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Screening for Cardio-Metabolic Risk Factors Among Student Nurses: A Cross-Sectional Study

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Abstract

Non-communicable diseases are a growing public health phenomenon in both developed and developing countries. This study examines the prevalence and correlates of cardio-metabolic risk factors among student nurses at a nursing college in East London, South Africa. The WHO STEPwise standardized questionnaire was used to collect information on socio-demographic data and behavioural characteristics (smoking, alcohol consumption, physical inactivity, and dietary intake) of 228 nursing students. Height, weight, waist circumference, blood pressure and fasting blood glucose were measured. The prevalence of overweight, obesity pre-diabetes and diabetes was 33%, 44%, 6% and 7%, respectively. Pre-hypertension and hypertension occurred in 44% and 11%, respectively. Female gender and increasing age were independent predictors of obesity. In the logistic regression model analysis, participants who were above 35 years [AOR=9.12, CI 3.37-24.68, p<0.000], female [AOR=4.10, CI 1.94-8.64, p=0.000], and do not meet the WHO sport criteria of physical activity participation [AOR=2.11, CI=1.10-4.07, p=0.025] had the likely odds of obesity. Interventions targeting physical activity and healthy lifestyle behavioural programmes to promote the health and wellness of the nursing students would improve the metabolic health of the nurses in the setting.

Keywords: cardiometabolic risk factors, nursing students, South Africa

1. Introduction

Cardiometabolic risk factors (CMRFs) are abnormal health conditions that could cause cardiovascular diseases (CVD) and cardiometabolic diseases (CMDs) (i.e. obesity and diabetes). Cardiometabolic risk factors are clusters of various factors such as tobacco use, (hypertension, dyslipidaemia, low physical activity, high fasting plasma glucose and high body mass index (BMI) (Cardiometabolic Risk Working Group, 2011). Behavioural risk factors such as tobacco use, insufficient physical activity, unhealthy diet and excessive alcohol consumption typically cluster together (Cardiometabolic Risk Working Group, 2011; Zimmet et al., 2007) to contribute to the development of various CVDs and CMDs such as hypertension, diabetes, dyslipidemia and overweight and obesity (Forket et al., 2016; Hazree et al., 2014; Heshmat et al., 2016; Nkeh-Chungag, Sekokotla, Rusike, Namugowa, & Iputo, 2015; Odunaiya, Grimmer, & Louw, 2015). Consequently, these diseases confers a higher cost to manage and treat CMDs in the future (Institute of Public Health, 2011; Mathers, & Loncar, 2006). Thus, contributing to the already strained economy, now struggling to cater for diseased people with negative impact on the productivity of the nation.

In developing countries, urbanization is increasingly the main driver responsible for the rising burden of chronic diseases, accounting for about 80% of global cardiovascular deaths) (Ali, & Crowther, 2014). The rising NCD prevalence worldwide has obvious implications, both for the affected individuals and the wider healthcare community (Hawley, Wier, Cash, Viali, Tuitele, & McGarvey, 2012). Therefore, it is important to focus on early detection and prevention of NCDs, as it is held ‘prevention is better than cure’. Worryingly, in South Africa, non-communicable diseases adds to the already strained and complex health situation resulting from the infectious disease burden, which has been stressed as one of the leading “colliding highways” of deaths; yet there is a little focus on the preventive strategies on cardio-metabolic diseases, while infectious diseases such as HIV/AIDS and tuberculosis has received tremendous attention. Scanty information exist on cardiometabolic risk factors among the young adults, especially in a nursing school setting. However, student nurses forms important asset in the

department of health, as future professional nurses. Nursing profession constitute the backbone of the department of health. Nurses as the engine of an effective health system plays a pivotal role in the health service delivery system of a nation. Nursing students, as future professional nurses, are fulcrum in educating the public on cardiovascular disease risk factors (Nyombi et al., 2016). The health system should endeavor to respond to health care needs of the country by providing preventative health services such as detection and screening programmes for NCDs. Understanding the lifestyle risk factors for cardio-metabolic diseases among students' nurses would provide insights for intervention, as lifestyle risk factors for cardiovascular diseases are potentially modifiable. Early identification and treatment of modifiable risk factors among young adults would reduce the risk of developing cardio-metabolic diseases, thus, promoting health, prolonging life and as well saving costs related to healthcare. This study examines the prevalence and correlates of cardio-metabolic risks among student nurses at a Nursing College in East London, South Africa.

