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The Role of Abdominal Mucles Strengthening in Management of Gerd: A Randomised Trial

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1. INTRODUCTION

Gastroesophageal reflux disease (GERD) is a chronic yet not so uncommon gastrointestinal complaint that is currently affecting around 13.3% of the population worldwide. [1] The frequency of GERD in India ranges from 7.6% to 30%.[2] A study has shown 16.2% prevalence of GERD in a large North Indian tertiary hospital employees.[3] Gastroesophageal reflux disease (GERD) is generally described as a condition resulting from the gastric material reflux via the lower esophageal sphincter (LES) into the esophagus or oropharynx.

The most apt definition of GERD that was formed in 2006 at consensus meeting held at Montreal defined GERD as “a condition that develops when the reflux of stomach contents causes troublesome symptoms and/or complications”. And due to this diverse clinical manifestation and symptom reporting by patient, diagnosis of GERD is not easy or straightforward.[7]

2. CLINICAL PRESENTATION

The clinical symptomatic presentation most commonly as reported in cases are heartburn and regurgitation. Heartburn presents as a burning like sensation in the chest moving towards the mouth, sometimes with sour taste in back of the mouth. In addition, GERD has a wide spectrum of symptoms such as chest pain, dysphagia and few other pulmonary (aspiration, asthma, cough), throat (hoarseness, globus sensation, laryngitis), oral (gingivitis, tooth decay), sometimes earaches also.[4]

GERD as a disease entity presents itself in wide variety clinically. Often it is seen that the endoscopic picture of the gastro-esophageal junction does not match with the signs and symptoms of the patient. It can be presented in the following ways:

1. typical reflux heartburn and symptoms with display of mucosal injury in endoscopy
2. symptoms of reflux and heartburn but a normal upper gastrointestinal endoscopy (UGIE)

3. no esophageal reflux symptoms but UGIE showing signs of mucosal injury

4. not so typical symptoms similar to dyspepsia, cough, asthma, etc. [6]

ANATOMY:

The esophagus in a mature adult begins at the inferior border of the cricoid cartilage (C6 level), descending in the posterior mediastinum through the esophageal hiatus of the diaphragm and terminating at the stomach (T11 level). In an adult, it's length measures approximately 25 cm long.

During its course, the esophagus encounters three anatomic constrictions:

(1) at the level of the cricopharyngeus muscle,

(2) as it travels posterior to the aortic arch/left mainstem bronchus, and

(3) at the level of esophageal hiatus of the diaphragm.

The esophagus has two functional sphincters, the upper and lower esophageal sphincters. The upper esophageal sphincter (UES) is a high-pressure zone, which is situated at the junction of the pharynx and the cervical esophagus. The lower esophageal sphincter (LES) is also a high-pressure zone and is located at the meeting site of the esophagus and the stomach. The average length of LES goes approximately to 3-4 cm and is a tonically contracted smooth muscle segment present at the esophagogastric junction (EGJ).

PHYSIOLOGY:

LES is comprised of an intrinsic and an extrinsic component.[5] The intrinsic component of the LES consists of the smooth muscle fibres of esophagus and is under neurohormonal control. The extrinsic component consists of the skeletal muscle fibres of diaphragmatic crura and the phrenoesophageal ligament- a continuation of the inferior diaphragmatic fascia, which provide anatomical support to the LES.[9] Together they prevent the retrograde migration of acidic gastric contents into the esophagus and protects the esophagus from the reflux of gastric contents.

The normal physiological function of LES is to relax transiently in response to food travelling from esophagus into the stomach and maintain a tonic contraction otherwise to control the exit of acidic contents of stomach into tissue above. During vomiting, belching or physiological food reflux too, the LES relaxes spontaneously. This is known as Transient LES relaxation (TLESR). After swallowing, there occurs a reflex relaxation of the LES for very short period of time of about 5 seconds due to the peristaltic movement of esophagus generating inhibitory signals. During this time, the diaphragmatic crura also relaxes. After the bolus transits into the stomach, the LES and crura return to their normal tonic contraction state. [5]

ETIOLOGY & RISK FACTORS:

The biomechanical factors increasing the susceptibility for GERD may include a short intraabdominal esophagus, structurally defective LES, diaphragmatic crura or phrenoesophageal ligament weakness an incompetent LES, hiatal hernia, and increased intraabdominal pressure.[5] Among all the other factors and mechanism behind GERD, TLESR is the one widely discussed and stressed upon. Other general risks factors for GERD are- older age, smoking and alcohol, sedentary lifestyle, higher BMI, sleep disturbance, eating disorders etc. Medicines altering the LES pressure such as calcium channel blocker agents, nitrates, and anticholinergics, can sometimes prove to be a causative agent in developing GERD. [10]

3. DIAGNOSIS

There lies no gold standard diagnosis of GERD. The diagnosis is usually grounded on a combination of symptom presentation by the patient, endoscopic evaluation of esophageal mucosa, reflux monitoring, and response to therapeutic intervention.[8] There are some validated questionnaires available that explore symptoms and their severity as well.

