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Effect of pilates and cable pulley exercises in work related musculoskeletal disorders on body composition and depression among male health care professionals

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Abstract

Aim: To compare the effect of Pilates and cable-pulley exercises in work related musculoskeletal disorders on body composition and depression among male health care professionals.

Method of the subject: 60 subjects working in a private health-care organization were taken in 3 Experimental group and a Control group. Malatron Bio scan 921, and DASS 21 scale were used to assess the fat percentage, muscle mass and depression of the subjects. Study was done for a period of 12 weeks and pretest was done before the study and posttest results were obtained after the completion of the study.

Variables: fat percentage, muscle mass and depression

Result: Since in this study the researcher found that there was positive changes in the improvement in fat percentage, muscle mass and depression by cable pulley exercises in the Experimental Group II when compared to Experimental Group I and III and depression in Experimental III Pilates and cable pulley exercises.

Conclusion: Hence it's concluded that the 12 weeks of individual training for fat %, Muscle mass improved better with Cable pulley exercises compared with other experimental groups, Depression was effective in combined training than other experimental groups and no changes has been noted in control group.

Keywords: Pilates and cable pulley exercises, body composition and depression, male health care

Introduction

Body composition is one of the key components of physical fitness that are related to health. Appropriate body composition contributes to the optimal development of physical fitness [1]. BC refers to the assessment of the absolute and relative amounts of bone, muscle, and fat mass measured by different methods. Of these variables, the fat mass and body fat percentage have been the most important estimates for health purposes, showing a strong correlation with cardiovascular diseases [2].

Like other professions, health care professionals are also affected by obesity and overweight. Health care professionals are the role models for community and encourage people to follow healthy lifestyle. Prevalence of obesity in health care professionals has shown to be higher than the general population [3, 4]. Different categories of jobs in health care industry may contribute to different risks for the health care professionals to become obese or overweight [5]. Regular physical activity/exercises should be included in the daily routine to improve body composition. Exercises is an established method for treating overweight or obesity [6].

Research suggests that resting metabolic rate (RMR) is lower in persons with overweight or obesity [7]. However, expressed per kg fat-free body mass, energy expenditure under resting conditions in the obese was higher than in the normal-weight [8]. Therefore, it is very important to build lean muscle mass that can be done with suitable physical exercises.

Various exercise techniques that can affect body composition have been introduced. Among these, Pilates method has become more popular now a days. A survey of the American College of Sports Medicine on the world's fitness trends showed that the Pilates method ranked ninth in the most sought-after exercises in 2010 [9]. In a systematic review, it was observed in most interventions that an increase in practice hours per week led to a trend toward reductions in body fat percentage and body weight.

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However, the systematic review also suggests that there is poor empirical evidence representing a conclusive effect of Pilates method on body composition.

This study aimed to find out whether a combination of exercises could help in improving body composition. Therefore the purpose of this study was to compare the effect of Pilates and cable-pulley exercises, and combination of both in improving body composition. The study also investigated the effect of these interventions on depression among health care professionals.

Statement of the Problem

The researcher has decided to take up different combination of training using Pilates and Cable pulleys in work related musculoskeletal disorders among male health care professionals. Hence the investigator is very much intent to adopt the concept to find out the body composition and depression in the body levels of the male health care professionals.

Selection of the Variables

Percentage of fat, muscle mass, and depression

Experimental Design

The study consisting of 60 male health care professionals randomly divided into four groups, the groups were assigned as experimental group I, II, III and control group with pre and post-test analysis.

Training schedule

A written informed consent was obtained from the subjects included in the study. The groups were given exercises interventions as under.

Group I

Pilates exercises

Group II

Cable-pulley apparatus exercises.

Group III

Combined Pilates and Cable-pulley apparatus exercises

Group IV

Control group with no exercises.

Subject’s demographics and all the general characteristics (Height, weight and BMI) were recorded. The outcome measures were recorded at baseline. Subjects were asked not to participate in other physical activities or change their daily. The groups participated in their respective Pilates or/and cable-pulley apparatus exercises. The control group did not receive any intervention. Pilates and cable pulley apparatus exercise aims to improving general fitness and wellbeing with particular emphasis on body composition and depression Exercises were performed 3 times a week for 12 weeks. Warm-up and cool down exercises were performed 10 minutes each before and after the exercise interventions respectively. Outcome measures were again tested at 12 weeks. Exercise intensity in both programs was based on the Borg Perceived Exertion Scale (PRE). The intensity was set at 5 on the scale. Subjects were instructed to report any discomfort immediately.

Statistical Technique

Analysis of covariance statistical technique was used, to test the significant difference among the treatment groups. Thirumalaisamy R. (2004).

Computation of Analysis of Covariance

The following tables illustrate the statistical results of Effects Of exercise protocols among male health care professionals having musculoskeletal disorders and ordered adjusted means and the difference between the means of the groups under study.