2. Methodology

2.1 Sampling

This was a cross sectional, convenient sample of 228 out of the 293 student nurses who registered for a four-year diploma in general nursing science in 2017 at a Nursing College in East London, South Africa.

2.2 Research Instrument

An extract of the World Health organization (WHO) STEPwise questionnaire was used to collect demographic and socio-behavioural data (WHO, 2011).

Anthropometric measurements were taken according to the International Society for the Advancement of Kinanthropometry recommendations (Stewart, Marfell-Jones, Olds, & de Ridder, 2011). Body weight was measured in light clothing without shoes using a calibrated digital electronic weighing scale (Seca 813, Seca, UK) to the nearest 0.1 kilogramme. A calibrated vertical stadiometer (Seca Portable 217 Seca, UK) was used to measure height to the nearest 0.1 centimetre. Girths of the waist and hip was measured with a Lufkin non-extensible flexible anthropometric tape (W606PM, Rosscraft, Canada) and recorded to the nearest 0.1 centimetre. Waist circumference was taken with the participant standing, by wrapping the non- elastic tape at the level of the narrowest point between the lower costal (10th rib) border and the iliac crest. Measurement was taken after a normal breathing. Hip circumference was measured at the widest diameter of the buttocks, at the level of the greater trochanter to the nearest 0.1 cm.

Blood pressure was measure in accordance with standard protocol (Seedat, van Niekerk, Suffa, & Ralele, 2014) with a validated Microlife BP A 100Plus model blood pressure apparatus which provided an average of two readings for each participants. Participants were asked to rest in a sitting position for at least five minutes, with feet on the ground and arm supported on the table.

Fasting blood glucose test was measured with a validated ACCU-CHEK glucose monitoring apparatus in fasting state. The second sample of random blood glucose test was measured on the second day. Readings were taken to the nearest 0.1 mmol/l.

2.3 Ethical Considerations

Ethical approval for the study was obtained from the University of Fort Hare (Ref: GOO151SMKA01). Permission was sought from the Eastern Cape Provincial Department of Health and the Nursing College, where the study was carried out. Informed consent was obtained from the participant prior to data collection.

2.4 Data Analysis

Descriptive statistics (frequency counts and percentages) were used for categorical variables. Inferential statistics (bivariate and multivariate logistic regression) were used to identify the significant associated risk factors of obesity, hypertension, and diabetes and their 95% confidence regression interval (95% CI). The logistic regression was also adjusted for confounding factors to determine which of demographic variables (sex, age, level of study) and behavioural lifestyles parameters (smoking, alcohol consumption, physical, dietary intake) would independently and significantly predict the risk of developing CMRFs in participants. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed with the Statistical Package for Social Science (SPSS) version 21.0 for windows (SPSS Inc., Chicago, IL, USA).

3. Results

3.1 Tobacco Use, Alcohol Consumption and Fruit and Vegetable Consumption

The majority of the participants (212/93%) reported not smoking. Only 10(4.8%) smoke daily. Of those who

reported smoking daily, 66.6% initiated smoking at the age of 18 and above. Very few 4(3.7%) had ever used smokeless tobacco. Majority of the participants (139/61%) never consumed alcohol. Only 70/33.3% had consumed alcohol within the past 12 months. Of these, about half (49.4%) consumed alcohol in less than once a month, while 37.7% consumed alcohol for 1-3 days per month. Similarly, almost half (86/48.3%) of the participants ate fruit daily, and majority (91/61.9%) ate a serving of fruit on a typical day. About 39.7% ate vegetables daily and half of them eat one serving per day (data not shown).

3.2 Physical Activity Participation

Overall, 54.8% of the participants met WHO criteria for physical activity in the sport domain. Only participants in the age category of 21-25 years met the sports domain criteria of physical activity participation (51.6%) (data not shown).

