Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 2s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Abdominal Muscle Dysfunction Interplay with Gerd: An Observational Study

Akshita Maheswari[1], Dr. Jafar Khan[2], Dr. Kapil Aggarwal[3], Dr. Renuka Pal[4], Dr. KM. Annamalai[5], Dr. Vardhman Jain[6], Dr. Richa Hirendra Rai[7], Dr. Shilpi Kapoor[8], Dr. Praveen Rawat[9], Dr. Vaibhav Choubey[10], Dr. Manoj Agarwal[11]

[1]M.P.Th. scholar, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

[2]Dean & HOD, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

[3]Assistant Professor, Department of Radiodiagnosis, Pacific Medical College & Udaipur, Pacific medical university, Udaipur, Rajasthan

[4]Associate Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

[5]Consultant Senior Physiotherapist & Director Physio Alliance Apollo Hospital, Ahmedabad, Gujarat, India

[6]Consultant Senior Physiotherapist & Director Synergy Health Point, Bombay, Maharashtra, India

[7]Professor, School of Physiotherapy, Delhi Pharmaceutical Sciences and Research University, New Delhi, India

[8]Principal, BIMR College Of Professional Studies, Gwalior, MP

[9]Assistant Professor, Himalayan Institute of Medical Science, Swami Rama Himalayan University, Uttarakhand

[10]HOD & Senior Physiotherapist, Gajraj Medical College, GWALIOR, MP

[11]Senior Consultant, Laparoscopic Surgeon Medicare Hospital, Betul, MP

***Corresponding Author:**

Akshita Maheshwari

Email ID:- physio.akshitamaheshwari@gmail.com

Cite this paper as: Akshita Maheswari, Dr. Jafar Khan, Dr. Kapil Aggarwal, Dr. Renuka Pal, Dr. KM. Annamalai, Dr. Vardhman Jain, Dr. Richa Hirendra Rai, Dr. Shilpi Kapoor, Dr. Praveen Rawat, Dr. Vaibhav Choubey, Dr. Manoj Agarwal, (2025) Abdominal Muscle Dysfunction Interplay with Gerd: An Observational Study. *Journal of Neonatal Surgery*, 14 (2s), 726-731.

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 frequence 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” [4]

2. CLINICAL FEATURES

The two main symptomatic presentation in GERD are heartburn and regurgitation. 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. [5]

The biomechanical factors increasing the susceptibility for GERD may include a short intraabdominal esophagus, diaphragmatic crura or phrenoesophageal ligament weakness an incompetent LES, hiatal hernia, and increased intraabdominal pressure.

3. ANOTOMY & PHYSIOLOGY

The esophagus travels down descending from the cricoid cartilage to terminating in the stomach, covering a length of 25cm in a mature adult. At the junction of esophagus and stomach, a flap-like structure is present called Lower Esophageal Sphincter (LES). LES, measuring upto 3-4 cm in a mature adult, creates high pressure zone that prevents retrograde flow of acidic content from stomach into the esophagus.

Physiologically, the LES transiently relaxes for 4-5 seconds in order to allow easy passage of bolus from esophagus to stomach. At this time, the diaphragmatic crura also relaxes. This is called Transient Lower Esophageal sphincter Relaxation (TLESR). The LES relaxation is controlled in intrinsic and extrinsic manner. The intrinsic component being neurohormonal while the extrinsic component are the skeletal muscle fibres of diaphragmatic crura and the phrenoesophageal ligament- a continuation of the inferior diaphragmatic fascia, providing anatomical support to the LES. [6]

Dysfunction of these two sphincter controls of the LES causes GERD-like symptoms and other upper gastric issues. In this paper, our focus is mainly on the extrinsic control of LES – the lesser talked reason behind GERD. This physiological TLESR mechanism becomes pathological when LES changes its tonically contracted state and is not able to create enough pressure to prevent flow of stomach contents cranially. The improper recruitment of diaphragm, upper abdominal muscle and diaphragmatic fascia disturbs the anatomical support of LES. Thus, leading to an incompetent LES and causing GERD or GERD- like symptoms.