Results of the study

The results of the study showed for the following variables

The following tables illustrated the statistical results of the Fat percentage in Effect of Pilates and Cable Pulley Exercises in Work Related Musculo Skeletal Disorders on Fat percentage Variable among Male Health Care Professionals and ordered adjusted means of the groups under study.

Table 1: Computation of analysis of covariance of fat percentage (Scores in percentage)

Test	EXP-I	EXP-II	EXP-III	Control	SV	SS	DF	MS	OF	TF
Pre-test	21.33	23	21.33	20.6	B	46.46	3	15.48	0.95	2.72
					W	914.26	56	16.32		
Post-test	19.73	20.86	18.26	21.6	B	94.98	3	31.66	2.44	2.72
					W	725.2	56	12.95		
Adjusted	19.93	19.61	18.47	22.44	B	124.67	3	41.55	82.71	2.72
					W	27.63	55	0.50		
Mean Gain	1.6	2.13	3.06	1						

*Significant at 0.05 level of confidence for 3 and 56 (DF) =2.72 and 55(DF) = 2.72

Results of fat percentage

Table I shows analyzed data on Fat percentage. The Pre-test means of fat percentage were 20.6 for Control Group, 21.33 for Experimental Group I, 23 For Experimental Group II and 21.33 For Experimental Group III. The ‘OF’ ratio 0.95 was lesser than the ‘TF’ ratio 2.72. Hence, the pre-test was not significant at 0.05 level of confidence for degrees of freedom 3 and 56.

The Post-test means were 21.6 for Control Group, 19.73 for Experimental Group I Group, 20.86 for Experimental Group II and for 18.26 Experimental Group III. The ‘OF’ ratio 2.44

was higher than the ‘TF’ ratio 2.72. Hence Post-test was significant at 0.05 level of confidence for the degrees of freedom 3 and 56.

The adjusted Post-test means were 22.44 for Control Group, 19.93 for Experimental Group I, 19.61 for Experimental Group II and 18.47 for Experimental Group III. The ‘OF’ ratio 82.71 was higher than the ‘TF’ ratio 2.72. Hence, the adjusted post-test was significant at 0.05 level for the degrees of freedom 3 and 56. The Mean gain values were 1 for Control group, 1.6 for Experimental Group I, 2.13 for Experimental Group II and 3.06 for Experimental Group III.

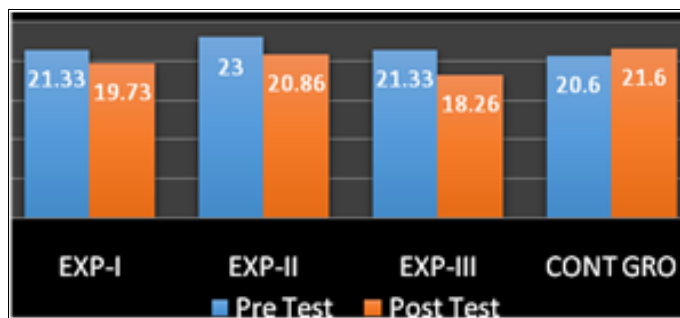


Fig 1: Fat percentage

It is interesting to note that the results obtained from Experimental Group III had a more significant effect than Experimental Group II and I on the decreased level of Fat percentage. Further, the results obtained from Experimental Group II and I had a significant influence on Fat percentage than the Control Group, but there is no much difference between Experimental Group I and II. Among three Experimental Groups, the Experimental Group III has tremendous change in Fat percentage reduction due to influence of 12 weeks combined training influenced better than other groups.

During the 12 weeks of training period, it was noted that the post-test score was greater reduction of Fat percentage. During the training period, the pattern of exercises are meaningfully influenced in calories burnout due to Pilates,

Cable pulley and combined exercises. Triacylglycerol, an energy reserve in adipose tissue, are hydrolyzed during exercise to produce free fatty acids (FAs) resulting in lipolysis, which are then released into the bloodstream and serve as a source of fuel for working muscles. Exercise alters the release of adipokines from adipose tissue, which may reduce inflammation and enhance insulin sensitivity. Myokines produced with exercise control this mechanism. Therefore, frequent exercise lowers the bulk of adipose tissue and enhances metabolism. Subjects were tuned properly and reform from its abnormal condition to normal and better condition. So the 12 weeks of training was influenced positively leading to Fat percentage of the subjects were reduced.

