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"Comparision Of Online Supervised Vs Workplace Training On Pain, Disablity And Quality Of Life In Patients With Low Back Pain Among It Workers - An Experimental Study"

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ABSTRACT

BACKGROUND: IT professional workers are associated with repetition of tasks, sedentary lifestyle and poor work-rest cycle. These workers are, therefore, at increased risk of a number of chronic diseases due to their sedentary behavior, and they are also at high risk of lowering their health-related quality of life (QoL). The main objective of the present study was to compare the effects of online supervised vs workplace training on pain, functional disability and quality of life in patients with low back pain among IT workers.
METHODS: In the present 51 patients with low back pain were included i.e. 17 in each group. Group A received online supervised exercise and ergonomic advice, Group B received workplace exercises and ergonomic advice and group C received only ergonomic advice. Patients were evaluated pre-intervention (0 week) and post intervention (8 week) for pain, disability quality of life by Numerical Pain Rating Scale (NPRS), Oswestry Disability Index (ODI) and 12-item Short Form Survey (SF-12) respectively. Statistical analysis was done by using jamovi version 2.3.28. Significance level was set at $p \leq 0.05$.
RESULT: Paired 't' test was applied for intra-group comparison and results showed that there was statistically significant difference in mean outcomes in all three groups during 8-week intervention period ($p \leq 0.05$). One-way ANOVA test was applied for between group comparison and result showed that there was no statistically significant difference between group A & group B ($p \geq 0.05$) but, there were statistically significant difference between group A and group B with group C in all outcomes after 8-week intervention period ($p \leq 0.05$).
CONCLUSION: Online supervised exercises vs workplace training exercises both are equally effective along with ergonomics advices for reduces pain
KEYWORDS: Online supervised exercise, workplace training, pain, functional disability, quality of life, low back pain.

INTRODUCTION

Work-related musculoskeletal Disorders can be observed at workplaces when there is a discrepancy between the physical capacity of the human body and the physical requirements of the task. (1) The prevalence of musculoskeletal disorders is between 13.5% and 47% in the general population.(2) but work related musculoskeletal disease among computer worker identify prevalence rates of 38.5% - 100%, and identified the back, neck, knees and upper limbs as the most affected body areas.(3) In India, the occupation- specific prevalence of MSDs found to be as high as 90% and the computer workers suffering

from MSDs reported the problem in the low back pain 40.4%, upper back 39.5%, neck 38.6%, hand/ wrist 36.8%, and shoulder 15.2%.[3]

The study on prevalence of computer related health problems among the Information technology (IT) professionals in Delhi reported that 93% of subjects had one or more than one computer related problems. [4] The symptoms reported were pain (55%), and stiffness (14.8%) and the commonest site affected was low back (64%). [5]

Repetitive trauma and overuse are common causes of chronic mechanical low back pain, which is often secondary to workplace injury. [6] The cause for Work related mechanical low back pain (WRMLBP) among IT professionals Workers demands more of prolonged and sustained sitting posture, faulty posture, flexion postures adopted during long periods of work, associated with repetition of tasks sedentary lifestyle and poor work-rest cycle.[7] These workers are, therefore, at increased risk of a number of chronic diseases due to their sedentary behaviour, and they are also at high risk of lowering their health-related quality of life (QoL).[7]

Multiple treatments may be employed for a chronic mechanical low back pain include pharmacological, surgical, physical therapy and psychological and other modality. There is strong evidence for short-term effectiveness and moderate-quality evidence for long-term effectiveness of yoga in the treatment of chronic low back pain.[8] Engaging in multidisciplinary biopsychosocial rehabilitation can result in decreased pain and disability secondary to low back pain, with moderate-quality evidence suggesting that it is more effective than usual care.[9]

Physical therapists play an important role in the diagnosis and treatment of low back pain. physical therapy Include various spinal stabilization exercise, McKenzie method (mechanical diagnosis and therapy), Osteopathic manipulative treatment, Acupuncture and dry needling, Massage. [6] The common strategy of ergonomic intervention is targeted at occupational risk factors such as lifting, physically heavy work, a static posture, frequent bending and twisting, repetitive work and exposure to vibration, and can be divided into individual worker interventions, physical ergonomic interventions and organisational ergonomic interventions.[9] Interventions mostly consists of (1) physical exercise programs to improve strength/work capacity, (2) education, instruction or advice on working methods or lifting techniques, or (3) lumbar supports or back belts.[10]

