

RESISTED EXERCISE TRAINING ON OBESITY WORKS?

***Dr. S. S. Subramanian, M.P.T. (Orthopaedics), M.S. (Education), M. Phil (Education),
Ph.D (Physiotherapy).**

The Principal, Sree Balaji College of Physiotherapy, Chennai – 100. Affiliated To (Bharath)
University, BIHER Chennai – 73.

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***Corresponding Author**

Dr. S. S. Subramanian

The Principal, Sree Balaji
College of Physiotherapy,
Chennai – 100. Affiliated To
(Bharath) University,
BIHER Chennai – 73.

ABSTRACT

Trend in globally increasing obesity has a huge impact on health care, economy and productivity of the subject and society preventive and therapeutic means with physical activities and exercises holds the key to combat problems arising of obesity related issues. **Aims and Objectives:** This monograph presentation was to analyse the impact of resisted exercises on obesity. **Materials and Methodology:** 20 sedentary obese subjects of both sex between 20 – 60 years of Chennai were allotted in random with control (n-10) and experimental (n-10) groups. Experimental subjects were treated with specific resisted exercises using Physioball with weekly thrice frequency for 1 year duration from 2015 – 2016. **Results:** Pre and post BMI and WC of all

the subjects were recorded statistically analysed and discussed. **Conclusion:** This innovative means of the treating obesity with resisted exercises were prudent with results, of $P < 0.001$. Hence can be used on obese subjects of other ages with metabolic ailments. this conservative way of physical therapy has minimal complications under qualified medical and physical therapist supervision compared to other pharmacological surgical and invasive procedure was the core of this presentation, where by millions of obese can benefit.

KEYWORDS: Obesity, BMI, WC- Waist Circumference, Resisted exercises.

INTRODUCTION

➤ An epidemic rise in the rate of obesity and obesity related diseases over the past 50 years, there has been an increase in a variety of therapeutic intervention to tackle this epidemic. This has resulted in numerous interventions to change the body composition, mostly though mass reduction (weight loss) where changes in eating behaviour (hypo caloric

dieting), involving in physical activity exercises (James Clark 2015) with the focus based on the implication that all mass being equal in the equation of body mass, obesity and disease (Mendis 2013) while (Williams 2001) have indicated that the responses are more related to an energetic imbalance (Kcal/day) between dietary caloric load and expenditure from activity that results from the intervention of choice (E.g. Diet exercise or combined there in than the actual intervention for the adult who is over fat.

- Beyond reduction of body mass large change in self-selected and self motivated behaviours which serves to increase health and fitness behaviours and invoke a psychological adherence to exercise that most adults who are over fat might not intrinsically possess (Brock et al 2011).
- Also intervention programs to alter body mass there are physiological modifications conditions, that arise throughout treatment that has been noted in the continuum of fitness and fatness factors impacting overall health of the adult who is over fat (ASCM 2010).
- An intervention method varies widely in various studies on (Pereira et al 2012). Length of intervention, where longer the intervention, the greater absolute change relative to a shorter duration intervention (Kraemer and Ratamess 2004).
- Center for disease control and prevention (CDC- US 2011) identified that 21% of US adults meet the recommendations of exercise behaviours, and 51% meet for aerobic training and only 29% meet the recommendations for resistance training each week.
- Altering any health behaviours leads to a reduction in the risk factors for preventable NCD (Ducan 2010) which can lead to greater use of other healthy behaviours leading to greater over all levels of fitness (Clark 2011).
- Number of endocrinological, changes that occur with both expression of over fatness and following exposure to exercise that ultimately alters the health status for the individual who is over fat and the greatest impact of these changes appears to be related to alterations in sex hormone and a host of adipokines (Abate et al 2002).
- With low utilization of healthy behaviours eliciting changes indicated to increase the risk for the development of metabolic issues and are readily associated with reduced work capacity and anabolic hormone responsible for the individual who is over fat (Brunsgard 2005) and are reversed with exposure to physical activity with speculation that resistance exercise may provide the greatest impact on reversing such issues (Baldacci et al 2009) and evidence for greater change in body composition from utilisation of resistance exercise, both with and without conjunction with hypo caloric diet (Bonchard et al 2009)

