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Relationship between Perceived Body Weight and Body Mass Index among Health Care Workers in a Limited Resource Secondary Health Care Facility in North Central Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author MDG designed the study, wrote the protocol, performed statistical analysis, and wrote the first draft of the manuscript. Author MD performed statistical analysis and literature search. Authors JKAM and BAG participated in the analyses of the study and literature search. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Overweight and obesity are leading causes of preventable deaths globally and healthcare workers should educate patients and the public about the danger of obesity. This is enhanced if they have appropriate perception of their weight. We aimed to determine the relationship between perceived body weight and body mass index among healthcare workers in a secondary healthcare facility.

Study Design: Cross sectional study using stratified random sampling technique.

Place and Duration of Study: Vom Christian Hospital, a faith-based, secondary health facility in Jos South, Plateau State, North Central Nigeria, in January 2015.

Methodology: Using a structured questionnaire, socio-demographic variables, risk factors for

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overweight/obesity and participant's self-perception of weight was obtained. Actual weight status based on BMI (Kg/m^2) was calculated.

Results: Only 30 (19.4%) perceived themselves to be overweight/obese, but 86 (55.5%) were overweight/obese based on BMI. Considering self-perception as a screening test and actual BMI as gold standard, the sensitivity was 89.4%, specificity 38.2%, positive predictive value 51.6%, negative predictive value 82.9%, diagnostic accuracy 60.0%, likelihood ratio of a positive test 1.4, likelihood ratio of a negative test 0.3 and diagnostic odds 5.2. Those who practiced for ≥ 10 years (OR 3.15, CI 1.07 – 9.30) were more likely to perceive themselves to be overweight/obese; male workers were less likely to have a perception of being overweight/obese (OR 0.26, CI 0.09 – 0.78; and those who did some exercise were less likely to have a self-perception of being overweight/obese (OR 0.31, CI 0.11 – 0.88). Staff who had practiced for ≥ 10 years were more likely to be actually overweight/obese (OR 2.74, CI 1.14 – 6.60,) and male workers were less likely to be overweight/obese (OR 0.45, CI 0.21 – 0.95).

Conclusion: There was a high prevalence of overweight and obesity, and staff were five times more likely to be overweight compared to their weight self-perception.

Keywords: Body mass index; health personnel; obesity; overweight; weight perception.

1. INTRODUCTION

Overweight and obesity imply excess body adiposity which is unhealthy. Globally, 35% of the adult population, 20 years and older, are overweight and 11% obese accounting for more than 1.4 billion adults [1]. In recent times, more than one-third of African women and a quarter of African men are overweight, and the World Health Organization (WHO) predicts that this will rise to 41% and 30% respectively within the next decade [1,2]. WHO uses the Body Mass Index (BMI) to calculate overweight and obesity. BMI greater than 25 and 30 are classified as overweight and obesity respectively [3]. Obesity is a well-known risk factor for cardiovascular diseases, diabetes, some cancers, heart diseases, and sleep apnea [2]. Moreover, obesity and overweight in adulthood are associated with decreased life expectancy [2]. In contrast, the WHO defines underweight as a BMI below 18.5. Although underweight is not as commonly mentioned, especially among adults, it is unhealthy and harmful. In fact, underweight has been identified as a cause of eating disorder, mental disorder, and irregular menstruation [2].

A recent review from Nigeria indicated a prevalence of overweight/obesity between 4.0% to 49.0% and two-thirds of urban, professional, high socioeconomic cadre adults were either overweight or obese [4]. Investigators have reported a high prevalence of obesity among health workers in Jos, Ido-Ekiti, Enugu, Benin, Ogbomosho, Ibadan, Bayelsa, and Lagos, Nigeria [4]. These are occurring in a context where more than 80% of urban, professional

Nigerian adults do not meet the WHO recommendations for physical activity [4].

Health Care Workers (HCW) are considered to be well informed about risks of obesity, but studies conducted in USA, Mexico, South Africa and Nigeria have consistently found them to be disproportionately at higher risk of overweight and obesity compared to the general population [5]. HCW are susceptible to being overweight because of the stress levels experienced at work and irregular working hours [5]. Although the mechanisms are unclear, shift duty nature of the work makes them prone to metabolic disturbances.[6] Obesity is associated with early retirement, increased morbidity and mortality. Thus, obesity can reduce long-term retention of HCW in inadequately staffed health systems of developing countries [7].