A Quasi-Experimental study done by Sara Moreira et al., administered online workplace exercises on computer workers after 17 week of intervention they found that the intervention group positively increased their QoL perception, reduction in the Pain and better QOL.[11] A another RCT study done on upper cross syndrome done by Zohreh Yaghoubitajan et al., included online supervised vs workplace training in patient with upper cross syndrome They have given various physiotherapy exercises and found that both the experimental groups showed significant reduction in pain and hence better QOL compared control group.[12]

IT workers has very long schedules among their work during a day, the major problem among this population is to give time for their treatment. So, it is necessary to find out feasible method of treatment for this population. In various past studies authors have tried online training on IT worker in different condition like Upper Cross Syndrome and found equivalent effect compared with workplace training. [12] There was still lack of evidence regarding online supervised training on work related mechanical low back pain. Hence there was need to the study effect of online supervised vs. workplace training among this population. Which will help in deciding suitable and effective in to treat WRMLBP among IT worker.

AIM AND OBJECTIVES OF STUDY:

AIM: To Compare effects of online supervised vs Workplace training on pain, functional disability and Quality of life in patients with low back pain among IT workers.

OBJECTIVES:

1) To Study the effect of online supervised training to reduce pain, functional disability and to improve Quality of life in patients with low back pain among IT workers.
2) To study the effect of Workplace training to reduce pain, functional disability and to improve Quality of life in patients with low back pain among IT workers.
3) To compare the effect of online supervised vs Workplace training to reduce pain, functional disability and to improve Quality of life in patients with low back pain among IT workers.

HYPOTHESIS

Null HYPOTHESIS (H0):

H01: There is no significant difference between the effects of online supervised vs. workplace training on pain, functional disability and Quality of life in patients with low back pain among IT workers.

Alternative HYPOTHESIS (H1):

H11: There is significant difference between online supervised vs. workplace training on pain, pain, functional disability and Quality of life in patients with low back pain among IT workers.

METHODOLOGY

STUDY DESIGN – pre-post Experimental study
STUDY POPULATION – IT workers with chronic low back pain.
SAMPLING TECHNIQUE – Convenience Sampling
STUDY DURATION – 1 Year
SAMPLE SIZE – For sample size calculation in this study, the effect size was calculated from the result of the pilot study. The sample size was estimated in G Power 3.1.9.7 version with effect size 0.51 and $\alpha = 0.05$ at 80% power. Sample size calculated was 42, with a drop out chances of 20% the total sample size was n = 51. So, 51 patients with chronic low back pain were included in this study i.e. 17 in each group.
STUDY SETTING – Data for present study was collected from 'Me Mighty', 'Narola InfoTech' and 'The address' IT companies.

SELECTION CRITERIA:

Inclusion criteria [13]

Patients willing to participate in the study was included if they met the following criteria:

1. Full time (minimum 8 hours) IT workers having WRMLBP.
2. 20-55 years of age group
3. Both males & females.
4. Subjects having mechanical low back pain for more than 3 months.
5. Giving informed consent and participate willingly.

Exclusion criteria [13]

1. Subjects having lower limb radiculopathy.
2. Subjects having LBP due to conditions like spinal stenosis, spondylolisthesis, ankylosing spondylosis, scoliosis, coccydynia, PIVD, etc.
3. Subject having infection, arthropathy and fibromyalgia, wide spread pain syndrome.
4. Subjects having history of dorsolumbar spinal surgery and trauma within past 6 months.
5. Post-partum up to 1 year LBP subjects.
6. Subjects having neurological disorders with history of present symptoms of impairment of balance & fall.
7. Gymers or athletes who are engaged with any sports and recreational activities.

