Prevalence of Obesity among Adult Surgical Patients in Tobago

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ABSTRACT

Objective: To estimate the prevalence of obesity among adult surgical patients in Tobago.

Methods: Patients aged 18 and over who had surgery at the Scarborough General Hospital were studied. Demographic data of age, gender, weight and height were collected from the anaesthesia records. Obesity was assessed using body mass index (BMI) calculated as weight in kilograms divided by the square of height in metres (kg/m^2). The World Health Organization (WHO) classification was used with obesity defined as BMI $\geq$ 30 kg/m^2, overweight as BMI $\geq$ 25–29.9 and normal weight as BMI $\geq$ 18.5–24.9.

Results: Data from 799 patients (214 [26.8%] male, 585[73.2%] female) were analysed. They had a mean age ± SD of 44.5 ± 15 years, median age of 42 year and a range of 18–97 year. Their mean BMI ± SD was 30.6 ± 8.15 (male 27.6 ± 7; female 31.7 ± 8.3). Two percent were underweight, 21% were normal weight, 32% were overweight and 45% were obese. A greater proportion of females were in the higher BMI categories compared with males. More than half of the females were obese (52%) compared to just over a third of the males (26%).

Conclusion: Overweight and obesity are common among adult surgical patients in Tobago and the prevalence is higher in females.

Keywords: Body mass index, Caribbean, obesity, surgery, surgical patients, Tobago

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INTRODUCTION

The World Health Organization (WHO) defines obesity and overweight as excessive body fat accumulation that may impair health (1, 2). The prevalence of obesity has been increasing rapidly worldwide, with rates more than doubling in the last three decades and it is now considered a major global public health problem (1–3).

Obesity is associated with a number of chronic physical and mental health problems including diabetes, heart disease, hypertension, stroke, gallstones, osteoarthritis, dyslipidemia, obstructive sleep apnea, certain types of cancer, and psychological and behavioural problems (4–6). In addition, several surveys and reviews have shown that people who are obese are more likely to be hospitalized and to undergo surgical procedures than those who are not obese (6–9). They are also at higher risks for developing surgical-related complications as well as major adverse cardiovascular events and all-cause mortality (7–12). Apart from the pathophysiologic changes associated with overweight and obesity, there are technical challenges associated with their perioperative management such as difficulties with venous access and regional anaesthetic blocks, airway management, appropriate monitoring devices, optimal surgical access, and requirement for extra personnel and special equipment for positioning, lifting and transporting (6, 9, 11). A worrying concern is that obese persons may be denied necessary surgery because of the perceived fear of increased risks by surgeons and anaesthesiologists (13, 14). Obesity is associated with a reduced quality of life and increased morbidity and mortality and is second only to smoking as the leading cause of preventable deaths worldwide (12, 15, 16).

Obesity is commonly assessed by body mass index (BMI) which approximates a person's body fat percentage. Body mass index is a calculated value and is defined as a person's weight in kilograms divided by height in metres squared (BMI = kg/m^2).

We aimed to study the prevalence of overweight and obesity among surgical patients in Tobago, the smaller and less populated (approximately 63 000 inhabitants) of the twin-island nation of Trinidad and Tobago.

SUBJECTS AND METHODS

In Trinidad and Tobago, healthcare in public health facilities is free of charge and available to all citizens. The Scarborough General Hospital is the largest and main surgical hospital in Tobago where most of the surgical procedures on the island are done. All patients scheduled for a surgical procedure undergo an anaesthetic assessment in the preoperative anaesthetic clinic where standard demographic data including age, gender, objectively measured weight and height and vital signs are collected and recorded as part of routine clinical practice. The height, weight, age and gender data of consecutive adult patients aged ≥ 18 years who underwent surgery in 2016 were extracted from the anaesthetic record and inputted into a Microsoft Excel spreadsheet. Obstetric patients were excluded. Body mass index was calculated according to the formula, BMI = weight (kg)/height $(m)^2$ and patients were grouped according to the WHO obesity classification (1, 2): Underweight is defined as BMI < 18.5 kg/m^2, normal weight is BMI > 18.5–24.9 kg/m^2, overweight is BMI between 25.0–29.9 kg/m^2 and obesity is BMI ≥ 30 kg/m^2. The degree of obesity is often subdivided into Class I (BMI 30–34.9), Class II (BMI 35–39.9) and Class III (BMI ≥ 40).

For our study, for ease of comparison with other studies and familiarity, we subdivided the obese group into 2 classes; obesity with BMI 30.0–34.9 (equivalent to class I), and morbid obesity with BMI ≥ 35 (equivalent to class II + III). The data were analysed using descriptive statistics of mean, median, range, standard deviation and percentages as appropriate. A p-value < 0.05 was considered significant. The institution approved the study as clinical audit and informed consent was not required as this was a retrospective registry-based study.