Perception of body weight is the picture of our own body formed in our own mind [8]. A wrong perception of one's actual body weight and having a personal preference for a body weight that is greater than recommended, might reduce the person's motivation to lose weight and maintain healthy weight.

Actual weight and weight perceptions are influenced by food habits, environment, nutritional knowledge, cultural norms and expectations and mass media depictions of what constitutes an ideal figure, in addition to lifestyle differences affecting physical activity [9]. These factors differ from place to place, and in the black population, cultural attitudes play vital roles. African women, think that being overweight is 'beautiful and attractive' hence they view

themselves as being of normal weight, healthy or very healthy [3]. Regardless of whether a person is obese or underweight, one main aspect of weight control is behavioral change. Weight perception plays an important role in managing appropriate body weight. Weight perception can overlook overweight, obesity or underweight, thereby missing an opportunity for subjective control of weight. Thus, encouraging people to perceive weight appropriately may be an effective method for managing body weight [2,9]. HCW are professionals who should have good knowledge about health promotion and should act as health role models for their patients [3]. Therefore, gaining an understanding of the body size perceptions held by HCW has important health implications, and encouraging people to perceive their weight accurately may be an effective method for managing body weight [8].

Despite the importance of weight perception, few studies have examined the differences between weight perception and actual values and among HCW. This study was undertaken to investigate how HCW in a low resource setting perceive their weight, and to determine the agreement between their weight perception and measured BMI as a means of adopting appropriate weight management strategies among HCW, who in turn would educate the general populace.

2. MATERIALS AND METHODS

This was a cross sectional study conducted at Vom Christian Hospital, in January 2015 amongst HCW. Data was obtained from a routine medical check-up as part of health promotion activities. Vom Christian Hospital, situated in Jos South local government area of Plateau state, is a faith based hospital that provides secondary health care services. It offers health care services to the local government and surrounding communities. Using a stratified random sampling technique, hospital staff were recruited into the study.

Ethical clearance for the study was obtained from the Research and Ethics Committee of the Jos University Teaching Hospital, Jos. Written informed consent was obtained from the staff after explaining the nature and purpose of the study. Data was obtained using a structured questionnaire where participant's bio-data, self-perception to weight and actual weight using the BMI was obtained. Anthropometric measurements were recorded using a bathroom scale (Hanson) for body weight in kilograms and

a stadiometer for height in meters. BMI was then calculated as: $BMI = \text{weight (kg)} / \text{height (m)}^2$. BMI was classified according to WHO guidelines [9].

Data was analyzed using Epi info 3.5.3 statistical software (CDC, Atlanta GA) and represented as frequencies and percentages. Chi square test was used to test association between biopsychosocial demographic parameters and overweight/obesity. Logistic regression was used to ascertain determinants of overweight/obesity for self-reported weight perception and BMI measurements. Variables with bivariate relationship values of $P \leq .25$ were included in the model. Probability values of $P < .05$ were considered significant.

3. RESULTS

3.1 Description of Study Population

The study had 155 persons (87%) enrolled out of the 178 hospital workers. Most 90 (58.1%) were female, with mean age 42.3 ± 11.8 years, and range of 22 – 68 years. Majority of the participants 112 (72.3%) were married or had been married before and about half, 79 (51.0%) had a secondary school education or less. The participants' work cadre was as follows: Health service providers (HSP); Doctors, lab scientists/technicians, nurses, other clinical staff and pharmacist/pharmacy technicians totaled 64 (41.3%) while health management and support workers; Attendants and 'support staff' were 91 (58.7%). The study population had 84 (54.2%) who had practiced for not more than 10 years. Other baseline study characteristics are shown in Table 1.