4. DIAGNOSIS & TREATMENT

The diagnosis of GERD majorly relies on excellent history-taking and clinical presentations. There is no gold standard diagnostic method for GERD. Other clinically popular diagnostic methods are endoscopic evaluation of esophageal mucosa, reflux monitoring, and response to therapeutic intervention. There are some validated questionnaires available that explore symptoms and their severity as well.[7]

Treatment methods of GERD range from lifestyle management to medical management to surgical and endoscopic interventions. Avoiding the risk factors, adapting a lifestyle that provides patient a balanced meal at the right timings, regular physical activity, maintain stress levels etc. along with bed elevation is primarily advised to patient. Medical treatments primarily include proton pump inhibitors (PPI) and H2 blockers. Surgical methods of Laparoscopic anti-reflux surgery or fundoplication are other ways.[8]

Beyond the benefits these treatments provide, there are many adverse effects and negatives of these options as well. Long term use of PPI has been proven to be a causative factor in fractures, gastric cancers, recurrent infections and kidney issues. The surgical options sometimes provide shorts term relief and at times patients have to undergo surgical revision. These treatments are not able to reinforce the extrinsic barrier. Musculoskeletal cause behind GERD is still not explored inn any of these treatments.

5. ROLE OF MUSCULOSKELETAL SYSTEM IN GERD

Myofascial trigger points (TrPs) in many references have been given the credit for various pains, disorders and dysfunctions. Travell & Simons in their book – 'Myofascial Pain and Dysfunction' (3rd edition, 2019) mention the presence of active trigger points in upper portion of the abdominal external oblique muscle and paraxiphoid trigger points in the upper rectus abdominis muscle, leading to "symptoms of abdominal fullness, "heartburn", indigestion and sometimes nausea and vomiting.[10] MTrPs are clinically associated with a variety of medical conditions including those of metabolic, visceral, endocrine, infectious, and psychological origin.[9]

Myofascial trigger points (TrPs) are highly sensitive, palpable knot-like irritable spots present in the taut band of muscle fibres. They can be classified as active or latent. They are likely to be developed in type-1 muscle fibres tend to remain in sustained low-level contraction. 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.

Abnormal breathing pattern or sedentary lifestyle with poor posture changes the length-tension relationship of abdominal muscles. The upper fibres of abdominal muscle remain in concentrically loaded while the lower fibres remain in eccentrically loaded. As, diaphragm and abdominal muscle are among the core muscles of body and have anatomical associations with other visceral structure. The skeletal and somatic tissues of abdomen together may cause dysfunction at organ level or vice-versa. Length tension relationship alteration in abdominal and diaphragm fibres causes a micro dysfunction in esophago-gastro-duodenal junction which further leads to macro dysfunctions like GERD, hiatus hernia etc. That can also affect gut and related organ motility. Basically, muscular dysfunction may invite organ dysfunction sooner or later.

Due to the limitations in medical and surgical managements, there 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 and GERD-HRQOL in patients diagnosed with GERD.

6. 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.

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]

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. [11]

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.

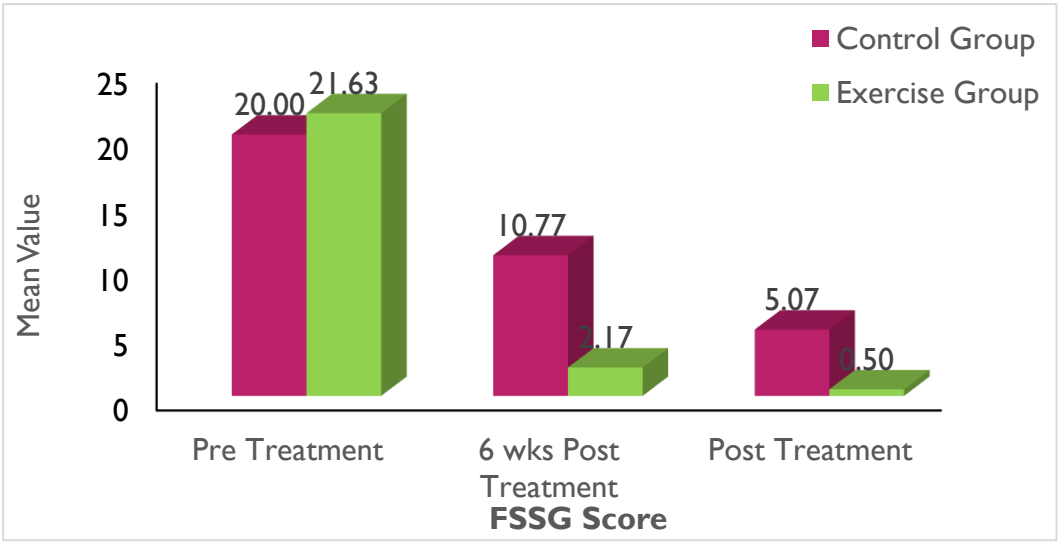
For the control group, Along with the ongoing medications, they received lifestyle modification advice, such as-

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.

