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Comparative Effects of Thoracolumbar Manipulation versus Abdominal Massage on Functional Constipation and Quality of Life

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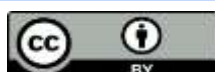
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ABSTRACT

Background: Functional constipation is a chronic constipation without any aetiology. Rome IV criteria defined functional constipation as having hard or lumpy stools, excessive straining during defecation, less than three bowel movements per week and an obstructive feeling during evacuation. Pathophysiology of functional constipation includes eating disorders, physical inactivity, fibre-deficient diet, family history and behavioural factors like stool withholding attitude. Physical therapy interventions can play a vital role in relieving functional constipation and improving quality of life. **Objective:** To investigate the comparative effects of thoracolumbar manipulation versus abdominal massage on functional constipation and quality of life. **Methodology:** This double-blinded, randomised controlled trial was conducted in the independent hospital physiotherapy department of Faisalabad with concealed allocation. A consecutive sample of 40 patients with functional constipation based on Rome IV criteria was taken. Patients were referred from gastroenterologists and general physicians and were randomly allocated by a universal lottery method to group A (lower thoracic-lumbar manipulation, 3 sessions per week) and group B (abdominal massage for 15 minutes, 3 sessions per week). The Constipation Scoring System and Patient Assessment of Constipation Quality of Life Questionnaire were evaluated at baseline, 2 weeks, and 4 weeks after treatment. A total of 12 sessions in 4 weeks were provided to patients. Data was analysed by using non-parametric tests, Kruskal-Wallis Test and Friedman Test and SPSS version 25. **Results:** The age of the participants in both groups was the mean and standard deviations (29.23 ± 3.23). Within-group analysis showed a significant relationship in both groups (Group A manipulation and Group B abdominal massage) ($p < 0.05$). Constipation scoring system and patient assessment of constipation showed significant value ($p < 0.00$), indicating that statistically significant relation between both groups. **Conclusion:** This study concluded that abdominal massage is a superior method to deal with functional constipation patients as compared to Maitland lower thoracolumbar manipulations.

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INTRODUCTION

Constipation is defined as a condition in which a person passes stools less than 3 times in a week. The important features of constipation are dry and hard faeces, difficulty and infrequency in evacuating, and pain.¹ It is a disorder in the gastrointestinal system which can lead to pain and stiffness while passing stools. Acute constipation can lead to intestinal obstruction, which may require surgery.² Constipation is of two types, acute or chronic, with the latter ordinarily being characterised as a time duration of more than three months.³ Chronic constipation is described as a functional disorder which have persistent, incomplete and infrequent bowel movements. Constipation without an organic aetiology is defined as functional constipation.

In 95% cases it's idiopathic, but in 5% cases the cause differs from neuromuscular disease, anorectal malformations, Hirschsprung disease and endocrine to metabolic disorders. The most common cause for having functional constipation in children is stool withholding behaviour.⁴ In functional constipation (normal transit constipation), there is no evidence of slow transit time or dyssynergic defecation. The pathophysiology of normal transit constipation is unknown. Functional constipation and IBS-C are difficult to diagnose due to the similarity of symptoms. There is no clear data on the physiological differences between Irritable Bowel Syndrome with Constipation (IBS-C) and functional constipation. Rome III diagnostic criteria are used to diagnose functional constipation from IBS-C. Patients who are listed in the Rome III criteria of IBS-C cannot be classified as having functional constipation.

More symptoms of constipation are seen in patients with IBS-Constipation than functional constipation, and visceral pain hypersensitivity has also been associated with IBS-C than FC patients. Treatment protocol is different for functional constipation, which mainly focuses on motility and pelvic floor dysfunction, than treatment of IBS-constipation that targets abdominal pain.⁵ Rectal evacuation disorders include dyssynergic defecation dysfunction, rectal prolapse and rectocele. It is the second most common type of constipation. Dyssynergic defecation disorder is an acquired behavioural disorder and is most common among the rectal evacuation disorders.⁶ Slow transit constipation

happens due to prolonged proximal colonic transit time. A decrease in the frequency of propulsive contractions and delayed emptying of the transverse and ascending colon are the main pathophysiological factors. Disturbances in extrinsic parasympathetic and enteric neuronal circuits are also associated with slow transit constipation. Some patients presented with megacolon, which is a dilated colon due to poor colonic compliance.³ In patients with STC, both the morphology and amount of Cajal interstitial cells and the enteric nervous system are changed, which play an important pathophysiological role in colorectal motility disorders. Reduction in ganglionic size and density is shown in the myenteric plexus system⁷