3.3 Prevalence of Overweight and Obesity

Figure 1 presents the prevalence of overweight and obesity among the participants. About 44% and 33% of the participants were obese and overweight, respectively. The highest prevalence rate of abdominal obesity was observed in the WHTR index (74.1%). The prevalence rates by WC and WHR were 64.5% and 42.5%, respectively (Figure 2).

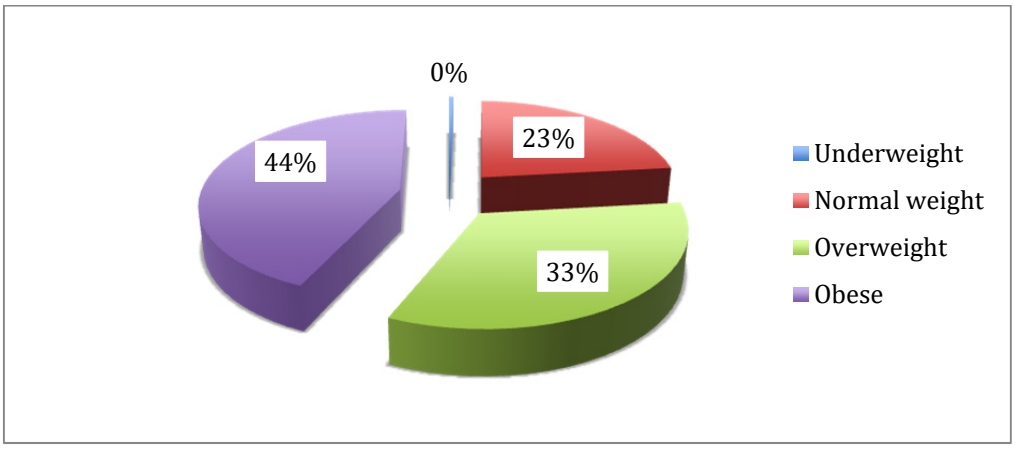
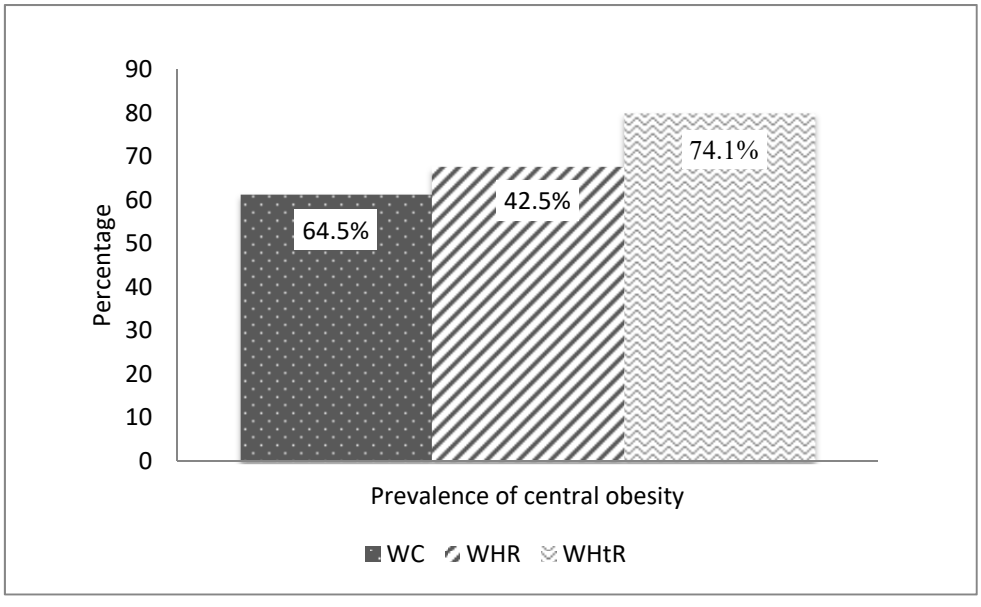


Figure 1. Prevalence of overweight and obesity



WC=Waist circumference; WHR= Waist-to-hip ratio; WHTR=Waist-to-height ratio

Figure 2. Prevalence of abdominal obesity using four anthropometric markers

3.4 Demographic and Behavioural Determinants of Obesity and Overweight

Table 1 describes the relationship between obesity and overweight relating to behavioural risk factors including use of tobacco, alcohol consumption as well as vegetable and fruit consumption. Of all the variables, alcohol use have significant (p=0.024) relationship between overweight.