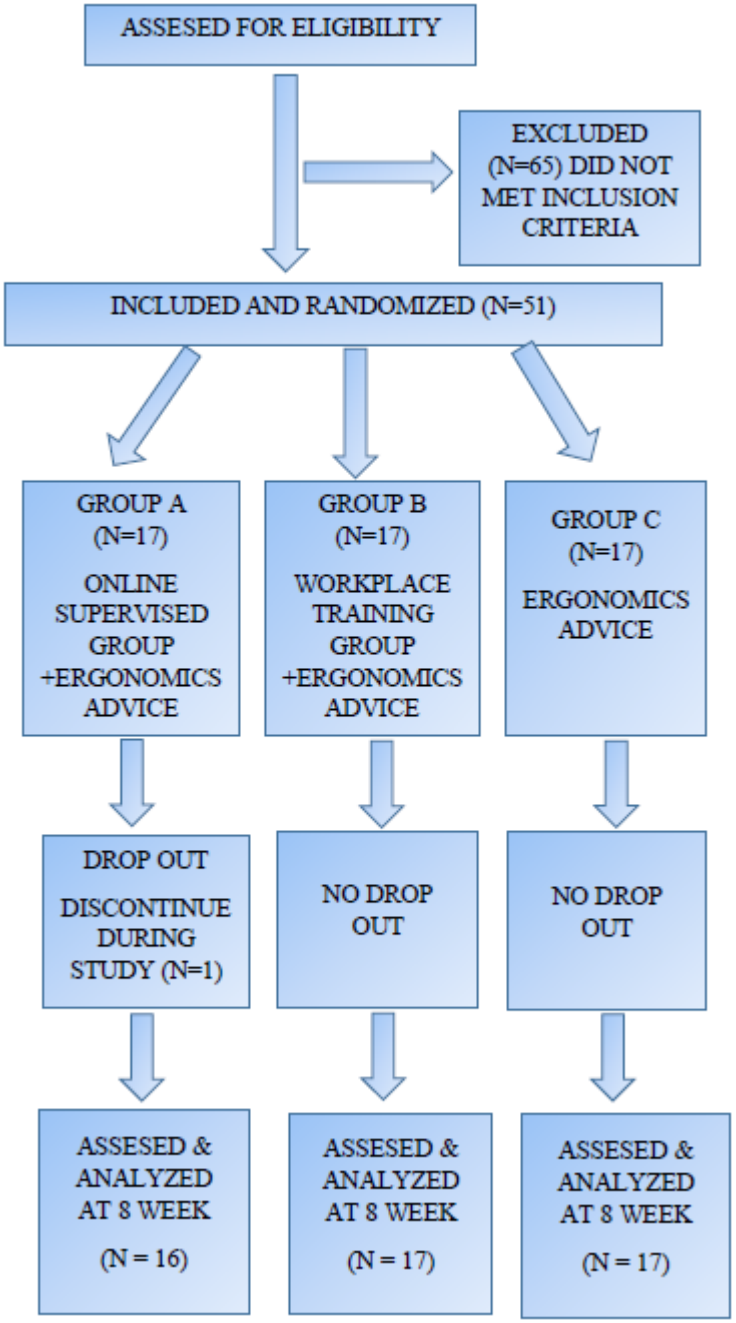


FIGURE -1: PROVIDES A FLOW DIAGRAME OF PARTICIPANTS RECRUITMENTS AND RETENTION THROUGH THE STUDY

OUTCOMES MEASURES:

1. Pain intensity was measured by NPRS.[14]
2. Functional disability was measured by Oswestry Disability Index (ODI). [15]
3. Quality of life was measured by 12-Items Short Form Survey (SF-12). [16]

PROCEDURE:

- Ethical clearance was taken from institutional ethical committee.
- The participants were preliminary screened based on the inclusion and exclusion criteria. Demographic details were obtained from all the participants. The purpose of the study was explained and all participants were asked to give written informed consent (annexure I) and pre intervention outcome measures were taken prior to intervention. They were randomly allocated into three groups. **GROUP A: Online supervised exercise + ergonomic advice. GROUP B: Work place training exercise +ergonomic advice. GROUP C: Only ergonomic advice.**
- **Procedure of Blinding**: Subjects was blinded on types of interventions and to which group they were belonged. Throughout the treatment sessions, subjects from the groups were not be allowed to have any interaction to each other and the subjects were not aware of what kind of treatment they received and its effects
- **Procedure of intervention for Group A: Online supervised exercises + ergonomic advice.** The online-supervised group exercises were given according to convenience of therapist and patient.

