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Effect of dry needing and IASTM in chronic upper trapezitis: A Randomised controlled trial.

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ABSTRACT:

BACKGROUND:

Trapezitis is an inflammation of the trapezius muscle leads to formation of myofascial trigger points which will get aggravated by forward head posture which causing pain and reduced range of motion. Dry needling and instrument assisted soft tissue mobilization will help to release myofascial trigger points to restoring the muscle structure and function.

METHOD AND METHODOLOGY:

Forty-eight patients with pain in neck and with positive jump sign were randomly assigned into 3 groups by group A dry needling + conventional therapy, group B instrument assisted soft tissue mobilization + conventional therapy, group C conventional therapy. All three groups were treated for 3 sessions in 10 days. For all three groups IFT, hot pack and self-trapezius stretching exercise were given

RESULT:

All the three groups showed statistical significant improvement but IASTM group was more effective in improving ROM, normalizing CVA angle and reducing functional disability and dry needling was more effective in decreasing pain.

DISCUSSION:

On the basis of results of present stud, dry needling, IASTM and conventional therapy all three are effective in upper trapezitis but dry needling is more effective in treating pain so, we can say that it will be more helpful to as latent trigger point (as it is using in muscle belly), IASTM reduces local pain, increases range of motion and alters neuronal activity. It affects soft tissues by creating microtrauma which will improve tissue repair by stimulating fibroblast proliferation.

CONCLUSION:

Dry needling is more effective in faster pain relief than IASTM than conventional therapy and IASTM. Along with this both the techniques showed improvement in postural correction but IASTM will be more effective than dry needling.

KEY WORDS:

Dry needling, Instrument assisted soft tissue mobilization, Myofascial trigger point, Trapezitis.

Introduction

Among the pain, musculoskeletal pain is more common, mostly neck pain.[1,2] In present generation about 60%-90% people are having bad postural habit which carries head in forward direction with rounded shoulders. This is mostly seen in person who on desk job. This faulty posture will increase unnecessary burden on upper trapezius on which denoted by forward head posture (FHP).[3- 5]

Trapezitis is an inflammation of trapezius muscle leading to pain, where it is present even during rest and will be aggravated by activity, inflammation in muscle cause spasm and tightness of trapezius muscle[6]. So in there is formation of descrit nodules within the band of skeletal muscle these are spontaneously painful and referred as myofascial trigger points. The trigger points are hyperirritable and spontaneously painful nodules. Trigger points causing pain at rest called active trigger pints while trigger points causing pain on palpation called latent trigger point. [7] When such repetitive microtrauma occurs with predisposing factors like FHP then muscle goes in spasm and tightness and there is formation of activated trigger points.[8]

Symptoms of upper trapezitis are pain in posterior region of neck, collar line. This pain may have referred in neck, occiput, shoulder, back and full hand.[9]Trigger points are always present in taut bands and found by palpation. Most common frequent trigger points occur in upper region of trapezius and shoulder about half way between spine and scapula and tip of shoulder.[10]While doing the palpation trigger points it causes severe pain that patient winces or withdraws the shoulder called jump sign.[11]

The main physical therapy program for pain and trigger points consist of, electro analgesics such as IFT, TENS, ultrasound, laser, stretching exercises, IASTM, deep friction massage, dry needling. [12-15]

Dry needling is non-pharmacological invasive technique used to reduce the pain and trigger point in taut muscles.[16]In which a sterile acupuncture needle is used along with plastic guide and inserted in the trigger point in different angles such as 30degree, 45 degrees. There are various techniques of dry needling such as Travell and Simon's technique, hongs technique, guns technique, baldrys technique. Dry needling of these myofascial trigger points causes analgesic effect. The mechanical stimulation causes local twitch response; it is an involuntary spinal cord contraction of muscle fibers in taut band. Triggering local twitch response has been shown to reduce the collection of nociceptive substance in chemical environment near myofascial trigger points. [17]

The needle may cause a small focal lesion which triggers satellite cell migration to the area which repair or replace damaged myofibers and a localised stretch to the cytoskeletal structures. This stretch may allow sarcomeres to resume their resting length, Electrical polarization of muscle and connective tissue. The mechanical pressure causes collagen fibers to intrinsically electrically polarize which triggers tissue remodelling. [18] It generates the action potential that helps to release the actin –myosin filament so it helps to increase length of muscle, decrease in pain, and increase in range of motion after the treatment. Studies shows that dry needing improve ROM, decrease in pain than other conventional therapy methods in trapezitis. [19, 20]

Recently practitioners have begun to use an instrument assisted soft tissue mobilization. It is based on the principles of James Cyrix cross frictional massage. It is a specially designed instrument to manipulate skin, myofascial, muscles and tendons by various direct compressive strokes techniques. [21] It causes myofacial release which decrease pain and tightness and also stress on

therapist hand while using instrument, gel should be used for lubrication. Instrument consists of different treatment planes. The introduction of controlled microtrauma to affected soft tissue structure via instrument causes the stimulation of local inflammatory response. Microtrauma initiates reabsorption of inappropriate fibrosis or excessive scar tissue and facilitates a cascade of healing activities resulting in remodelling of affected soft tissue structures. It stimulates normal physiological oscillations that helps to lengthen fascia results in breaking adhesions hence it decreases the pain. [22,23] Studies have shown that IASTM improves ROM, decreases pain than other conventional therapy methods in trapezitis. There are some studies on dry needling, IASTM which shows effectiveness in improving range of motion, decrease in pain in patients with upper trapezitis but, none of them are compared those with basic conventional group.

The previous studies have used neck disability index to evaluate % of disability but none of the study used Northwick park index to evaluate the functional disability and also none of the previous studies took changes in CVA angle which is reliable measure of FHP. [24]

Hence, the present study is designed to compare effectiveness of dry needling, IASTM in pain, range of motion, CVA angle in patients with upper trapezitis. And there by to determine efficacy of these 2 treatment techniques in term of subjective and objective functional outcome using Northwick park index. [25]

Objectives

To compare the effect of dry needling and IASTM on pain, ROM, CVA angle, functional impairment and conventional group in chronic upper trapezitis.

Review of literature

A study done by Dr. Basvraj et al. Immediate effect of instrument assisted soft tissue mobilization with m2t blade technique in upper trapezitis: The conclusion of the study is instrument assisted soft tissue mobilization with MT blade is an effective tool in immediate reduction of pain in subjects with trapezitis.

An another study by ashwini s. bulbuli in 2017 on comparison of myofacial release and IASTM M2T technique is more effective than myofacial in reducing heel pain, IJAR vol-7, page no 75.

A study done by Haytham on instrument assisted soft tissue mobilization v/s stripping massage for myofacial trigger points in upper trapezius in 2020 on 40 participants with active trigger points in right upper trapezius shows significant relief of pain using IASTM instrument

In 2015 lynn h. et.al proved that dry needling is more effective and alters trigger point in subject with chronic upper trapezitis.

Recently in May 2021 a comparative study between dry needling and IASTM were done by zeinab ahmadpour emashi, farad okhovatian but it shows no significant difference in both treatments but the present study shows comparison of DN and IASTM with a controlled group. But in this present study we are taking the different outcome measures and comparing the effectiveness of both group with each other and with conventional therapy and also noticing the changes in pain, range of motion, craniovertebral angle and percentage of disability via Northwick park index.

Materials and methodology

The study was randomised controlled trial, conducted to know effectiveness of dry needling and IASTM in patients with chronic upper trapezitis.

The research is done at a physiotherapy clinic for the duration of 6 months from December 2021 to June 2022. Ethical clearance is taken from Oyster College of physiotherapy, Aurangabad submitted to Maharashtra University of Health Science Nashik in July 2022.

In the study 48 participants are taken from a physiotherapy clinic by using following formula,

$$n = \frac{(r+1)}{r} * \frac{\sigma^2 (Z_\beta + Z_{\alpha/2})^2}{d^2}$$

The clinical diagnosis of upper trapezitis is done by pain history given by participant and with positive "jump sign". All the subjects were given clear explanation of the both of treatment before taking part in this research and a written consent form was taken from the subject. Screening of subjects done on the basis of inclusion criteria were assigned into 3 groups. Group allocation is done by simple convenience method of sampling and patient allocated to group by envelope method. Blinding of the participants has not done. Baseline data i.e. Pain, ROM, CVA, NPI was recorded prior to 1st session post treatment values of outcome measure was recorded after 2nd session (day 5), 3rd session (day 10). Group "A" received dry needling, IFT, hot pack and stretching exercises. Group "B" received IASTM, IFT, and hot pack and stretching exercises Group "C" received IFT, hot pack and stretching exercises.

Inclusion criteria:	**Exclusion criteria:**
1. Age 20 to 60 year 2. Patients willing for treatment. 3. Male and female with positive "jump sign". 4. Chronic pain more than 3 months.	1. Any recent cervical surgery. 2.spinal pathology 3. history of cervical fracture 4. allergy 5.sever diabetes mellitus 6. Any hematological problems.

Intervention

DRY NEEDLING:

Position of patient – sitting on chair hand supported on table and head resting on hand.

Position of therapist- behind the patient towards involved side.

Technique: Treatment area exposed properly, hot pack was given 15 min prior to treatment, and a 0.25 gauze acupuncture sterile needle is used. the exposed area is wiped with spirit, then nodules will be palpated then keeping the needle along with plastic guide tube over a myofacial trigger point, then tapping movement performed to get twitch response which is aim of dry needling. When a needle is inserted in trigger point penetrated at angle of 30 degrees the fanning technique was performed, needle kept for few seconds then removed out successfully. [26]

IASTM:

Position of patient – sitting on chair hand supported on table and head resting on hand.

Position of therapist- behind the patient towards involved side.

Technique: hot pack was given 15 min prior to treatment, treatment area exposed

properly then gel was used for lubrication then instrument used at angle of 45 applied slow strokes on the muscle from origin to insertion (sweeping technique) for 3 min [27]

PHOTOGRAPH : IASTM FOR UPPER TRAPEZITIS.


PHOTOGRAPH : DRY NEEDLING FOR UPPER TRAPEZITIS


CONTROL GROUP:

HOT THERAPY**:** The treatment commenced with the hot therapy for all three groups. Patient in sitting position, hands supported on the table and neck resting on hand. hydro collator packs were used wrapped in 2-3 layer of Turkish towel. Hot pack therapy was given for period of 20 min/session/day for 10 sessions. [28]

IFT: Base-20 and Sweep-40 used in 2 pole mode for 15 min per session. IFT is used as an electro-analgesic for pain reduction as one of treatment method of control group.

STRECHING EXERCISES**:** Self trapezius stretch – lift your hand up and over the head, resting your other hand on back or holding the chair. Then laterally flex your head and apply over pressures by hand over head hold this for 30 secs then release 3 reps thrice a day. [29]

The treatment of control group was given to all the 3 groups.

Statistical analysis

The statistical data analysis of intra group was done using student t test. Equal distribution of patients in each group is by using normality test using Shapiro Wilk test, data is normally distributed so parametric tests did as show in results.

Result

In the study there were 16 subjects in each group, group A was having 5 males and 11 females. In group B 5 male and 11 females and in group C there was 4 males and 12 females (table1). The test of normality is in table 2. The NPRS Value measured after treatment was significantly lower than before the treatment in every group with $p<0.001$ but group A (dry needling) showed much more reduction of pain than group B(IASTM) which in comparison showed more reduction of pain to group C (conventional)(table-3). Lateral flexion ROM of neck increased significantly after treatment in each group with $p<0.001$ but ROM in group receiving IASTM showed more significantly more improvement than the other groups receiving dry needling or conventional group (table-4)

Similarly, CVA angle and NPI in both the outcome measures showed increased significantly after treatment in each group with $p<0.001$ but ROM in group receiving IASTM showed more significantly more improvement than the other groups receiving dry needling or conventional group. (table-5,6).