4. CONVENTIONAL TREATMENT METHODS

PHARMACOLOGIC THERAPY

Medical therapy is a primary treatment method in GERD patients. It is also indicated in patients who do not respond to lifestyle modifications. Medical management most commonly involves antacid antisecretory agents such as histamine (H2) receptor antagonists (H2RAs) or PPI therapy and prokinetic agents in selective patients. [10] The medical treatment has proved to be able to manage and control the GERD symptoms quite effectively.

SURGICAL THERAPY

Surgery methods aim to restore length of the intraabdominal esophagus, close the crura of the diaphragm, and reinforce the LES. The currently prevalent surgical options for GERD are laparoscopic Nissen fundoplication, laparoscopic anterior 180° fundoplication, or even bariatric surgery for obese patients. Interestingly, gastric bypass surgery is the most common surgical treatment for GERD in USA. Gastric bypass is advised in patients who are usually obese with symptoms of GERD who prefer surgical therapy.[10] Magnetic Sphincter Augmentation (MSA) is an alternative to fundoplication.

Clinical guidelines advice the avoidance of trigger foods (spicy, fatty food items) and latenight meals, tobacco cessation, weight loss, and elevation of the head end of bed during sleep are beneficial for symptomatic GERD patients.

Myofascial trigger points (TrPs), have mostly been not given the attention as cause of pain found in myofascial pain syndrome (MPS). They are localized palpable knots of taught band of muscle fibre - hard hypersensitive and hyperirritable in nature. They cause pain and dysfunction within the muscles. The discrete area of a TrP may be spontaneously painful (i.e. active), or painful only on compression (i.e. latent). Active trigger points cause local pain with or without pressure, referred pain, autonomic symptoms of redness etc. Latent trigger points cause pain only on compression, affecting contractile tissue contraction/relaxation ability and dysfunction that leads to reduction range of motion (ROM) And Range of movement (ROMt) etc.

MTrPs are clinically associated with a variety of medical conditions including those of metabolic, visceral, endocrine, infectious, and psychological origin.[24] Muscles with larger proportion of type-1 muscle fibres tend to remain in sustained low-level contraction. Thus, it is conceivable that ischemia, hypoxia, and insufficient ATP synthesis in type I motor unit fibers occur often and are responsible for increasing the pH value, Ca^{2+} accumulation, and subsequent sarcomere contracture. All these changes lead to a vicious cycle of increased ischemia, hypoxia, and reduced intramuscular perfusion, which may possibly cause the development of MTrPs.

According to Travell & Simons, Myofascial Pain and Dysfunction (3rd edition, 2019) “symptoms of abdominal fullness, “heartburn”, indigestion and sometimes nausea and vomiting due to paraxiphoid trigger points located in upper rectus abdominis. Active trigger point in upper portion of the abdominal external oblique muscle is likely to produce “heartburn” and other symptoms commonly associated with “hiatal hernia”. The referred pain patterns of a number of abdominal diseases are mimicked by TrPs in abdominal wall muscles, hiatal hernia (gastroesophageal reflux) being one of them.[25]

With the high-tech methods and advanced technologies available for diagnosis and intervention procedures, there still exists limitations in pharmacological and surgical treatment. There is remarkably growing interest in applying complementary and alternative therapy (CAT) to optimize GERD management. Recent studies have attempted to establish relationships between visceral gastrointestinal disorders and somatic dysfunctions [16]. Besides, several studies have shown non-pharmacological intervention could help to reduce the disease burden of GERD. Actively training the diaphragm by breathing exercises [17], Diaphragmatic breathing reduces the number of postprandial reflux events [11], Inspiratory muscle training (IMT) has been shown to increase diaphragm thickness thereby increasing LES pressure in patients with GERD [12]. Dietary and lifestyle modifications might play an important and complementary role in alleviating GERD symptoms [13], transcutaneous electrical acustimulation and diaphragmatic breathing therapy were proved to be useful adjuncts or alternative options in relieving GERD symptoms, minimizing medication dosage and slowing the demand for surgery, along with treating GERD [1].

In addition, patients undergoing a long-term PPI use also encountered some adverse events such as, infections, bone fractures, kidney disease, and gastric cancer. It is also reported that surgical interventions needed to be repeated to get wanted benefits. Also, these treatments do not target the TLESR mechanisms of reflux, as it does not strengthen the anti-reflux barrier or promote better sphinctor control. There have been episodes of relapses in symptoms of GERD even after complete course of conventional treatments.

There is a wide array of contradictory data available about the correlation of exercise and GERD. Strenuous exercise may aggravate GERD signs and symptoms while moderate recreational exercise may have the opposite effect. Although few observational studies have found the association of proper exercise with a decreased risk of GERD, the degree of “proper” is not investigated in these studies. However, there is individual data available on diaphragm exercises, breathing exercises, general recreational exercises; but a proper physiotherapeutic exercise protocol with definite effectiveness including the exercises of all the body segments that have been previously studied to be helpful in GERD management is still missing. Hence, here arises the need of a study which explores alternate treatment options for GERD management, which emphasize on the physiological and anatomical barrier reinforcement of LES in clinical protocols of management of GERD, at the same time provides an exercise protocol adequate for GERD patients.

Aim of this study is to corelate the musculoskeletal dysfunction and GERD.