Four patients were included for training in a single meeting. Total 24 sessions were given. Each session was remotely performed and supervised three times a week for 8 weeks in their home environment using real-time desktop videoconferencing software https://meet.jit.s via a laptop or mobile.[12] Each session lasts nearly 30-40 min in group. Initiating by 5–7 min of warm-ups and finishing by cool down, respectively. In addition, the exercises were initiated by three repetitions holding for 10sec. and it was progressed to six repetitions, holding for 25sec. based on overload principles and individual characteristics.[12] On first session all the participants were explained about the ergonomic advices. Exercises given were pelvic tilt, Hamstring muscle stretch, alternate legs and arm raises in supine lying and prone lying, leg cycling in supine, Bridging, Pelvic rotation, side lying abduction, Straight Leg raises and Mackenzie extension and flexion exercises.

- **Procedure of intervention for Group B: workplace exercise training + ergonomic advice.** The workplace exercise training was given according to convenience of therapist and patient. Four patients were included for training in a single session. Total 24 sessions were given. Each session was remotely performed and supervised three times a week for 8 weeks in Each session lasts nearly 30-40 min in group. Initiating by 5–7 min of warm-ups and finishing by cool down, respectively. In addition, the exercises were initiated by three repetitions holding for 10sec. and was progressed to six repetitions, holding for 25sec. based on overload principles and individual characteristics. [31] On first session all the participants were explained about the ergonomic advices. The workplace exercise training included same exercise and ergonomic advice explain in online supervised group but it given to workplace.
- **GROUP C: Only ergonomic advices** were given to this group: Which include same ergonomic advice explain in online supervised groups.

STATISTICAL ANALYSIS

The Statistical software named jamovi version 2.3.28 was used for the analysis of the data and Microsoft word 2016 and Excel 2016 was used to generate graphs and tables. Descriptive statistical analysis was carried out at 95% confidence interval. Level of Significance was set at 5 % with $p \leq 0.05$.

The data were ensured for their normal distribution using Shapiro-Wilk Test. All quantitative data of this study follows the normalities ($p > 0.05$). So the parametric tests were performed for the within and between group analysis. Paired 't' test have been used to analyse within groups pre-intervention to post intervention outcome measures. One-way ANOVA test has been used to compare the outcome measures post intervention between groups.

RESULT

Total 116 patients were assessed for eligibility. 51 patients were enrolled in the study and randomized to one of the treatment group (17 in group A, 17 in group B and 17 in group C). Mean age of participants in group A was 26.8±3.36, group B was 28.8±2.93 and group C was 28.8±2.93. One patient from group A discontinued intervention in between. Outcome measurements were completed on 50 participants (16 in the group A, 17 in group B and 17 in the group C) after 8 weeks of intervention**.**

Table-1 shows analysis of baseline demographic and outcome measures of all three groups. All the groups were matched in term of age, BMI, duration of symptoms, NPRS ODI, PCS- 12, MCS-12. The baseline characteristics were equivalent across the intervention groups ($p > 0.05$) so all three groups were homogenous before intervention.

TABLE – 1 BASELINE DEMOGRAPHIC DATA BETWEEN GROUPS

VARIABLES	GROUP A (OSE)	GROUP B (WPT)	GROUP C (CG)	p-value
	Mean ± SD	Mean ± SD	Mean ± SD	
AGE(Years)	26.8±3.36	28.8±2.93	28.7±5.44	0.294
BMI(kg/m^2)	24.1±3.09	25.4±4.09	24.2±4.69	0.583
DURATION OF SYMPTOMS(MONTHS)	9.06±4.60	9.65±4.89	9.18±5.35	0.536
NPRS PRE	5.71±1.26	6.06±1.25	5.06±1.34	0.927
ODI PRE	22.6±5.66	24.5±6.22	21.0±5.44	0.245
PCS-12 PRE	34.6±5.89	32.0±5.56	36.3±7.25	0.160
MCS-12 PRE	37.2±5.71	36.1±7.07	38.1±7.22	0.731

INTRA GROUP COMPARISION OF OUTCOME MEASURES

Paired t-test was used to compare the Pre-intervention values of outcome measure with post intervention values within the groups.