The result from statistical analysis of present study supportive alternative hypothesis which stated that there will be difference in pain, range of motion in chronic trapezitis patients treated with dry needling and instrument assisted soft tissue mobilization.

In the present study the mean age of participants in group A was 40.13 that in group B was 39.94 were as in group C it was 37.63 the statistical analysis of age distribution showed no difference in the group which represents homogeneity of participants.

TABLE-1: Distribution of Gender in all three groups

Particular		Group			Total	p-value
		Group A	Group B	Group C		
Gender	Male	5	5	4	14	0.904
	Female	11	11	12	34	
Total		16	16	16	48	

TABLE-2: Test of Normality for the Groups of the study

Variables	**Time**	**Group A**		**Group B**		**Group C**	
		Z-value	p-value	Z-value	p-value	Z-value	p-value
NPRS	Day 1	0.14	0.20	0.18	0.13	0.20	0.08
	Day 5	0.14	0.20	0.21	0.05	0.14	0.20
	Day 10	0.19	0.11	0.21	0.05	0.16	0.20
ROM	Day 1	0.18	0.13	0.15	0.20	0.14	0.20
	Day 5	0.21	0.05	0.15	0.20	0.20	0.07
	Day 10	0.23	0.01	0.21	0.05	0.18	0.17
CVA	Day 1	0.19	0.12	0.21	0.05	0.21	0.05
	Day 5	0.212	0.052	0.213	0.051	0.212	0.051
	Day 10	0.21	0.05	0.18	0.13	0.21	0.05
NPI	Day 1	0.207	0.066	0.145	0.200	0.218	0.050
	Day 5	0.13	0.20	0.21	0.05	0.16	0.20
	Day 10	0.14	0.20	0.13	0.20	0.13	0.20

TABLE-3: Within and between groups comparison of NPRS mean reduction scores from Day 1-5 and Day 1-10

Interval	Group A		Group B		Group C		f-value	p-value
	Mean	SD	Mean	SD	Mean	SD		
Day 1-5	2.94	0.48	2.94	1.06	2.22	0.88	**3.892**	**<0.028***
Day 1-10	5.34	0.68	5.78	0.95	4.31	0.95	**12.121**	**<0.001***
t- value	**18.393**		**10..425**		**10.202**			
p-value	**<0.001***		**<0.001***		**<0.001***			
Effect size	**4.60**		**2.61**		**2.55**			

TABLE-4: Within and between groups comparisons of ROM mean reduction scores from Day 1-5 and Day 1-10

Interval	Group A		Group B		Group C		f-value	p-value	
	Mean	SD	Mean	SD	Mean	SD			
Day 1-5	6.81	3.06	6.75		1.77	3.50	1.26	12.224	<0.001
Day 1-10	11.50	4.16	11.63		2.94	7.06	2.08	10.695	<0.001
t-value	**9.934**		**10.442**			**9.938**			
p-value	**<0.001***		**<0.001***			**<0.001***			

TABLE-5: Within and between groups comparison of CVA mean reduction scores from Day 1-5 and Day 1-10

Interval	Group A		Group B		Group C		f-value	p-value
	Mean	SD	Mean	SD	Mean	SD		
Day 1-5	0.69	0.24	0.62	0.24	0.87	0.49	2.249	0.117
Day 1-10	1.44	0.36	1.15	0.32	1.67	0.91	3.054	0.057
t-value	**10.190**		**11.259**		**5.456**			
p-value	**<0.001***		**<0.001***		**<0.001***			
Effect size	**2.55**		**2.81**		**1.36**			

TABLE-6: Within and between groups comparison of NPI mean reduction scores from Day 1-5 and Day 1-10

Interval	Group A		Group B		Group C		f-value	p-value
	Mean	SD	Mean	SD	Mean	SD		
Day 1-5	23.94	4.02	20.56	5.77	27.06	5.53	6.331	<0.004
Day 1-10	47.00	5.87	44.13	6.35	49.19	6.98	2.506	0.093
t-value	**16.976**		**22.469**		**18.276**			
p-value	**<0.001***		**<0.001***		**<0.001***			
Effect size	**4.24**		**5.62**		**4.57**			

Discussion

The mean value of data present study indicates that both dry needling and IASTM could be beneficial in the management of upper trapezitis. There was statistical difference in intensity of pain, lateral flexion range of motion, craniovertebral angle and functional improvement in terms of NPI score in the both group from day1 to 10 but however between group comparison showed that dry needling is more effective in pain reduction and IASTM is more effective in increase range of motion, CVA angle and functional improvement than conventional group.

Superficial heating agents was given in all 3 groups, studies have shown that superficial heating agents increases the blood supply to that body part and causes vasodilatation which helps in removing of metabolic waste, it also decreases the excitation of nociceptive nerve endings in tern causing relaxation of soft tissue and relieving muscle spasm.

In the present study all the groups were given hot packs which are used as superficial heating agents. Both the study group along with control group were given hot pack at the start of the treatment. The result of our study showed that all groups showed reduction in pain, increase in range of motion this can be due to application of hot pack.

IFT is an electro analgesic modality which was used in all three groups for treating pain in study. From the results we can see that all the groups showed decrease in NPRS scoring. IFT can be one of the reason for reduction in pain.

Dry needing can cautiously be recommended for pain relief in myofascial trigger point in neck and shoulder. It shows acceptable efficacy in reducing pain from trigger point but its mechanism of effect is still unclear. It has been suggested that mechanism could be hyper stimulating analgesia through descending inhibitory system. other believe that treatment works by reducing spontaneous electrical of trigger point, pain gait theory by inhibiting transmission if C fibers and activating A-delta fibers. It also increases the length of shortened sarcomeres and reduce overlap between actin and myosin filament which would help the muscle to returns normal to its length and function. Also the evidence suggests that ISTM reduces local pain intensity, increases range of motion and alters neuronal activity. It is a unique method that based on evidence, enable therapists to effectively and efficiently identify soft tissue injury and Musculoskeletal involvements. It affects the soft tissue by creating microtrauma which some studies suggest will improve the tissue repair by stimulating fibroblast proliferation. There is clinical evidence supporting hypothesis that IASTM increases mobility of myofascial tissue and reduces effect of local ischemia by increasing blood flow to area. It also reduces the therapist hand pain and fatigue.

Pain relief and improvement in ROM, CVA which is found in both the groups could certainly have led to functional improvement because it is pain which restrict the range of motion and it limits daily activities causing functional impairment and disability.

Also in the study all three groups were given conventional exercise i.e. stretching of trapezius muscle. On the basis of results of present stud, dry needling, IASTM and conventional therapy all three are effective in upper trapezitis but dry needling is more effective in treating pain so, we can say that it will be more helpful to reduce / release the active myofacial trigger point which is cause of severe pain so, the dry needling is more effective in treating pain then IASTM and conventional therapy, IASTM is more effective in increase ROM than dry needling because the IASTM releases active as well as latent trigger point (as it is

using on muscle length) so, that helps to detached all actin myosin bridge and lengthening the length of sarcomeres so, it shows increase range of motion by lengthening sarcomeres than dry needling than conventional therapy.

Conflicts of interest

No conflict of interest.

Limitations

Small sample size. Longer study period. No-blinding of therapist to groups. No separate outcome evaluator.

Future recommendation

Large sample size. Blinding of therapist to groups or outcome evaluator would increase validity of study. Standardised equipment to measure amount of force during application of IASTM for desired effect. More studies can be done to see effect of IASTM on muscle length and increase in range of motion.

Conclusion

All three treatments that is conventional therapy, dry needing, instrument assisted soft tissue mobilization are effective in reducing pain, improving range of motion, increasing craniovertebral angle and reducing disability in patients with chronic trapezitis.

Further it was noticed that instrument assisted soft tissue mobilization group was more effective in improving range of motion, normalizing CVA angle and reducing functional disability and dry needling group was more effective in decreasing pain and hens should form a part of treatment plan in chronic trapezitis. So for short term symptom relief one may use dry needling and for long term symptom relief IASTM. Along with this both the techniques showed improvement in postural correction but IASTM will be more effective than dry needling.

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EFFECTIVENESS OF TELE-PHYSIOTHERAPEUTIC CONSULTATIONS IN MUSCULO-SKELETAL CONDITIONS- A LITERATURE REVIEW

Varun Ahuja[1*], L. Gladson Jose[2]

ABSTRACT

Background: Since past two years, as Covid Era hit the world, there have been a gradual progress in the number of rehabilitation studies and technological development. Although the term Tele-Rehabilitation is known for decades but it got the spotlight in this scenario. The term "Telerehabilitation" can be defined as the use of internet or telecommunications to provide physical, occupational or speech therapy to patient in their homes or any comfortable environment.

Purpose: To determine the effectiveness of Tele-Rehabilitation Strategies in patients with musculoskeletal disorders.

Methodology: A comprehensive review of the available literature was conducted using electronic databases namely Google scholar, PubMed, Science Direct published between April 2007 and January 2021.This review includes studies which examines following components namely validity, reliability, patients' feedback and satisfaction of tele rehabilitation-based Physiotherapy assessment and treatment in Musculoskeletal conditions other than post Covid complications.

Results: A total of 18 rehabilitation based researches were taken out of which 15 studies showed the increased acceptance with better finding of tele- rehabilitation in accordance with musculoskeletal disorders. On other hand certain limitation in assessment of lumbar spine posture, orthopedic special test, neurodynamic test and scar assessment were found in 3 studies.

Conclusion: Tele-Rehabilitation based physiotherapy was found to be more feasible with good validity and reliability but in certain areas orthopedic specialized test and treatments require face to face or in clinics mode of operation.

Keywords: Tele-Physiotherapy; Tele-Rehabilitation; Musculoskeletal; Physiotherapy; Tele-communication; Disorders.

INTRODUCTION

Worldwide musculoskeletal disorders are a widespread and increasing health problem. [1] The international Labour Organization and WHO has referred musculoskeletal disorders as new epidemic that should be researched and solved. [2] Musculoskeletal Disorders or MSDs are injuries or disorders that affects the functioning of musculoskeletal system. (i.e., muscles, ligaments, tendons, bones etc.). The underlying cause of these disorders are usually multifactorial which include physical, ergonomically, regional and psychosocial factors. Individuals who have work of excessive repetition, awkward postures and heavy lifting usually suffered from these disorders. [1]

With increasing demographic projections in elderly population musculoskeletal disorders are becoming common problem in this era. Literature shows that in geriatric population loss of mobility and physical dependence basically results from either arthropathies or fracture cases.

As familiar with COVID-19 pandemic, it has affected all aspects of health care delivery systems. To protect health care workers and patients across the country from the risk of disease transmission, there is a very important need to adapt different strategies in order to provide quality treatment to patients. This led to a whole new world of tele-rehabilitation.

The term Tele rehabilitation can be defined as the use of internet or telecommunications to provide physical, occupational or speech therapy to patient in their homes or comfortable environment. [3] As per on the goal of the treatment tele rehabilitation or tele-Physiotherapy can be provided in many different forms. The most common among them is video conferencing which provides direct contact between patient and physiotherapist. After assessment the protocol of the treatment is given to patient in form of video recording, written regime or sometimes, they are even guided through an app. [4] Tele Physiotherapy programs may include monitoring of physiological signals and vitals of the patient depending upon his health. However, it may be necessary to perform a number of home visits depending upon the situation and condition of the patient. [4]

Although the term Tele- Rehabilitation is known for decades but it got the spotlight in now time. So, it is necessary for one to determine its validity, reliability and patient's satisfaction as Tele-Rehabilitation is different from conventional mode of treatment.

