CALCULATED RESTING ENERGY EXPENDITURE AND OTHER PREDICTORS OF WEIGHT LOSS AFTER BARIATRIC SURGERY

Alfred R Lopez, MD; Lucila I Beuses; David Hsu; Linda W Moore; Aman Ali, MD; Vadim Sherman, MD; Nabil Tariq, MD; Houston Methodist Hospital

- The prevalence of obesity and severe obesity continues to increase worldwide resulting in bariatric surgery being one of the fastest-growing elective operative procedures performed worldwide.
- Bariatric surgery ≥30% may have suboptimal weight loss or weight regain.
- Aim of our study is to identify risk factors for failure of optimal weight loss after surgery including the effect of initial predicted resting energy expenditure (REE), as higher REE may predict better weight loss.

Methods:

- Retrospective review of primary gastric sleeve (GS) and Roux-en-Y gastric bypass (GB) surgery records from 2016 to 2021 at a single hospital system.
- Univariate analysis was performed to compare characteristics between outcome groups (<50% excess weight loss versus ≥60% excess weight loss [EWL]) after bariatric surgery at 1 year, 3 years, and 5 years.
- Longitudinal weight loss, Harris-Benedict, and Mifflin St Jeor equations for resting energy expenditure (REE) rates were evaluated.
- Stratified analysis by procedure was performed.

Table 1: Characteristics of patients achieved excess weight loss greater than or equal to 60% vs. less than 50% at 1 year.

	Overall	Excess weight loss < 50% at 1 year	Excess weight loss ≥ 60% at 1 year	p-value
N	1443	462	372	
Age				
Median [Q1, Q3]	47.0 [37.6,56.7]	49.8 [40.1,59.4]	46.9 [37.5,56.6]	**0.01**
Gender				**0.03**
Female	1100 (76.2)	363 (78.6)	267 (71.8)	
Male	343 (23.8)	99 (21.4)	105 (28.2)	
Race				**<0.001**
Caucasian	838 (58.1)	246 (53.2)	257 (69.1)	
Black	541 (37.5)	202 (43.7)	97 (26.1)	
Asian	11 (0.8)	1 (0.2)	3 (0.8)	
Native American	9 (0.6)	3 (0.6)	2 (0.5)	
Hawaiian/Pacific Islander	1 (0.1)	1 (0.2)		
Other/Unknown	43 (3.0)	9 (1.9)	13 (3.5)	
Ethnicity				0.487
Hispanic or Latino	273 (18.9)	87 (18.8)	75 (20.2)	
Not Hispanic or Latino	1154 (80.0)	369 (79.9)	295 (79.3)	
Unknown	16 (1.1)	6 (1.3)	2 (0.5)	
Height (inch)				
Median [Q1, Q3]	65.6 [63.0,68.2]	65.0 [63.0,68.0]	66.1 [63.5,68.9]	**0.004**
Initial Weight (kg)				
Median [Q1, Q3]	121.1 [107.5,138.3]	126.2 [110.2,146.5]	116.4 [104.7,129.7]	**<0.001**
Initial BMI				
Median [Q1, Q3]	43.1 [39.3,48.3]	45.1 [40.7,51.6]	40.7 [38.1,44.4]	**<0.001**
Initial Basal Metabolic rate (kcal/day) (Harris-Benedict)				
Median [Q1, Q3]	1941.5 [1765.5,2240.0]	1975.2 [1765.9,2287.2]	1903.5 [1737.1,2201.7]	**0.007**
Initial Basal Metabolic rate (kcal/day) (Mifflin St. Jeor)				
Median [Q1, Q3]	1892.5 [1695.5,2139.8]	1932.8 [1699.3,2208.9]	1860.8 [1676.8,2057.9]	**0.002**

Table 2: Characteristics of patients achieved excess weight loss greater than or equal to 60% vs. less than 50% at 3 years.

	Overall	Excess weight loss < 50% at 3 years	Excess weight loss ≥ 60% at 3 years	p-value
N	958	253	158	
Age				
Median [Q1, Q3]	47.7 [37.9,57.1]	49.9 [41.0,59.5]	48.1 [37.0,59.7]	0.222
Gender				0.72
Female	731 (76.3)	202 (79.8)	123 (77.8)	
Male	227 (23.7)	51 (20.2)	35 (22.2)	
Race				0.05
Caucasian	577 (60.2)	145 (57.3)	106 (67.1)	
Black	344 (35.9)	99 (39.1)	46 (29.1)	
Asian	8 (0.8)	2 (0.8)		
Native American	6 (0.6)	3 (1.2)		
Other/Unknown	23 (2.4)	4 (1.6)	6 (3.8)	
Ethnicity				0.982
Hispanic or Latino	175 (18.3)	49 (19.4)	31 (19.6)	
Not Hispanic or Latino	772 (80.6)	202 (79.8)	126 (79.7)	
Unknown	11 (1.1)	2 (0.8)	1 (0.6)	
Height (inch)				
Median [Q1, Q3]	65.5 [63.0,68.1]	65.0 [63.1,67.8]	65.9 [63.0,68.0]	0.359
Initial Weight (kg)				
Median [Q1, Q3]	119.7 [106.6,137.5]	118.9 [105.9,138.5]	115.1 [102.0,132.9]	**0.032**
Initial BMI				
Median [Q1, Q3]	43.0 [39.1,48.0]	43.1 [39.4,50.0]	41.0 [37.5,45.8]	**0.001**
Initial Basal Metabolic rate (kcal/day) (Harris-Benedict)				
Median [Q1, Q3]	1929.1 [1748.2,2228.1]	1900.3 [1717.3,2187.0]	1888.4 [1706.0,2127.2]	0.44
Initial Basal Metabolic rate (kcal/day) (Mifflin St. Jeor)				
Median [Q1, Q3]	1868.8 [1676.2,2136.9]	1843.5 [1653.6,2123.9]	1829.3 [1636.6,2050.7]	0.404

Results:

- 1675 patients analyzed, 857 had GS and 810 patients had GB.
- Median age 47 years; majority were females (76.3%) and Caucasians (58%). Initial median BMI was 43.3kg/m^2 median REE was 1942 (Harris-Benedict)/ 1893 (Mifflin St. Jeor).
- Table 1: Patients experiencing ≥60% EWL at 1 year were younger (p= 0.01), male (p=0.03), Caucasian (p= <0.001), had lower initial BMI (p<0.001), lower initial REE (p=0.007), and were taller (p=0.004) than patients with <50% EWL.
- Table 2: At 3 years, race (p=0.05), initial weight (p=0.03), and initial BMI (p<0.001) correlated with ≥60% EWL. Of patients with 3 years follow-up, Black patients had less EWL than Caucasian patients.
- 5-years follow-up, those with initial lower weight, BMI, and REE had better weight loss. The correlation with race was not significant at 5 years.
- When analyzed by procedure type, the relationship of race with weight loss was significant with gastric bypass but not with sleeve gastrectomy.

Conclusion: Race was associated with significantly decreased weight loss after bariatric surgery, especially in black patients. Interestingly this relationship was present in gastric bypass patients but not sleeve gastrectomy patients. We hypothesized that having a higher initial predicted REE will be associated with higher weight loss, but we discovered the opposite. Further multivariate analysis may clarify these relationships further.

Nabil Tariq, MD ntariq@houstonmethodist.org
Alfred R. Lopez, MD arlopez@houstonmethodist.org