Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2016; 4(8E):3092-3099 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2016.v04i08.070

Original Research Article

Comparison of Mulligan Mobilization with Movement (MWM) and Kinesiotaping (KT) On Pain, Lumbar Range of Motion and Functional Disability in Chronic Low Back Pain Participants - A Randomized Controlled Study

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Abstract: Low back pain (LBP) is most commonly affects the individuals with a lifetime prevalence of 60– 70%. There are various treatment approaches available to chronic LBP. Recently, lumbar Mulligan mobilization with movement and kinesio taping has the more significant emphasis even though other various treatments are available. The objectives are to compare the effectiveness of Mulligan mobilization with movement (MWM) and kinesio taping (KT) on pain, lumbar ROM and functional disability in chronic low back pain participants. A randomized controlled design (single blinded). This study was conducted at musculoskeletal physiotherapy outpatient department. Total 30 low back pain individuals were randomly assigned into three groups (segmental stabilization exs (SSE) (control group); Mulligan movement with mobilization (experimental group-1) and kinesio taping (experimental group-2); n=10 in each group. Group A &B underwent 5 treatment session per week and total 2weeks and group C was received thrice per week for total 2 weeks of KT application and all interventions was supervised programs. Visual analog scale (VAS), Lumbar ROM and functional disability outcome measures were recorded at baseline (pre) and after two weeks of the interventions (post). The 2 weeks intervention of MWM &KT program resulted in significant improvement ($P < 0.05$) but mulligan MWM was more significant than KT in improving functional, lumbar ROM and reduction of pain in chronic low back pain individuals which was not evident in control. The result of the study indicates that MWM was found to be superior to KT in improving lumbar ROM and functional and reduction of pain among chronic LBP individuals.
Keywords: chronic LBP, SSE, Mulligan MWM & KT.

INTRODUCTION:

Low back pain (LBP) is the most common musculoskeletal disorder which affects patient's daily activities so ultimate and frequent referral by medical practioners. It has been estimated that between 60–80%of the population will suffer from at least one episode of LBP during their lifespan. Approximately 5–10% of LBP progresses to chronic LBP, which generates between 60–90% of the costs related to this pathology [1].

Ahern D et al described with his EMG analysis on para vertebral muscle flexion relaxation pattern in chronic low back pain (CLBP). He reported that CLBP often fail to achieve flexion relaxation and consequently display higher levels of disability due to deconditioning and there will be prolong disuse of muscles [2-3].

The Kinesio Taping (KT) is a newer technique which uses to treat various musculoskeletal disorders. It has various therapeutic effects are 1) correcting muscle activity, 2) improving active range of motion, 3)improving blood and lymphatic circulation, 4)decreasing pain by neurological suppression, and repositioning joints [4].

In previous researchers around 38.1% of therapists reported mulligan mobilization is the "second

most suitable treatment technique" for chronic low back pain dysfunction. It is the technique, the therapist has to apply a glide to the segments and patients should do the required movements actively. MWM is the popular technique which widely used in musculoskeletal conditions, such as the low back pain [5].

Brian Mulligan pioneered described that, mobilization with movement (MWM) also known as 'sustained natural apo physeal glide' (SNAG). SNAG'S is the technique, applying the accessory passive glide to the affected segments or lumbar vertebrae while the patient simultaneously performs an active movement. The direction of the passive glide is to be along the plane of the lumbar facet and the technique is performed in either in a sitting or standing [6-10].

Segmental stabilization exercise (SSE) is focused to strengthen the deep core muscles of the spine. Core muscle has been classified in to local and specific stabilizers of the spine. In previous research reported that deep core muscles such as mulifidi function is reduced in chronic low back pain sufferers. So instead of giving generalized treatment, can focus on specific stabilization of deep core muscles. So it can improve better performance in low back pain individuals of daily activity [11-13].

Low back pain is a common problem within our society affecting individual's physical and social functioning considerably and interfering with sufferer's daily activities. It is not known if the benefits of MWM exceed those of Kinesiotaping, as none of the studies included such a comparison. Therefore, the purpose of the current study was to compare the effects of MWM and Kinesio taping on pain, lumbar range of motion and functional disability in chronic low back pain study participants.

Hypothesis of this study was there is a statistical significant difference in mobilization with movement (MWM) & Kinesiotaping on pain, lumbar range of motion and functional disability in chronic low back study participants in local population of Surendra nagar.

Table 1: Demographical details

Variables	**Control Group (n=10)**	**MWM$^{€}$ Group (n=10)**	**KT$^{©}$ Group (n=10)**	**p-value**
	Mean ±SD	**Mean ±SD**	**Mean ±SD**	**p > 0.05**
Age (Y)$^{\#}$	48.30 ± 6.09	44.40 ± 6.58	51.73 ± 5.10	0.266
Body height(cm)	161.2 ± 10.23	157.4 ± 10.02	156.8± 9.70	0.572
Body mass(kg)	62.80± 5.28	62.80± 5.15	67.30 ± 3.91	0.073
BMI(Kg/m^2)*	24.37± 3.22	25.36 ± 1.78	27.41 ± 2.31	0.035
Duration (Month)	09.50± 3.43	13.30± 9.90	8.70± 4.24	0.260
Gender	Male = 50.00% Female = 50.00%	Male =30.00% Female =70.00%	Male = 20.00% Female = 80.00%	
***BMI=Body mass index, KT$^{©}$=Kinesiotaping & Y$^{\#}$=years. MWM$^{€}$= mobilization with movement**				

METHODOLOGY

Sampling method

This study design was single blinded (assessor blinded) randomized controlled design. Before the data collection, institutional ethical approval was taken from the ethical committee. Here all participants were recruited through C.U. Shah Physiotherapy musculoskeletal outpatient department. The total 50 were interested to participate in the study. A total 30 low back pain study participants who fulfilled selection criteria were recruited to this study. Here was simple random sampling method [computer generated randomization]. The total 30 participants were randomly assigned in to three groups [(SSE (n=10), MWM (n=10) &KT (n=10)].