Table-2 shows intra group comparision of mean of all outcome measures that indicate there is significant difference between pre and post intervention mean NPRS, ODI, PCS-12 and MCS-12 in all three groups

TABLE 2 INTRA GROUP COMPARISION OF MEAN NPRS, ODI, PCS -12 AND MCS -12 SCORE BEFORE AND AFTER 8-WEEK INTERVENTION USING PAIRED T TEST.

VARIABLES	GROUP A(OSE)			GROUP B(WPT)			GROUP C(CG)		
	Pre Mean ± SD	Post Mean ± SD	p - value	Pre Mean ± SD	Post Mean ± SD	p-value	Pre Mean ± SD	Post Mean ± SD	p-value
NPRS	5.71±1.26	2.31 ±1.25	<0.001	6.06±1.26	1.41±1.25	<0.001	5.06 ±1.34	3.65 ±1.22	<0.001
ODI	22.6±5.66	8.00 ±3.83	<0.001	24.5±5.66	6.82±3.83	<0.001	21.0 ±5.44	16.2 ±5.17	<0.001
PCS-12	34.6±5.89	53.1±6.35	<0.001	32.0±5.56	53.1±4.57	<0.001	36.3 ±7.25	38.3±7.06	0.007
MCS-12	37.2±5.71	56.9 ±4.64	<0.001	36.1±7.07	54.0±6.42	<0.001	38.1±7.22	39.9±5.87	0.039

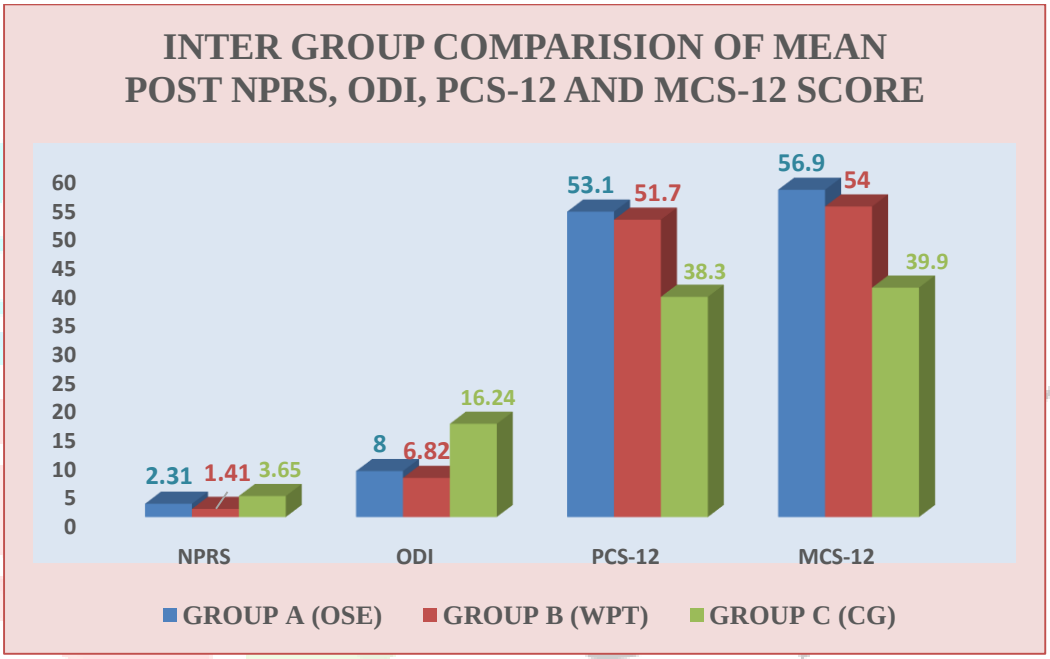
INTER GROUP COMPARISION OF OUTCOME MEASURES:

One-way ANOVA was used to analyse the post intervention differences between group for the mean values of outcome measure Table-3 shows pre and post means of all outcome measures in each group with F and p values, which suggest there is statistical significant differences between all three groups. Result of tukey's post hoc test suggest that there were no significant differences between post intervention all outcome measures of group A and group B but there were significant differences between group A and group B with group C.