In this literature review, our main objective is to determine the effectiveness of Tele-Rehabilitation Strategies in patients with musculoskeletal disorders.

METHODOLOGY

A comprehensive review of literature was conducted using a number of electronic databases: Google scholar, PubMed, Science Direct published between April 2007 and January 2021.The studies examine the validity, reliability, patients' feedback and satisfaction of tele rehabilitation-based Physiotherapy assessment and treatment.

A total of 53 results were obtained with keywords Tele-Physiotherapy, Tele-Rehabilitation, Musculoskeletal, Physiotherapy and Tele-medicine. Out of which 13 were related to musculoskeletal disorders due to Covid-19 and 22 were related to conditions other than musculoskeletal.

Remaining 18 researches were taken for this study and reviewed for the effectiveness of tele-physiotherapy in musculoskeletal disorders.

During the screening of the articles, the following inclusion and exclusion criteria were used:

Inclusion Criteria

1) Selected articles in English language.

2) Population: Adult population with musculoskeletal disorders.

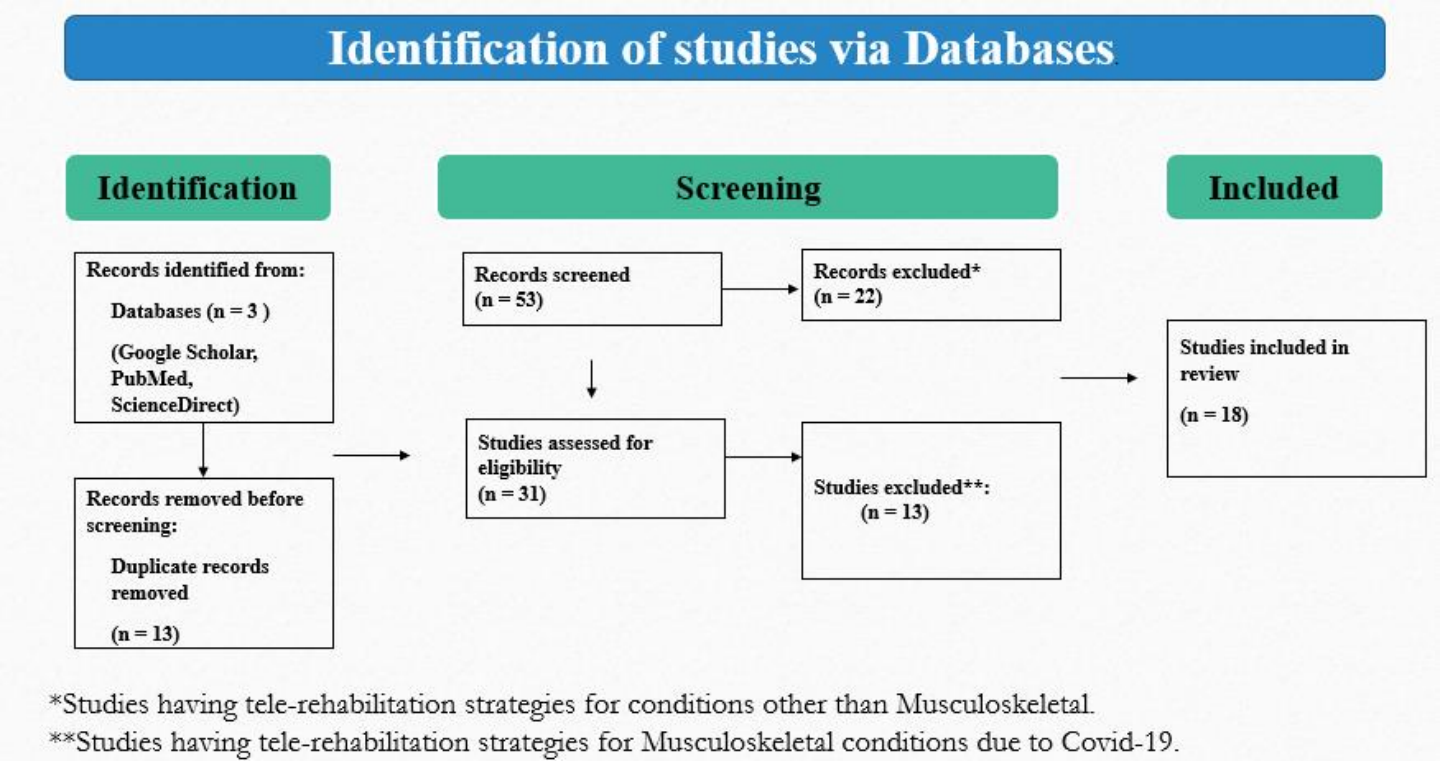
3) Intervention: Use of Tele-Physiotherapy as a tool for rehabilitation.

4) Outcome: Effect of Tele-Physiotherapy intervention on Musculoskeletal Disorders.

Exclusion Criteria

1) Musculoskeletal Disorders due to Covid-19.

2) All other forms of intervention or rehabilitation except musculoskeletal disorders.



*Studies having tele-rehabilitation strategies for conditions other than Musculoskeletal.
**Studies having tele-rehabilitation strategies for Musculoskeletal conditions due to Covid-19.

Results

After data extraction based on the inclusion & exclusion criteria, the results are listed in following table:

S.No.	Author	Article type	Population	Measurement outcome	Tool of measurement
1	Adesola C. Odele et.al. in Dec. 2013 [5]	RCT (n = 50)	Patients with Osteoarthritis of Knee. Control group: Exercise in OPD. Thrice/week x 6 weeks (n=25).	No significant differences in pain intensity and physical function.	IKHOAM VAS

			Experimental group(n=25) : Tele-rehab for 6 weeks.		
2	Leah Steele et.al. in Nov 2020 [6]	Case study (n=22)	(n=22) All subjects were given tele rehab as well as face to face physical therapy.	Moderate Validity (59.72%) Strong Reliability achieved Inter-Rater Reliability (73.08%) Intra-Rater Reliability (100%)	Postural Analysis, Joint Palpation, Range of Motion (ROM) Testing at The Shoulder and Adjacent Joints, Static Muscle Tests (SMT's), Special Orthopedic Tests and Neural Testing for Physical Testing.For tele-rehab: rehab Tele rehabilitation System.
3	Pratiksha Dighe et.al in Jan 2020 [7]	RCT (n= 50)	Population: Knee OA Grade 1 & 2. Control group (n=25): Exercise in OPD. Thrice a week for 4 weeks. Experimental group(n=25): Tele-Rehab thrice weekly for 4 weeks.	Both groups showed improvement but no significant difference amongst the groups except balance and proprioception which improved more in Tele-rehabilitation group.	NPRS ROM MMT WOMAC SINGLE LEG STANCE TEST
4	Neslihan Duruturk et.al. in Dec 2019 [8]	Double Blind Randomized Controlled Trial (n=50)	Population: Patients having Type II Diabetes Mellitus and musculoskeletal disorder. Subjects were given breathing and callisthenic exercises, thrice/week for 6 weeks, at home by video conferencing.	Tele-rehabilitation interventions were safe and proved to be economical.	HbA1c 6 min walk test Muscle strength Dynamometer

5	Erdi Kayabınar et.al. in Sept 2020 [9]	RCT (n=40)	40 teachers participated in study whereas 18 took tele-rehabilitation.	Tele rehab is beneficial to population having no/limited access to conventional rehabilitation.	CMDQ ODI UEFI BAI BDI WLBS
6	M. A. Cabello et.al. in Dec 2020 [10]	RCT (n=54)	Population: Subjects with Patellofemoral pain syndrome (PFPS) (4 weeks—12 treatment sessions)	Tele rehab was effective in improving functional status and reducing pain.	Visual Analog Scale (VAS) The DN4 Neuropathic Pain Questionnaire Functional Balance—Through the Kujala Score Test Lower Extremity Functional Scale
7	Dahlia Kairy et.al. in Aug 2013 [11]	Case study (n=5)	Subjects who had undergone TKR. (8-week rehabilitation process)	Neither of the subject regarded tele-rehab as a barrier in receiving quality rehabilitation services.	Verbal interview
8	Adesola C. Odele et.al. in 2014 [12]	RCT (n=50)	Population: Subjects with Knee OA. Both the groups were given rehab thrice a week for 6 weeks.	Significant improvements were seen in psychological and physical domains of QoL.	WHOQoL-Bref
9	Michel Tousignant et.al. in June 2011 [13]	RCT (n=48)	Subjects receiving TKR. (Control group n= 24	Both groups were satisfied with the services. Moreover, the physiotherapist	Healthcare Satisfaction Questionnaire

			Experimental group n=24)	giving intervention was more satisfied with respect to achieving goals, patient–therapist relationship, and quality and prognosis of tele-rehab.	
10	Julia Miller et.al. in July 2009 [14]	RCT (n=385)	Patients with musculoskeletal/ orthopedic conditions. (a) Videotape Featuring the Treating Physiotherapist (B) Videotape Featuring an Unknown Physiotherapist (C) Face-To-Face Consultation with The Physiotherapist (Control Group). (Duration Of Study = 4-6 Weeks)	Patients in the videotape groups were prescribed more exercises and were more skilled in performing them than were the face-to-face group. However, in terms of clinical progress, instruction by videotape was no more effective than face-to-face. Videotaped instruction proved popular and appeared to help motivate patients to continue self-treatment but produced no detectable saving in physiotherapist time in consultation.	1. Clinical progress of the condition; 2. Changes in well-being/disability; 3. Physiotherapist contact time; 4. Patients' experience and perceptions of videotaped instruction; and 5. Level of patients' self-treatment skills
11	Bradley R Richardson in March 2016 [15]	Repeated measure design study (n=18)	Population: Subjects with Knee Pain (n=18) who underwent traditional as well as telerehabilitation.	67% of cases had exact agreement w.r.t. pathoanatomic assessment and were similar in 89% of cases.	Self-palpation Self-applied modified Orthopedic tests Active movements and functional tasks.