Table 1. Demographic and behavioural determinants of obesity and overweight

Variables	Obese		*p-value*	Overweight		*p-value*
	No n(%)	Yes n(%)		No n(%)	Yes n(%)	
Gender						
Male	58 (78.4)	16(21.6)	0.000	41 (55.4)	33(44.6)	0.012
Female	71 (46.1)	83(53.9)		111(72.1)	43(27.9)	
Year of study						
First	30 (44.8)	37(55.2)	0.001	45 (67.2)	22(32.8)	0.628
Second	38 (67.9)	18(32.1)		35 (62.5)	21(37.5)	
Third	26 (44.1)	33(55.9)		43 (72.9)	16(27.1)	
Fourth	35 (76.1)	11(23.9)		29 (63.0)	17(37.0)	
Age (years)						
Less than 21	23 (82.1)	5 (17.9)	0.000	15 (53.6)	13(46.4)	0.055
21-25	65 (68.4)	30(31.6)		59 (62.1)	36(37.9)	
26-30	24 (50.0)	24(50.0)		33 (68.8)	15(31.3)	
31-35	10 (45.5)	12(54.5)		14 (63.6)	8 (36.4)	
36-40	4 (26.7)	11(73.3)		13 (86.7)	2 (13.3)	
Above 40	3 (15.0)	17(85.0)		18 (90.0)	2 (10.0)	
Met WHO physical activity recommendation (work domain)						
Yes	72(53.7)	62(46.3)	0.300	90 (67.2)	44(32.8)	0.849
No	57(60.6)	37(39.4)		62 (66.0)	32(34.0)	
Sports domain						
Yes	70(68.0)	33(32.0)	0.002	62 (60.2)	41(39.8)	0.060
No	59(47.2)	66(52.8)		90 (72.0)	35(28.0)	
Travel domain						
Yes	87(54.7)	72(45.3)	0.389	108(67.9)	51(32.1)	0.849
No	42(60.9)	27(39.1)		44 (63.8)	25(36.2)	
Tobacco use						
Yes	11(68.8)	5(31.3)	0.308	9 (56.3)	7 (43.8)	0.359
No	118(55.7)	94(44.3)		143(67.5)	69(32.5)	
Alcohol use						
Yes	32(62.7)	19(37.3)	0.728	27 (52.9)	24(47.1)	0.024
No	55(59.8)	37(40.2)		66 (71.7)	26(28.3)	
Meet vegetable consumption recommendation						
No	83(58.0)	60(42.0)	0.563	92(65.7)	48(34.3)	0.700
Yes	46(54.1)	39(45.9)		60(68.2)	28(31.8)	
Meet fruits consumption recommendation						
No	80(57.1)	60(42.9)	0.828	95(66.4)	48(33.6)	0.923
Yes	49(55.7)	39(44.3)		57(67.1)	28(32.9)	

In the logistic regression model analysis (Table 2), participants were at increased odds of obesity if they were 26-35 years [Adjusted Odds Ratio(AOR)=1.46, Confidence Interval (CI) 2.13-9.34, p=0.000], above 35 years [AOR=9.12, CI 3.37-24.68, p<0.000], being female [AOR=4.10, CI 1.94-8.64, p=0.000], and not meeting the WHO sport criteria of physical activity participation [AOR=2.11, CI=1.10-4.07, p=0.025].