RESULTS

We analysed data from a total of 799 patients; 214 (26.8%) were male and 585 (73.2%) were female and they had a mean age of 44.2 year ± 15.3 (SD), median age of 42 year and a range of 18–97 year. The distribution of BMI according to categories is shown in Table 1.

Table 1. Distribution of BMI according to categories

BMI Category (kg/m^2)	**Male (%)**	**Female (%)**	**Total (%)**
<18.5 [underweight]	7 (3)	7 (1)	14 (2)
18.5-24.9 [normal weight]	67 (31)	98 (17)	165 (20)
25-29.9 [overweight]	81 (38)	178 (30)	259 (31)
30-34.9 [obese]	39 (18)	141 (24)	180 (22)
≥35 [morbidly obese]	20 (10)	161(28)	181 (24)
BMI Mean± SD	27.6 ±7.0	31.7 ± 8.3	30.6 ± 8.2
BMI Range	14.5-82.5	15-117	14.6-117
Total	214 (26.8)	585 (73.2)	799

The average BMI of all our patients was 30.6 (male- 27.6, female- 31.7) and more than 3/4th (78%) of them were either overweight or obese (male-64%, female-83%). A greater proportion of females were in the higher BMI categories compared to males (Fig. 1) with females being twice as obese as males (52% *versus* 26%). More than half of the females were obese compared to just over a third of the males. Morbid obesity rate (BMI ≥ 35) was 24% overall with a higher prevalence in women (29%) compared with men (9%).

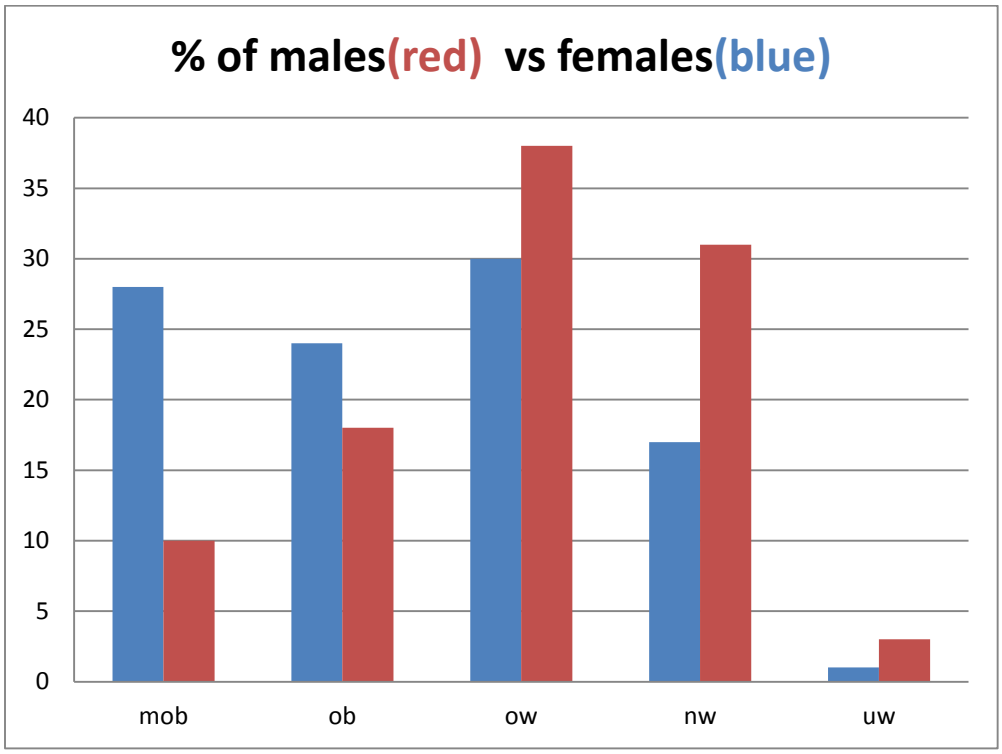

Figure 1. Comparison of males (red) versus females (blue) in percentages according to BMI categories.

Key: mob = morbidly obese; ob = obese; ow = overweight; nw = normal weight, uw = underweight

DISCUSSION

The prevalence of overweight and obesity in adult Tobagonians undergoing routine surgery is very high. In fact, it is among the highest documented prevalence worldwide as Table 2 shows.

Table 2. Comparison of prevalence of obesity among surgical patients in different countries/regions

Country	**Netherlands(10)**	**UK[a] (8)**	**UK[b] (13)**	**Benin(20)**	**Nigeria(21)**	**USA(18)**	**Tobago**
Obesity BMI≥30kg/m^2	17.3%	34.5%	20.7%	9.7%	11.4%	35.4%	46%

a = multicentre including bariatric centres; b = single centre; ( ) reference

This study is corroborated by the national survey conducted in 2011 that indicated that more than half (55.7%) of the population aged between 15 to 64 years is either overweight or obese and that a quarter (25.7%) is obese (16). As a comparison, in 2014 the WHO estimated that globally about 13% of adults aged 18 and over were obese and 39% were overweight or obese (2). This indicates that the obesity rate of Trinidad and Tobago is twice the global rate.