Chronic constipation hurts the quality of life, including mental and physical aspects. A work productivity loss of 2.4 productive days per month was mentioned in constipated individuals. Chronic constipated patients had significantly greater resource use than those without constipation.⁸ The quality of life (QOL) of 50% patients was affected by functional constipation and mostly showed dissatisfaction with their current treatment protocols. Due to suboptimal levels of treatment, the symptoms can be debilitating and limit daily activities. This may increase visits to health care, thus alleviating the burden of medical costs.⁹ In different countries, (16 to 40%) functional constipation patients use laxatives, and laxative use increases with increasing age, frequency of symptoms and time duration of functional constipation.

Each year in the USA, a budget of approximately \$800 million is spent to buy laxatives.¹⁰ Total health expenditure costs for a patient having chronic constipation were \$11,991 annually, with 44.8% credited to outpatient services, which include 10.0% physician office checkups and 34.8% other outpatient services.⁶ There are some alternative treatment methods which can relieve chronic constipation. Spinal manipulation comprises mobilisations and manipulation. During Maitland Grade V spinal manipulation, the therapist applies a high velocity low amplitude (HVLA) thrust to the specific spinal vertebra by manually contacting the paraspinal muscles overlaying the transverse, spinous processes of that specific vertebra.¹¹ During mobilisations, low velocity, low amplitude passive movements are delivered to the patient within the available range of motion. In case of manipulation end range

physiological end range is achieved, and HVLA is delivered at that end range. An audible crack is heard due to cavitation of synovial joints. The mode of action of spinal manipulation is further divided into neurophysiological and mechanical approaches. Neurophysiological parameters indicate that spinal manipulation can alter the afferent neurons, pain processing and the motor control system. Reduction in internal mechanical stress is observed after spinal manipulation.¹² Mechanical force applied during the spinal manipulation has a good impact on the central nervous system, producing good neurophysiological responses resulting in a decrease in central sensitisation. Spinal manipulation can lead to neurological changes in both the central and peripheral nervous systems.

The relationship between the autonomic nervous system and the thoracic spine shows that thoracic manipulation might affect the functioning of the autonomic nervous system. Noxious sensory input from paraspinal tissues can reflexively initiate sympathetic nerve activity. Spinal manipulation can reduce the compression between the intervertebral foramen and spinal nerve roots. Manipulating the thoracic spine can lead to desensitisation of increased sympathetic outflow by increasing pain tolerance or its threshold. Spinal manipulation initiates paraspinal muscle reflexes and changes motoneurons. It can stimulate the afferent Muscle spindle and Golgi tendon organ. Massage is a non-invasive technique which can activate the superficial and deeper layers of connective tissues and muscles.

Different techniques of massage have been created over thousands of years, but it is unclear which one is best. Massage can provide several benefits to the human body which including reduced neurological excitability, reduced muscle pressure, improved blood flow and improved sense of well-being. Body massage can induce mechanical pressure, which can lead to increased muscle compliance, muscle mass, resulting in decreased stiffness and increased collection of joint range of motion.¹³ Massage-generated pressure will help to alleviate blood circulation by enhancing the arterial pressure and keeping tissue temperature from rubbing and friction. Massage-generated mechanical pressure on the tissues can decrease or increase the nerve excitability as measured by H-reflex, which is called a neurological mechanism. This is observed in parasympathetic nerve activity (as measured

by blood pressure, heart rate and heart rate variability) and junk levels as observed by measuring the cortisol levels in the body following body massage, creating a response of relaxation, also known as physiological mechanisms.¹⁴ Abdominal massage can be beneficial for functional constipated patients. There are some important benefits of massage. Firstly, there are no side effects of a massage. Massage is easy to learn, and patients can apply it independently. It is a non-invasive, cost-effective technique, and patients can self-administer it. Abdominal massage increased the defecation frequency, relieved the abdominal pain and decreased the Gastrointestinal rating scale.

Prolonged bed rest in hospitalised patients can lead to constipation. A decrease in physical activity can lead to a reduction in peristaltic movements and a decrease in colonic motility. Prolonged colonic transit time will make the stools hard, dry and evacuation difficult. The use of effleurage abdominal massage can reduce the risk of constipation in patients with impaired physical activity.¹⁵ Effleurage abdominal massage can stimulate defecation by producing rectal waves, which increase colonic motility. It also stimulates the somatic-autonomic reflex and bowel sensations. It stimulates the parasympathetic nervous system, thus reducing pressure on abdominal muscles and increasing colonic motility.