12	Ji Hui Neo et.al. in Dec 2019 [16]	Case study (n=1)	43-year-old patient with frozen shoulder.(duration = 9 weeks)	Telerehabilitation is beneficial in treating frozen shoulder.	ROM
13	Hélène Moffet et.al. in Feb 2017 [17]	RCT (n=205)	Patients undergone TKA.(Both control and experimental groups were given same regime but mode of application was different)	The satisfaction level of both the groups did not differ and was highly significant (over 85%).	Participants were assessed at baseline (before TKA), at hospital discharge, and at 2- and 4-months post discharge (E4) using functional outcomes.
14	Trevor G. Russell et.al. in Aug 2010 [18]	Repeated measure design study (n=15)	Patients with chronic ankle pain and disability.	93.3% similar agreement & 80% exact agreement in patho-anatomic cases.	A digital assessment system.
15	Trevor Russell et.al. in June 2010 [19]	Repeated measure design study (n=19)	Patients with existing lower-limb musculoskeletal conditions (not related to joints) (Duration of study= 1 month)	There was 79% or higher primary diagnosis agreement (same or similar diagnoses) and 79% or higher exact systems diagnosis agreement for validity, intrarater reliability, and interrater reliability studies.	Video recordings
16	Kamran Azma et.al. in Aug 2017 [20]	RCT (n=54)	Population: Subjects with OA Knee (Duration = 6 weeks)	Both the groups showed improvement but no differences in between the groups.	KOOS WOMAC
17	Stacey L Grona et.al. in April 2017 [21]	Systemic review (Randomized controlled trials, pre-experimental studies, and	Population: Subjects with chronic musculoskeletal pain. (Age group 18-80)	Validity and reliability studies were identified as having high risk of bias. Intervention studies were of moderate quality.	Quality analysis was performed utilizing standardized tools specific for the study designs.

		case-control studies were included) n=4			
18	Suresh Mani et.al. in March 2016 [22]	Systemic review (n=4)	Patients with musculoskeletal conditions.	The physiotherapy assessments such as pain, swelling, range of motion, muscle strength, balance, gait and functional assessment demonstrated good concurrent validity. However, lumbar spine posture, special orthopedic tests, neurodynamic tests and scar assessments ranged from low to moderate.	QAREL QUADAS

Discussion

A total of rehabilitation-based 18 Researches were taken into study related to Tele-Rehabilitation and Musculoskeletal disorders. 15 studies presented the increased acceptance and better results of Tele - Physiotherapy. Pratiksha Dighe found increased balance and proprioception in tele-rehabilitation group. [7] Michel Tousignant stated that therapist satisfaction was also found to be higher in tele-rehabilitation intervention. [13] However, Julia Miller in her study stated that Tele-Rehabilitation wasn't a time saver for therapist. [14] Validity was found to be conflicting as some researchers suggested good validity but some suggested low to moderate validity. [4,15,17,18,21] However, both intra-rater and inter-rater reliability was found to be high. Stacey L Grona in her study highlighted that there might be a high risk of bias in validity and reliability studies. [20] Most studies showed tele-rehabilitation to be safe & effective. However, 3 studies portrait certain limitations in assessment of lumbar spine posture, orthopedic special test, neurodynamic test and scar assessment. [4, 20, 21] Decreased need of transportation and reduced cost leads to improved access to services for larger population especially remote areas. Erdi Kayabınar also stated that Tele-Rehabilitation is valuable for people having limited to no access to face-to-face physiotherapy. [7]

Conclusion

Since Covid pandemic has hit the world there have been a substantial increase in healthcare system's capacity to deliver physiotherapy services at a distance using Tele-Rehabilitation. But at the same time, it has occurred that "hands-on" Physiotherapy technique have become less important for some health conditions. Various researches have shown that the impact of a good exercise therapy regime has similar effect as a clinical session in in OPD.

Telerehabilitation has also decreased the use of electrotherapy for routine treatments whereas exercise therapy has seen a rise as an important component of care. Tele-Rehabilitation based physiotherapy was found to be more feasible with good validity and reliability but in certain areas orthopedic specialized test and treatments require face to face or in clinics mode of operation. Majority of articles depicted that Tele-Rehabilitation might be the future of Rehabilitation but in country like India, providing quality services in rural areas will still remain a bigger challenge.

Conflict of interest

Nil

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EFFECT OF EXERCISE ON LOW BACK PAIN DURING PREGNANCY

Dr. Pallavi Patel[1], Dr. Gaurishankar[2], Dr. Vandana Rathod[3]

Abstract

Background:

Back pain during pregnancy may commence as early as the 12th week, although the fifth through seventh months are cited as the most common period for onset of back pain... Self-help' treatment or coping strategies may be appropriate forms of management and can be taught so that women are able to treat themselves.

Method

Ethical approval was taken. After ethical approval 17 pregnant women with back pain were assigned alternatively to two groups: Group A (control group) and Group B (experimental group). The baseline data were obtained from both the groups using Rolland Morris questionnaire and Visual Analogue Scale (VAS) for pain. The subjects of group A were explained about the life style modification with the use of pamphlet. They were advised to follow dos and don'ts at home as written in the pamphlet. The subjects of group B also received same pamphlet of home advice for do's-don'ts along with pamphlet of exercises.

Result

Comparison of VAS & RMQS for pain & Disability score before & after intervention in Group A and B is statically significant. Intergroup comparison of VAS (p=0.082) and RMQS (p=0.367) before intervention shows that there is no significant difference between the pretreatment values of VAS and RMQS. The post treatment values of VAS and RMQS were done with independent t test. The t value of inter group treatment for VAS is 0.141 and p=0.89.

Discussion

In this study, exercises were given with use of pamphlet to only one group and home advices were given with the use of pamphlet to both the groups. The effects of home advices were found as effective as those of exercises. It may be due to the fact that ergonomic enhancements may reduce back pain during pregnancy.

Conclusion

This study concludes that exercises with pamphlet are as effective as home advices with do's and don'ts in reducing pain and disability in low back pain during pregnancy.

Introduction

In India, every day 67,385 babies are born. According to UNICEF, (UNICEF: India 2022) it is sixth of the world's live child births. Many pregnant women have reported that LBP compromises their ability to work during pregnancy and interferes with their activities of daily living. [1, 2]

More than one-third of women experience back and pelvic pain at some stage during pregnancy. [3] Research indicates that, in about 50% of those pregnant women experiencing pain, it is of sufficient intensity and duration to affect their lifestyle in some way, and for one-third of these individuals the pain is severe. [4, 5] Recent researchers found that severity of back pain during pregnancy may have impact over the entire life of women. So prevention of back pain is an important issue to be handled which is related with the women's health and it is not only concerned with only pregnant women but also with overall health of women.

Back pain during pregnancy may commence as early as the 12th week, although the fifth through seventh months are cited as the most common period for onset of back pain. A previous history of back pain, back pain during a prior pregnancy, multiparity, and advancing age are the most commonly named risk factors. [6] Pregnancy makes changes in almost all the systems of the woman's body including endocrine, reproductive, cardiovascular, respiratory, gastrointestinal, nervous, urinary and musculoskeletal system. The influences of pregnancy on the musculoskeletal system are the ones that involve the physiotherapist most directly, first to attempt to prevent disorders arising and where problems do arise; to treat them. [7] Back pain during pregnancy can be significant in terms of intensity and resulting disability.

The female body is exposed to various factors during pregnancy that have an impact on the dynamic stability of the pelvis. One such factor is the effect of the hormone relaxin, which in combination with other hormones, affects the laxity of ligaments of the pelvic girdle as well as ligaments in the rest of the body. The effect of increased ligament laxity is a slightly larger range of movement in the pelvic joints. Mechanical stress from the gravid uterus and compensatory lordosis also contributes to the posterior pelvic pain and lumbar pain. [8] Explanations are linked to hormonal and biomechanical changes of pregnancy. Unfortunately, very few studies actually measure postural changes through pregnancy. Few studies supported increase in the lumber lordosis, whereas others have not or have shown a variable effect of lordosis during pregnancy. [9, 10] Unfortunately, survey studies are not able to describe the types of back pain. No other mechanical factors are responsible. Stress on ligaments and joints, joint laxity, and muscle fatigue can alone explain back pain in pregnancy.

Numerous treatments have been advocated for back pain during pregnancy, including exercise (such as encouraging maintenance of fitness as much as possible), use of proper ergonomics, heat and cold therapy, relaxation exercises, rest as needed, patient education on avoiding aggravating factors and encouraging relieving activities, joint mobilization, stretching, massage, acetaminophen (or other pain relieving medications), acupuncture, and chiropractic.[11] Two reviews of chiropractic care for LBP during pregnancy exist.[12,13] As a part of parental counselling, value of good posture as well as regular exercise should be implemented properly. This can be added with proper advice on resting

positions for comfort. Suggestions on back care and preventive pain strategies are available for the pregnant woman. [14] Because some standard examinations cannot be done and many treatment methods are contraindicated in pregnancy, it would be valuable for personnel involved in maternity care to be able to identify, in advance, women with a high risk of pregnancy-related LBP. Pharmacologic as well as complementary and alternative medicine (CAM) interventions have been suggested as treatments for LBP in the general population. However, most of the LBP treatments in the literature have primarily focused on and been intended for non-pregnancy-related LBP. [15, 16]

Frequently, a clear explanation, and consequent understanding, of the reasoning behind the symptoms will in the majority of cases be sufficient to enable the mother-to-be to 'manage' and cope with them. 'Self-help' treatment or coping strategies may be appropriate forms of management and can be taught so that women are able to treat themselves.[11]Both, basic and clinical research, needs to be focused on the mechanisms contributing to back pain in pregnancy. Evidences suggest that the impact of back pain in pregnancy is substantial. There are limited suggestive evidences of medications and electrotherapeutic modalities to relieve this pain because of suspected harm to the fetus. Usefulness of the exercises to help pregnant woman with low back pain is still controversial. So the aim of the study is to find out the effects of exercise with home advice and home advice alone over low back pain and the disability during pregnancy

Methods

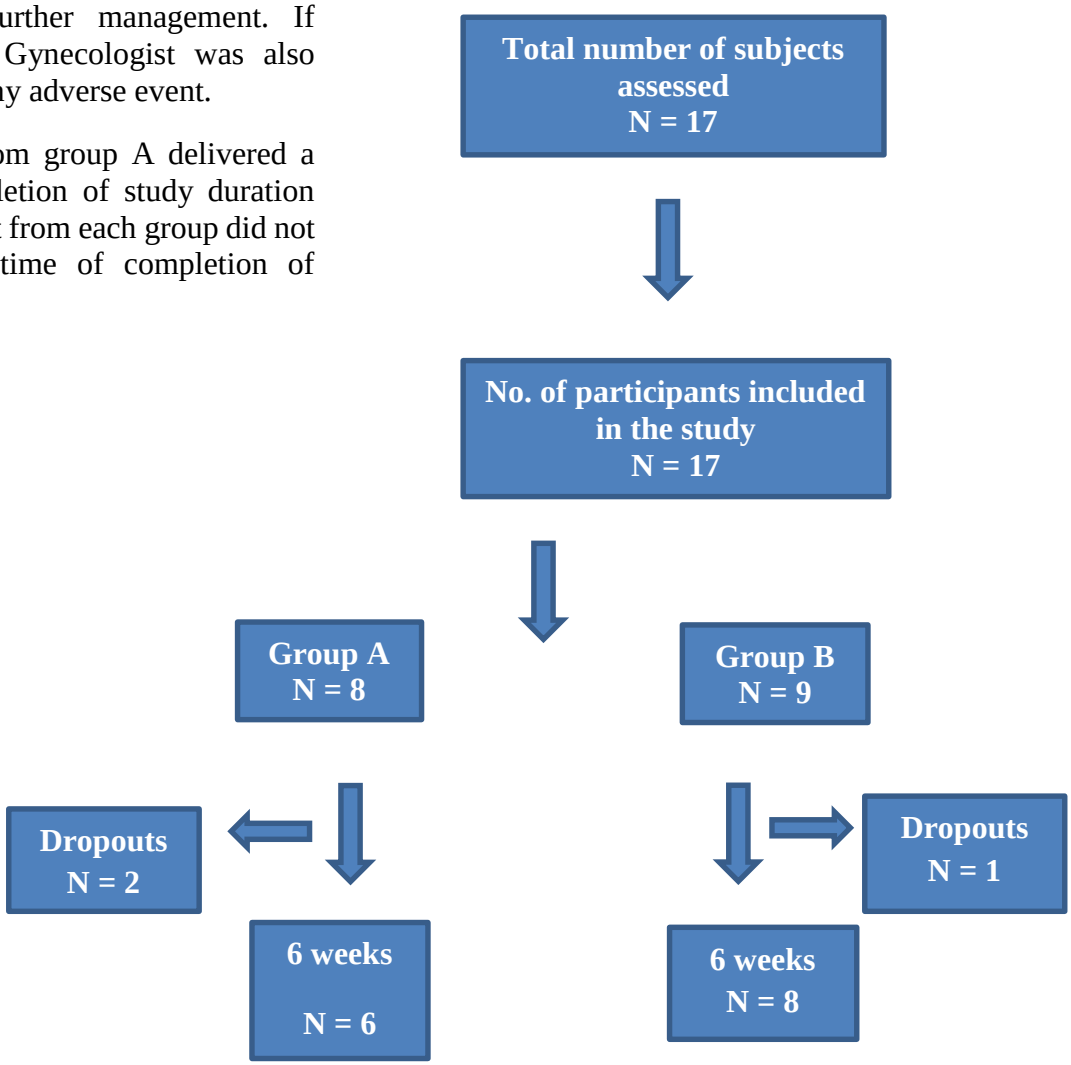
For the experimental study to conduct ethical approval was received from Suamandeep Vidyapeeth institutional Ethical Committee (SVIEC). Data was collected from outpatient department of obstetrics and gynecology of Dhiraj General Hospital, Piparia, Vadodara and Nisarg Orthopedic and Maternity Hospital, Vadodara. Primipara with age between 20-30 yrs., with 14-30 weeks of gestation with low back pain and Rolland Morris questionnaire score <14 were included in the study. At time of the routine antenatal visit, each pregnant woman was approached individually & records were reviewed, all primipara were approached & the detail enquiry of back pain during pregnancy was done on one to one basis. Women with high risk pregnancy, previous trauma particular to pelvic area, other musculoskeletal or cardio respiratory conditions and who cannot read Gujarati or English were excluded from the study.