Our objectives are to assess the effect of abdominal muscle strengthening exercises on FSSG Score, GERDQ Score and GERD-HRQOL in patients diagnosed with GERD.

5. METHOD

STUDY DESIGN

This is an observational study, performed at Pacific medical college & hospital, Udaipur for 12 weeks. The subjects were recruited in the study on the basis of inclusion criteria- age group 18-60 years, GERD diagnosis by Hill’s classification in esophagogastroendoscopy. A total of 60 subjects were taken and divided into two group, each having 30 participants. The sessions were held 3 times a week, for 45 minutes per session.

PROCEDURE

All subjects were first assessed by treating consultant on the basis of clinical signs and symptoms and went for an endoscopy. After meeting the inclusion criteria, they were then sent to Department of Physiotherapy. After detailed assessment, all the participants signed consent forms and agreed to take part willingly in the study and to be informed the results publication. They were instructed not to mix with other exercise programs throughout the duration of the study.

A simple random sample method was used, and participants were randomly assigned into two groups, group A (study group) or group B (control group). Before the treatment, 6 weeks into the treatment and after the treatment, one assessor (the concerned consultant) blinded to the study, assessed the outcome measures. The assessor was not aware of the treatments protocol, the primary researcher (physiotherapist) acknowledged the treatment protocol and applied it to all participants. Therefore, all participants and assessor were blinded, while the (primary researcher) physiotherapist was not.

Study group protocol consisted of dry needling of abdominal group of muscles and subsequent recruitment and strengthening of these muscles. The exercises used for abdominal strengthening were-

1. Abdominal Drawing-in Maneuver Technique;
2. Diaphragmatic & abdominal breathing;
3. Pelvic floor contraction;
4. Plank;
5. Isometric, voluntary activation of the trunk “deep stabilisers” in the supine position with the lower legs flexed at the hip and knees and with feet flat on the floor-active pelvis posterior tilt;
6. Active straight leg-lowering exercise in supine position, with the focus on maintaining a neutral spine;
7. Side plank (right and left side) with hip abduction.

Dry needling of abdominal group of muscles viz. rectus abdominis, internal oblique and external oblique were performed twice a week at the start of the session. The site of needle insertion sites varied in each patient; the treating therapist determined the site to be treated in each session by palpation. Prior to needle insertion, the site will be sterilized with 70% alcohol using a cotton swab the participants in group A were to perform three sets of 20 repetitions for each exercise, with a hold of 5 seconds, followed by 10 seconds of relaxation, for each repetition. The participants were also advised to repeat the same exercise program once daily as a home exercise program along with following lifestyle modification advice.

For the control group, along with the ongoing medications, they received lifestyle modification advice, such as-

1. Avoidance of trigger food and spicy, high fat foods and other affecting beverages,
2. Low volume of food and dinner before around 90 mins to bedtime,
3. weight loss,
4. Tobacco & alcohol cessation,
5. Sleeping with the head of the bed elevated,
6. Improving sleep pattern, if affected,
7. Routine physical workout etc.

OUTCOME MEASURES

Frequency scale for the symptoms of GERD (FSSG) and GERD Health-Related Quality of Life (GERD-HRQL) Questionnaire were tools used to assess the the pre- and post- intervention values. FSSG contains 12 questions, out of them 7 questions (number 1, 4, 6, 7, 9 and 12) are for reflux score and 5 questions (number 2,3,5,8 and 11) are to score the dysmotility or dyspeptic. A score of 8 or more is often considered indicative of probable GERD. [13]

Symptomatic GER Questions from GERQ is a questionnaire consisting of total 6 items. The 4 items are to asses positive predictors of GERD: heartburn, regurgitations, disorders related to sleep and use of over the counter products. Rest 2 items are to assess negative predictors of GERD: nausea and epigastric pain. The answers are graded in a Likert like scale from 0 to 3 for positive predictors and from 3 to 0 for negative predictors. The maximum score that can be obtained is 18.

GERD-HRQOL is a 10-questions based tool that examines the intensity and frequency of heartburn, difficulty swallowing, bloating, and the burden of GERD medication. The answers of patient are graded on a 6-point scale (0-5). It is a 10-questions based tool that examines the intensity and frequency of heartburn, difficulty swallowing, bloating, and the burden of GERD medication.[11]

6. DATA ANALYSIS & RESULTS

The collected data was first organized and entered into Microsoft Excel. Data analysis was done using SPSS version 23.1.2 Chi-Square test, t-test and One-way Analysis of Variance (ANOVA) were used in the analysis wherever required. The level of significance was set at p-value ≤0.05.

Table 1: Age wise Distribution of Patients Among Groups

	Control Group		Exercise Group	
Age Group (yrs)	**No.**	**%**	**No.**	**%**
<21	1	3.33%	3	10.00%
21-30	5	16.67%	7	23.33%
31-40	10	33.33%	10	33.33%
41-50	11	36.67%	6	20.00%
51-60	3	10.00%	4	13.33%
Total	**30**	**100.00%**	**30**	**100.00%**

Table 1 illustrates that 60 study participants were included in this study, 30 in each group. The minimum number of participants were in age group <21 in both the groups and the maximum number of participants were in 41-50 in Control group and in 31-40 in exercise group.