Table 2: Computation of analysis of covariance of muscle mass

TEST	EXP-I	EXP-II	EXP-III	Control Group	SV	SS	DF	MS	OF	TF
Pre-test	33.6	33.2	33.23	34.63	B	20.16	3	6.72	1.02	2.7
					W	367.66	56	6.56		
Post-test	34.76	36.66	34.6	33.86	B	64.11	3	21.37	3.51	2.7
					W	340.6	56	6.08		
Adjusted	34.82	37.09	35.00	32.97	B	123.29	3	41.09	91.27	2.7
					W	24.76	55	0.45		
Mean Gain	-1.16	-3.46	-1.36	-0.76						

*Significant at 0.05 level of confidence for 3 and 56 (DF) = 2.7 and 56 (DF) = 2.7

Results of muscle mass

Table II shows analyzed data on Muscle Mass. The Pre-test means of Muscle Mass were 34.63 for Control Group 33.06 for Experimental Group I, 32.20 for Experimental Group II and 32.23 for Experimental Group III. The obtained 'F' ratio 1.02 was lesser than the table 'OF' ratio 2.7. Hence, the pretest was significant at 0.05 level of confidence for degrees of freedom 3 and 56.

The Post-test means were 33.86 for Control Group, 34.76 for Experimental Group I, 36.66 for Experimental Group II and 34.6 for Experimental Group III. The obtained 'F' ratio 3.51 was higher than the table 'OF' ratio 2.7. Hence, Post-test was

significant at 0.05 level of confidence for the degrees of freedom 3 and 56

The adjusted Post-test means were 32.97 for Control Group, 34.82 for Experimental Group I, 37.09 for Experimental Group II and 35.00 for Experimental Group III. The obtained 'F' ratio 91.27 was higher than the table 'F' ratio 2.72. Hence, the adjusted post-test was significant at 0.05 level for the degrees of freedom 3 and 55.

The Mean gain values were -0.76 for Control group, -1.16 for Experimental Group I, -3.46 for Experimental Group II and -1.36 for Experimental Group III.

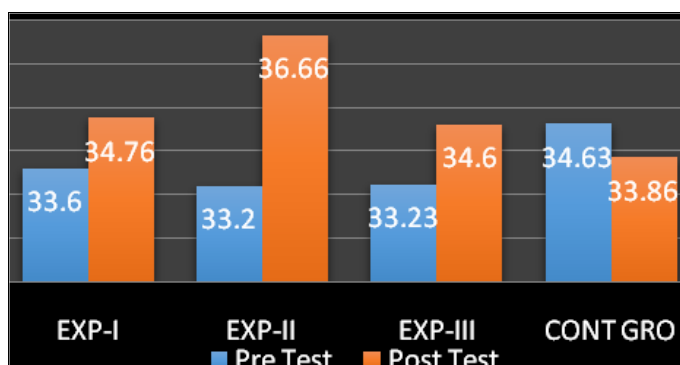


Fig 2: Muscle mass

It is interesting to note that the results obtained from Experimental Group II had a more significant effect than Experimental Group I and III on the increased level of Muscle mass. Further, the results obtained from Experimental Group I and III had a significant influence on Muscle mass than the Control Group, but there is no much difference between Experimental Group I and III. Among three Experimental Groups, the Experimental Group III has tremendous change in Muscle mass increase due to influence of 12 weeks combined training influenced better than other groups.

Due to busy schedules, lack of physical activity and negligence, health care professionals lead to weight gain causing overweight and gain of muscle mass resulting in impairment of Body composition values and other Musculo skeletal injuries. In this study we included Pilates and Cable

pulley exercises as a protocol to study the Muscle mass changes in different groups. Due to above resistance exercise stimulates the release of growth hormone from the anterior pituitary gland. With released levels being very dependent on exercise intensity. Growth hormone helps to trigger fat metabolism (muscle protein breakdown) for energy use in the muscle growth process hence there will be muscle size increase (muscle protein synthesis) when given task to deal with higher levels of resistance to the muscle hence body repairs or replaces damaged muscle fibres through cellular process where it combine muscle fibers a union to form new muscle protein strands or myofibrils, this process is known as muscle hypertrophy. Muscle hypertrophy occurs when the fibers of the muscles prone to musculoskeletal disorders.

Table 3: Computation of analysis of covariance of depression

TEST	EXP-I	EXP-II	EXP-III	Control	SV	SS	DF	MS	OF	TF
Pre-test	17.33	17.86	16.33	18.33	B	33.2	3	11.06	0.42	2.72
					W	1469.73	56	26.24		
Post-test	13.86	14.8	9.93	19.46	B	690.18	3	230.06	13.87	2.72
					W	928.8	56	16.58		
Adjusted	13.93	14.60	10.47	19.05	B	547.62	3	182.54	16.95	2.72
					W	592.28	55	10.768		
Mean Gain	4.86	3.13	5.26	0.2						

*Significant at 0.05 level of confidence for 3 and 56 (DF) =2.72 and 55(DF) = 2.72

Results of depression

Table III shows analyzed data on Depression. The Pre-test means of depression were 18.33 for Control Group, 17.33 for Experimental Group I, 17.86 For Experimental Group II and 16.33 For Experimental Group III. The ‘OF’ ratio 0.95 was lesser than the ‘TF’ ratio 2.72. Hence, the pre-test was not significant at 0.05 level of confidence for degrees of freedom 3 and 56.