Furthermore, relaxing puborectalis muscle and anal sphincters and break up the hard stools. Previous literature supports the use of whole spine adjustment for resolving chronic constipation, but no specific spinal vertebra level was mentioned. There is limited evidence available about the comparison between lower thoracic-lumbar manipulations versus abdominal massage for relieving functional constipation. The purpose of this study is to evaluate the best treatment available for relieving chronic constipation by comparing the thoracolumbar manipulation with the abdominal massage technique and the impact of these interventions on the quality of life of constipated patients.

METHODOLOGY

An experimental study was conducted using a randomised controlled trial design to compare the effects of lower thoracic-lumbar manipulation and abdominal massage on functional constipation.

Figure 1: Lumbar manipulation in side-lying position

and quality of life. The participants were recruited. From the Physical Therapy Department of the Independent Hospital Faisalabad, after being referred by a gastroenterologist with complaints of functional constipation. The study was carried out in a naturalistic, real-world clinical setting over a duration of four months following the approval of the research synopsis by BASAR. During this period, both interventions were administered, data were collected at multiple time points, and final inferences were drawn. All 40 participants completed the study with no dropouts. Participants were selected using a convenient sampling technique and were randomly assigned to two groups (Group A and Group B) using the universal lottery method, with 20 participants in each group.

Participants were screened based on specific inclusion and exclusion criteria. Inclusion criteria involved male participants aged 20 to 40 years diagnosed with functional constipation as per the Rome IV criteria. Female participants and individuals with other types of primary constipation (e.g., slow transit or defecation disorders), major gastrointestinal surgery, IBS with constipation, drug addiction, use of medications like antihypertensive drugs, psychiatric conditions, neurological disorders such as multiple sclerosis, metabolic disorders like diabetes, and pregnancy were excluded from the study. Enrollment into the study was carried out using a standardised patient evaluation form, and participants were included only if they fulfilled the Rome IV criteria, Constipation Scoring System (CSS), and Patient Assessment of Constipation Quality of Life Questionnaire (PAC-QOL) benchmarks. Written informed consent was obtained from all participants, with the assurance

Figure 2: Lower thoracic manipulation in prone-lying position

that their data would be kept confidential.

Participants were informed about the study procedures, outcome measures, and implications before the start of data collection. The independent variables in this study included diet modification, lower thoracic-lumbar manipulation, and abdominal massage. The dependent variables were assessed using the Rome IV criteria, CSS, and PAC-QOL. A confidence level of 95% and a confidence interval of 0.05 were maintained throughout the study. The primary outcome measure used was the Constipation Scoring System, a validated tool widely accepted for assessing chronic constipation. It consists of eight questions, each scored from 0 to 4, with a maximum score of 30. The secondary outcome measure was the PAC-QOL, which evaluates the impact of chronic constipation on the patient's quality of life. This questionnaire includes 28 items categorised into four domains: physical discomfort, psychosocial discomfort, worries and concerns, and patient satisfaction. Each item is rated on a 5-point Likert scale ranging from 0 to 4, where higher scores reflect greater symptom severity and poorer quality of life.

Data collection occurred at baseline, at the end of the second week, and after four weeks. Demographic and clinical data were recorded using the patient evaluation form. The 40 eligible participants were randomly assigned to one of two treatment groups. Group A received lower thoracic-lumbar spinal manipulations combined with dietary modification, while Group B received abdominal massage with dietary modification. Each participant underwent 12 physiotherapy sessions over four weeks, at a frequency of three

sessions per week on alternate days. Both groups received identical dietary guidelines, which recommended a daily fibre intake of 25–31 grams. Participants were advised to consume fibre-rich foods such as oranges, berries, apples, vegetables like green peas, carrots, broccoli, nuts such as peanuts, almonds, and whole grains like oatmeal, whole wheat bread. They were instructed to avoid low-fibre foods like meat, fast food, chips, frozen meals, and processed items. Additionally, participants were advised to drink at least 8 glasses of water daily and include fibre-digestive liquids such as vegetable juices, soups, and sweetened fruit juices in their diets.