3.2 Overweight/Obesity Prevalence, Risk Factors, Bivariate and Multivariate Analysis

Although 30 (19.4%) were overweight/obese based on self-perceived weight status, 86 (55.5%) were overweight/obese based on BMI. The age group with the highest number of overweight/obese persons based on self-perception were those in their fifties, 12 (29.4%), while those in their twenties had the lowest 0 (0.0%). Similarly, the age group with the highest number of overweight/obese persons based on BMI were those in their sixties and lowest, those in their twenties. Overweight/obesity was higher among females both based on BMI 55 (61.1%), and self-perception 25 (27.8%). Those who were

married, had more than 10 years practice experience, HMSW, and those that did not have more than a secondary school education were more overweight/obese than their matched pairs. Prevalence of hypertension was higher (36%) among those who perceived their weights as normal vs (30.4%) those who were normal weight based on BMI. Similarly, the prevalence of Diabetes mellitus was higher (7.2%) among those who perceived their weight as normal compared to (2.9%) those who were normal weight. See Table 2 for details.

Table 1. Characteristics of study population

Variables	N =155	Percentage %
Age (Years)		
20 – 29	24	15.5
30 – 39	41	26.5
40 – 49	43	27.7
50 – 59	34	21.9
60 – 69	13	8.4
Sex		
Male	65	41.9
Female	90	58.1
Marital Status		
Married	112	72.3
Separated	5	3.2
Single	22	14.2
Widow/Widower	16	10.3
Years in practice		
0 – 9	77	49.7
10 – 19	32	20.6
20 – 29	16	10.3
≥ 30	30	19.4
Work Cadre		
Health Management Support	91	58.7
Health Service Provider	64	41.3
Educational Qualification		
Primary	53	34.2
Secondary	26	16.8
Tertiary	76	49.0
Do you exercise		
No	84	54.2
Yes	71	45.8

Multivariate analysis showed that years in practice ≥ 10 years (OR 3.15, CI 1.07 – 9.30, $P = .04$), being male (OR 0.26 CI 0.09 – 0.78, $P = .02$) and participating in some exercise (OR 0.31, CI 0.11 – 0.88, $P = .03$) had a significant relationship with being self-perceived as overweight/obese. Also, years in practice ≥ 10 years (OR 2.61, CI 1.14 – 5.97, $P = .02$) was

related to being overweight/obese based on BMI, while male gender was protective (OR 0.45, CI 0.21 – 0.95 $P = .04$). Other details are in Tables 3 and 4.

3.3 Self-perceived Weight Status as a Screening Test

When the BMI measurements were compared with self-perceived weight status, considering self-perception as a screening test, the sensitivity was 89.4%, specificity 38.2%, positive predictive value 51.6%, negative predictive value 82.9%, diagnostic accuracy 60.0%, likelihood ratio of a positive test 1.4, the likelihood ratio of a negative test 0.3 and the diagnostic odds 5.2.

4. DISCUSSION

4.1 Prevalence of, and Agreement between Overweight/Obesity Based on Self-perception and BMI

The study investigated how HCW in a low resource setting perceive their weight, and determined how matched these perceptions were to the measured BMI.

We found that 19.4% of workers perceived themselves as being overweight/obese, but 55.5% were overweight/obese based on measured BMI. Also, it was five times likely that a staff's perceived weight to the actual weight status was incorrect. The finding of misperceived weight status among HCW in this study is similar to studies carried out in South Africa where 75% of HCW were overweight but 50% of them perceived themselves to be normal weight [8]. A report from Kenya showed that prevalence of overweight and obesity among HCW was 58.8% while in Ghana it was 38.0%. These were higher than the national prevalences [1,8]. These studies agree with our findings and could be explained by the fact that HCW are usually concerned about patient care and might neglect their own health due to the irregular and long hours they work [1].

Similar studies among Nigerian university staff showed that while the prevalence of overweight/obesity was 47%, 80% considered their weight to be normal [10]. This indicates that despite differences in obesity prevalence based on geographical location, weight perception mismatch may not be directly related to the actual weight.

Among health service providers in Lagos, 27.3% reported they were obese and 72% were either overweight/obese [7]. The higher prevalence of overweight/obesity in Lagos compared to our study may be because of the cosmopolitan setting and among HSP who have higher average incomes compared to workers in a semi-urban faith-based institution.

A study among HCW at a tertiary hospital in Jos, reported the prevalence of obesity to be 23.2% and obese or overweight as 54.6% [4]. The overall prevalence (54.6%) compares closely with that obtained in this study (55.5%), even

though the previous study was in a tertiary hospital and located in the city center.