- Physical activities are not only beneficial in body mass reduction, but many overall health functions among obese subjects.
- **BMI & WC**
 1. WHO 1998 classification of weights in adults is useful in identifying individuals at increased risk of morbidity and mortality from obesity with BMI.
 2. BMI is unable to distinguish between different kinds of body mass (Romero – Corel et al 2008) and BMI. Waist circumference may be a better predictor of healthcare costs than the widely used BMI (Cornier et al 2002).
 3. Central adiposity carrying greater risk than peripheral adiposity (Serag et al 2013) and WC can be a useful indicator of clinical risk, particularly for hypertension, diabetes and dyslipidemia (Han et al 1995).
- Economic costs of obesity: with high prevalence and the significant associated health risks, economic costs of obesity is estimated to be 3-8% of total health care expenditure (Isomaa et al 2001) in UK.
- Genetic factors: plays an important role in the development of obesity (Snyder et al 2003) more than 41 sites on the genome as possible links to the development of obesity in a favourable environment. Genetic defects that produce significant obesity and a group of genes susceptibility to develop obesity.
- Gene – Environmental factors: obesity relation is important to be assessed. It was estimated that 25-70% of the variations in body weight can be attributable to genetic factors (Bonchard 1990) with BMI highly correlated among first degree relatives (Chagnon et al 1997). In humans, autosomal recessive mutations in the genes for leptin (Chekhranova et al 2008) the leptin receptor, prohormone convertase I and POMC (Montague et al 1997).

KEYWORDS

Adipose, RET- Resisted Exercise training, ET- Endurance training, Pilates, ASCM – American college of sports medicine, NCD – Non- communicable diseases.

AIMS AND OBJECTIVES

This monograph presentation was to analyse RET on obesity using BMI and WC.

MATERIALS AND METHODOLOGY

20 obese subjects of both sex between age group of 20-60- were of random allotted in two groups. Control group (n-10) and experimental group (n-10) were allotted to continue their daily physical routine, while experimental subjects were made to do specific RET exercises using Physio ball for 1 year duration of weekly thrice frequency.

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|--|---|--|
| 6 – 8 weeks, set of 10 exercises, 3 repetition | 9 -16 weeks, 10 exercises of 5 repetition | 17 – 24 weeks, 10 exercises repetition |
|--|---|--|

Each session lasted for 20-35 minutes. Subjects heart rate, physical signs were noted. Intensity of exercises ranged from 50- 70% maximal heart rate. With no untoward incidents recorded. All the subjects completed the study with good adherence.

All the participants BMI and WC were measured and recorded once at the beginning and after 24 weeks completion.

This original research was carried at Chennai during the period from June 2015 – May 2016. After obtaining individual consent, ethical committee clearance as obtained.

RESULTS

Table on Results of pre and post BMI and wc using paired ‘t’ test of group I and II:

| VARIABLE | GROUP | SD | SE | T | P |
|----------|-------|------|------|-------|-------|
| BMI | I | 1.35 | 0.42 | 1.19 | >.01 |
| | II | 1.73 | 0.54 | 6 | <.001 |
| WC | I | 1.48 | 0.46 | -1.86 | >.01 |
| | II | 2.58 | .081 | 9.3 | <.001 |

Note: X – No significant statistically.

XX – Highly statistically significant.

DISCUSSION**CRITICAL ANALYSIS OF OBESITY, EXERCISES AND DIET WITH EVIDENCE**

- Lowering of obesity with physical and physiological changes was evidenced with studies.
- Also psychological impact of lowered body weight builds confidence, self esteem and an enhanced independence for physical and social activities as supported by
- Metabolic disorders such as diabetes mellitus where lowering Of obesity is considered preventive and of therapeutic nature as shown by:

1. Physical and Psychological impact of obesity

Obese individuals are 6-8 times likely to develop osteoarthritis of knee (Coggon et al 2001) and the impact obesity on musculoskeletal problems is more on weight bearing joints (OA of Knee – 50%) and lower back region (35%) as recording by (Salah et al 2015) and being obese reduces quality of life and life expectancy.