The lower thoracolumbar spinal manipulation for Group A included Maitland Grade V mobilisation techniques. For manipulation, participants lie prone with arms hanging over the couch sides and head turned to one side. The physiotherapist, standing at the level of the targeted vertebra, placed both thumbs adjacent to the spinous processes and delivered an HVLA thrust in a superior-anterior direction during the patient's exhalation. Lumbar manipulation was performed in a side-lying position. The participant's upper leg was flexed until movement was detected at the target interspinous space, and their upper foot was placed in the popliteal fossa of the lower leg. The physiotherapist applied side bending and opposite rotation of the trunk, followed by a quick anterior pelvic thrust using their forearm and body weight to deliver the manipulation.¹⁶

For Group B, abdominal massage was performed with participants lying supine and the head of the bed elevated to 30° to 45°. After applying moisturising lotion, the therapist began with gentle strokes over the abdominal wall, progressing to effleurage along the ascending colon, across the transverse colon, and down the descending colon in a clockwise direction. This sequence was repeated several times over 15 minutes, concluding with transverse abdominal strokes. Photographic documentation of both spinal manipulation and abdominal massage techniques was obtained by the researcher during treatment sessions. The therapeutic interventions were supervised by qualified rehabilitation specialists.¹⁷ Only male patients were inducted in the study. Patients diagnosed with functional constipation are included in the study. The outcome of the current study cannot be applied to other patients having primary and secondary

forms of constipation. Due to COVID-19 restrictions, the study was conducted on a small number of patients, and further follow-up data were not obtained.

RESULTS

A total of 40 participants were enrolled and equally distributed into two treatment groups: Group A (Lower Thoracolumbar Manipulation) and Group B (Abdominal Massage). The results revealed significant improvements in both groups across all measured outcomes, with Group B showing consistently greater improvements at post-intervention assessments. The mean age of the participants was 29.23 years. No significant difference was observed at pre- and mid-intervention. A significant difference at post-intervention ($p=0.00$) indicates that one group outperformed the other at the final assessment. Both groups showed significant reductions in constipation scores, with Group B demonstrating a larger decrease at post-treatment. PAC-QOL Domains: Participants in both groups reported significant improvements in symptoms, daily life impact (time and intensity), feelings related to constipation (time and intensity), life satisfaction, and degree of satisfaction.

However, Group B consistently had lower post-treatment scores (indicating better outcomes) and higher satisfaction than Group A. Post-treatment comparisons showed that abdominal massage (Group B) outperformed lower thoracic-lumbar manipulation (Group A) across all outcomes, with p-values indicating statistically significant differences. Both lower thoracic-lumbar manipulation and abdominal massage significantly improved functional constipation and quality of life within their respective groups. However, the abdominal massage group demonstrated significantly greater improvements post-intervention compared to the lower thoracic-lumbar manipulation group across multiple PAC-QOL domains and CSS scores. Figure 3 shows both groups' mean CSS scores before and after treatment. Both groups showed improvements, with Group B showing greater improvements than Group A.

DISCUSSION

This study was a randomised clinical trial conducted on thirty-six patients selected by the

Table 1: Treatment effects in both groups

Outcome Domain	Group A (Lower Thoracic-Lumbar Manipulation)		Group B (Abdominal Massage)	
	Pre-Treatment Mean $\pm$ SD	Post-Treatment Mean $\pm$ SD	Pre-Treatment Mean $\pm$ SD	Post-Treatment Mean $\pm$ SD
Constipation scoring system (CSS)	13.25 $\pm$ 1.12	10.15 $\pm$ 1.31	13.10 $\pm$ 1.07	8.45 $\pm$ 1.32
Symptoms related to constipation	5.20 $\pm$ 1.06	3.30 $\pm$ 0.47	4.70 $\pm$ 0.66	1.55 $\pm$ 0.69
Daily life impact (Time)	9.75 $\pm$ 2.22	6.90 $\pm$ 0.91	10.30 $\pm$ 0.73	3.60 $\pm$ 1.54
Daily life impact (Intensity)	14.95 $\pm$ 1.47	10.30 $\pm$ 1.22	14.50 $\pm$ 1.43	5.50 $\pm$ 1.67
Feelings (Time)	15.20 $\pm$ 1.44	10.20 $\pm$ 1.67	14.55 $\pm$ 1.64	6.20 $\pm$ 0.89
Feelings (Intensity)	7.70 $\pm$ 1.38	5.00 $\pm$ 0.65	7.10 $\pm$ 0.85	3.00 $\pm$ 1.03
Life with constipation	7.40 $\pm$ 1.23	4.65 $\pm$ 1.14	7.50 $\pm$ 0.89	3.40 $\pm$ 1.96
Degree of satisfaction	4.15 $\pm$ 1.42	9.35 $\pm$ 1.14	4.35 $\pm$ 1.57	13.50 $\pm$ 0.95