Table 2. Logistic regression showing determinants of obesity

Variables	Beta	Wald	AOR	CI	p-value
Age (years)					
25 and below					
26-35	1.49	15.66	4.46	2.13-9.34	0.000
Above 35	2.21	18.93	9.12	3.37-24.68	0.000
Gender					
Male					
Female	1.41	13.72	4.10	1.94-8.64	0.000
Year of study					
First					
Second	-0.98	4.85	0.38	0.16-0.90	0.028
Third	0.07	0.03	1.07	0.47-2.43	0.864
Fourth	-1.53	9.29	0.22	0.08-0.58	0.002
Meet WHO sport criteria					
Yes					
No	0.75	4.99	2.11	1.10-4.07	0.025

3.5 Prevalence of Hypertension

The majority of the participants indicated having their blood pressure (BP) being measured by a health worker (207/91.6%), only few were diagnosed with raised BP (21/9.3%),12.1% diagnosed of hypertension and 5.9% were currently on antihypertensive treatment (data not shown). About 44% participants had pre-hypertension and 11% hypertensive (Figure 3).

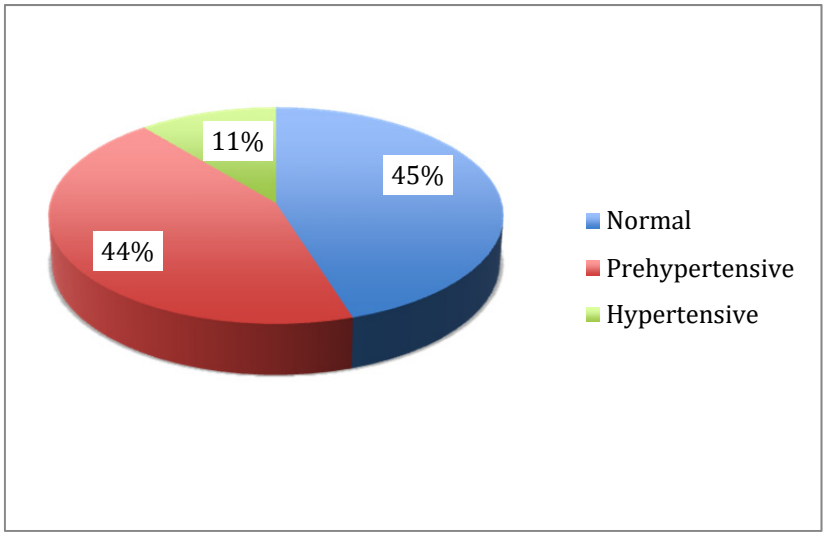


Figure 3. Hypertension prevalence (JNC 7 definition)

3.6 Demographic and Behavioural Determinants of Hypertension and Pre-Hypertension

Table 3 shows the relationship between demographic and behavioural determinants of hypertension among the participants. Of all the variables, only vegetables consumption (p=0.013) and diabetes (p=0.011) have significant relationship with hypertension.

Table 3. Demographic and behavioural determinants of hypertension and pre-hypertension

Variables	Hypertension		p-value	Pre-hypertension		p-value
	No n(%)	Yes n(%)		No n(%)	Yes n(%)	
Gender						
Male	68(91.9)	6(8.1)	0.339	39 (52.7)	35(47.3)	0.468
Female	135(87.7)	19(12.3)		89 (57.8)	65(42.2)	
Year of study						
First	60(89.6)	7(10.4)	0.559	34 (50.7)	33(49.3)	0.167
Second	50(89.3)	6(10.7)		28 (50.0)	28(50.0)	
Third	50(84.7)	9(15.3)		34 (57.6)	25(42.4)	
Fourth	43(93.5)	3(6.5)		32 (69.6)	14(30.4)	
Age (years)						
18-25	112(91.1)	11(8.9)	0.173	65(52.8)	58(47.2)	0.509
26-35	63 (90.0)	7(10.0)		41 (58.6)	29(41.4)	
Above 35	28 (80.0)	7(20.0)		22 (62.9)	13(37.1)	
Meet WHO physical activity recommendation (work domain)						
Yes	120(89.6)	14(10.4)	0.765	76 (56.7)	58(43.3)	0.834
No	83 (88.3)	11(11.7)		52 (55.3)	42(44.7)	
Sports domain						
Yes	91 (88.3)	12(11.7)	0.764	61 (59.2)	42(40.8)	0.394
No	112(89.6)	13(10.4)		67 (53.6)	58(46.4)	
Travel domain						
Yes	141(88.7)	18(11.3)	0.794	90 (56.6)	69(43.4)	0.830
No	62 (89.9)	7(10.1)		38 (55.1)	31(44.9)	
Tobacco use						
Yes	15(93.8)	1(6.3)	0.531	8 (50.0)	8 (50.0)	0.608
No	188(88.7)	24(11.3)		120(56.6)	92(43.4)	
Alcohol use						
Yes	82(92.1)	7(7.9)	0.231	47 (52.8)	42(47.2)	0.417
No	121(87.1)	18(12.9)		81 (58.3)	58(41.7)	
Meet fruit consumption recommendation						
No	125(89.3)	15(10.7)	0.879	76(54.3)	64(45.7)	0.477
Yes	78(88.6)	10(11.4)		52(59.1)	36(40.9)	
Meet vegetables consumption recommendation						
No	133(93.0)	10(7.0)	0.013	72(50.3)	71(49.7)	0.022
Yes	70(82.4)	15(17.6)		56(65.9)	29(34.1)	