2. Diseases and disorders obesity predisposes

Polycystic ovaries syndrome, the most common endocrine disorder in premenopausal women (Lindholm et al 2008) and obesity is common in PCOS patients (Gambineri et al 2006) contributes to 43% prevalence of the metabolic syndrome in PCOS patients (Apridonize et al 2005) predisposes to cardiovascular complications (Talbot et al 2004), significant reproductive morbidity (Solomon et al 2002) increased sleep apnea (Fogel et al 2001) and substantial impairment on quality of life (Simon et al 2002). Evidence has linked obesity to pro-inflammatory conditions such as cancer, asthma and auto immune diseases (Renehan et al 2008).

3. Physical activities to combat

Obesity early in life may become the cost effective non- pharmacological means (Mc Millen et al 2009) because of the increased metabolic demand induced by excess body weight (Pietro et al 2004) at any given level of activity, the cardiac workload is greater for obese subjects. The risk of obesity for various diseases and disorders varies depending on physical fitness (Wei et al 1999).

4. Physical activities

Physical activities have shown to be inversely related to body weight (French et al 1994), rate of weight gain with age (Williamson 1993) and an increase in physical activity can create an energy deficit and is an important component of weight loss treatments, with strong evidence that increased physical activity in over weight and obese adults increases cardio respiratory fitness and reduces the risks of cardiovascular disease independent of weight loss (Lee et al 1999) along with dietary treatment physical activities for eight reduction and in maintaining weight loss are very useful means (Gurire et al 1999), for most obese patients physical activity should be initiated slowly, with time, depending upon progress and capacity intensity of exercises could be increased (Labib 2003).

5. Molecular basis of obesity

Adipose tissue, an endocrine organ that is capable of synthesising and releasing into the blood stream, an important variety of peptides and non-peptide compounds that may play a role in cardiovascular homeostasis and is a significant source of tumour necrosis factor (TNF – α) interleukin -6 (IL-6), plasminogen activator inhibitor – 1, resistin, lipoprotein lipase, acylation stimulating protein, estrogens, leptin, angiotensinogen, adiponectin, insulin like growth factor – I (IGF – I) and monobutyrin (steppan et al 2001) TNF – α , C-reactive protein, fibrinogen, angiotensin II are all, related to BMI (Yudkin et al 1999) 30% of as I \leq 6 modulates CRP production in the liver and a marker in acute coronary syndrome (Ridker 2000) ghrelin may be involved in the pathophysiology of obesity (English et al 2002).

6. Investigations involved

With obesity which involves the biochemical profile, full blood count are useful as routine fasting plasma glucose and lipid profile should be done to exclude diabetes and dyslipidaemia; serum free thyroxine and TSH to exclude hypothyroidism – an ECG to rule out hypertension and cardiovascular disease. Further investigations should be based on the degree of clinical suspicion of underlying pathology such as PCOD: Cushing's disease. Measurement of leptin deficiency among morbid obese subjects. (Labib 2003).

7. Surgery associated with obesity

1. Laparoscopic gastric bypass, a restrictive and mal-absorptive operation, standard procedure done globally.
2. Sleeve gastrectomy is purely a restrictive operation where sign eighths of the stomach is removed; hence patient can only eat a small amount of food.
3. Laparoscopic insertion of an adjustable gastric band placed in the upper portion of the stomach just below the oesophagus.

8. Future trends/ recent advancements

With health service use and medical costs associated with obesity and related diseases have increased and will increase (Wang et al 2003). Abdominal obesity independent of gender, ethnicity, smoking, age is associated with increased total healthcare expenditure. With costs of bariatric surgeries increasing, an increased physical activity in early life is more cost effective on obesity.

