Journal of Medicine and Allied Health
Journal Homepage: www.jomah.org
ISSN: XXXXX-YYYYY
Email: editoric@jomah.org

Original Article

Evaluating the effects of diet alone compared to diet coupled with strengthening exercises on anthropometric and sonographic characters in obese patients with chronic low back pain

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ARTICLE INFO

Article history:
Received 12 October 2024
Revised 23 November 2024
Accepted 12 December 2024
Available online 29 December 2024

Keywords:
LBP, NSCLBP, Fat analysis & reduction, muscle thickness, Muscle Ultrasound, Muscle mass gain/ reduction, Muscle strengthening and endurance, BMI, Grade I & II obesity

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https://doi.org/10.5281/zenodo.15970420

ABSTRACT

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***Background**: This study was aimed to equate two frequently proficient methods of weight/fat loss and in turn how they influence the low back pain (non-specific) in the subjects falling under the category of grade I and II Obesity.*

***Subject and methods**: 26 females and 26 male subjects with inactive lifestyle with age among 25- 40 years were allocated in two different assemblies on the basis of obesity grade I & II. All the participants were evaluated for their body mass/weight (BW), Pain perceptions (numeric Pain Rating Scale), Disability Index (Oswestry), Body Mass index (BMI), Waist to hip ratio (WHR), Body Fat mass/Fat mass (BFM/FM), lean Body Mass/Lean Mass (LBM/LM), Total Body Fat Percent (TBF %) & ultrasound for muscle thickness. Group A observed dieting (D) and group B was tracked for dieting with strengthening exercise (DS) training. Participants followed 42 days regimen after which all of them were evaluated again on same parameters. Results were analyzed on SPSS version 21.*

***Results**: Diet plus Strengthening group showed affirmative changes nearly in all considerations including body mass/weight (0.00), Body Mass Index (0.00), Waist-hip ratio (0.01), BF percentage (0.00), Fat Mass (0.00), Lean Mass (0.01), pain scale (0.00), disability index (0.00) & Muscle thickness (0.00). Conversely, the Diet group reflected non-significant outcomes in Waist hip ratio (p-value 0.73), lean mass (p value 0.38) & Muscle thickness (p value >0.05)*

***Conclusion**: In Comparison, 6 weeks of diet brought about the affirmative variations in NPRS and ODI but in all considerations DS group outweighed the D group.*

1. Introduction

Low back pain is a distressing ailment which distresses an ample portion of the populace, estimating that 50% to 80% of grownups will have low back pain any time in their livelihood. Fatness in reality is a deep-seated risk for the advancement of CLBP, with evidences presenting that people with BMI of 30 or more are at a higher threat of developing CLBP. Sedentary life style where there are fewer physical activities and usually increase in the usage of foods from hawkers/outside is vital for progression of obesity. A fascinating information in 2017 was discovered that great fat percentage is on the first place is a threat for initiating CLBP. It is interesting to note interrelationship between physical idleness and the risks associated with obesity, particularly, the one, recognized as central obesity which is targeted to abdomen 5.

Astonishingly, one can see that obesity itself leads to physical idleness promotes obesity, henceforth, additional low back pain, The LBP instigated due to obesity disrupts work efficiency as well as stated by WHO, that approximately about 60 percent of labor absenteeism in Europe, is because of MSK (Musculo-skeletal) disorders .The relationship among obesity, idle life style and CLBP has formerly been examined in mostly cross sectional designs or cohort studies, as well as altered modes of exercise routines, including gym training utilizing weight, aerobic/ cardio exercise, High Intensity Interval training or HIIT, Moderate Intensity continuous training or MICT or amalgamation of them .

Nutritional variants have long been accepted as a commanding feature for controlling fatness, with investigations signifying that mass will reduce CLBP, Similarly, diets that are short in caloric count yet, higher in protein have

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been revealed to be a good option when it comes to declination in CLBP in obese individuals in contrast, some of the researches have testified in disagreement to this. In 2018 a systematic review recognized that the diets low in caloric count substantially lowered the chronic low back pain in contrast to Control samples. The writers determined that foods in low calories can be a workable solution in managing CLBP in obese persons.

For countering the issue, a strong need to appraise D with and without SE is being felt and this is the reason that this research has been conducted. This will clear the air about which regimen can be opted for better results as till now inadequate inquiries on the relative efficacy of these medications are available.

2. Materials and Method

In this research (Randomized Control Trial) 26 males and 26 Females have been taken. The participants falling in 20-45 years age bracket with pain falling in the range 2 - 5, BMI grade I & II obesity (30.0 to 39.9 kg / m2) while disability no further than 40. percent inducted through convenient sampling. Patients having fractures, Vulnerable injuries, skin problems, Congenital deformities, pulmonary issues, Heart conditions, liver and urinary problems, were not included in the study.

The Study site was 2 fitness centers of Karachi 13 female and 13 male subjects (26 subjects) each group were allocated in to diet following group and strengthening (DS) exercise following group along with diet.

