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Does Weight Machines protocol Actuate contradistinction on Strength Variables among BMI categories of Male College Students?

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ABSTRACT

The study examined the impact of weight machines training on selected strength factors among different BMI of male college students. Sixty-six males aged 19 to 23 years participated in this investigation. The subjects were distributed into four groups; Underweight Group1 (UWG1, n = 14), Normal Weight Group2 (NWG2, n = 25), OverWeight Group3 (OWG3, n = 19) and Obese Group4 (OG4, n = 8). The strength measurements were seated chest press (CP), seated leg press (LP), and seated abdomen (Abdo) workouts, performed before and after training. One Repetition Maximum (1RM) was used to decide the maximum strength of all subjects. The training involved several weight machines such as leg press, abdomen, chest press, pull down, row, and leg extension. The data were analyzed using a One-Way Analysis of Variance (ANOVA) and t-test (Paired). The significance level was 0.05. The OG4 revealed meaningfully greater mean different value than the NWG2 (17.46 ± 6.79, 10.92 ± 5.66 kg, respectively, P = 0.02) in Abdo when post-tests were subtracted from pre-tests (mean differences). When paired t-test was used, the UWG1 revealed significant increases in BM, LP, Abdo, and CP by 2, 42, 38, and 35%, respectively, the NWG2 by 2% (BM), 31% (LP and Abdo), and 25% (CP), the OWG3 by 21% (LP), 30% (Abdo) and 20% (CP) and the OG4 by 33% (LP), 36% (Abdo) and 15% (CP). In conclusion, the 4 categories of body mass index enhanced their strength elements after 8 weeks of weight machine training.

Key words: *Weight machines, Body mass index, Strength variables, Underweight group*

INTRODUCTION

Weight machines training is a workout that uses the apparatus as loads to build up and form the musculoskeletal system and enhancing muscle character [1, 2]. The advantages of weight machines are easy to use, permit the individual to exercise with heavyweight without support, and suitable for students, aged populations, and particular muscle groups. In addition, the weight machines provide more security and save time for college students than the free weights for instance. The resistance exercise regime is utilized as a broad term identical with various other common terminology: weight lifting and strength exercise intervention. Physiologically, the gains of regular strength exercise protocol; consist of a surge in muscle dimension, tone, muscle strength [3, 4], and bone mineral density [5, 6]. It is reliably observed that exercising with weights has resulted in enhanced psychological health in addition to an increase in self-esteem [7], self-confidence, and self-worth. Further, Weight training increases energy; improves digestion, elimination processes, intellectual capacity, and productivity. In addition, strength training leads to better sleep, weight loss, and decreased body fat [7]. The training helps in the

decrease of low-density lipoprotein cholesterol [7], range of motion, and flexibility. Due to the effect of resistance training the lung function and cardiovascular circulation capacity increase. There is an effect on the overall appearance, body composition of a person indulging in resistance training. It slows down or stops the aging process [7]. It helps reduce the incidence of injury [8]. It also increases the agility, balance, and coordination with more power available for the athlete. The literature in the area of strength training has recommended that weight training should be practiced recurrently; otherwise, one tends to lose roughly around ½ kilogram of muscle each year of our existence after reaching the age of 30 years. Unless if we do not employ an impervious and efficient weight exercise intervention, our muscles steadily decline in mass and strength causing atrophy, which in turn results in the loss of muscle mass [9] and a reduction of one-half in basal metabolic rate (BMR) each year [10]. Strength exercise also assists to avert osteoporosis [7]. It is believed that for the majority of individuals who suffer from stroke or orthopedic surgery rehabilitation in the form of strength training is very much essential to augment the weak muscles that are a key factor to ameliorate recovery [11]. Several studies examined the effect of resistance training on different categories of body mass index [12-17]. They found out that resistance training has a remarkable training effect on the leg press and bench press of different classifications of BMI. To our knowledge, no study examined the effectiveness of weight machines training on strength parameters among 4 types of MBI of male college students. The main issue of this investigation was to scrutinize the impact of weight machines training programs on selected strength factors among different BMI of male college students.

MATERIALS AND METHODS

Subjects

Sixty-six male college students aged between 19 and 23 years from King Fahd University of Petroleum & Minerals participated in this investigation. The subjects were distributed into four groups called Underweight Group1 (UWG1, n = 14), Normal Weight Group2 (NWG2, n = 25), Overweight Group3 (OWG3, n = 19) and Obese Group4 (OG4, n = 8). The subject whose BMI is less than 18.5 kg / m^2 is treated as underweight, who ranged between 18.5 to 24.9 kg / m^2 is normal weight, who is 25 to 29.9 kg / m^2 is overweight, and who is 30 kg / m^2 and above is obese.

Body compositions

The body composition was measured before and after the training period for all subjects, were age, height (H), body mass (BM), and body mass index (BMI). The body mass was assessed by SECA medical balance-Germany to the nearest 0.1 kg, while the participant wearing a T-shirt and Sport Pant, the height was measured by speedometer to the nearby cm and the body mass index was evaluated by dividing the body mass in kg over the height in a square meter.

Weights machine measurements

The weight machine measurements were performed before and after the training period. One Repetition Maximum (1RM) test was used to decide the maximum strength of all subjects. The weight machines that were utilized in this investigation were seated leg press, seated abdomen, and horizontal chest press.

Training program

The training program involved several weight machines such as seated leg press, seated abdomen, horizontal chest press, pull down, seated row, seated calf raises, seated leg extension, horizontal leg curls, and seated back extension. Subjects exercised 8 weeks, twice a week for 40 min per training session. They also used an intensity of 80% of 1RM, 3 sets of 8-12 repetitions with a break period of 1-2 min between sets during the first week. The intensity increased by 5% each week. However, in the last week, the intensity was reduced to 70% to rest before the post-test measurements.