Convenience sampling. Patients reporting with a chief complaint of functional constipation were referred by a gastroenterologist to the physical therapy department at the Independent Hospital, Faisalabad. Rome IV criteria were used for the induction of patients. Participants who met the inclusion criteria were randomly allocated to group A and group B by the Universal lottery method. 18 participants were allocated to each group. The participants in group A received lower thoracic-lumbar manipulation with diet modification, 3 sessions, alternate days per week. Group B received abdominal massage as a treatment with diet modification, 3 sessions, alternate days per week. Their demographic data were obtained from the patient evaluation forms, and CSS, PAC-QOL were utilised to fill in data at baseline, 2nd week and after 4th week.

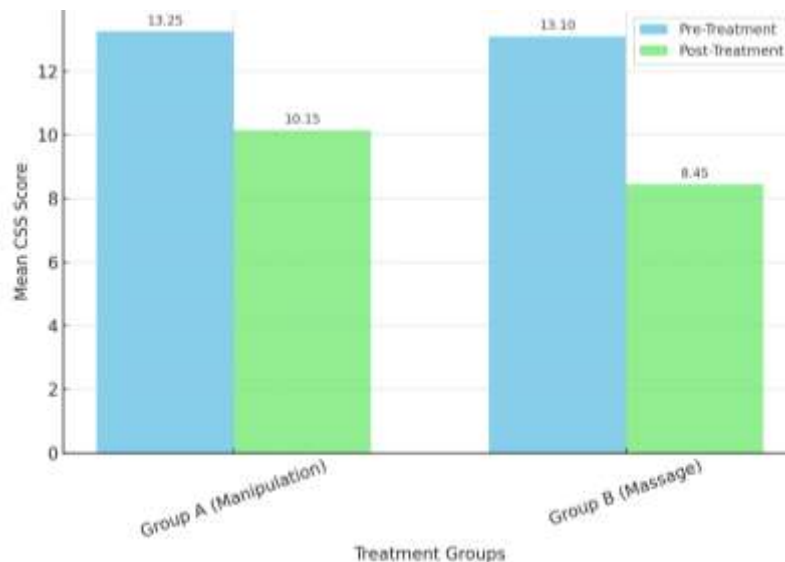
The Constipation Scoring System measures primary outcomes, and Secondary outcomes are measured by the PAC-QOL questionnaire. A total of 12 sessions were delivered during a time duration of 1 month. SPSS version 25 was used for data analysis within groups and between groups. Data was not normally distributed, so a Non-Parametric Test was used. Kruskal-Wallis Test was used to assess the significance difference across the groups, and the Friedman Test was used to measure the difference within the groups with repeated measurements. Two study parameters, constipation relief and quality of life, were compared between groups and within groups and measured by using the constipation scoring system and PAC-QOL. In the current study,

there was a significant result in both groups concerning the constipation scoring system and PAC-QOL score. Both groups showed a decline in CSS and PAC-QOL value, but there was a greater reduction of both CSS and PAC-QOL scores in Group B receiving Abdominal massage. Quality of life is improved more in Group B than in Group A.

A randomised controlled trial was conducted to explore which one is more effective, whether polyethylene glycol or abdominal massage or a combination of both, for functional constipation. Rome IV criteria were used to diagnose functional constipation, and patients were randomly allocated into 3 treatment groups. The Bristol Stool Scale and PAC-QOL questionnaire were evaluated before and after 2 weeks of treatment. After 2 weeks of treatment Constipation-associated symptom score, Bristol and PAC-QOL were re-evaluated and showed improvement in all study groups. Abdominal massage in combination with PEG is more effective than either one alone.¹⁸

Another trial was conducted to explore the effects of connective tissue manipulation (CTM) on the severity of constipation and quality of life in patients with complaints of chronic constipation. Rome III criteria were used for diagnosing patients with chronic constipation. The result of this study shows that, change in lifestyle, along with CMT, was superior in decreasing symptoms of chronic constipation and improving quality of life. CMT is a good and effective conservative treatment for reducing the symptoms of constipation without any adverse effects.¹⁹ Lucy