9. With Diet and Exercises interventions

Diet and Exercises were more effective at including responses in body compositional changes than either an exercise or diet, alone option for intervention (ASCM 2010) and among the modes of exercises diet and RET was not only more effective at altering body mass in the most beneficial pattern with reduction of fat mass and retention of fat free (Strasser et al 2007). A detailed dietary assessment with dietary intake, including the diet history and the seven day un-weighed diet diary (Bingham 1987). Obesity is associated with increased risk for number of medical conditions including diabetes, coronary artery disease, hypertension, hyperlipidemia and certain types of cancer.

10. Diet and exercises on obesity

1. Hypo caloric high protein; low carbohydrate diet appears to generate the greatest effect size for change relative to all hypo caloric low fat diets at changing of body composition in diet only recommendation interventions (Volek et al 2005).
2. Exercise alone when compared with diet only interventions on altering body composition; RET were more effective in eliciting beneficial changes than ET (Clark 2015).
3. When combined with diet, exercise interventions were more effective at inducing responses in both compositional changes that either an exercise or diet alone as an interventional option (AHANC Lichtenstein et al 2006).

11. Modes of exercises on obesity

1. RET was widely found to be related to alteration of body mass, resolving metabolic issues and improvements in the overall health status for the adults who are over fat. (Mc Auley and Blair 2011).
2. Clark 2015 in a Meta analysis and systematic review has reported that change in behaviour in highly sedentary individuals who are over fat should result in an immediate effective means for altering both body composition and health status, which occurs regardless of the methods utilized for the adult who is over fat. Irrespective of methodologies utilized, effect size, treatments were able to produce a positive effects on body composition and health status. Research findings of this presentation with lowered BMI and WC concur with this study among RET as displayed in table results.
3. The use of higher – intensity exercise was more effective than lower intensity exercise without regard to diet selection (Williams 2001).

4. Subject who is over fat does not self select ET as mode of exercise where RT is available option (Clark and Goon 2015). As all the experimental subjects adherence was full in line with this report.
5. RET leads to longer periods of utilization as such activities throughout on as remaining life span (Fogel Holm 2008) with.
6. Modes of interventions (ET/RET/dirt or combines) induce differential cardiovascular adaptations for reduced risk of development of cardiovascular diseases and improvements in work capacity and overall health (Booth et al 2000).
7. Effectiveness of exercises becomes more pronounced regardless of methodology (RET, ET or combined) with higher levels of intensity of exercises. (CDC 2011).
8. RET was more effective than ET at altering BM in the most beneficial pattern (i.e. reduction of FM with retention of FFM) without regard to the level of training while ET results appeared greatest with interval style of ET and at higher intensities at 75% of Vo₂ max (Votruba et al 2000).
9. Relationship between caloric imbalance and the altering body composition for adults who are over fat arises, where analysis points to un matching with effectiveness to induce changes in caloric imbalance on body compositional changes for the adult that is over fat (Clark 2012).
10. Alteration of health status for the adult who is over fat, is linked with hormonal functions related to energetic balance (leptin gherkin) and tightly associated with metabolic markers of exertional stress (AMPK) (Hainer et al 2008).
11. While changes to body composition appear to be eliciting changes in hormonal factors (cytokine, blood lipids and biomarkers of inflammation that are necessary for health status improvement (Bastard et al 2006).
12. Among metabolic health issues, key indicator for adults that over fat is high levels of circulations insulin, and with therapy that elicit reduction in fasting levels of insulin indicate metabolic and immune improvements (Clark and Gom 2015).

12. Surgical procedures among obese

Obesity is a significant risk factors for surgical site infection (Din do et al 2003), longer surgical time among obese patients (Mullen et al 2008) and impaired immunity, elevated blood glucose levels are contributing factors to impaired wound healing (Tanaka et al 1993) smoking, underlying chronic diseases among obese may increase post operative complications (Galal et al 2008).