Statistical analysis

SPSS version 16.0 software was utilized as the statistical tool for analyzing the data for this study. Mean and standard deviations were calculated for all variables. The gathered scores were evaluated by utilizing One-Way Analysis of Variance (ANOVA) to find out the significant differences between groups at pre and post-tests or when the post-tests were compared with the pre-tests (mean differences). Scheffe's post hoc test was used because

of the use of unequal sample sizes between groups. Paired t-test was used to identify any significant differences within each group independently. The significance level was 0.05.

RESULTS AND DISCUSSION

Table 1. Body composition means (± SD) measured before (Pre-tests), after (Post-tests), and post minus pre-training for 4 training groups.

Body Composition Variables	Tests	UWG1 n=14 Mean ±SD	NWG2 n=25 Mean ± SD	OWG3 n=19 Mean ± SD	OG4 n=8 Mean ± SD	P-values Between Groups
Age (y)	Pre	20.36±0.74	20.80±0.76	20.63±0.76	20.38±0.51	0.255
Height (cm)	Pre	172.36±6.99	171.20±6.39	173.32±6.37	174.75±4.80	0.505
BM (kg)	Pre	51.27±4.71	63.71±6.25	80.56±5.96	99.80±11.60	0.000
	Post	52.35±4.75	65.39±6.00	81.24±6.60	101.12±9.75	0.000
	Post-Pre	1.08±1.35	1.67±2.43	0.67±2.06	1.32±4.57	0.621
BMI (kg/m^2)	Pre	17.27±0.80	22.03±1.85	26.86±1.39	32.67±2.53	0.000
	Post	17.64±0.90	22.34±1.70	27.05±1.56	33.41±2.34	0.000
	Post-Pre	0.37±0.48	0.31±0.91	0.19±0.64	0.73±1.37	0.501

Table 1 indicated that there was no change in all body composition variables between groups at mean differences ($P > 0.05$). When paired t-test was used, there were similar changes in BM and BMI for OWG3 and OG4 ($P > 0.05$). While the UWG1 and NWG2 increased their BM significantly by 2% each ($P < 0.05$) from 51.27±4.71 to 52.35±4.75 (UWG1) and from 63.71±6.25 to 65.39±6.00 (NWG2).

Table 2. Strength variables mean (± SD) measured before (pre-tests), after (post-test), and posts minus pre-training for 4 training groups.

Strength Variables	Tests	UWG1 n=14 Mean ±SD	NWG2 n=25 Mean ± SD	OWG3 n=19 Mean ± SD	OG4 n=8 Mean ± SD	P-values Between Groups
Leg Press (kg)	Pre	79.42±21.58	92.20±20.80	119.63±28.87	122.62±17.07	0.000
	Post	112.97±31.52	120.51±20.62	145.21±24.12	162.61±11.78	0.000
	Post-Pre	33.54±19.78*	28.31±11.08*	25.57±18.11*	39.98±22.95*	0.185
Abdomen (kg)	Pre	31.35±7.45	35.32±6.57	43.31±8.60	49.12±10.46	0.000
	Post	43.20±8.23	46.24±7.46	56.10±10.65	66.58±10.01	0.000
	Post-Pre	11.85±3.00*	10.92±5.66*	12.78±5.02*	17.46±6.79*	0.026
Chest Press (kg)	Pre	45.94±10.03	59.75±19.51	77.70±70	78.15±18.37	0.000
	Post	62.02±12.04	74.90±18.23	93.25±14.20	90.17±14.48	0.000
	Post-Pre	16.07±6.99*	15.14±7.10*	15.55±13.03*	12.02±11.94*	0.807

*significant by paired t-tests.

When the post-tests were subtracted from the pre-tests (mean difference) values, the ANOVA showed no change in LP and CP ($P > 0.05$). However, in Abdo, the OG4 revealed a meaningfully greater mean different value than the NWG2 (17.46 ± 6.79, 10.92 ± 5.66 kg, respectively, $P = 0.02$). When paired t-test was used, the UWG1 revealed significant increases in LP, Abdo, and CP by 42, 38, and 35%, respectively, the NWG2 by 31% (LP and Abdo) and 25% (CP), the OWG3 by 21% (LP), 30% (Abdo) and 20% (CP) and the OG4 by 33% (LP), 36% (Abdo) and 15% (CP). These results can be seen in **Table 2**.

The outcomes of the LP of the existing study indicated that no training effect was achieved between groups. This result corresponds with the outcomes of [16]. However, some investigations disagree with our result who found meaningful training influence between groups [3, 12-15]. The explanation of this result may be because the present

study used 4 different categories of body mass index, while the previous researchers used normal body mass subjects [3, 12-14] or underweight participants [15] which means that the homogeneity is identified in the previous investigations and not the same in the current study. However, when the pre-tests were compared with the post-tests, the LP of our study showed a training effect of 21 to 42%. This result has agreed with the studies of [12, 14-16] who showed an increment from 18 to 66%. There was a training impact between the experimental groups in the Abdomen strength variable of the current study from 30 to 38%. The larger size of the upper part of the obese subjects may clarify this result. Our consequence of the CP displayed a similar training effect between groups. This outcome opposite with the former studies of [3, 13, 15, 18, 19]. When the pre-tests were compared with the post-tests, the outcome of the CP of the present study indicated a greater training impact from 15 to 35%. Investigations of [3, 13, 15, 18] come to an agreement with this finding that showed the training effect from 30 to 38%.

CONCLUSION

It was concluded that 8 weeks of weight machine strength training have a significant impact on all BMI categories. It also indicated that the chest, leg, and abdomen muscles enhanced remarkably after the training period when the post-test were compared with the pre-tests.

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