4.2 Prevalence of Hypertension and Diabetes Mellitus among Participants

HCW who were obese in this study had significant prevalence of hypertension and diabetes mellitus. A significant 51.2% of the obese/overweight compared to 30.4% of those with normal weight were hypertensive. Similarly, 8.1% of the obese/overweight were diabetic compared to 2.9% of those with normal BMI.

Table 2. Comparing perceived weight status and actual weight status (BMI) against socio-demographic and clinical variables

Variables	Perceived weight status		Actual weight status	
	Normal	Overweight/Obese	Normal	Overweight/Obese
Age (Years)				
20 – 29	24 (100.0)	0 (0.0)	19 (79.2)	5 (20.8)
30 – 39	33 (80.5)	8 (19.5)	16 (39.0)	25 (61.0)
40 – 49	33 (76.7)	10 (23.3)	18 (41.9)	25 (58.1)
50 – 59	24 (70.6)	10 (29.4)	15 (44.1)	19 (55.9)
60 – 69	11 (84.6)	2 (15.4)	1 (7.7)	12 (92.3)
Sex				
Male	60 (92.3)	5 (7.7)	34 (52.3)	31 (47.7)
Female	65 (72.2)	25 (27.8)	35 (38.9)	55 (61.1)
Marital Status				
Married	90 (80.4)	22 (19.6)	46 (41.1)	66 (58.6)
Separated	3 (60.0)	2 (40.0)	1 (20.0)	4 (80.0)
Single	21 (95.5)	1 (4.5)	18 (81.8)	4 (18.2)
Widow/Widower	11 (68.8)	5 (31.3)	4 (25.0)	12 (75.0)
Years in practice				
0 – 9	67 (87.0)	10 (13.0)	42 (54.5)	35 (45.5)
10 – 19	24 (75.0)	8 (25.0)	14 (43.8)	18 (56.3)
20 – 29	11 (68.8)	5 (31.3)	5 (31.3)	11 (68.8)
≥ 30	23 (76.7)	7 (23.3)	8 (26.7)	22 (73.3)
Work Cadre				
Health Management Support	71 (78.0)	20 (22.0)	40 (44.0)	51 (56.0)
Health Service Provider	54 (84.4)	10 (15.6)	29 (45.3)	35 (54.7)
Educational Qualification				
Primary	42 (79.2)	11 (20.8)	26 (49.1)	27 (50.9)
Secondary	21 (80.8)	5 (19.2)	9 (34.6)	17 (65.4)
Tertiary	62 (81.6)	14 (18.4)	34 (44.7)	42 (55.3)
Do you exercise				
No	60 (71.4)	24 (28.6)	34 (40.5)	50 (59.5)
Yes	65 (91.5)	6 (8.5)	35 (49.3)	36 (50.7)
Hypertension				
No	80 (88.9)	10 (11.1)	48 (53.3)	42 (46.7)
Yes	45 (69.2)	20 (30.8)	21 (32.3)	44 (67.7)
Diabetes mellitus				
No	116 (79.5)	30 (20.5)	67 (45.9)	79 (54.1)
Yes	9 (100)	0 (0.0)	2 (22.2)	7 (77.8)

Table 3. Multivariate logistic regression of risk factors for overweight/obesity based on self-perceived weight status

Variables	OR	95% CI	P
Age ≤42 years	1.39	0.46 - 4.01	.57
Years in practice ≥10 years	3.15	1.07 - 9.30	.04
Sex (Male)	0.26	0.09 - 0.78	.02
Health care provider	0.51	0.21 - 1.29	.16
Exercise	0.31	0.11 - 0.88	.03

Table 4. Multivariate logistic regression of risk factors for overweight/obesity based on actual (BMI) weight status

Variables	OR	95% CI	P
Age ≤42 years	1.05	0.46 - 2.39	.90
Exercise	0.92	0.45 - 1.88	.81
Being married	1.70	0.78 - 3.74	.18
Years in practice ≥10 years	2.61	1.14 - 5.97	.02
Sex (Male)	0.45	0.21 - 0.95	.04

The obvious implications of such significant non-communicable diseases on the cardiovascular health of HCW has been previously highlighted by other reports [6,7].