Graph 1 shows the gender-wise distribution of the study participants.

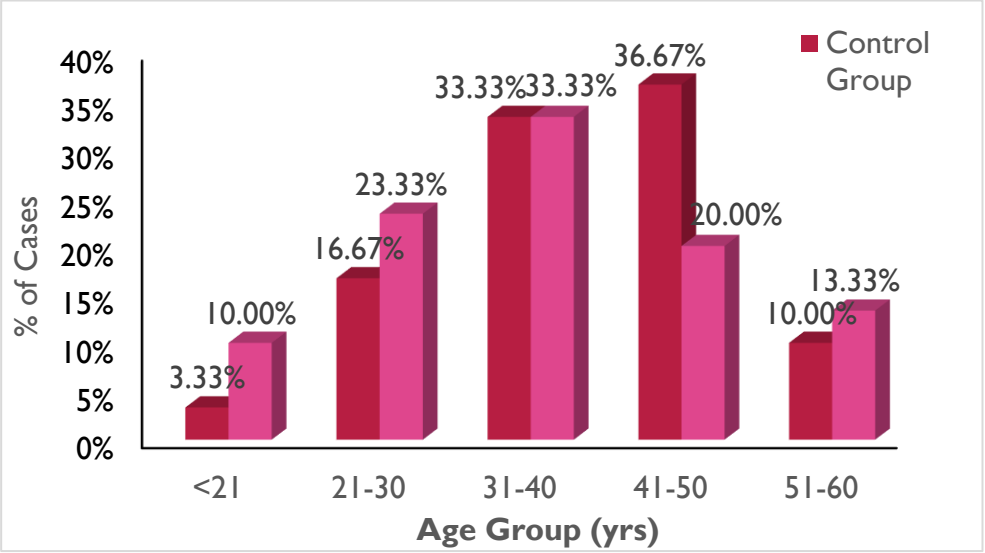


Table 2: Sex wise Distribution of Patients Among Groups

	Control Group		Exercise Group	
Gender	**No.**	**%**	**No.**	**%**
Female	9	30.00%	12	40.00%
Male	21	70.00%	18	60.00%
Total	**30**	**100.00%**	**30**	**100.00%**

Table 2 illustrates that 60 study participants were included in this study. In control group, there were 21 males (70.00%) and 9 were females (30.00%). In exercise group, there were 18 males (60.00%) and 12 were females (40.00%). Graph 2 shows the gender-wise distribution of the study participants.

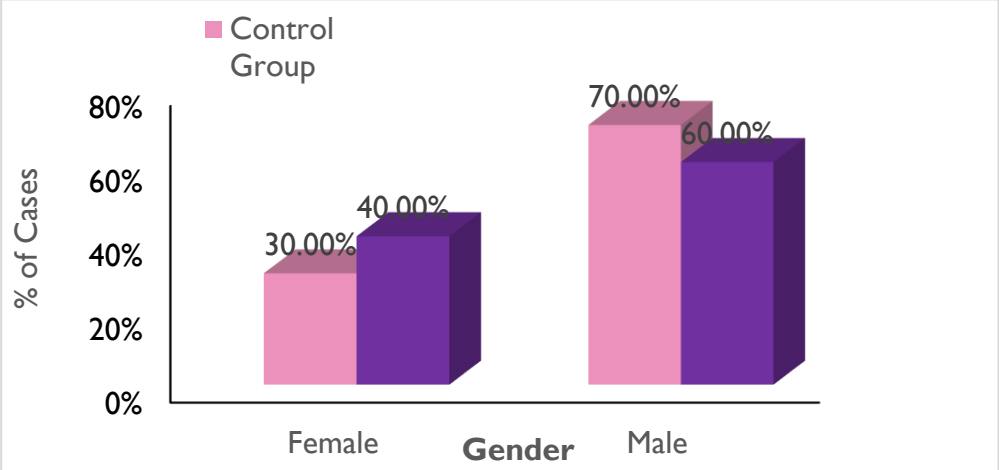


Table 3: BMI wise Distribution of Patients Among Groups

	Control Group		Exercise Group	
BMI	**No.**	**%**	**No.**	**%**
Underweight (<18.5)	2	6.67%	1	3.33%
Normal (18.5-24.9)	17	56.67%	21	70.00%
Overweight (>24.9)	11	36.67%	8	26.67%
Total	**30**	**100.00%**	**30**	**100.00%**

Table 3 illustrates that 60 study participants were included in this study. The number of participants in control group and exercise group- with normal BMI were in 17 and 21 respectively, with Underweight category were 2 and 1, and in Overweight category were 11 and 8 respectively. Graph 3 shows the BMI-wise distribution of the study participants.