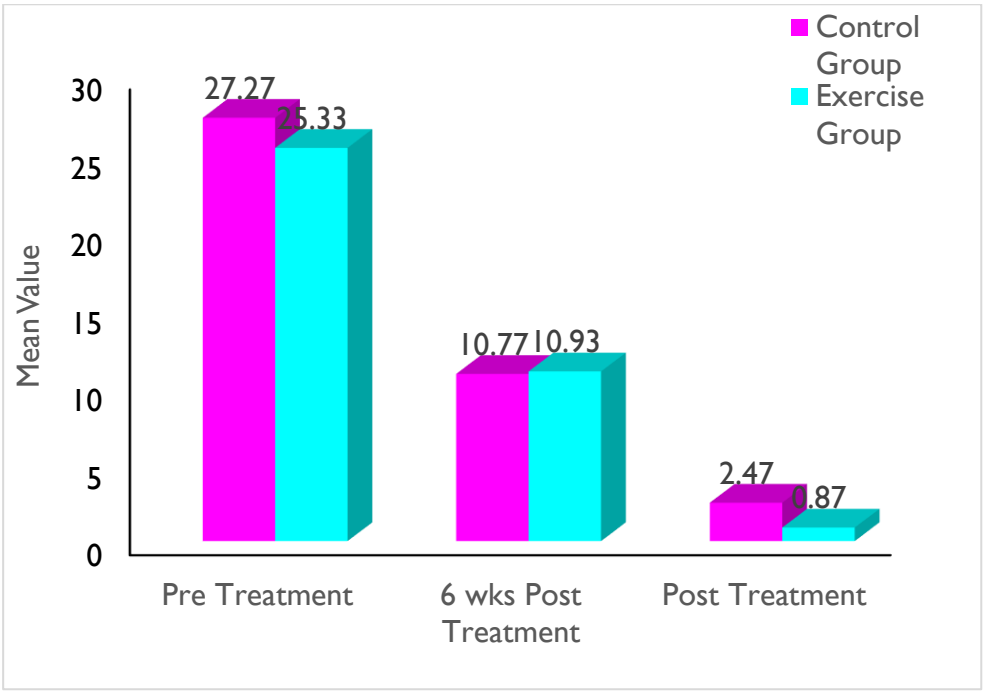
7. RESULTS

There was significant difference in the values of FSSG and GER-HRQOL scores after 6 weeks and after 12 weeks of interventions in both control and study 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. 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.



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. 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.



8. CONCLUSION

The present study suggests that combined approach of abdominal strengthening exercises along with Conventional medical treatment were effective in reducing FSSG Score and GERD-HRQOL in individuals of Gastroesophageal Reflux Disease (GERD) by accepting the alternate hypothesis. In our study, the exercise group showed major difference and stood superior in comparison to the control group, we confirm that involving physiotherapeutic interventions in forms of abdominal and diaphragmatic exercise along with the current treatment methods can play a key role in the reduced dependency of medicines, reducing the duration of course of treatment, preventing or delaying the surgical options, improving the quality of life.

Muscle understands only one language, i.e. of contraction and relaxation. Any sedentary lifestyle pattern or incorrect muscle memory, injury or any misuse of muscle function causes reduction in sensory inputs that leads to reduced motor endplates and their recruitment and hence the output. This is one way of muscular dysfunction. The other way it happens is when muscle doesn't get fully contracted or relaxed due to any dysfunction, it gets locked in a range. This locking can range from 10-20-30-40% according to Hanna Thomas.[13] So, the muscle consumes the energy but is not able to give the optimal output. Acc. To K-CAT by KM Annamalai, this muscle dysfunction occurs due to sensory inhibition, myofascial TRPs form in the muscles due to overuse, injury or insult of that tissue. It may get long locked or short locked, according to Tom Myer. So, muscle starts transferring its tension to nearby or fascially related structures. Later this puts systemic load on these other structures because of originally imbalances muscular tissue. The motive of this study was to connect these scattered dots around the muscular, physiological and biomechanical concepts that might have corelation with occurrence of systemic diseases like GERD here.

Here we conclude, GERD can be treated alternatively by approaching its biomechanical root cause as well. When the anatomical and physiological component aren't the cause, there is a possible way to look into biomechanical cause and treat instead of depending on PPIs or surgical procedures for undesired longer times. These musculoskeletal approaches can be incorporated in treatment of GERD. Further, more ideas and method belonging to movement science can be investigated and involved in GERD treatment.