TABLE-3 INTER GROUP COMPARISION OF MEAN POST NPRS, ODI, PCS-12 AND MCS-12 SCORE AFTER 8-WEEK INTERVENTION USING ONE WAY ANOVA TEST.

VARIABLES	GROUP A (OSE)	GROUP B (WPT)	GROUP C (CG)	F-value	P-value
	Post Mean ± SD	Post Mean ± SD	Post Mean ± SD		
NPRS	2.31±1.25	1.41±0.939	3.65±1.22	16.44	<0.001
ODI	8.00±3.83	6.82±2.66	16.24±5.17	27.41	<0.001
PCS-12	53.1±6.35	51.7±4.57	38.3±7.06	30.30	<0.001
MCS-12	56.9±4.64	54.0±6.42	39.9±5.87	42.17	<0.001

GRAPH-1 INTER GROUP COMPARISION OF MEAN POST NPRS, ODI, PCS-12 AND MCS-12 SCORE AFTER 8-WEEK INTERVENTION.



DISCUSSION

In this study efforts were made to examine the efficacy of the different modes of delivering treatment for improving Pain, Functional disability and Quality of life in patients with low back pain among IT workers. group-A received conventional physiotherapy at home supervised online via google meet and group-B received same exercise at work place. Conventional physiotherapy includes core stability exercises, stretching exercises and McKenzie exercises and ergonomics advices were given to all three groups.

The paired sample t test was applied for within group analysis, which showed $p \leq 0.05$ for all outcome measures in all three groups. Hence all the outcome measures gave statistically significant results post interventional compared to pre values.

The physiological mechanism behind improvement in outcomes with core stability exercises include, emphasis was placed on retraining Transverse abdominis and lumbar muscles, which possibly increased the muscle activity of those muscles, and stimulating muscle spindles and joint receptors, thereby improving the accuracy of the sensory motor integration procedure and initiating precise joint repositioning.[17] the possible mechanism behind McKenzie exercises include The intervertebral discs act as a spherical joint, permitting movement in flexion, extension, lateral bending, and rotation.[9] Internal disruption and displacement of the nucleus pulposus - annulus fibrosus complex will result in either back

pain or referred pain along the nerve course, or both, depending on the degree of displacement and whether or not there is associated nerve root compression. [9] The basis for extension-based pain is most commonly the movement of the nucleus pulpous within the annulus fibrosus of the intervertebral disc. The physiological mechanism behind improvement by ergonomics it based on postural control it improves interactions between muscle-skeletal system with afferent and efferent pathways of the central nervous system and whose main role is to keep your body in a state of muscle-skeletal balance. [18]

There was similar study in which **Thomas R. Toelle et al.,** Concludes that 12 weeks of training with 'e- Kaia' App as a multidisciplinary back pain app is an effective treatment in LBP patients and is superior to physiotherapy in combination with online education to reduce pain. [19] **Sara Moreira et al.,** in their 17 weeks study concluded that online workplace exercise more effective intervention on the pain perception and quality of life of computer workers.[11] **Adelaide Maria Castro-Sánchez et al.,** concluded that an e-Health program more superior than home based rehabilitation program in patients with low back pain. [20] Hence these results are similar to present study in which there is improvement in pain and Quality of life after giving online exercise and ergonomics advices which showed same effect after 8 weeks.

In accordance to above studies the result of present study can be justified, which state that online supervised exercises and ergonomics advice causes significant differences in mean of decrease pain and functional disability and increase Quality of life in patient with low back pain among IT workers after 8 weeks of intervention.