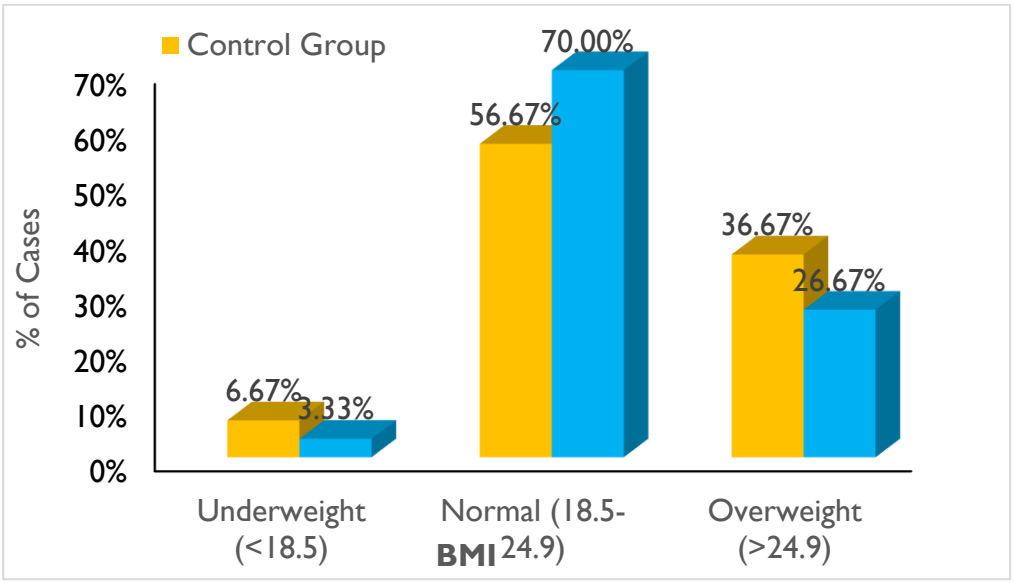


Table 4: Residence wise Distribution of Patients Among Groups

	Control Group		**Exercise Group**	
Residence	**No.**	**%**	**No.**	**%**
RURAL	7	23.33%	10	33.33%
URBAN	23	76.67%	20	66.67%
Total	**30**	**100.00%**	**30**	**100.00%**

Table 4 illustrates that 60 study participants were included in this study. In control group, most of the participant belonged to urban area, in control group the number was 23 (76.67%) and in exercise group, the number was 20 (66.67%). Graph 4 shows the Residence-wise distribution of the study participants.

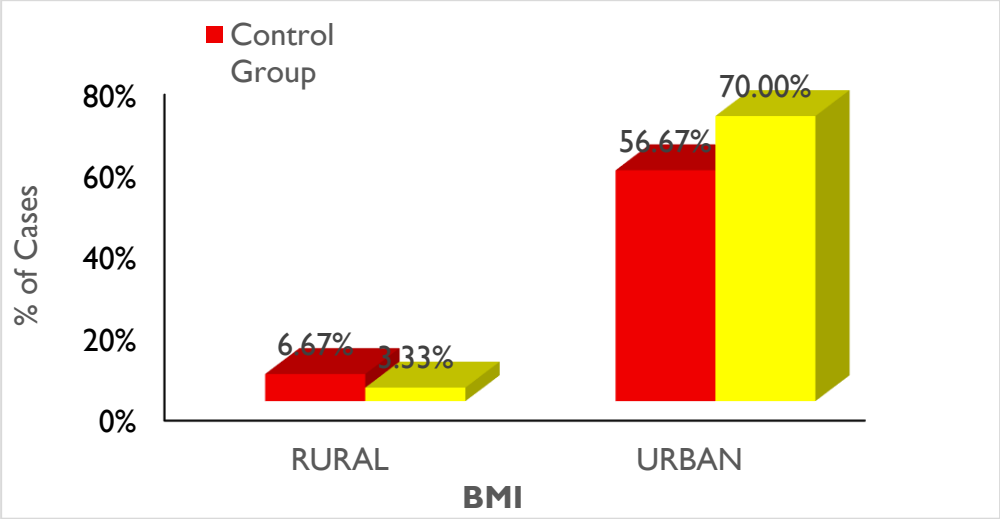


Table 5: FSSG Score Distribution of Patients Between Groups

	Control Group		Exercise Group		
	Mean	**SD**	**Mean**	**SD**	**P value**
Pre Treatment	20.00	9.60	21.63	10.55	0.53 (NS)
6 wks Post Treatment	10.77	8.86	2.17	2.02	<0.001 (HS)
Post Treatment	5.07	4.88	0.50	0.68	<0.001 (HS)
ANOVA P value	<0.001 (HS)		<0.001 (HS)		

Table 5.5 illustrates that the FSSG Score in Control group and Exercise group. In Control group, FSSG Score reduced from 20.00±9.60° to 10.77±8.86° after 6 weeks treatment and to 5.07±4.88° post treatment. In Exercise group, FSSG Score reduced from 21.63±10.55° to 2.17±2.02° after 6 weeks treatment and to 0.50±0.68° post treatment.

Graph 5.3 illustrates the pre-interventional, 6 weeks treatment and post-treatment mean values of FSSG Score of Control Group (pre- 20.00±9.60°, 6 weeks- 10.77±8.86° and post- 5.07±4.88°) and Exercise Group (pre- 21.63±10.55°, 6 weeks- 2.17±2.02° and post- 0.50±0.68°). The calculated ANOVA test p value for pre-intervention is 0.53 suggesting no statistically significant difference between the two groups at baseline. The 6 weeks treatment ANOVA test p value is <0.001 suggesting

high statistically significant difference between the groups 6 weeks post-intervention. The post-treatment ANOVA test p value is again <0.001 suggesting high statistically significant difference between the groups in FSSG Score value. This shows that both of the treatments were able to reduce the score in subjects but the Exercise group stood superior to the Control group.

