Incidence and Prevalence of Vitamin and Micronutrient Deficiencies in a Predominantly Black Population Undergoing Bariatric Surgery

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Introduction

Obesity has continued to plague the American population and has long been considered a risk factor to many comorbidities such as hypertension (HTN), hypercholesterolemia (HC), and diabetes mellitus type II (DM). What was initially considered an issue only in high income communities is now becoming a predominant issue in urban settings.

Bariatric surgery has become the forefront treatment for sustained weight loss in patients with obesity. The most common bariatric procedures are Roux-en-Y Gastric Bypass (RYGB) and Laparoscopic Sleeve Gastrectomy (LSG). Though both procedures have shown high efficacy for weight loss, it does not come without potential complications, specifically micronutrient and protein deficiencies (MNP). Several factors contribute to MNP, like reduced caloric intake, gastric volume reduction, gastrointestinal tract bypass and malabsorption, and lack of compliance with oral supplementation. These MNP are also found in a significant proportion among an obese population before surgery. An explanation would be the lack of intake of enriched food in proteins, vitamins, minerals and fiber, and the abuse of high caloric density meals with poor nutritional value. The aim of this study was to determine the incidence and prevalence of MNP among a predominantly Black population undergoing bariatric surgeries.

Methodology

Data Source: Howard University Hospital Bariatric Data (2010-2017)

Patient Selection: Individuals that underwent bariatric surgery at Howard University Hospital that were between the ages of 18-65 years old

Patient Characteristics: Of the 584 patients reviewed, data extracted included the patient's race, type of bariatric surgery, body mass index (BMI), hemoglobin, iron, vitamin D, prealbumin blood levels, and co-morbidities including HTN, HC, DM

Outcomes: Prevalence rates of MNP deficiencies were determined preoperatively and the incidence of MNP was evaluated at 6 months postoperatively

Analysis: Differences in the outcomes of patients were evaluated using descriptive statistics

Results

Table 1: Baseline Characteristics of Patients Undergoing Bariatric Surgery, N = 584

Characteristics		n (%)
Gender	Female	483 (83)
	Male	101 (17)
Age	≤40	246 (42)
	>40	338 (58)
Race/Ethnicity	Black	539 (92)
	Non-Black	45 (8)
Weight		296 (65)*
BMI		48 (9)*
Procedure	RYGB	374 (64)
	LSG	210 (36)
Any Deficiency	Yes	353 (60)
	No	231 (40)
Insurance	Public	188 (32)
	Private	396 (68)
Comorbidities	HTN	419 (72)
	HC	143 (24)
	DM	182 (31)

*Mean (SD)

Table 2: MNP Status at 6-month follow-up among patients that WERE deficient at baseline, n=154

Deficiency	Resolved (n, %)	Unresolved (n, %)
Any n=154	32 (21)	122 (79)
Calcium n=3	2 (66)	1 (33)
Hemoglobin n=44	12 (27)	32 (73)
Iron n=24	16 (67)	8 (33)
Prealbumin n=19	0 (0)	19 (100)
Thiamine n=2	1 (50)	1 (50)
Vitamin D n=83	24 (29)	59 (71)

Table 3a. Characteristics of MNP at Baseline and 6 Months Postoperatively

	RYGB				
	Baseline		6 months		
	n	%	n	%	p-value
Any	224	60	137	73	0.002
Hemoglobin	65	18	51	29	0.003
Creatinine	20	6	20	13	0.012
Iron	49	22	20	15	0.127
Calcium	8	2	8	4	0.185
Vitamin D	166	70	87	62	0.115
Prealbumin	45	23	49	46	<0.001

Table 3b. Characteristics of MNP at Baseline and 6 Months Postoperatively

	LSG				
	Baseline		6 months		
	n	%	n	%	p-value
Any	129	61	50	64	0.785
Hemoglobin	47	22	15	23	1.000
Creatinine	11	6	6	10	0.383
Iron	22	19	6	13	0.371
Calcium	7	4	3	4	1.000
Vitamin D	94	68	29	52	0.049
Prealbumin	27	23	7	33	0.411

A total of 584 patients, predominantly Black (91%) were included. Most were female (82%), with a mean age of 43 years (SD 10). Mean preoperative BMI was 48 kg/m2, with 76.5% having associated comorbidities. LRYGB was performed in 69% of patients.

At baseline, 53% of the population presented with at least one deficiency. The most common preoperative deficiency was vitamin D noted in 69% of patients, followed by prealbumin in 24% of patients. Postoperatively, among those without any preoperative deficiency, 48% developed at least one deficiency and among those with at least one pre-existing deficiency, 60% had a persistent deficiency. Vitamin D and prealbumin were the most common de-novo and persistent deficiencies 45% and 42% and 71% and 48%, respectively. Despite the different mechanism of each type of surgery to induce nutritional deficiencies, we did not find any difference among LRYGB and LSG.

Conclusion

The incidence and prevalence of metabolic deficiencies after bariatric surgery are remarkable among the Black population. They are likely related to decreased food intake, to the physiologic impact of the anatomic changes induced by surgery as well as the lack of compliance with oral supplementation post-operatively.

New strategies that guarantee the success of nutritional supplementation in correcting or preventing nutritional deficiencies need to be granted.

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