The purpose and procedure of study were explained to the participants and informed consent was obtained. 17 pregnant women from Dhiraj General Hospital (n=15) and Nisarg Orthopedic and Maternity Hospital (n=2) with back pain were assigned alternatively to two groups: Group A (control group) and Group B (experimental group). The baseline data were obtained from both the groups using Rolland Morris questionnaire and Visual Analogue Scale (VAS) for pain.

The subjects of group A were explained about the life style modification with the use of pamphlet. They were advised to follow dos and don'ts at home as written in the pamphlet. The subjects of group B also received same pamphlet of home advice for do's-don'ts along with pamphlet of exercises. Exercises were demonstrated to the participants by investigator and confirmed that they were done correctly. The subjects were told to do the exercises daily. Each exercise (for abdominals, gluteus Maximus, latissimus dorsi, pelvic

floor and hip adductors) had 5 repetitions and was supposed to be done for three times a day. Subjects were given a log diary and were informed to record the number of times the exercises were actually performed in the log diary. During or after the period of exercise, if participants felt any discomfort, they were asked to discontinue the programme and immediately report to the investigator for further management. If required, help of Gynecologist was also sought in case of any adverse event.

One participant from group A delivered a baby before completion of study duration and One participant from each group did not visit hospital on time of completion of intended intervention and could not be communicated. So they were considered as drop outs. 6 participants from group A and 8 participants from group B were assessed to measure progression after 6 week of intervention by using VAS for pain and Roland Morris Questionnaire for Disability.



Exercises protocol

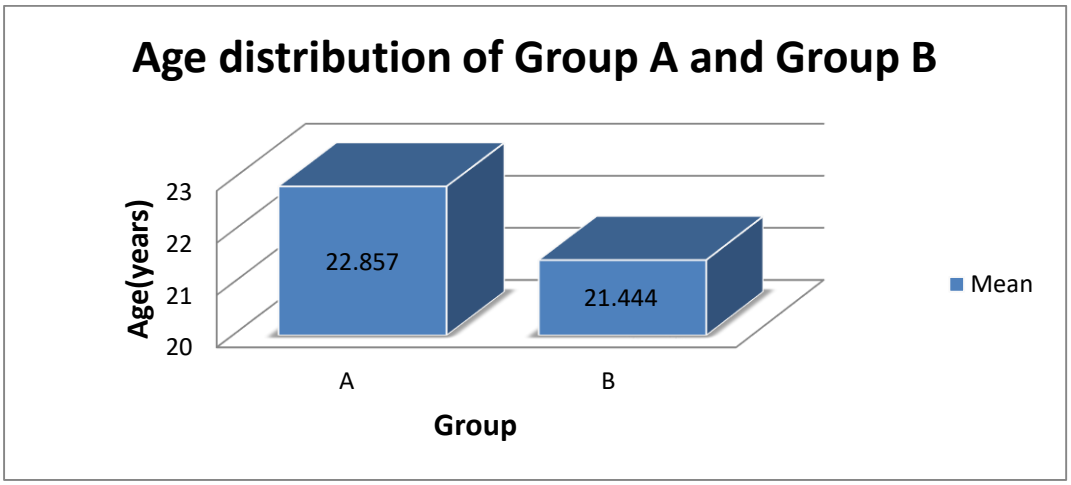
General exercises for	Home advice (do's and don'ts for) with using pamphlet
Abdominal stabilization	Getting into bed
Pelvic floor	Rolling over in bed
Gluteus maximus muscle	Getting up from a chair
Latissimus dorsi muscle	Sitting down
Hip adductor muscles	Walking
Sitting pelvic tilt exercise	Using stairs & what to remember and what to avoid

Statistical Analysis

All the statistical analysis was done by using SPSS 15 for windows software. Normal distribution of data was checked with Shapiro wilk test. The test was done with power level kept at 0.8. Intra group comparison for VAS and Roland Morris Questionnaire (RMQ) for Disability was done by using Paired t test for both the groups. Descriptive analysis for both groups was also done. The VAS and RMQ was analyzed for mean and standard deviation before and after intervention.

The inter group comparison for VAS and RMQ was done by using independent t test to check the homogeneity between two groups at the baseline. Independent t test was used to see the treatment effect between two groups for VAS and RMQ.

Result



Age distribution of participants in both group

INTRA GROUP ANALYSIS

PRE AND POST TREATMENT COMPARISON OF VAS & RMQS IN GROUP A

Table: 4.2 Pre and post treatment comparison of VAS for pain in group A

VISUAL ANALOGUE SCALE				
	Mean	±SD	t value	p value
Pre treatment	3.133	±0.273	5.966	0.002
Post treatment	2.033	±0.508		
RMQ DISABILITY SCALE				
Pre treatment	6.500	±1.048	7.050	0.001
Post treatment	4.333	±1.211		

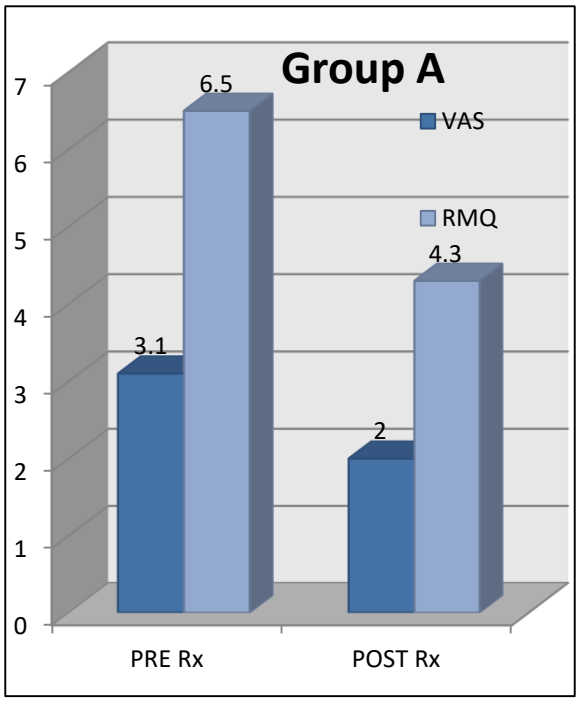
Comparison of VAS & RMQS for pain & Disability score before & after intervention in Group A

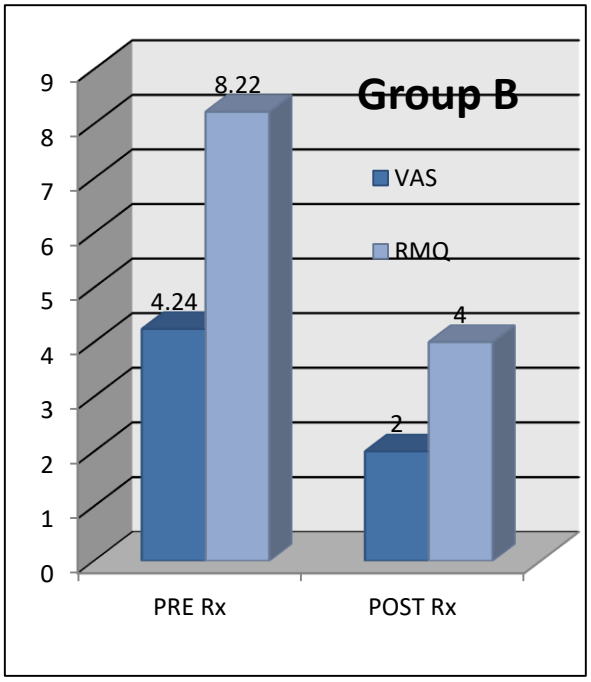
The p value being <0.001 indicates that home advice programme is statistically significant in reducing pain and disability in subjects with low back pain during pregnancy.

PRE & POST TREATMENT COMPARISON OF VAS & RMQS FOR PAIN & DISABILITY IN GROUP B

Table: 4.4 Pre and post treatment comparison of VAS & RMQS for Group

VISUAL ANALOGUE SCALE				
	Mean	±SD	t value	p value
Pre treatment	4.242	±0.820	7.687	0.000
Post treatment	2.042	±0.953		
RMQ DISABILITY SCORE				
Pre treatment	8.222	± 2.774	6.332	0.000
Post treatment	4.00	± 1.195		

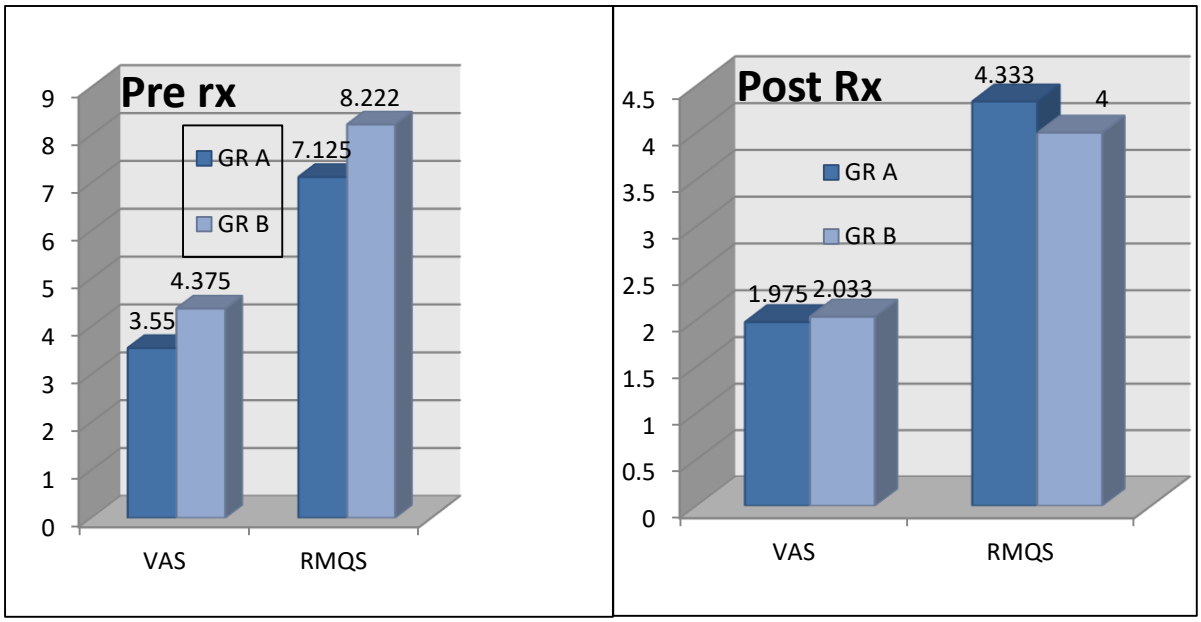




Comparison of VAS & RMQS for pain & Disability score before & after intervention in Group B Effect of exercises for low back during pregnancy is statistically significant in reducing pain and disability for Group B.