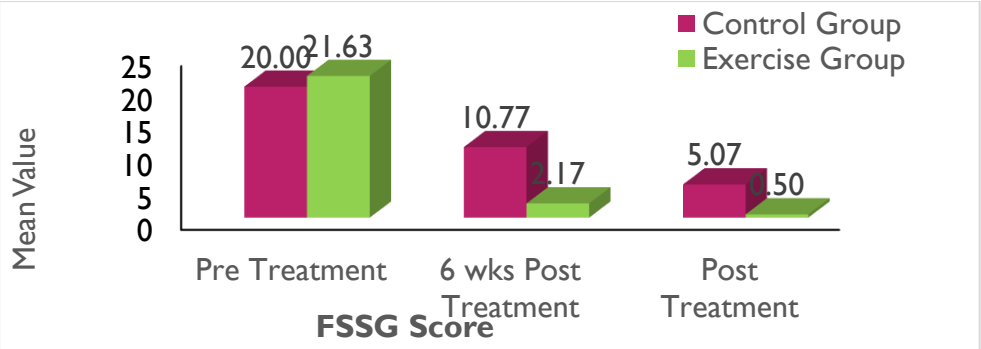


Table 6: GERDQ Score Distribution of Patients Between Groups

	Control Group		Exercise Group		
	Mean	**SD**	**Mean**	**SD**	**P value**
Pre Treatment	9.83	4.30	10.07	4.05	0.82 (NS)
6 wks Post Treatment	5.00	4.08	3.03	3.06	0.04 (S)
Post Treatment	2.77	3.20	0.40	0.77	<0.001 (HS)
ANOVA P value	<0.001 (HS)		<0.001 (HS)		

Table 5.5 illustrates that the GERDQ Score in Control group and Exercise group. In Control group, GERDQ Score reduced from 9.83±4.30° to 5.00±4.08° after 6 weeks treatment and to 2.77±3.20° post treatment. In Exercise group, GERDQ Score reduced from 10.07±4.05° to 3.03±3.06° after 6 weeks treatment and to 0.40±0.77° post treatment.

Graph 6 illustrates the pre-interventional, 6 weeks treatment and post-treatment mean values of FSSG Score of Control Group (pre- 9.83±4.30°, 6 weeks- 5.00±4.08° and post- 2.77±3.20°) and Exercise Group (pre- 10.07±4.05°, 6 weeks- 3.03±3.06° and post- 0.40±0.77°). The calculated ANOVA test p value for pre-intervention is 0.82 suggesting no statistically significant difference between the two groups at baseline. The 6 weeks treatment ANOVA test p value is 0.04 suggesting statistically significant difference between the groups 6 weeks post-intervention. The post-treatment ANOVA test p value is again <0.001 suggesting high statistically significant difference between the groups in FSSG Score value. This shows that both of the treatments were able to reduce the score in subjects but the Exercise group stood superior to the Control group.

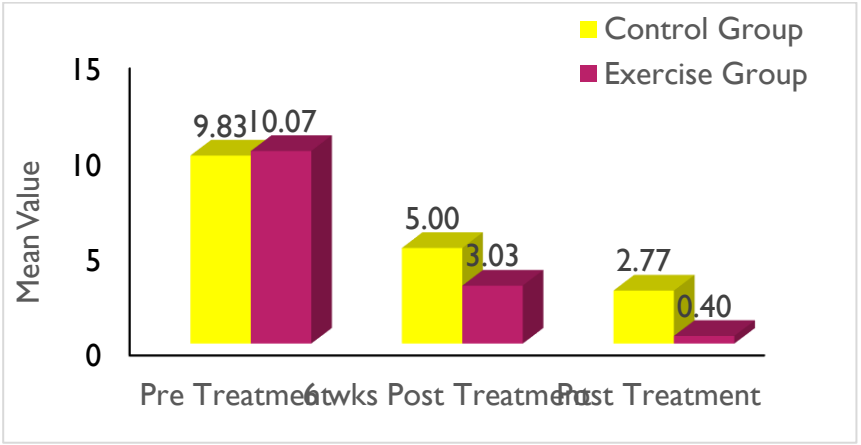


Table 7: GERD-HRQOL Score Distribution of Patients Between Groups

	Control Group		Exercise Group		
	Mean	**SD**	**Mean**	**SD**	**P value**
Pre Treatment	27.27	10.88	25.33	12.30	>0.05 (NS)
6 wks Post Treatment	10.77	7.99	10.93	7.03	>0.05 (NS)
Post Treatment	2.47	2.86	0.87	1.55	<0.001 (HS)
ANOVA P value	<0.001 (HS)		<0.001 (HS)		

Table 7 illustrates that the GERD-HRQOL Score in Control group and Exercise group. In Control group, GERD-HRQOL Score reduced from 27.27±10.88° to 10.77±7.99° after 6 weeks treatment and to 2.47±2.86° post treatment. In Exercise group, GERD-HRQOL Score reduced from 25.33±12.30° to 10.93±7.03° after 6 weeks treatment and to 0.87±1.55° post treatment.