13. Weight loss benefits

1. Intentional weight loss in obese patients can improve or prevent many of the obesity related risk factors for CHD (Sjostrom et al 2000).
2. Surgically induced weight loss produces a decrease in resting oxygen consumption and cardiac output that is proportional to the magnitude of weight loss (Buckwalter et al 2004).
3. A reduction in angiotensin converting enzyme activity after weight reduction could also be important (Harp et al 2002) with reduced.
4. Weight a decrease plasma renin activity and aldosterone levels (Tuck et al 1981).
5. Strong evidence suggest that the risks of mortality and morbidity associated with obesity can be reduced with weight loss, a 10 kg weight loss was associated with a 20-25% fall in total mortality, 30-40% fall in diabetes related deaths, 40-50% fall in obesity related cancer deaths (Jung 1997). Relative weight loss between 5-10% has been associated with significant improvements in concomitant medical disorders such as type 2 diabetes, hypertension and cardiovascular disease in addition to an increase in life span (Wing et al 1987).
6. In severely obese patients who lost 20-30% following surgical banding gastroplasty, hypertension and diabetes were cured in 89-43% of patients respectively (Sign 1996).
7. Weight loss in the management of osteoarthritis has strong evidence (Svege et al 2013). With strong evidence weight loss was influencing along with exercises in low back pain management (Hene et al 2013). Obesity is associated with numerous comorbidities. Such as CVD, Type II Diabetes, HT, (Poirier et al 2000) mortality (Engeland et al 2003) osteoarthritis (Spector et al 1996).

14. Risks of weight loss

1. Weight loss through different modalities for example starvation (Prentice et al 2008) liquid protein diets (sours et al 1981) very low calorie diets and even obesity surgery (Drenick et al 1978) has been associated with prolongation of the QT interval and potentially life threatening arrhythmia (Lantigua et al 1980).
2. Fenfluramine which reduce appetite by enhancing serotonin causing aortic and mitral insufficiency and pulmonary hypertension (Parker et al 2010).
3. Sibutramine hydrochloride which increases heart rate and blood pressure should not be used in CHD, arrhythmia, stroke, untreated hypertension (Andre J.scheen 2010).

15. Consumption of high fat

Diet is associated with an increased risk of obesity with some evidence (Bray et al 1998) but dietly studies in last three decades have failed to show a consistent relation between nutritional factors and relative weights (Nut tall et al 2015). But another study where energy intake and obesity and the physical activity on their prevalence of obesity, shows no relationship with diet and obesity but more pronounced with physical activity and obesity (Prentice 1995).

EXECUTIVE SUMMARY

- An increasing consumption of high calorie food with lowered physical activity adds fuel to increasing of obesity, urbanisation, and modern technology limits human work force with lesser physical exertion.
- Hence physical activities and diet holds the key to health conditions of present and future generations. As obesity is linked to physical ailments such as arthritis, spondylosis and dependency for locomotion. And its psychological impact on depression, less social interaction. Health hazards associated with being obese includes diabetes, hypertension, cancer and reduced quality of life most important is the economy of the individual obese spending 25% higher than same non obese subjects of that age is alarming as their family and the economy of the nation's health care expenditure increases with lowered productivity.
- This original monograph presentation where an innovative means of combined Pilates, physiotherapy and yoga were researched and critical components were analysed using evidences.
- As with bariatric surgery and pharmacological means of reducing obesity has huge complications and side effects, this innovative physical exercise under supervision by qualified expert is safer and prudent with results.

CONCLUSION

The purpose of this original monograph presentation was to analyse impact of RET among obese subjects. Not only reduction in body mass and fat, this mode of physical activity is similar to daily activities even highly obese finds it easier to perform compared with aerobic exercises such as brisk walking. As could be indoor nature adherence to this type of exercises among obese subjects irrespective of climatic variations. Similar to the dietly influence on obesity, RET has better impact on preventing many health related disorders with obesity. An

improved quality of life needs to be studied as further continuation with larger sample size, also comparing with other modes of exercises, including more variables, using NMRI for better validation of this study outcome.

A short coming of this study includes lesser sample size and lack of follow up. The other has no conflict on dissemination of this presentation.

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