INTERGROUP ANALYSIS

PRE Rx GR COMPARISION FOR VAS				
GROUP	MEAN	±SD	t value	p value
A	3.550	±0.911	1.876	0.082
B	4.375	±0.846		
PRE Rx GR COMPARISION FOR RMQS				
A	7.125	±1.807	0.930	0.367
B	8.222	±2.862		
POST Rx GR COMPARISION FOR VAS				
A	1.975	±0.903	0.141	0.890
B	2.033	±0.508		
POST Rx GR COMPARISION FOR RMQS				
A	4.333	± 1.211	0.514	0.617
B	4.000	± 1.195		



Intergroup comparison of VAS (p=0.082) and RMQS (p=0.367) before intervention shows that there is no significant difference between the pretreatment values of VAS and RMQS. It proves the pretreatment homogeneity of both the groups before the intervention.

The post treatment values of VAS and RMQS were done with independent t test. The t value of inter group treatment for VAS is 0.141 and p=0.89 there is no significant difference in effect of exercise programme and home advice programme in reducing low back pain during pregnancy which is showing that there is no significant difference (p=0.617) in effectiveness of exercises and home advices in improving disability in low back pain during pregnancy. So null hypothesis is accepted.

Discussion

The purpose of this study was to check the effect of exercises in low back pain during pregnancy. The implication of this study

may justify the efficacy of exercises in the treatment of low back pain during pregnancy. Results of this study demonstrated that treatment of low back pain during pregnancy with proper dosage of exercise programme was efficacious. The outcome measures used were VAS for pain and Rolland Morris Questionnaire for disability.

The groups were synchronized with age and pretreatment scores of VAS (p=0.082) and RMQ disability scale (p=0.367). All the participants of one group were treated with exercise programme and various lifestyle modifications as home advice and those of another group were explained with home advice only. Beneficial effects were significantly found in both the groups for pain and disability.

Low back pain during pregnancy is very common and interfering with activities of daily living. To answer the question of type, frequency, and also dose of exercises, head to head comparisons in which participants are randomly assigned to receive different exercises are highly needed. Numerous theories propose effectiveness of various exercises in treatment of low back pain during pregnancy. [17] Various preventive measures for pregnancy related back pain have also been proved.[31]Results of these studies show small but significant reduction in low back pain. In this study exercises and home advices for do's and don'ts were given.

Various evidences are support exercise programme and also home advices. In this study one group was treated with exercise programme and home advice with do's and don'ts and other group was treated by home advices with do's and don'ts only. Total 6 weeks of intervention was given in this study. There was an equal improvement found in reduction of pain and disability in both the groups after the session.

The result of this led to inference that both exercises and lifestyle modifications are effective in reducing pain and disability in subjects with low back pain during pregnancy, but no differences found when comparison was made between home advice and general exercises programme. Numerous studies have come up with effective home advices with conclusion in treatment of pregnancy related low back pain. [18, 19]

Our trial does not provide information on the effectiveness of advice compared with no intervention, but other trials suggest that advice supported by a booklet is a useful intervention when compared with usual care given by a general practitioner as long as the information is reinforced by all involved in the patient's care. It would be useful to determine the long term effectiveness of such interventions in future studies. The result of this study may be applied to a population with multigravida during pregnancy.

Preventive intervention in form of exercise can be directed to high risk mothers to motivate them to be aware of self-treatment methods of low back pain during pregnancy.[53 This] study did not include long-term follow up period, though exercises are effective for long term benefits of the interventions. In this study, exercises were given with use of pamphlet to only one group and home advices were given with the use of pamphlet to both the groups. The effects of home advices were found as effective as those of exercises. It may be due to the fact that ergonomic enhancements may reduce back pain during pregnancy. E.g. When patients stand for long periods, placing one foot on a foot stool relaxes the iliopsoas muscles and tilts the pelvis forward, decreasing the strain on the lumbar spine and paraspinal musculature. [51] This would result in better improvement in pain and disability in low back pain.

This study provides evidence to support the exercises and home advices with do's and

don'ts in the management of low back pain during pregnancy.

Limitation &Future recommendation

The study includes very small sample size which may not prove the study results in terms of comparison. So future study is recommended with larger sample size.

Further studies could focus on the long-term benefits of physical therapy for this condition and the relative effectiveness of these treatment regimens compared with other approaches. Further studies can be conducted with randomized control trial for the effectiveness of exercise programme in low back pain during pregnancy and also on multi gravida. The long term effects can be evaluated with these treatments in low back pain during pregnancy.

Conclusion

This study concludes that exercises with pamphlet are as effective as home advices with do's and don'ts in reducing pain and disability in low back pain during pregnancy.

Ethical Approval

Suamandeep Vidyapeeth institutional Ethical Committee (SVIEC)

Conflict of interest

Nil

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BIOPSYCHOSOCIAL FACTORS AND THEIR ASSOCIATION WITH SYMPTOMS OF CHRONIC LOW BACK PAIN

Bid Dibyendunarayan Dhrubaprasad[1], SD Shahanawaz[2], Kaitra Dhara[3], Trivedi Jay[3], Ankita Dhanani[3], Urvi Parmar [3]

Abstracts

Background: Low back pain (LBP) is a significant public health issue. LBP causes psychosocial distress and dysfunction in individuals**.**

Objectives: This study intended to observe the prevalence of pain, disability, depression, and fear-avoidance beliefs among chronic low back pain patients (CLBP). Also, we attempted to find out the association of these outcome measures with CLBP symptoms.

Methodology: A cross-sectional study was conducted among CLBP patients from various physiotherapy clinics and orthopedic hospitals in Surat; from October 2018 to February 2019. A total of 250 CLBP patients completed the following questionnaire: Demographics & personal data questionnaire, Fear-avoidance beliefs Questionnaire-Gujarati version (FABQ-G), Oswestry Disability scale - Gujarati version (ODI-G), Zung's Depression Scale (ZSDS), and SF-12. Also, the pain level was noted on a numerical pain rating scale.

Results: The average pain scores of the patients in the Organic, Amplified Organic, and Non-Organic groups were 4.57, 5.00, and 4.80 points, respectively, with no significant difference among the groups (p = 0.29). The average disability scores of the patients in the Organic, Amplified Organic, and Non-Organic groups were 12.08, 15.27, and 16.40 points, respectively, with no significant difference among the groups (p = 0.29). The average Fear-avoidance beliefs score of the patients in the Organic, Amplified Organic, and Non-Organic groups were 42.63, 45.72, and 51.80 points, respectively. Patients classified into the Non-Organic group experienced the most FABs out of all three groups (p = 0.007). The average HRQoL (SF-12) PCS scores of the patients in the Organic, Amplified Organic, and Non-Organic groups were 38.81, 39.62, and 34.96 points, respectively, with no significant difference among the groups (p = 0.99). The average HRQoL (SF-12) MCS scores of the patients in the Organic, Amplified Organic, and Non-Organic groups were 49.08, 45.56, and 46.31 points, respectively, with no significant difference among the groups (p = 0.99). The average depression scores of the patients in the Organic, Amplified Organic and Non-Organic groups were 38.06, 40.11, and 44.60 points, respectively, with no significant difference among the groups (p = 0.29).

Conclusion: All the outcome measures showed a mild to moderate association. Pain, PCS, and MCS showed no difference across pain diagram groups. FABs and disability scores were slightly higher in the Amplified organic group. Depression was also marginally more elevated in the amplified-organic group. We need studies from multiple centers with larger CLBP samples to confirm the reproducibility and validity of these data in other populations.

Keywords:
Chronic low back pain, Fear-avoidance beliefs, disability, depression, and pain

Introduction

Low back pain (LBP] is present nearly everywhere in society. Many published guidelines for diagnosing and managing CLBP are available. Up to 30% of individuals who report LBP have recurrent or persistent symptoms.

LBP is a frequent cause of physical limitations and absence from work and is associated with various somatization disorders. [1-8]Studies have shown that the disability credited to LBP symptoms presents a weak correlation with pain intensity. [1-3, 6, 8, 9] Many factors are linked with a disability, such as cognitive, affective, social, and environmental factors, and they may influence a patient's desire to question the pain they experience. [2-4, 6, 8, 10, 11] Thus, a bio-psychosocial approach could offer an alternative understanding of chronic pain and its impact on the ability of the patient to function. [1-3, 6, 8, 9]

Depression and anxiety are the two most common psychological disturbances seen in patients. Depression or anxiety, and psychological distress frequently accompany CLBP symptoms. [12, 13] Scant data are available on depression and anxiety in the CLBP population.

Fear-avoidance Behaviors

The Fear-Avoidance Model includes pain-related fear. [14] The Fear-Avoidance Model has been used to explain the development of unfavorable pain experiences and behaviors. [15]

Classification of LBP Patients Based on Pain Diagrams

Ransford [16]showed a group of patients with a high correlation between symptoms and image findings respecting the sensitive and motor radicular paths and a group with scattered, amplified, migratory and non-anatomic pain without correlation with the image findings. However, clinical experience shows that we usually have a third group transitioning between those groups, with signs and symptoms explained by the images but associated with amplified or exaggerated paths out of the anatomic distribution. Therefore, Trocoli, T O and Botelho R V classified the patient's symptoms as representative of an organic disease [Organic-ORG), of organic disease with behavioral-cognitive expansion (Amplified Organic-AO), or as representative of psychosomatic manifestations (Non-Organic-NO).[17] They correlated each of these symptom groups with the levels of anxiety, depression, and kinesiophobia.