Graph 7 illustrates the pre-interventional, 6 weeks treatment and post-treatment mean values of FSSG Score of Control Group (pre- 27.27±10.88°,6 weeks- 10.77±7.99° and post- 2.47±2.86°°) and Exercise Group (pre- 25.33±12.30°, 6 weeks- 10.93±7.03° and post- 0.87±1.55°). The calculated ANOVA test p value for pre-intervention is >0.05 suggesting no statistically significant difference between the two groups at baseline. The 6 weeks treatment ANOVA test p value is also >0.05 suggesting no statistically significant difference between the groups 6 weeks post-intervention. The post-treatment ANOVA test p value is <0.001 suggesting high statistically significant difference between the groups in GERD-HRQOL value. This shows that both of the treatments were able to reduce the score in subjects only after 12 weeks of treatment but the Exercise group stood superior to the Control group.

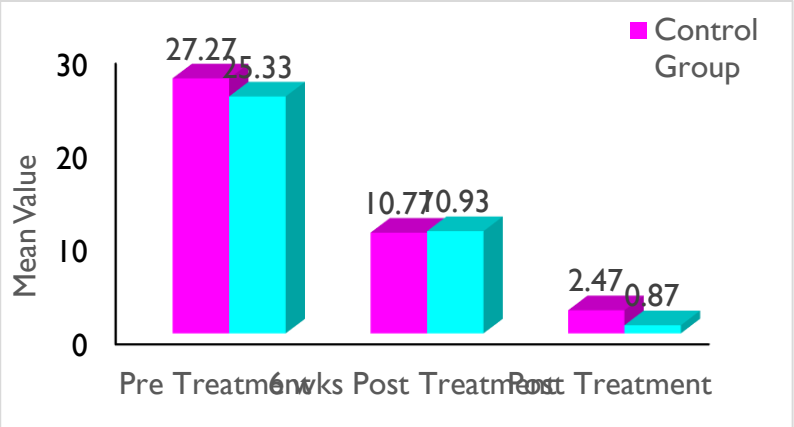


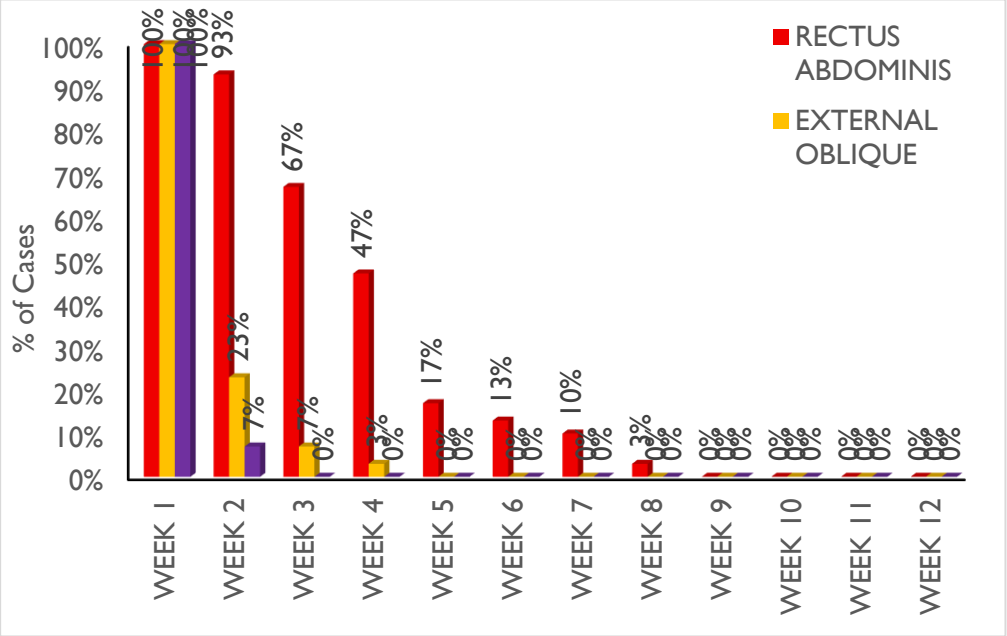
Table 8: Frequency of Muscle Needling in Total Subjects in Exercise Group

	RECTUS ABDOMINIS		EXTERNAL OBLIQUE		INTERNAL OBLIQUE	
WEEK 1	30	100%	30	100%	30	100%
WEEK 2	28	93%	7	23%	2	7%
WEEK 3	20	67%	2	7%	0	0%
WEEK 4	14	47%	1	3%	-	0%
WEEK 5	5	17%	0	0%	-	0%
WEEK 6	4	13%	-	0%	-	0%
WEEK 7	3	10%	-	0%	-	0%

WEEK 8	1	3%	-	0%	-	0%
WEEK 9	-	0%	-	0%	-	0%
WEEK 10	-	0%	-	0%	-	0%
WEEK 11	-	0%	-	0%	-	0%
WEEK 12	-	0%	-	0%	-	0%

Table 8 illustrates the frequency of needling of three abdominal muscles- Rectus abdominis, External oblique and Internal oblique in Exercise group. It depicts the number of subject who undergone the muscle needling from week 1 to week 12.