General obesity						
No	118(91.5)	11(8.5)	0.179	75(58.1)	54(41.9)	0.487
Yes	85(85.9)	14(14.1)		53(53.5)	46(46.5)	
Overweight						
No	133(87.5)	19(12.5)	0.294	89(58.6)	63(41.4)	0.299
Yes	70(92.1)	6(7.9)		39(51.3)	37(48.7)	
Abdominal obesity by waist-to-hip ratio						
No	120(91.6)	11(8.4)	0.149	75(57.3)	56(42.7)	0.694
Yes	83(85.6)	14(14.4)		53(54.6)	44(45.4)	
Abdominal obesity by waist-to-height ratio						
No	56 (94.9)	3(5.1)	0.093	36 (61.0)	23(39.0)	0.381
Yes	147(87.0)	22(13.0)		92(54.4)	77(45.6)	
Abdominal obesity by WC						
No	76(93.8)	5(6.2)	0.086	47(58.0)	34(42.0)	0.670
Yes	127(86.4)	20(13.6)		81(55.1)	66(44.9)	
Pre-diabetes						
No	188(88.7)	24(11.3)	0.168	123(58.0)	89(42.0)	0.018
Yes	15(100.0)	0(0.0)		4(26.7)	11(73.3)	
Diabetes						
No	195(90.3)	21(9.7)	0.011	121(56.0)	95(44.0)	0.875
Yes	8(66.7)	4(33.3)		7(58.3)	5(41.7)	

3.7 Prevalence of Diabetes Mellitus

The majority of the participants indicated having their blood sugar being measured by a health worker (195/87.4%), only few were diagnosed with raised blood sugar (10/4.4%), 10.7% diagnosed of diabetes and 1.8% were currently on insulin treatment. Only abdominal obesity measured by waist-to-hip ration had a significant relationship between pre-diabetes. The prevalence of diabetes was pre-diabetes and diabetes was 6% and 7%, respectively (Figure 4).