At the start of study all the subjects filled PAR-Q / Physical Activity readiness questionnaire followed by base line values documentation including height, weight, Pain, Disability, BMI, waist & hip measurements, WHR, BF percent & muscle thickness through ultrasound.

The measurement of the lumber Multifidus was recorded in a prone lying, with a pillow placed under the abdomen to flatten the lumber lordosis as this delivers an enhanced touching base position for the transducer (3-7 MHZ curvilinear probe, Nyro 10, Novadex, China).

The iliac crest level was palpated and the transducer was positioned longitudinally alongside of the spinal column and bilateral Multifidus muscle thickness was measured in rest. For the measurement of Transverse abdominus muscle patient were asked to lie supine and the measurement of muscle thickness of transverse abdominus was taken at the level of umbilicus in rest. As shown in the figure 1A, B,

Figure 1- Showing Ultrasound: A(Multifidus) B (Transverse Abdominus)

Mutually the individual subjects were evaluated by a nutrition specialist for 500 kcal daily deficit diet for 6 weeks.
For diet plans, BMR (basal metabolic rates) was estimated through formula {Men: 66.47+(6.24xweight lbs) + (12.7x height inches) -(6.75xage) Women: 655+(4.35xwt lbs) +4.7xheight inches) – (4.7xage)} at first than this BMR was multiplied by the life style (1.2 for inactive people) to acquire everyday caloric necessity, then from this DCR, 500 kcal were condensed to get recommended caloric requirement (RCR).

For DS group professional Physiotherapist who were also Physical Fitness Trainer formulated an exercise regimen in the fitness center. Weight training intensity for the patients/subjects was adjusted by asking the subjects to execute 15 reps of each workout of major muscle group (stated underneath) on a load on which subject can perform maximum12-15 repetition. At the end of 2nd week with identical technique the progression was given to workout intensity (10-12 repetitions).

A full body supervised exercise regimen for 6 weeks i.e. 42 days, 5 days per week (5x6=30 sessions)25 was given in which following workout was given;

Butterfly for pectoralis, Wide grip let pull down for latismus dorsii, Shoulder Press machine for deltoids, Shoulder shrug machine for trapezius, biceps curl machine for biceps brachi, lying triceps extension for triceps, sitting leg extension for quads, sitting leg curl for hams, supine lying to partial sit ups for Rectus Abdominus, Abdominal bracing for Transverse abdominus, Bird-dog for MF and Erector spinea and standing heel raises for Gastronaemius.

Paired T-test was used and Data was analyzed on SPSS 21 version.

3. Result

A sample of 276 participant were selected from general population, between 25-45 years of age. The sample analyzed included 98 men (35.5%) and 178 women (64.5%). Half participants were obese, and half participants were non-obese. Table 1 representing demographic details of the participant. We analyzed data of 52 samples by using SPSS 21 software. Men and women were equally distributed that is 13 males & females in individual data collections. 31.1 years was the cumulative age for induction.

Present research carries differentiation of Muscle size (for MF & TA), Body total weight, Fat weight/Mass, Waist and hip ratio, BMI/Body Mass Index, Body Fat %, Fat mass (BF percent x Body wt. =FM), Lean mass (Body wt. – fat mass= LM), pain scale & disability index with in D and DS group. Therefore, substantial transformation in the group's mainstream parameters (P value 0.00 to 0.004) was seen, on the contrary, strengthening group indicated momentous transformation in everything as depicted in Table 1 & 2. On the other hand, diet only group presented insignificant effects in Muscle thickness, WHR & LM consecutively. (p value- >0.05) Table 1 &2 figure 1. It is noteworthy that Table 2 and figure 1 revealed significant improvements in muscle size of group which followed Diet + strengthening exercises (p value- 0.00 for Multifidus and Transverse Abdominus both sides that is Right and Left).

Interestingly. both groups showed declination in hip and waist circumferences, while, diet group presented insignificant WHR, on the contrary, DS group exhibited positive outcome.