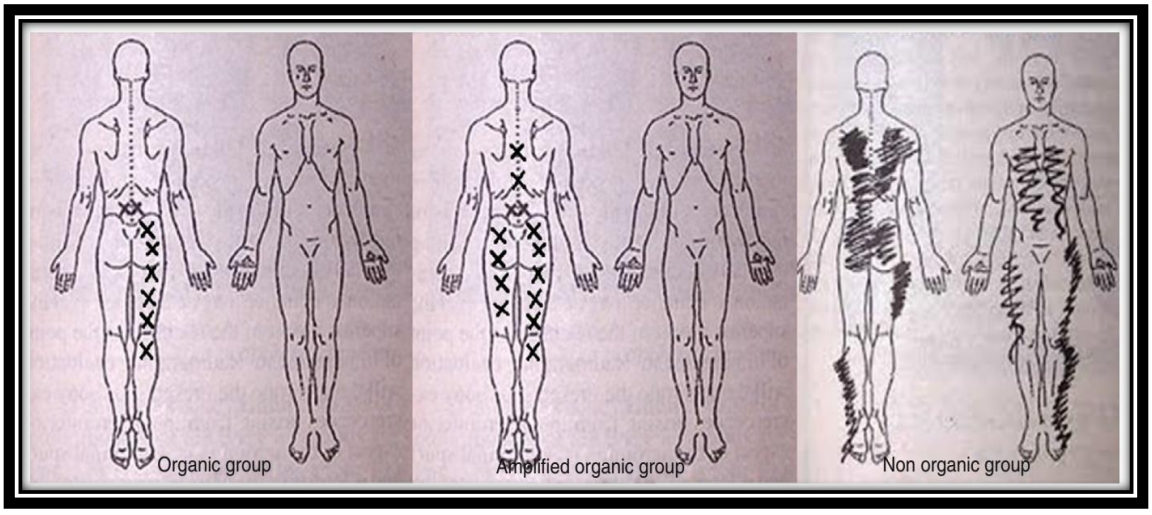


Figure 1: Representation of patients' symptoms according to the pain diagram groups

MA Sagheer, MF Khan, and S Sharif [18]concluded that individuals with CLBP were at high risk of experiencing anxiety and depression. This risk was higher for females. Trocoli, TO, and Botelho RV [17]stated no association between the groups and anxiety and depression. However, there was a positive correlation between kinesiophobia and the Organic group.

EJ Chung, et al suggested that screening for fear-avoidance beliefs may be helpful in the identification of patients at risk of psychosocial problems as well as pain intensity and physical impairment.[19] Hong JH et al. reported that patients with CLBP showed significant functional disability and significant impairment of psychological status with a low quality of life. [20]

Oliveira D Set al stated that anxiety, depression, and their interaction are associated with changes in pain disability at one-year follow-up. [21] VP Panhale, et al concluded that higher scores on the FABQ, 47% in physical activity and 27% in work component, indicate greater fear and avoidance beliefs. [22] A strong relationship exists between elevated fear-avoidance beliefs (FABQ) and activity limitation (BPS) in patients with CLBP.

So the study aimed to find the association between psychological factors and pain diagram classification.

METHODS

The present study is a cross-sectional study. We calculated the sample size of 246 Chronic Low Back Pain (CLBP) patients by using the prevalence rate of CLBP patients (P=20%) from published literature. [23] We collected data from 250 CLBP patients from various physiotherapy clinics and orthopedic departments in Surat, India and Hail, Saudi Arabia and as per inclusion and exclusion criteria.

Inclusion Criteria:

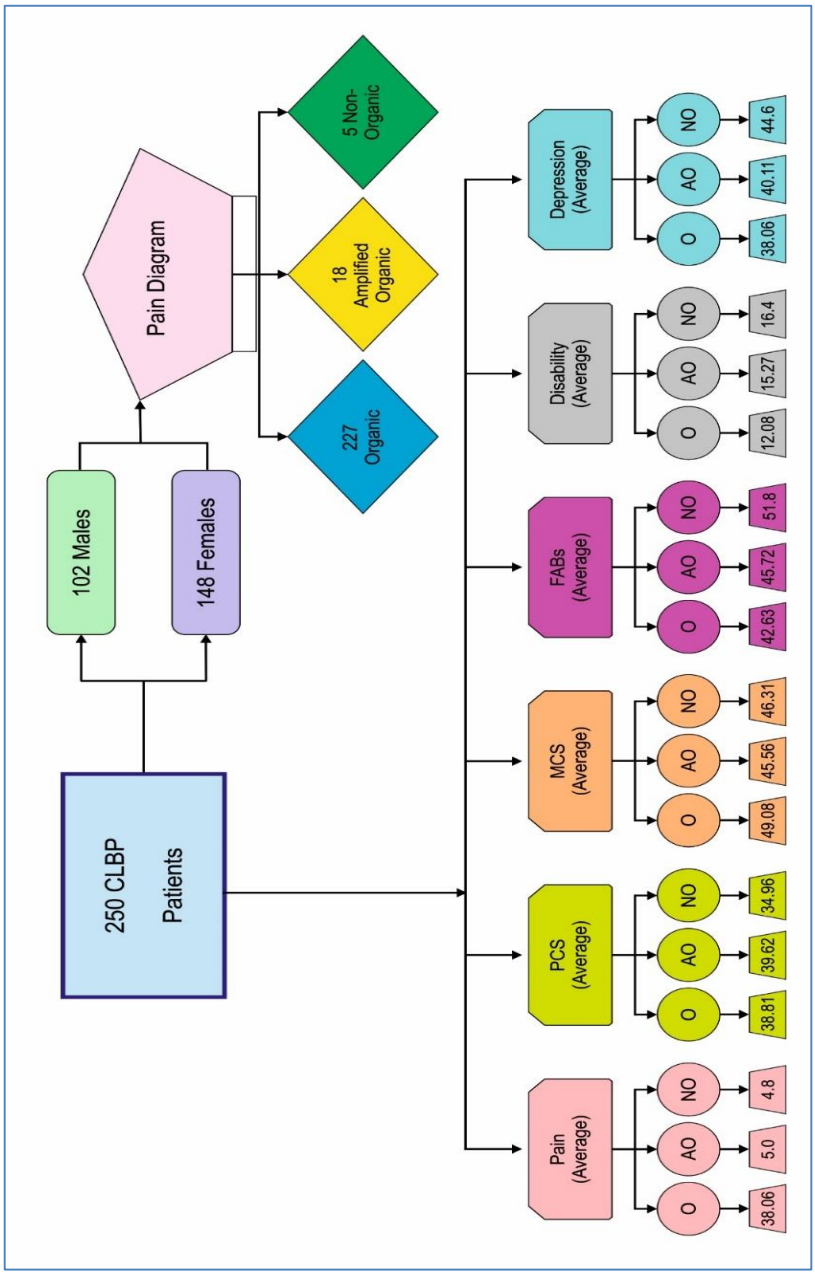
(a) Patients invited to participate were 20–70 old.
(b) CLBP was present for more than six months, and the average pain level on NPRS was 2 to 6.
(c) The patients were diagnosed with CLBP by a physician.

Exclusion Criteria:

(a) Having systemic disease and specific conditions such as neoplasm, fractures, spondylolisthesis, spondylolysis, spinal stenosis, ankylosing spondylitis, previous low back surgery
(b) Taking medication for specific psychological problems
(c) Being pregnant or having hypertension
(d) Receiving conflicting or on-going co-interventions;

The following data collection tools or questionnaires were used:
(a) Demographics & Personal Data,
(b) NPRS [24]
(c) FABQ-G: It is a 16-item, self-reporting questionnaire in which each item is graded on a 7-point Likert scale of strongly disagree to agree strongly. The FABQ score is calculated by adding up individual item scores. A higher total score indicates a higher level of fear-avoidance beliefs. The FABQ has demonstrated high levels of internal consistency (Cronbach's alpha= 0.88) and test-retest reliability (r= 0.95). [9] For ease the use, the original FABQ is translated and validated for Gujarati-speaking subjects with CLBP.
(d) SF-12: The short form 12-item survey demonstrated good internal consistency reliability, construct validity, and responsiveness in patients with back pain. [25-27](e) ODI: This instrument is widely used to evaluate functional disability associated with back pain.

Figure 2: Flowchart of CLBP patients included with the distribution in each group and the scores of Pain, PCS, MCS, FABs, Disability, and Depression



Procedure

The investigators prepared the data collection sheet by including demographic data and other questionnaires to collect the data. The data collection sheet was distributed among 250 CLBP patients according to the inclusion and exclusion criteria. Consent was taken, and the study's objective was explained to the CLBP patients. All the relevant instructions were given to fill out the questionnaire. Data were collected in 30-40 minutes' sessions from each CLBP patient. Data collection was completed in 4 months, from October 2018 to January 2019.

Statistical Analyses

Descriptive analysis was done as frequencies for categorical variables; and mean and standard deviation for continuous variables. A bivariate Pearson moment correlation was done among the outcome variables. All study analyses were conducted using SPSS 20.0, IBM, Armonk, NY, USA, with 95% confidence interval (CI) limits and a p-value at <0.05 as statistically significant. The present study included 102 males (40.8%) and 148 females (59.2%). Table-1 shows the general demographic characteristics of the participants.

Table 1: Demographic Characteristics of CLBP Patients (N=250)

Variable	Mean	Standard Deviation (SD)
Age	43.06	13.26
Height (feet)	5.40	0.36
Weight (Kg)	65.67	11.31
Pain (NPRS)	4.57	1.13
PCS	38.79	7.68
MCS	48.77	9.29
FABQ-G-Total	43.03	17.62
FABQ-G-Work	20.78	9.93
FABQ-G-PA	13.67	5.52
ODI-Total	12.40	6.56
ZSDS-Total	38.34	8.70

Table 2: (a) to (j): Demographic Characteristics of CLBP Patients according to pain diagrams

(a) Gender

Subjects Characteristics		Frequency	Percentage
Organic	Male	95	41.9
	Female	132	58.1
	Total	227	100
Amplified Organic	Male	6	33.3
	Female	12	66.7
	Total	18	100
Non-Organic	Male	1	20
	Female	4	80
	Total	5	100

(b) Occupation

Subjects Characteristic		Frequency	Percentage
Organic	Computer Professionals	14	6.16
	Other professionals	54	23.79
	Housewives	98	43.17
	Bank Employees	14	6.16
	Laborers	22	9.69
	Businessman/ woman	13	5.72
	Students	12	5.28
	Total	227	100
Amplified Organic	Computer Professionals	5	27.77
	Other professionals	3	16.66
	Housewives	5	27.77
	Bank Employees	1	5.55
	Laborers	0	00
	Businessman/ woman	4	22.22
	Students	0	00
	Total	18	100
Non-Organic	Computer Professionals	1	20
	Other professionals	0	00
	Housewives	2	40
	Bank Employees	0	00
	Laborers	0	00
	Businessman/ woman	2	40
	Students	0	00
	Total	5	100

(c) Employment Status

Subjects Characteristics		Frequency	Percentage
Organic	Yes	88	38.76
	No	121	53.30
	Retired	18	7.92
	Total	227	100
Amplified Organic	Yes	5	27.78
	No	12	66.67
	Retired	1	5.55
	Total	18	100
Non-Organic	Yes	2	40
	No	2	40
	Retired	1	20
	Total	5	100

(d) Marital Status

Subjects Characteristics		Frequency	Percentage
Organic	Married	187	82.4
	Not Married	36	15.9
	Widowed	4	1.8
	Total	227	100
Amplified Organic	Married	16	88.9
	Not Married	2	11.1
	Total	18	100
Non-Organic	Married	5	100
	Total	5	100

(e) Smoking Status

Subjects Characteristics		Frequency	Percentage
Organic	Smoking	22	09.7
	Not Smoking	205	90.3
	Total	227	100
Amplified Organic	Smoking	2	11.1
	Not Smoking	16	88.9
	Total	18	100
Non-Organic	Not Smoking	5	100
	Total	5	100

(f) Education Level

Subjects Characteristics		Frequency	Percentage
Organic	Postgraduate and Above	25	11.01
	Graduate	50	22.02
	12th Pass	82	36.12
	10th Pass and less	70	30.83
	Total	227	100
Amplified Organic	Postgraduate and Above	1	5.56
	Graduate	4	22.22
	12th Pass	5	27.78
	10th Pass and less	8	44.44
	Total	18	100
Non-Organic	Graduate	2	40
	12th Pass	2	40
	10th Pass and less	1	20
	Total	05	100

