood Pressure; SBP - Systolic Blood Pressure

The females had significantly higher BMI and weight, and also, higher plasma glucose and blood pressure, as shown in Table 1.

Disease Prevalence

Of the 373 inmates screened, 60 (16.1%) were found to have systemic hypertension, 2 (0.5%) diabetes mellitus, 16 (4.3%) obesity and 24 (6.4%) underweight. Eighty (21.4%) inmates had at least one chronic medical disease. The distribution of diseases according to the prevalence is demonstrated in Table 2.

Table 2. Distribution of diseases

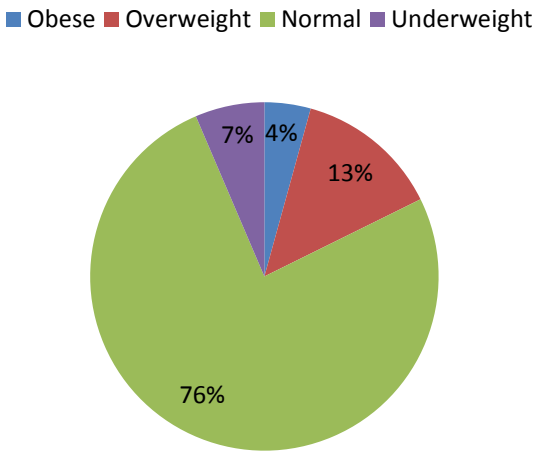
Disease	No. (n)	Prevalence (%)
Hypertension	60	16.1
Diabetes mellitus	2	0.5
Obesity	16	4.3
Overweight	50	13.4
Underweight	24	6.4

The most common NCD was systemic hypertension.

BMI Category

The distribution of inmates according to BMI category is as shown in Figure 1.

Figure 1. Pie chart showing distribution according to BMI category



Majority (76%) had normal BMI, while 4%, 7% and 13% were obese, underweight and overweight, respectively.

DISCUSSION

Non-communicable diseases (NCDs) are increasing globally as evidenced by increased prevalence of hypertension, heart disease, diabetes mellitus, stroke and cancer.[7,8] Hypertension, which is a major risk factor for cardiovascular disease, was found to be common among prison inmates in this study with a prevalence of 16%. This is consistent with other studies that show high prevalence of hypertension in prison inmates.[12,13,14] The high prevalence of hypertension may be related to exposure to hostility, stressful environment and high illicit drugs consumption.

The 6.4% prevalence of sub-optimal weight is higher than the 5.4% previously reported in the general population of the State. Obesity and overweight were also found to be 4.3% and 13%, respectively.[15] These are lower than the 6.7% and 31.4% for obesity and overweight reported previously in the urban population of Sokoto where the prison is located.[15] The increased prevalence of underweight, and lower prevalence of obesity among the prison inmates, when compared to the general public may be due to inadequate feeding.

In many prisons across the world, food is scarce and prisoners are provided with insufficient calories or nutrients.[16,17] The dietary requirement of prisoners in developing countries is usually ignored because of economic difficulties and general dislike for prisoners. Our finding is in accordance with the meta-analysis of BMI data from worldwide prisoners' population which showed that BMI of prisoners was less than in the normal population of similar age and sex.[18]

The 0.5% prevalence of diabetes mellitus is lower than the 4.6% previously reported in the urban population of the state.[15] The low prevalence of diabetes mellitus among inmates can be attributed to the low risk factors for diabetes mellitus in Nigerian prisons. The prisons are associated with increased physical activities, low calories and decreased obesity.[17]

This study shows that a significant number of prisoners have NCDs, especially systemic hypertension. There is, therefore, the need to implement appropriate management of these diseases because, ultimately, most of them will return to the society to add to the burden of disease.

The main limitations of this study are related to the cross-sectional design which clearly impairs the extrapolation of conclusions. Screening for other NCDs such as cancer and dyslipidemia was not done.

CONCLUSION

The prevalence of NCDs, especially hypertension, in this Nigerian prison is high which is consistent with the observation from other countries. There is, therefore, the need for prison authorities to embark on health education of prison inmates and for health policy makers and other stakeholders to come up with strategies aimed at reducing the burden of hypertension in Nigerian prisons.

REFERENCES

1. Walmsley R. World prison population list. 8th ed. Home Office Research Development and Statistics Directorate: International Centre for Prison Studies. London: KCL 2009.
2. Moller L, Stover H, Jurgens R, *et al*. Health inprisons: A WHO guide to the essentials in prison health. Geneva; World Health Organization 2007.
3. Dumont DM, Brockmann B, Dickman S,*et al*. Public Health and the Epidemic of Incarceration. *Annu Rev Public Health* 2012; 33:325–339.
4. Freudenberg N. Jails, Prisons and the Health of Urban Populations: A Review of the Impact of the Correctional System on Community Health. *J Urban Heal*, Bull New York Acad Med 2001; 78(2):214–235.
5. Oninla OA, Onayemi O. Skin infections and infestations in prison inmates. *International Journal of Dermatology* 2012; 51: 178–181.
6. Andersen HS. Mental health in prison populations. A review – with special emphasis on a study of Danish prisoners on remand. *ActaPsychiatricaScandinavica*2004; 110:5–59.
7. Herbert K, Plugge E, Foster C, *et al*. Prevalence of risk factors for non-communicable diseases in prison populations worldwide: a systematic review. *Lancet* 2012; 6736(12):1–8.
8. Fazel S, Baillargeon J. The health of prisoners. *Lancet* Elsevier Ltd 2011; 377(9769):956–965.
9. National Institutes of Health, National Heart, Lung and Blood Institute. Clinical guidelines on the identification, evaluation and treatment of overweight and obesity in adults: the evidence report. *Obes Res* 1998; 6(*Suppl 2*):51S–209S.
10. World Health Organization Definition, Diagnosis and classification of Diabetes Mellitus: Report of a WHO Consultation, Geneva, Switzerland: WHO Publication. WHO/NCD/NCS 1999: /99-2.
11. National High Blood Pressure Education Programme Coordinating Committee. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension* 2003; 42:1206-1252.
12. Hafizullah M, Fawad A, Saqib M, *et al*. Frequency of cardiovascular risk factors among prisoners. *Pak J Cardiol* 2010; 43:3-7.
13. Binswanger IA, Krueger PM, Steiner JF. Prevalence of chronic medical conditions among jail and prison inmates in the USA compared with the general population. *Journal of Epidemiology and Community Health* 2009; 63(11):912–919.
14. Harzke AJ, Baillargeon JG, Pruitt SL, *et al*. Prevalence of Chronic Medical Conditions among Inmates in the Texas Prison System. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*. 2010; 87(3):486-503.
15. Sabir AA, Isezuo SA, Ohwovoriole AE. Dysglycaemia and its risk factors in an Urban Fulani Population of Northern Nigeria. *West African Journal of Medicine* 2011; 30(5):325–330.
16. DeMontmollin D, MacPhail J, McMahon J. Outbreak of beri-beri in a prison in West Africa. *Trop Doct* 2002; 32:234–236.
17. Ogwezzi MC. From reformation to deformation: An approach towards sustainable development of the defective prison system in Nigeria. *Journal of Sustainable Development in Africa* 2011; 13:7.
18. K Herbert, E Plugge, C Foster, *et al*. Prevalence of risk factors for non-communicable diseases in prison populations worldwide: a systematic review. *The Lancet* 2012; 379:1975-1982.