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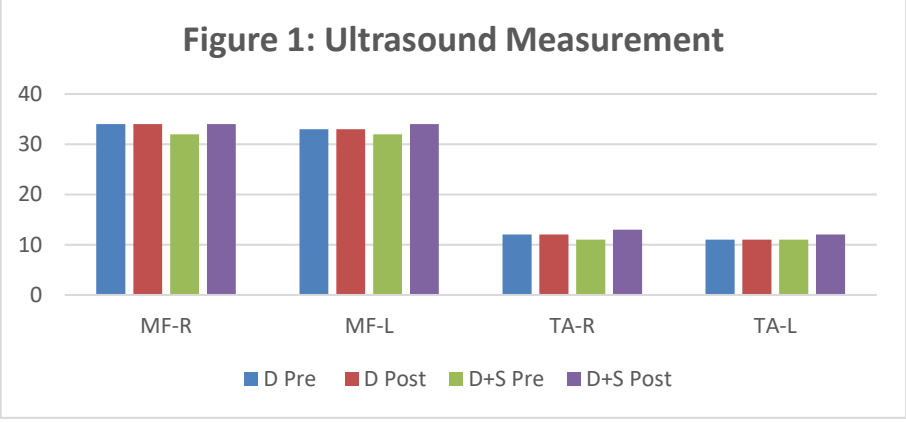
Table1- Paired T-test for pre post variable variations						
	Dieting Group			Dieting + Strengthening Group		
	pre	post	p-value	pre	post	p-value
Weight(kg)	90.2±13.1	89±12.9	0.00	90.6±14.0	88.8±13.7	0.00
Waist(inch)	41.3±7.1	40.5±6.8	0.004	40±5.5	38±5.7	0.004
HIP(inch)	46.2±4.2	45.1±4.3	0.003	46.8±3.9	45.7±3.8	0.003
WHR (inch)	0.89±0.1	0.89±0.1	0.736	0.85±0.1	0.83±0.1	0.001
BMI (kg/m2)	36.0±2.70	35±2.80	0.00	32..7±3.1	32.1±3.0	0.00
NPRS	4±0.8	2.5±0.7	0.00	4.5±1.1	2.7±0.7	0.00
OLBPD (%)	13.2±4.2	10.5±3.8	0.00	13.4±5.2	7.9±2.9	0.00
BF (%)	55±6.3	54.1±6.4	0.00	56±8.6	54.4±8.6	0.00
FM (kg)	49.6±8.2	48.1±8.2	0.00	49.8±12.4	48.3±13.3	0.00
LM (kg)	40.5±8.9	40.8±8.8	0.384	40.7±8.3	40.4±8.3	0.001
* p-value<0.05 considered significant						

Again, it's fascinating to observe that lean body mass has been increased in the Diet + Strengthening group whereas there has been a decline in diet following group as shown in Table 1 & 2 & Figure 1.

variable	N	D-Pre mm	D-post mm	p-value	DS pre mm	DS post mm	p-value
MF-R	26	34±2.5	34±2.8	0.84	32±1.6	34±1.6	0.00
MF-L	26	33±2.4	33±2.3	0.86	32±1.8	34±1.6	0.00
TA-R	26	12±2.3	12±2.7	0.74	11±1.1	13±1.3	0.00
TA-L	26	11±2.9	11±3	0.89	11±1.4	12±1.4	0.00

Table 2 shows that Diet group has failed to brought about any positive change in muscle thickness while DS group showed increase in muscle thickness detected by ultrasound.



*MF- Multifidus TA- Transverse Abdominus R-Right L-Left

It is astonishing to observe that DS group has shown marked improvement in muscle thickness for multifidus and transverse Abdominus of both sides while D group can be seen with no evident change in Figure 1.

4- Discussion

The present work was intended to examine the Diet contrasted with Diet Strengthening groups in obese individuals having chronic back pain of non- specific type in both sexes. There was significant drop in Waist to hip ration, BMI and weight, in the two sets. Captivatingly, Lean body Mass presented substantial upgrading in D+S group however, in Dieting group; the lean body mass, Waist Hip Circumference Ratio was not significant.

Uçar etal conducted research in 2021 where they explained the association that exists among body fat ratio, muscle size, pain and disability & obesity, in persons suffering from NSCLBP by examining 54 participants. A positive affiliation amid high BMI and LBP was evident; signifying that amplified disability and fat mass do impact the severity of pain. Almost the identical was established in this work that body fat mass lessening leads to considerable reductions in pain and disability.

Likewise, Svein O. Tjøsvoll did a supervised heavyweight muscular training study in which subjects followed a full body regimen with complex workouts 2 sessions per week for 16 weeks. The research established significant enhancement in strengthening, reduction in pain self-efficacy, pain intensity & disability. This is again same as our study results where strengthening exercise group eased pain and disability while increased lean body mass showing the muscle endurance as well as strengthening improvement. Our training results are also compatible with the results revealed by Jung seok lee work (2016). The research was led to appreciate the advantageous outcomes of strengthening training regimen in contrast pooled workout regimen displaying obvious decrease in disability, weight, low back pain and percentage of fat. Similar study16 was done in 2022, which investigated the approaches for body mass drop and fluctuations in anthropometric dimension, it included fat mass, BMI, hip, waist & waist- hip ratio illuminating the subjects who followed intense workout disclosing enhanced aftermaths. This is parallel to our work where we established that resistance exercise group displayed dominating consequences.

Pardis etal investigated the impression dieting along with resistance abdominal and determined that resistance training and energy restricted diet for weight loss brought about positive changes in the muscle size of obese and overweight people, which is in line with our findings.

5- Acknowledgement

We acknowledge all the participants that were involved in our study, without them the study couldn't be completed. Also, all the authors were acknowledged for their contributions.

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