Our figures for BMI, obesity, and overweight and obesity combined, are consistently higher than the corresponding national figures (31.3 kg/m^2, 31%, 78% *versus* 26.5 kg/m^2, 25.7%, 55.7%, respectively). A number of reasons can be offered for this difference. One, the national survey was done in 2011 while this Tobago study was done in 2016, a half decade later. As earlier mentioned, obesity has been noted to be rapidly increasing with time due mainly to dietary and lifestyle changes (3). Secondly, Tobago is an island separate and different from its larger sister island Trinidad and the sociocultural and economic activities and ethnic mix may be different. Third, our sample is quite different from the national survey. Theirs was a nationally representative population-based survey of individuals in Trinidad and Tobago aged 15–64 years

using a stratified randomized cluster sample while ours was a sample of hospital surgical patients aged ≥ 18 years. They have a relatively younger age-group than us. Hospitalized patients have been noted to be more obese than their non-hospitalized counterparts (10, 12). Similar findings of a difference in BMI between hospitalized persons and non-hospitalized persons within the same population have been observed in other surveys from Europe and North America (8, 10–13, 18). Our findings support these studies that indicate that overweight and obese persons are overrepresented in patients who are hospitalized and who require surgery. It must be stated though that the surgical procedures performed at the major surgical hospital in Tobago do not include procedures that target obese patients such as orthopaedic joint replacement surgery or bariatric surgery for treatment of morbid obesity.

The majority of Tobagonians (> 85%) are of African ancestry, being descendants of slaves mainly from western Africa (19). It was therefore quite instructive and interesting when we compared our BMIs to the BMIs of similar surgical patients in the Republic of Benin and Nigeria, two West African countries that had major slave seaports (20, 21). There were significant similarities and differences. The main and surprising difference was that the percentage of obesity in Tobago was five times greater than that of Benin (46% *versus* 9.67%) and four times greater than that of Nigeria (11.4%) and the main similarity was that women were significantly more obese than men in all three studies. This striking gender disparity of persons of African origin is well recognized (20–22).

Several studies have shown that Africans in the diaspora are generally more overweight and obese compared to their counterparts in the homeland (22–24). This has mainly been attributed to ‘westernization and urbanization’ leading to the adoption of less healthy diets and lifestyles (3,

22–24). Interestingly, the rate of increase in obesity seems to be related to the level and stage of socio-economic development of the particular region or country. A comparative longitudinal study of BMI of persons of African descent over five years was carried out in three countries representing different levels of development as classified by the World Bank using gross national income (GNI) per capita: Nigeria (low income), Jamaica (middle) and USA (high) (25). As expected, baseline average BMIs were highest in the USA and lowest in Nigeria with Jamaica in between, but surprisingly, the annual rate of weight gain was most rapid in Jamaica (1.37 kg/year), the middle-income country compared to USA (0.52 kg/year) the high- income country and Nigeria (0.31 kg/year) the low income country (Table 3).

Table 3. Three-country obesity comparison according to Gross National Income per capita.

	Nigeria (Low-income)	**Jamaica (Middle)**	**USA (High)**
Obesity BMI $\geq$ 30kg/m^2	5%	24%	51%
Weight change (S.E) Kg/year	0.31(0.05)	1.37(0.04)	0.52(0.05)

The average weight gain/year in Jamaica was about four times that of Nigeria or the USA. This highest increase in weight gain with time has been attributed to 'the accelerating effects of the cultural and behavioural shifts' in these 'transitional societies' (22, 25).

Our findings have important clinical and policy implications. Self-perception of overweight and obesity in the Caribbean is often grossly underestimated (26, 27). Many obese persons are unaware of the severity of their obesity and its health implications and more worrisome, is the fact that greater than 50% of these obese persons state that they have never been

told about their weight problem by a clinician even when their weights had been taken during the hospital visit (26). Patients are routinely seen before their surgery by surgeons, anaesthetists and other clinicians and their data such as weight, height and BMI are usually available in their records. This is a key opportunity to educate the patient about the health risks of obesity and its control. When patients are informed about obesity and its myriad effects, they are more likely to take appropriate preventative and corrective actions.

This study also provides important information to policy-makers and public health administrators that our population is becoming less healthy. This implies increased healthcare utilization and costs and decreased productivity (5, 12, 22, 26).

Obesity fortunately is a preventable and treatable condition by readily available and proven public health methods (1, 4, 5). In this era of escalating healthcare costs and very limited resources, the importance of preventing and treating obesity cannot be overemphasized. There is an urgent need for a multidisciplinary and multifaceted approach to effectively manage this crisis (1, 22).

Author Contributions

AO Amata conceived paper, collected data, conducted data analysis, wrote manuscript and approved final version. VT Mitchell participated in study design, data analysis and interpretation, critically revised manuscript and approved final version.

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