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.

REFERENCES

[1] Jiang D, Zhuang Q, Jia X, Chen S, Tan N, Zhang M, Xiao Y. Current complementary and alternative therapy forgastroesophageal reflux disease. Gastroenterol Rep (Oxf). 2023 Oct 4;11:goad057. doi: 10.1093/gastro/goad057. PMID: 37810946; PMCID: PMC10551227.

[2] Bhatia SJ, Makharia GK, Abraham P, Bhat N, Kumar A, Reddy DN, Ghoshal UC, Ahuja V, Rao GV, Devadas K, Dutta AK, Jain A, Kedia S, Dama R, Kalapala R, Alvares JF, Dadhich S, Dixit VK, Goenka MK, Goswami BD, Issar SK, Leelakrishnan V, Mallath MK, Mathew P, Mathew P, Nandwani S, Pai CG, Peter L, Prasad AVS, Singh D, Sodhi JS, Sud R, Venkataraman J, Midha V, Bapaye A, Dutta U, Jain AK, Kochhar R, Puri AS, Singh SP, Shimpi L, Sood A, Wadhwa RT. Indian consensus on gastroesophageal reflux disease in adults: A position statement of the Indian Society of Gastroenterology. Indian J Gastroenterol. 2019 Oct;38(5):411-440. doi: 10.1007/s12664-019-00979-y. Epub 2019 Dec 5. PMID: 31802441.

[3] Sharma PK, Ahuja V, Madan K, Gupta S, Raizada A, Sharma MP. Prevalence, severity, and risk factors of symptomatic gastroesophageal reflux disease among employees of a large hospital in northern India. Indian J Gastroenterol. 2011 May;30(3):128-34. doi: 10.1007/s12664-010-0065-5. PMID: 21061110.

[4] Vakil NB, Halling K, Becher A, Rydén A. Systematic review of patient-reported outcome instruments for gastroesophageal reflux disease symptoms. Eur J Gastroenterol Hepatol. 2013 Jan;25(1):2-14. doi: 10.1097/MEG.0b013e328358bf74. PMID: 23202695.

[5] Kahrilas PJ. GERD pathogenesis, pathophysiology, and clinical manifestations. Cleve Clin J Med. 2003 Nov;70 Suppl 5:S4-19. doi: 10.3949/ccjm.70.suppl_5.s4. PMID: 14705378.

[6] Rosen RD, Winters R. Physiology, Lower Esophageal Sphincter. [Updated 2023 Mar 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK557452/

[7] Katz PO, Dunbar KB, Schnoll-Sussman FH, Greer KB, Yadlapati R, Spechler SJ. ACG Clinical Guideline for the Diagnosis and Management of Gastroesophageal Reflux Disease. Am J Gastroenterol. 2022 Jan 1;117(1):27-56. doi: 10.14309/ajg.0000000000001538. PMID: 34807007; PMCID: PMC8754510

[8] Azer SA, Hashmi MF, Reddivari AKR. Gastroesophageal Reflux Disease (GERD) [Updated 2024 May 1]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK554462/

[9] Shah JP, Thaker N, Heimur J, Aredo JV, Sikdar S, Gerber L. Myofascial Trigger Points Then and Now: A

Historical and Scientific Perspective. PM R. 2015 Jul;7(7):746-761. doi: 10.1016/j.pmrj.2015.01.024. Epub 2015 Feb 24. PMID: 25724849; PMCID: PMC4508225.

[10] Travell & Simons, Myofascial Pain and Dysfunction (3rd edition, 2019)

[11] Velanovich V, Karmy-Jones R. Measuring gastroesophageal reflux disease: relationship between the Health-Related Quality of Life score and physiologic parameters. Am Surg. 1998 Jul;64(7):649-53. PMID: 9655276.

[12] Kusano M, Shimoyama Y, Sugimoto S, Kawamura O, Maeda M, Minashi K, Kuribayashi S, Higuchi T, Zai H, Ino K, Horikoshi T, Sugiyama T, Toki M, Ohwada T, Mori M. Development and evaluation of FSSG: frequency scale for the symptoms of GERD. J Gastroenterol. 2004 Sep;39(9):888-91. doi: 10.1007/s00535-004-1417-7. PMID: 15565409.

[13] Thomas Hanna, Somatics- Reawakening the mind's control of movement, flexibility, and health