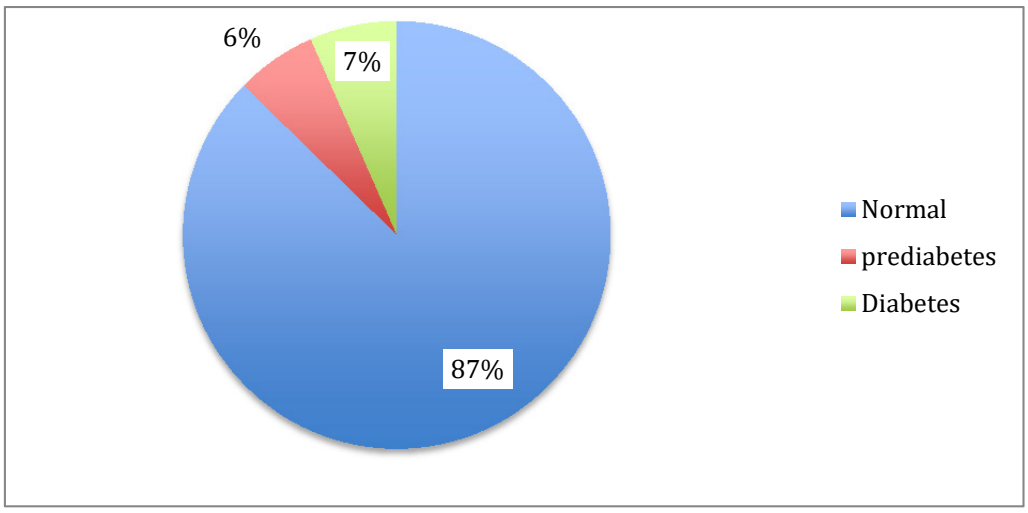


Figure 4. Prevalence of diabetes mellitus

4. Discussion

The current study sought to determine the cardio-metabolic risk factors among student nurses in a Nursing College in East London, South Africa. What is not measured remains unknown. An understanding of cardio-metabolic risks factors among this cohort of nursing students is important viewed in three perspectives: the individual's health and well-being, the nursing college's interest to foster a healthy training work force and students' potential to serve as health role models for others in the community they served; and the baseline information to inform health and policy interventions.

The prevalence of overweight and obesity among the nurses in this present study was 33% and 44%, respectively. The prevalence of overweight and obesity among the nursing students in this present study is comparable to studies determining the bodyweight of nursing and other medical students in South Africa. A study among 154 South African medical students reported 8.9% and 2.5% overweight and obesity, respectively (Morar, Seedat, Naidoo, & Desai, (1998). The prevalence rate of overweight (33%) and obesity (44%) among nursing students in this present study is also comparable to other studies reporting prevalence of overweight/obesity in South African adults' population (Cois, & Day, 2015; Nagao et al., 2013; Finucane et al., 2011; Motadi, Veldsman, Mohlala, & Mabapa, 2018; Adeboye, Bermano, & Rolland, 2012). The relatively high rate of overweight and obesity has important public health implications for health planners in South Africa. As a low-income country with a heavy burden of infectious diseases, overweight and obesity will definitely increase the financial burden on the economy. Lifestyle behaviours, such as lengthy hours of sitting in class, physical inactivity, and unhealthy diet (Lim et al., 2012) are likely reasons for the high prevalence of obesity found among the nursing students in this setting. Observably, the foods sold in the students' canteens in the nursing campus are 'millie' meal or '*magwinya'* (fat cake), rice (carbohydrates) and '*ulusu'* (internal organs of sheep and beef) (fats), and other soft and carbonated energy drinks. In addition, the rapid urbanization in South Africa has change the lifestyles and dietary habits of most South Africans both in urban and rural settings, such that people now have easy access to numerous fast food outlets, restaurants and supermarkets, and freely take decisions on what to eat. It is possible that most of the students patronize vending shops outside the nursing college settings on their way to or from their places of residence. The above anecdotal evidences should not be ignored as possible explanations for the high prevalence of overweight and obesity found among the cohort of nursing students in this study. One would expect that nursing students, by virtue of their educational training, and greater access to information, should have less rate of overweight and obesity and other health outcomes often linked to lifestyles.

Anthropometric indices measuring abdominal obesity such as WC, WHR, WHTR and WHR correlates with cardiovascular diseases and mortality (Guan, Sun, Zheng, & Hu, 2015). Overall, the prevalence of abdominal obesity by WC, WTHR and WHR was 64.5%, 74.1% and 42.5%, respectively. Consistent with other studies (Ashwell, & Gibson, 2016; Haregu, Oti, Egondi, & Kyobutungi, 2016), and irrespective of the criteria used in diagnosing abdominal obesity among our cohort participants, the findings mirrors discordant results. This indicates the difficulty and the controversy concerning the measurement of abdominal obesity using different diagnostic criteria. Among the three anthropometric indices, the prevalence of abdominal obesity was higher as measured by WHTR. Even among the general population in South Africa, the prevalence of abdominal obesity has been reported as being high (Peer, Lombard, Steyl, & Levitt, 2015; Goon, Maputle, Olukoga, Lebese, Khoza, & Mothiba, 2014).