The Post-test means were 19.46 for Control Group, 13.86 for Experimental Group I Group, 14.8 for Experimental Group II and for 9.93 Experimental Group III. The ‘OF’ ratio 13.87 was higher than the ‘TF’ ratio 2.72. Hence Post-test was

significant at 0.05 level of confidence for the degrees of freedom 3 and 56.

The adjusted Post-test means were 19.05 for Control Group, 13.93 for Experimental Group I, 14.60 for Experimental Group II and 10.47 for Experimental Group III. The ‘OF’ ratio 16.95 was higher than the ‘TF’ ratio 2.72. Hence, the adjusted post-test was significant at 0.05 level for the degrees of freedom 3 and 56.

The Mean gain values were 0.2 for Control group, 4.86 for Experimental Group I, 3.13 for Experimental Group II and 5.26 for Experimental Group III.

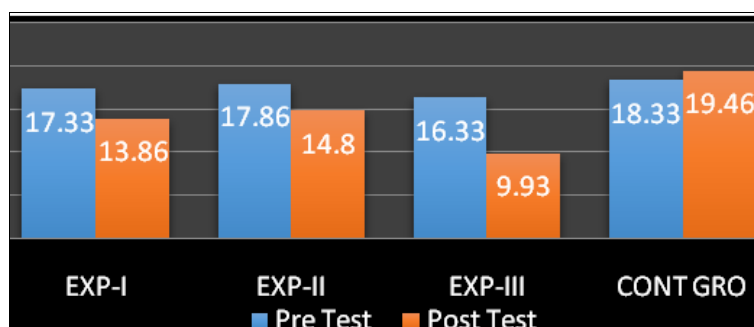


Fig 3: Depression

It is interesting to note that the results obtained from Experimental Group III had a more significant effect than Experimental Group II and I on the decreased level of Depression. Further, the results obtained from Experimental Group II and I had a significant influence on Depression than the Control Group, but there is much difference between Experimental Group I comparing to II. Among three Experimental Groups, the Experimental Group III has tremendous change in Depression decrease due to influence of 12 weeks combined training influenced better than other groups.

During the 12 weeks of training period, it was noted that the

post-test score was greater decrease of Depression. Due to Pilates and cable pulley exercise training the following changes are noted in depression subjects. Increased release of beta endorphins, natural cannabis like brain chemicals such as endogenous cannabinoids and other natural brain chemicals that can improve depression and quality of life in health care professionals on all experimental groups after 12 weeks of training.

It has been found that during the training period, the pattern of exercises are meaningfully influenced in improvement on depression due to Pilates, Cable pulley and combined exercises at the end of 12 weeks of course.

Discussion on findings of study

Work related musculoskeletal disorders among health care professionals' leads to various health related issues in the core stability and stress plays an important role in the internal body. Present study, Pilates and cable pulley exercises proves how core stability and stress is maintained in the internal tissues.

The findings of Niel A. Segal, *et al.*, (2016) investigated an observational study on the effect of pilates training on flexibility and body composition. 47 adults were chosen for this study gave training for 1 weekly 1 hour session pilates mat class during each 2 month period and concluded that pilates training improved flexibility, body composition (fat percentage), health status and posture.

James Steele, *et al.*, (2017) conducted a study on a higher effort based paradigm in physical activity and exercise for public health professionals: making the case for a greater emphasis on cable pulleys resistance training. A debate study was made in between aerobic and resistance training using cable pulleys. Study concluded that high intensity of cable pulley training gives results in muscle strengthening activities along with muscle mass changes when compared to aerobic exercises.

McKercher, *et al.*, (2013) conducted a study on cable pulley strength training and depression symptom profiles in young men and women with major depression. 950 men and 1045 women took for the study and depression were assessed using the composite international diagnostic interview. Prevalence of major depression was 5.5% for men and 11.6% for women. Interactions between cable pulleys exercise and sex were improved for depressed mood, appetite changes, vacillating thoughts, and suicidality after the training.

From these analyses, it is found that the results obtained from the experimental groups had significantly shown that they were improved their physical health parameters and depression due to work related musculoskeletal disorder after the training, resulted in body composition and depression in the tissue level in male health care professionals.

Conclusion

Work related musculoskeletal disorders leads to various complications in that weight related issues leads imbalance in the physical health, leading to imbalance in fat percentage, muscle mass, and depression. Twelve weeks of training by Pilates and cable pulley exercises shows balance of body composition and mental status. Experimental group II showed significantly balance in fat percentage, muscle mass, when compared to other groups and Experimental group III showed significantly reduced levels of depression when compared to other groups.

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