Graph 5.3 illustrates that Rectus abdominis was Needled in all 30 subjects in week 1(100%) followed by 28(93%), 20(67%), 14(47%), 5(17%), 4(13%), 3(10%), 1(3%) respectively in week 2 till week 8. Afterwards, no subjects required needling of rectus abdominis. The muscle External oblique was needled in all 30 subjects in week 1 (100%) followed by 7(23%), 2(7%), 1(3%) respectively in week 2 to week 4. The muscle Internal oblique was needled in all 30 subjects in week 1 (100%) followed by 2(7%) in week 2.



7. DISCUSSION

This study investigated the effects of dry needling and strengthening the abdominal muscles on frequency, symptoms and quality of life in the individuals diagnosed with GERD using FSSG Score, GERDQ and GERD-HRQOL respectively. The results showed significant improvement in FSSG Score, GERDQ and GERD-HRQOL in both the exercise and control group, exercise group coming out to be superior than the control group. So, a combination of medical and physiotherapeutic management along with lifestyle advice can improve the effectiveness of GERD management.

Medication therapy for GERD is mainly targeted at symptom reduction and minimizing mucosal damage resulting from acid reflux. Recently, there is a growing concern about the role of PPIs in contribution to the development of bone fractures, electrolyte deficiencies, infections (e.g., Clostridium difficile, pneumonia), and renal insufficiency after a prolonged use. The use of anti-reflux surgery (fundoplication) has also been controversial due to relapse and ineffective symptom reduction after some time. Studies have shown only minimal long-term symptomatic improvements with surgery over PPI therapy, that is again paired with an increased incidence of dysphagia and dyspepsia. Approximately half of all the patients who undergo surgery eventually require surgical revision.[18] Despite the benefits of medical management, as many as 40% of patients undergoing the treatment are dissatisfied with their PPI management and up to 45% of patients can have progressive disease despite maximal treatment with PPIs.[15] Management of GERD requires a multifaceted approach, taking into account the symptom presentation, endoscopic findings, and likely physiological abnormalities.[20]

Successful treatment of GERD is considered to be one that is associated with reduction in symptoms for a long time as well as significant improvement in quality of life, superior status of physical and social function, decreased physical pain, increased vitality, and emotional well-being.[18] Our need of the research also aligns with the findings of above mentioned studies, that there remains need of the protocols which work upon the cause as well as the symptoms of GERD. Combining

the effect of medicine which are directed at neutralization or reduction of gastric acid[20], lifestyle adjustments which aim at avoiding the scenarios aggravating the symptoms, we also need a treatment strategy to reinforce the physiological barriers at gastroesophageal junction. Excessive acid reflux due to TLESR is the most common causative mechanism behind GERD.[21] By strengthening the crura of diaphragm, improving the resting tone of LES, maintaining a sufficient pressure zone at LES, we infer that there can be significant reduction in symptoms of GERD and improvement in quality of life of subjects.

In our study, TrPs of abdominal muscles, which were targeted in dry needling procedure, that we hypothesize were causing motor dysfunction and weakness of the extrinsic barrier of LES. The reasoning behind development of TrPs goes to the excessive eccentric or concentric loading of the skeletal muscular components of the extrinsic barrier of LES, which leads to release of acetylcholine, increased activation of nicotinic receptors and inhibition of acetylcholinesterase at the motor endplate causing development of muscle contractures. Some studies also link TrPs with higher concentrations of inflammatory and nociceptive agents and a lowered pH value in the surrounding area, giving it characteristics of a pathological muscle behavior. These physiologic changes are the most likely causative factors behind the physical impairments associated with the presence of MTrPs, such as loss of optimal range of movement (ROM), altered muscle physiological functioning and painful contractions.

Previous studies have reported deep diaphragmatic breathing. [22] Inspiratory muscle training [12], abdominal breathing exercises [17] had positive effect on controlling GERD. The results of our studies also align with these researches showing that abdominal muscles strengthening along with diaphragmatic breathing exercises can play a vital role in management of GERD.

8. CONCLUSION

The combined protocol of medical management, physiotherapeutic exercises of abdominal muscles and diaphragm, lifestyle adjustments are effective in improving the frequency, symptoms and quality of life in GERD individuals.

Due to eccentric loading of abdominal muscle, which remain tonically active for most of the postural tasks and day-to-day activities, the development of TrPs is so common in abdominal muscle, causing rise in the GERD prevalence and incidences. With the use of dry needling to mechanically disrupt the MTRPs, we optimize the pain, dysfunction and recruitment of abdominal muscles.

The intervention protocol of this study along with medical management and lifestyle adjustments is crucial in managing as well as treating the symptoms of GERD. A holistic program of medical, surgical, physiotherapeutic and nutritional components is much more effective than any of these alone.

It is expected that the results of this study would contribute towards better clinical protocols and patient handling. A more comprehensive approach towards GERD may be established to restore and rehabilitate the GERD patients.

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