Roberta F. C. Moreira et al. The Effects of a workplace exercise program on physical capacity and lower back pain. The therapeutic exercise program (TEP) lasted 12 weeks. pain pressure threshold, and low back symptoms were evaluated before and after the intervention period. reference group not received any kind of treatment. After they concluded that work place exercise more effective in reduce low back pain.[21] This result line up with result of present study in which after giving workplace exercise gave better results to improve pain after 8 weeks, by increase in mean of pre-intervention and post-intervention mean values.

Another study done by **Yamato Tsuboi et al.,** The Effectiveness of workplace active rest programme on low back pain in office workers the intervention phase, participants performed WARP comprising frequent stand-up and individualised brief exercise/physical activity during work. and control group not receive any treatment. They used primary outcome pain. After they concluded that workplace activity and rest programme more effective to reduce low back pain. [22] This result line up with result of present study in which after giving workplace exercise gave better results to improve pain. this study differs from present study it may be due to rest period given to this study

Another study done by **Amir Houshang Mehrparvar et al.,** Ergonomic intervention, workplace exercises and low back complaints: a comparative study in an interventional study on office workers, the effect of two interventions was compared. Ergonomic modification consisted of correcting the arrangement of workstation and changing some equipment; workplace exercises included stretching exercises focusing on low back after 1 month of study used pain as primary outcome after they concluded that effect for both ergonomic modifications and stretching work-place exercises on reducing low back pain pain in office workers.[23] This study similar to present study result. It may be due to the present study has long duration of intervention. Another study done **by Markus D. Jakobsen et al.,** Physical exercise at the workplace prevents deterioration of work ability among healthcare worker 10 week of study after they concluded that Performing physical exercise together with colleagues at the workplace prevents deterioration of work ability among healthcare workers[24]. This study similar to present study result. It may be due to the present study has workplace exercise along with ergonomics intervention.

In accordance to above studies the result of present study can be justified, which state that workplace training exercises and ergonomics advice causes significant differences in mean of decrease pain score by used NPRS and functional disability by used ODI and increase Quality of life by used PCS-12 and MCS-12 of SF-12 in patient with low back pain among IT workers after 8 weeks of intervention.

One way ANOVA test was carried out for comparing the post intervention means of all the outcome measures which showed statically significant differences between all three groups. Tukey's post hoc test was done to know individual effect of post intervention and the results suggest that there were no significant differences between post intervention MCS-12 of group A and group B. but there were significant differences between post intervention MCS-12 of group A and group C & group B and group C.

Zohreh Yaghoubitajan et al., in their study concluded that implementing an 8-week corrective exercises program resulted in clinically desired significant improvements in most study outcomes and The findings in the online-supervised group revealed significant changes, which confirm that the supervised intervention could be more effective than the un-supervised intervention.[12] This result difference from the present study as both are effective it may be due to this study done in COVID-19 where many workers have to work from home. Another study done of by **John M. Mayer et al.,** concluded that Worksite exercise, delivered by on-site supervision or telehealth both can reduce LWT related to LBP in career firefighters. Here present study shows that both exercises equally effective reduce pain and functional disability. [25]

The purpose of this study was to compare the effect of online supervised Vs. Workplace training to reduce pain, functional disability and to improve Quality of life in patient with low back pain among IT workers. Result of present study confirms null hypothesis that there are no significant differences between the effect of online supervised Vs. Workplace training to reduce pain, functional disability and to improve Quality of life in patient with low back pain among IT workers. Present study reported that the experimental group (online supervised + ergonomics advices and Workplace training + ergonomics advices) is more useful than control group (ergonomics advice only) for reducing pain, functional disability and to improve Quality of life in patient with LBP among IT workers. There was no follow up once the treatment was completed hence long-term effects were not evaluated, patients were included from Surat city IT companies only, included only chronic low back patients were few limitations of present study.

CONCLUSION

The results of present study concludes that both Online supervised exercises and workplace training exercises are equally effective over only ergonomic advices for reducing pain, functional disability and improves Quality of life after 8 weeks of intervention in patients with low back pain among IT workers. So, therapist can choose any of the convenient mode of delivering an intervention for WRMLBP among IT workers to obtain better clinical result.

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