The Effect of Weight Loss Programs on Physical Performance in Obese Population Jueshen Hou, Gary Miller

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Obesity, defined as excessive fat accumulation within the body with body mass index (BMI; weight in kg/height in m2) >30.0 kg/m2), is considered a major health risk factor across the U.S. According to the Center of Disease Control, in 2019 North Carolina had a 34% prevalence of adult obesity, indicating more than one-third of North Carolina residents were considered to be obese. The purpose of this study was to examine the efficacy of three weight loss programs: Essential, Optifast, and Surgical used in Wake Forest Baptist Health Weight Management Center (WFBH WMC) on weight loss and measures of physical function. Impaired physical function with mobility disability is a major health concern in obesity. This analysis was conducted on 500 obese individuals in the real-world clinical environment over six months. The programs consist of surgical weight loss (bariatric surgery), meal replacements (including commercial meal replacement products and self-prepared regular foods), prescribed exercises, and modification of lifestyles, while each program is respectively focused on different aspects of the weight management approaches. Statistically significant improvements in physical function were detected. The analysis exhibited that Optifast appears to have the best efficacy on improving gait speed (1.15m/s - 1.28 m/s); Essential has the best efficacy on improving chair rising time (9.86s – 8.29s) and grip strength (64.87kg-122.57kg), indicating the moderate effects of three weight loss programs toward weight loss and improvement on physical function in the obese population.

*Data are average values

Methods

Separating Data Based on Needs



Data Cleaning



Visualization for Comparison & Analysis



(R and RStudio were used to treat the dataset)

- *n=245 after eliminating patients with only baseline data
- **Grip strength: patient squeeze apparatus to measure
- ***Gait Speed: Timed walk in 4 meter distance
- ****Chair rising time: Time taken to stand up from sitting to complete stand up from a chair



Figure 1: Optifast used in program

Results

Essential Gait 1 Baseline 1.5 1.0 0.5 0.5 0.4 0.2 0.0 0.2	Essential Gait 2 After 3 months 1.5 1.0 0.5 0.4 0.4 0.2 0.0 0.2 0.2	Essential Gait 3 After 6 months 1.5 0.4 0.5 0.4 0.4 0.2 0.0 0.2 0.4	Essential Grip 1 Baseline H 100- 50- 50- 50- 60- 60- 60- 60- 60- 60- 60- 60- 60- 6	Essential Grip 2 After 3 months H 100 75 50 25 0 -0.4 -0.2 0.0 0.2 0.4	Essential Grip 3 After 6 months H 100 - 75 - 50 - 50 - 50 - 50 - 50 - 50 -	Essential ChairRise 1 Baseline Francisco WE ST ST ST ST ST ST ST ST ST S	20-	Essential ChairRise 3 After 6 months
Surgical Gait 1 Baseline 1.5 1.0 0.5 0.0 -0.4 -0.2 0.0 0.2	Surgical Gait 2 After 3 months 1.5 1.0 1.0 1.5 1.0 1.0 1.0 1.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	Surgical Gait 3 After 6 months 1.5 1.0 0.5 0.4 0.0 0.4 0.0 0.4 0.0 0.0 0.4 0.0 0.4 0.0 0.0	Surgical Grip 1 Baseline H 100- 75- 50- 25- 0- 0- 0-0.4 -0.2 0.0 0.2 0.4	Surgical Grip 2 After 3 months 100 75 75	Surgical Grip 3 After 6 months H 100 - 75 - 50 - 50 - 50 - 50 - 50 - 50 -	Surgical ChairRise 1 Baseline Fig. 10 - Fig.	Surgical ChairRise 2 After 3 months	Surgical ChairRise 3 After 6 months 20 15 15 10 10 10 10 10 10 10 10 10 10 10 10 10
Optifast Gait 1 Baseline 1.5 1.0 0.5 0.0 -0.4 -0.2 0.0 0.2	Optifast Gait 2 After 3 months 1.5 1.0 0.5 0.6 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7	Optifast Gait 3 After 6 months 1.5 1.0 0.4 0.5 0.4 0.0 0.4 0.0 0.4 0.0 0.0 0.4 0.0 0.4 0.0 0.0	Optifast Grip 1 Baseline H 100 - 50 - 50 - 50 - 50 - 50 - 50 - 50	Optifast Grip 2 After 3 months	Optifast Grip 3 After 6 months HL 100- 75- 50- 50- 25- 0- 0-4-0.2 0.0 0.2 0.4	Optifast ChairRise 1 Baseline F 20 B 10 B 10	20-	Optifast ChairRise 3 After 6 monthss

Figure 2: Gait Speed Improvement

Figure 3: Grip Strength Improvement

Figure 4: Chair Rising time Improvement

Program←	Essential← ←	Optifast∈ ←	Surgical← ←	
Weight Loss←	-8.622/←	-22.81/←	-37.4704/-	
(lb.)/(kg)←	-3.91←	-10.35←	17₽	
Gait Speed	0.0345↩	0.1256↩	-0.016←	
Improvement				
(m/s)←				
Chair Rising	1.574↩	0.029←	-2.72←	
Improvement				
(s)←				
Grip Strength	5.390←	57.710←	-9.020←	
Improvement				
(kg)←				

Figure 6: Key Measures Improvement

Program↩	Essential←	Optifast	Surgical←	Essential←	Optifast	Surgical←	Essential←	Optifast [¿]	Surgical
Measures∹	Gait Speed←			Grip Strength←			Chair Rising←		
P-value	0.577↩	0.0196←	0.00247↩	0.805←	0.752←	0.691←	0.0708↩	0.0204↩	0.0294↩

Next Steps

- Seek to conduct a Randomize Controlled Trial
- Utilizing additional statistical techniques to analyze the data for further investigation

Reference

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Figure 5: P-values for 3 programs

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