(g) Diagnostic Label for CLBP

Subjects Characteristics		Frequency	Percentage
Organic	Disc Prolapse	45	19.83
	Lumbar Spondylosis	33	14.53
	Non-specific LBP	78	34.36
	Lumbar Radiculopathy	55	24.22
	Lumbar Spondylolisthesis	11	4.86
	Sciatica	5	2.20
	Total	227	100
Amplified Organic	Disc Prolapse	5	27.77
	Lumbar Spondylosis	2	11.11
	Non-specific Low Back Pain	10	55.56
	Lumbar Spondylolisthesis	1	5.56
	Total	18	100
Non-Organic	Non-specific Low Back Pain	5	100
	Total	5	100

(h) Medication Uses

Subjects Characteristics		Frequency	Percentage
Organic	Pain Killers	85	37.4
	Muscle Relaxants	19	8.4
	NSAIDs	3	1.3
	No Medications	120	52.9
	Total	227	100
Amplified Organic	Pain Killers	8	44.4
	Muscle Relaxants	1	5.6
	NSAIDs	1	5.6
	No Medications	8	44.4
	Total	18	100
Non-Organic	Pain Killers	2	40
	NSAIDs	1	20
	No Medications	2	40
	Total	5	100

(i) Duration of CLBP in Months

Subjects Characteristics		Frequency	Percentage
Organic	6-12 months	110	48.45
	13-24 months	46	20.27
	25-36 months	36	15.87
	>36 months	35	15.41
	Total	227	100
Amplified Organic	6-12 months	4	22.22
	13-24 months	6	33.33
	25-36 months	7	38.89
	>36 months	1	5.56
	Total	18	100
Non-Organic	6-12 months	1	20
	13-24 months	2	40
	25-36 months	1	20
	>36 months	1	20
	Total	5	100

(j) Oswestry Disability Index (ODI-Gujarati) and ODI- Arabic Categories

Subjects Characteristics		Frequency	Percentage
Organic	Minimum Disability	195	85.9
	Moderate Disability	22	9.7
	Total	227	100
Amplified Organic	Minimum Disability	16	88.9
	Moderate Disability	2	11.1
	Total	18	100
Non-Organic	Minimum Disability	3	60
	Moderate Disability	2	40
	Total	5	100

Table 3: According to Pain Diagram Groups Demographic Characteristics of CLBP Patients (N=250)

According to the Pain diagram		Mean	SD
ORGANIC GROUP	PCS	38.81	7.62
	MCS	49.08	9.05
	FABQ-G-Total	42.63	17.46
	FABQ-G-WORK	20.53	9.85
	FABQ-G-PA	13.46	5.47
	ODI-TOTAL	12.08	6.45
	ZSDS-TOTAL	38.06	8.34
	NPRS	4.57	1.13
AMPLIFIED ORGANIC GROUP	PCS	39.62	8.47
	MCS	45.56	11.26
	FABQ-G-Total	45.72	14.72
	FABQ-G-WORK	23.22	8.86
	FABQ-G-PA	15.16	4.85
	ODI-TOTAL	15.27	6.48
	ZSDS-TOTAL	40.11	11.83
	NPRS	5.00	1.08

NON ORGANIC GROUP	PCS	34.96	7.69
	MCS	46.31	12.21
	FABQ-G-Total	51.80	32.29
	FABQ-G-WORK	23.40	16.90
	FABQ-G-PA	18.00	8.48
	ODI-TOTAL	16.40	9.63
	ZSDS-TOTAL	44.60	11.28
	NPRS	4.80	1.30

Table 4: Pearson Correlation among the PCS, MCS, FABQ-G-Total, FABQ-G-Work, FABQ-G-PA, ODI-G-Total, and ZSDS-Total Scores (N=250)

	NPRS	PCS	MCS	FABQ-G-Total	FABQ-G-W	FABQ-G-PA	ODI-Total	ZSDS-Total
NPRS	1	-.257**	-.145*	.249**	.146*	.341**	.419**	.237**
		.000	.021	.000	.021	.000	.000	.000
PCS		1	.142*	-.247**	-.169**	-.271**	-.452**	-.298**
			.025	.000	.007	.000	.000	.000
MCS			1	-.124*	-.144*	-.025	-.316**	-.454**
				.050	.023	.694	.000	.000
FABQ-G-Total				1	.933**	.801**	.562**	.133*
					.000	.000	.000	.036
FABQ-G-W					1	.599**	.516**	.080
						.000	.000	.206
FABQ-G-PA						1	.457**	.117
							.000	.064
ODI-G-Total							1	.462**
								.000
ZSDS-Total								1
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

Discussion

This is the first known study in Gujarat, India. That reports the association of pain, disability, depression, and FABs in patients with CLBP. Many studies established the relationship between pain, depression, disability, health-related quality of life, and

FABs in patients with CLBP. The main aims of this study were to replicate the relationship of these outcome measures in CLBP patients in the Indian or, more precisely, Gujarat scenario. The present study included 250 CLBP patients comprising 102 (40.8%) males and 148 (59.2%) females in the age range from 20 to 70 years, and the average age was 43.06 years. The average pain intensity for the whole group of patients was 4.8 points on the NPRS: None of the patients experienced severe pain (8–10 points), 82.4% experienced moderate pain intensity (4–7 points), and 17.6% experienced mild pain intensity (0–3 points). The organic group's mean FABQ-G Total score was 42.63, the FABQ-G-Work mean score was 20.3, and the FABQ-G-Physical activity mean score was 13.46. The amplified organic group's mean FABQ-G Total score was 45.20, the FABQ-G-Work mean score was 23.22, and the FABQ-G-Physical movement mean score was 15.16. The non-organic group's mean FABQ-G Total score was 51.80, the FABQ-G-Work mean score was 23.40, and the FABQ-G-Physical activity mean score was 18.00.

The FABQ-G physical activities score was classified as low fear (0–14 points) or high fear (15 points or more). FABQ-G Work subscale score was classified as low fear (0–33 points) or high fear (34 points or more). [22, 28]In the present study, 53.6% of patients of CLBP out of 250 patients had low fear on the FABQ-G Physical activity subscale, and 46.4% of patients had high fear. In the present study, 90.8% of patients of CLBP out of 250 patients had low fear on the FABQ-G Work subscale, and 9.2% of patients had high fear.

According to pain diagram groups under the FABQ-G Physical activity subscale, In the Organic Group, 55.5% had low fear, and 44.5% had high fear among 227 CLBP patients. However, in the amplified organic group, 38.9% had low fear, 61.1% had high fear among 18 CLBP patients, and in the non-organic group, 20% had low fear, and 80% had high fear among five patients. According to pain diagram groups under the FABQ-G Work subscale, 91.6% had low fear in the Organic Group, and 8.4% had high fear among 227 CLBP patients. However, 88.9% had low fear in the amplified organic group, 11.1% had high fear among 18 CLBP patients; in the non-organic group, 60% had low fear, and 40% of patients had high fear among five patients. In this study, pain level weakly correlates with FABs and their subscales. This situation means that if pain increases, it mildly increases the FABs in CLBP patients. However, Tania Inés Nava-Bringas et al. **[29]**suggested a strong relationship between pain severity, FABQ scores, and functional disability in Mexicans with CLBP. This difference in findings may be linked to geographically different samples.

In SF-12, PCS and MCS each have a score range of 0-100. Those who scored above 50 are considered in good health, those who scored between 31 and 50 are believed to have average health, and below 30 are considered in poor health. Out of 250 CLBP patients under the PCS subscale of SF-12, 11.2% had poor health, 76.8% had average health, and the remaining 12% of patients considered themselves in good health despite having CLBP. Out of 250 CLBP patients under the MCS subscale of SF-12, 2.4% had poor health, 46.4% had average health, and the remaining 51.2% considered themselves in good health despite CLBP. In this study, pain level shows a weak negative correlation with the physical and mental components of HRQoL (SF-12) scores. That indicates that QoL will be poor if the pain level is more. Similarly, Husky M M *et al.* [30] reported in their study that persons with CLBP scored significantly lower on all SF-

36 subscales, including both composite physical (PCS) and mental scores (MCS). That reflects a decreased quality of life for persons with no CLBP.

In this study, PCS and MCS scores of SF-12 were mild to moderate and negatively correlated with depression scores. Also, this study's PCS and MCS scores ranged from 34.96 to 49.08. Scores less than 50 on PCS and MCS are considered suboptimal, and less than 30 are deemed poor. However, in their research, Elliott TE, Renier CM, and Palcher JA concluded that the SF-36 Mental Composite Score and all subscales were highly correlated with depression in chronic pain patients. [42] They also recommended that The SF-36 may be a useful clinical tool to measure HRQoL in chronic pain patients.

This study's pain level positively correlates with the disability scale (ODI-G). That indicates that if pain increases, it moderately increases the disability in CLBP patients. In this study, pain level shows a weak positive correlation with depression scores. If pain increases, it will mildly increase the depression level in CLBP patients. Beyraghi N *et al.* [31] reported that there is a significant link between psychiatric (depression and anxiety) and clinical factors (pain and disability) in patients with CLBP. The disability score was higher than pain intensity, and depression was the most critical predictor of disability, which must be recognized and treated in CLBP patients. The present study supports that depression can predict disability and pain severity in CLBP patients.

The concept of fear avoidance has offered an appealing model that accounts for why some people develop dysfunctional pain problems. [32] This study aimed to determine the relationship between fear-avoidance beliefs, pain, and disability index in patients with LBP and identify factors influencing FABs, pain, and disability index. In this study, disability scores positively correlate with FABQ-G Total score and its subscales. If the disability is more, there will be a moderate increase in FABs in CLBP patients. It has been proposed that confrontation is an adaptive response to pain, while avoidance is a maladaptive behavior causing LBP patients to avoid certain daily activities that may cause pain. [33] In the acute phase of LBP, fear avoidance is considered an adaptive response to avoid movements that would cause tissue damage. However, higher fear-avoidance beliefs were related to persistent disability and inactivity. [34] It is considered an essential cognitive factor leading to chronic disability in LBP patients.

In this study, we categorized depression based on their scores as normal, i.e., not having depression, mildly depressed, moderately depressed, and severely depressed on Zung's self-reporting depression scale. Out of 250 CLBP patients, 217 (86.8%) were normal, 29 (11.6%) were mildly depressed, 3 (1.2%), and 1 (0.4%) patient was severely depressed.

In the organic group, out of 227 CLBP patients, 201 (88.5%) CLBP patients were not having depression or were normal, 23 (10.1%) were mildly depressed, 2 (0.9%) were moderately depressed, and 1 (0.4%) was severely depressed. In the amplified organic group, out of 18 CLBP patients, 13 (72.2%) CLBP patients were not having depression or were normal, 4 (22.7%) were mildly depressed, 1 (5.6%) was moderately depressed, and none were severely depressed. In the non-organic group, out of 5 CLBP patients, 3 (60.0%) CLBP patients were not having depression or were normal, 2 (40%) were mildly depressed, and none were moderately or severely depressed. In this study, disability scores and depression scores have a moderate correlation. This study shows that if the disability is more

than correspondingly, depression also will be moderately increased.

This study shows it is crucial to test the psychological aspects, such as fear-avoidance beliefs, depression, and quality of life, besides measuring disability and pain among CLBP patients. We need studies from multiple centers with larger CLBP samples to confirm the reproducibility and validity of these data in other populations.

Conclusion

All the outcome measures showed a mild to moderate association between them. Pain, PCS, and MCS showed no difference across pain diagram groups. FABS and disability scores were slightly higher in the Amplified organic group. Depression was also marginally more elevated in the amplified-organic group.

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