Figure 3: Pre and post-treatment CSS scores



reported a case of a 2-year-old male child having idiopathic constipation and sleeping problems. Spinal palpation revealed the restrictions at the sacroiliac joint and the thoracic level. Spinal manipulation of modified high velocity low amplitude was performed on a child at the thoracic and bilateral sacroiliac joints. Parents reported improvement in bowel frequency, less straining and softer stools after the first treatment. Six treatment sessions were carried out over an eight-week time period. Pediatric manipulative therapy can decrease the straining and problems linked to child constipation.²⁰ A randomised controlled trial was conducted to find out the effects of CTM and the Kinesiology Taping on chronic constipation and quality of life in cerebral palsy. Rome III criteria are used as a diagnostic measure for chronic constipation. Forty children were randomly allocated to 3 groups. All were assessed by using the Bristol Stool Form Scale, Pediatric Quality of Life Inventory, 7-day bowel diaries and visual analogue scale.

Both techniques were effective in improving the frequency and duration of defecation, consistency of stools, straining pain and quality of life in cerebral palsy children who have complaints of chronic constipation.¹⁸ A RCT was conducted to evaluate the impact of abdominal massage on constipation and quality of life among patients who have undergone orthopaedic surgery. Abdominal massage applied to postoperative constipated patients can decrease time intervals between defecation, reduce symptoms of postoperative constipation and increase quality of life.¹⁶ A randomised controlled study was conducted to explore the effect of abdominal massage, muscular training and diaphragmatic

breathing on functional constipation as compared with medical treatment using laxatives. Primary outcome measures were the frequency of bowel movements and faecal incontinence. A total of 6 weeks of treatment protocol was provided to both groups. In the physiotherapy group, the frequency of bowel movements was higher than in the medication group ($p=0.01$). There is no difference in the frequency of faecal incontinence between the 2 groups ($p=0.31$). Relaxation exercises, such as breathing exercises and massage, can aid in relieving constipation²¹

Aquino reported a case of a 10-year-old boy diagnosed with a Pitt-Hopkins Syndrome (PTHS) who developed chronic constipation. The patient received 6 weekly manual therapy sessions. During these sessions, myofascial release, colonic manipulation, and strain-counter-strain techniques were applied. Data was assessed by using the Bristol Stool Form Scale, the constipation diary and QPGS-Form. OMT can be used to improve the bowel movement frequency, decrease the chronic constipation symptoms and reduce the use of enema, thus improving the quality of life of infants having Pitt-Hopkins Syndrome-induced constipation.²² A research study was conducted to find out the effect of abdominal massage in patients with Multiple Sclerosis. The treatment group patients were informed with advice on defecation management, and patients or their attendants were taught how to perform abdominal massage at home. They were advised to apply it daily during the 4-week treatment period. The control group were informed only about bowel management. The CSS, bowel diary and the Neurogenic Bowel Dysfunction Score were analysed. The results of

the study demonstrate a positive effect of the abdominal massage on the symptoms of chronic constipation in patients having Multiple Sclerosis.²³ According to the results, this study tells us that we can effectively relieve functional constipation and improve the quality of life by using both the lower thoracic lumbar manipulation and abdominal massage techniques in limited sessions and availability of time.

These are low-cost treatments rather than other therapies, which include counselling, laxative therapy, lifestyle modification, dietary changes, fibre supplementation and surgery. Within a few sessions patient can get results instead of long-term drug therapy, which takes time and cost. Lower thoracic-lumbar manipulation and abdominal massage have minimal adverse effects rather to drug therapy, which has considerable adverse effects. The study was conducted in a real clinical setting at the Physiotherapy department of the Independent Hospital, where all the external factors were eliminated. All the patients received the same form of treatment.

CONCLUSION

Both treatment protocols were concluded to be effective in relieving functional constipation, increasing bowel movements, bowel frequency and improving overall quality of life in subjects under observation. There was more improvement in group B (abdominal massage) related to the Constipation scoring system and PAC-QOL score than in group A (lower thoracic-lumbar manipulation). It is concluded that Abdominal massage is a superior method to deal with functional constipation patients as compared to Maitland lower thoracic-lumbar manipulations.

DECLARATIONS

Consent to participate: Written consent had been obtained from patients. All methods were performed following the relevant guidelines and regulations.

Availability of Data and Materials: Data will be made available upon request. The corresponding author will submit all dataset files.

Competing interests: None

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Authors' contributions: All authors had read and approved the final manuscript.

CONSORT Guidelines: All methods were performed following the relevant guidelines.

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