The finding of this study indicated that only few (4.8%) of the participants smoked daily and initiated smoking at the age of 18 and above. The low level of smoking in this population could be link to the knowledge the nursing students obtained from instructional manuals about dangers of smoking, advice on quitting smoking and the smoking related health problems seen in patients by the students (Rexhepi & Mornas, 2017).

In this present study, 33.3% participants consumed alcohol within the past 12 months. Compared with other studies in South Africa and elsewhere (Kyei & Ramagoma, 2013; Chauke, van der Heever, & Hoque, 2015; Davoren, Cronin, Perry &, O'Connor, 2015) alcohol consumption among university students in this study is relatively low. Harmful alcohol use has causal relationships with many chronic diseases and new evidence is suggesting similar relationships with pneumonia, tuberculosis and HIV/AIDS (WHO, 2014). The possible reasons for the low alcohol consumption among the nursing student in this present study could attributed to serval reasons. Most students are in residence at the nursing school, away from taverns; and the school timetable is fully dotted with curricula learning activities, which might not allow time for socialisation. In addition, it is possible that the students understand the consequences of alcohol use.

In the logistic regression model analysis, participants who were above 35 years [AOR=9.12, CI 3.37-24.68, $p<0.000$], female [AOR=4.10, CI 1.94-8.64, $p=0.000$], and do not meet the WHO sport criteria of physical activity

participation [AOR=2.11, CI=1.10-4.07, p=0.025] had the likely odds of obesity. These findings are similar to previous reports in South Africa (Owolabi, Goon, Adeniyi, Adedokun, & Seekoe, 2017; Adeniyi, Longo-Mbenza, & Goon, 2015; Goon, Libalela, Amusa, & Muluvhu, 2015) and Ghana (Addo, Nyarko, Sackey, Akweongo, & Sarfo, 2015) affirming female sex, aging and physical inactivity being significant risk factors for obesity. In addition, previous studies have alluded to ageing population as one of the main driver for the epidemic of obesity in many African countries (Kandala, & Stranges, 2014; Benkeser, Biritwum, & Hill, 2012; Popkin, Adair, & Ng, 2012).

In this study, 44% of the participants had pre-hypertension and 11% hypertensive. This finding is consistent with a study conducted among Saudi Arabia medical students reporting prevalence rate of 9.3% (Tadesse, & Alemu, 2014). Similar findings are evidence among university students in Japan young adults, in which approximately 7-20% of students were hypertensive [Uchiyama, Shimizu, Nakagawa, & Tanaka, 2008). Elevated blood pressure is among leading causes of mortality and morbidity in the world, with large share of their health burden borne by low and middle – income countries (Tzoulaki, Elliot, Kontis, & Ezzati, 2016).

The prevalence of overweight and obesity in this study could be a predisposing factor to incidence of diabetes mellitus observed among our cohorts in this study, which could be possibly mediated by rapid urbanization, physical inactivity and the consumption of unhealthy diets. Diabetes mellitus is a serious metabolic disorder that poses a significant threat to the life of people, and requires interventions to reduce the burden of diabetes.

4.1 Limitations

The limitations of this study are worth noting. First, this was a cross-sectional study, and causal associations were not determined. Second, the questionnaire was self-reported; therefore, some elements of dishonesty and recall bias cannot be overruled. Finally, the cut-off points used to diagnose obesity are for different population groups, and may not necessarily suits our study population. Notwithstanding, the data was collected by an experienced professional nurse, and all the anthropometric indicators (height, weight, waist and hip circumferences), blood pressure and fasting glucose were objectively measured, and not reported, which add strength to the data. In addition, this the first study investigating the cardio-metabolic risk factors among nursing students in a nursing institution in the Eastern Cape. Thus, the study provides a baseline data on future studies concerning the metabolic health of nursing students in the setting.

5. Conclusion

The prevalence of overweight and obesity, hypertension and diabetes among the nursing students in this setting suggest the need to develop a physical activity and healthy lifestyle behavioural programme to promote the health status of the nursing students in the setting.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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