4.3 Determinants of Overweight/Obesity Based on Self-perception and BMI

The study also showed that HCW who had practiced for 10 or more years were more likely to perceive that they were overweight/obese compared to those who had less years of practice. Men were less likely to perceive that they were overweight/obese compared to women, and those who did some exercise were also less likely to feel they were overweight. For those who were overweight/obese based on BMI, HCW who had practiced for 10 years or more were more likely to be overweight/obese, while males were less likely to be overweight/obese. The number of years of practice may be related to higher income, education and older age as reported in other studies [1,7,11,12]. Most studies among HCW reported that females were significantly more overweight/obese than males with less perceiving their weight status as being overweight/obese. However, some studies reported the opposite [3,4,7]. Our finding of men being less likely to perceive they were overweight may be because females were more likely to be overweight or obese based on actual measurements in our study. Based on this general observation, the men might have therefore assumed this general rule in the case of those who misperceived their weight status.

A qualitative study in South Africa reported that overweight women, did not only underestimate their body weights, but had low perceptions of the threat of obesity, unlike obese/overweight men. Overweight women perceived being overweight as attractive while obese men desired a reduction in their weight [13,14]. This differed from our study and may suggest better health seeking behavior in the female study participants.

Our study found that those who did some exercise, were less likely to perceive that they were overweight/obese. This may be related to the fact that those who were exercising felt the exercise was reducing their weight. A previous study showed that people who did less exercise were more likely to self-perceive themselves to be overweight than those who did regular, strenuous exercise [12].

4.4 Relevance of Health Care Workers Knowing their Weight Status

HCW are expected to give advice and act as role models to their patients by following a healthy lifestyle, promoting health and preventing diseases and illnesses. However, since they themselves are often overweight or obese, they might be reluctant to discuss issues related to a healthy lifestyle with their patients. There is evidence showing that doctors who engage in regular physical activity provided better counseling and motivation to their patients [3].

In a study done from rural South – East Nigeria, prevalence of obesity was 6.0%, but only 16.3%

admitted that they were aware of their condition. Majority, 36.6% of those who were aware of their obese condition were informed by a health care worker [15]. This underscores the need for health workers in weight awareness campaigns.

In a Malaysian study among adolescents, 13.8% underestimated their weight, 35.0% overestimated, and 51.2% correctly judged their own weight [16]. The overall appropriateness of weight control practices was 72.6%.

HCW attempting to lose or gain weight need to have understanding towards desirable behavior changes [16]. Studies have found that individuals move through a series of stages called the stages of change (SOC) when trying to modify their health behavior. The Transtheoretical Model posits five or six stages to describe the process of change in health behaviors, each of which is characterized by distinctive practices and motives that reflect variances in individual's willingness and readiness to make a behavior change [17]. A study among an overweight and obese, medically underserved population, showed a mismatch in 20.2% of individuals. Participants who were overweight/obese and viewed themselves as overweight were more likely to be in active SOC for weight loss. Weight management interventions should therefore address weight perceptions in overweight and obese individuals especially those who are at the lower stage of change for weight loss [17].

A study among literate obese patients in primary care in Jos, Nigeria showed that in assessing their readiness to lose weight, 25.0% were pre-contemplation, 73.5% were in contemplation and only 1.5% were in the preparation stage of change [18]. Majority (73.5%) were contemplating weight loss and needed to cross over to the action stage. Counseling methods using their self-perceived weight status would therefore be helpful [8].

5. LIMITATIONS

The study was a cross sectional study as such causality cannot be inferred from the results.

6. CONCLUSION

The study revealed a high prevalence of obesity and overweight, and HCW were five times more likely to be overweight compared to their weight perception. This calls on physicians managing HCWs to be deliberate in instituting weight

measurement to identify the overweight/obese. Educational programs targeted at health workers should bear in mind that they would most likely have a mismatch between their actual weights and their self-perception.

CONSENT

All authors declare that written informed consent was obtained from the study participants.

ETHICAL APPROVAL

All authors confirm that ethical approval was obtained from the Research and Ethics Committee of Jos University Teaching Hospital.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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