Outcome measures

The baseline pre-intervention primary outcome measures consisted of pain assessment using visual analog scale(VAS),lumbar range of motion was assessed by using modified schober test (m.ST) and lumbar functional disability was assessed by using modified- oswestry disability questionnaire (m.ODI).

VAS is a self-assessing questionnaire (quality outcome). It was used to measure the patient's current level of pain intensity. It is an ordinal scale using a 10cm horizontal line with "no pain" anchored at left end and "pain as bad as it could be "anchored at right. The patient was asked to place a mark on the line that represented the severity of his or her pain at the moment [14].

The second outcome measure was the modified schober test (m.ST).It is the test used to assess the lumbar range of motion. In this study the patient was in standing with back towards the examiner. The therapist was determined the location of the dimple and Venus. The intersection of the top dimples of Venus was marked by drawing a horizontal line. That line was the land mark. The 2nd line was marked above 10 cm above the 1st and the 3rd was marked the 5cm below

the first line. The difference between the measurements in erect standing and flexed positions was indicated the outcome of the lumbar flexion [15].

The third outcome measure in this study was Modified ODI. It is a self-report questionnaire. In this study questionnaire was used to assess, how the back pain patients was affected their daily functional or activities in daily living. It consists of 10 items and each items has the score of 0-5 [16].

Inclusion criteria

In this study the inclusion criteria's were used 1)both genders, 2)had a history of recurrent low back pain (repeated episodes of pain in past year collectively lasting for less than 6 months).3) Lumbar &lumbosacral LBP,4)Grade-2 lumbar spondylosis,5)no radiating pain,5)normal neurological examination findings of lumbosacral nerve function, including deep tendon reflexes, plantar response, voluntary muscle action, straight leg raising and sensory examination, and 6)study participants willing to participate [6-8].

Exclusion criteria

In this study the exclusion criteria's were used: any recent traumatic injury of the spine, lumbar inter vertebral disc prolapsed, lumbar Stenosis , Inflammatory disorder (Ankylosing Spondylitis),Cauda equine syndrome, Infection in the spine (discitis),Tumor in lumbar &lumbo sacral area, Severe Osteoporosis, Meningitis, infection or inflammatory oedema , previous adverse reaction to acupuncture or anesthetic, serious neurological or systemic disorders, HIV and hepatitis-B, Known skin allergies and skin lesion, Pregnancy, Severe overweight(BMI>32),Previous spinal surgery or scheduled spinal surgery, Any respiratory& cardiovascular impairment and peripheral vascular disease, Any muscular disorders, and Any psychiatric disease [6-8].

Segmental stabilization exercise procedure (Group A)

Group A received a warm-up exercise as a stationary bicycling for 10–15 minutes followed by segmental stabilization exercise training was given (In table 5 elaborately explained about exercise protocol). All exercise was done 5series with 10 repetitions.5 sessions per week for total 2 weeks [11-13]. (Figure 2-5).

Mulligan's Mobilization with movement intervention procedure (Group B)

Patient was positioned comfortable sitting on plinth with his/her leg over the side; therapist was stood behind & placed a belt around him/her & our self. The belt was placed around the patient's lower abdomen below the ASIS for the comfortable .The belt was adjusted below therapist hip joint. The Ulnar border of the therapist hand was placed under the spinous process of the vertebra above the suspected lumbar spinal segment. Then therapist other hand was placed on the bed. Then made the patient was flexed forward until the pain is felt. Again instructed patient was come back to forward position. Therapist applied glide force with her right hand, opposite along the facet treatment plane and again patient was flexed. Then the patient was flexed painless to almost full ROM. Then all the patients underwent SSE supervised program for 15 minutes. 5 treatment sessions per week & for total 2 week [5, 7-8]. (Figure 6).

Kinesiotape application procedure (Group C)

The KT group received the KT application with 30 cm "Y" strips while the subjects were in maximum forward bending of the spine. Here Kinesiotap was applied for pain inhibition method by utilizing short and long oscillations in order to apply a various amount of tension (15% to 50%). Then all the patients underwent SSE supervised program for 15 minutes. 3 treatment sessions per week & for total 2 weeks [4, 18-19]. (Figure 7)

STATISTICAL ANALYSIS

All statistical analysis was done using SPSS 16 for windows software. The level of significant was set at p=0.05. Descriptive analysis was used to calculate mean and standard deviation (SD). The inter group comparison of demographic details were performed using one way ANOVA &for inter group comparison of pre and post was done with one way ANOVA &for intra group comparison pre and post was done with paired'-test &Wilcoxon Signed Rank test was used**.**

RESULT

2weeks of mulligan MWM versus KT interventions led to the findings that MWM treatments group improved significantly in lumbar flexion m.schober test), lumbar function and reduction in pain (VAS),when compared to alone segmental stabilization exercise group(A-control group). After analysis of pre and post treatment scores, it results interpreted that significant improvement ($p<0.05$) in MWM group. There was significant difference ($p<0.05$) in post treatment comparison between with MWM, KT and control group (Table-II&III). The findings of this study suggested that MWM along with segmental stabilization exercise training is effective in the treatment of chronic low back pain. The MWM shows more effectiveness than that of KT & control group in VAS, m.schober test &modified ODI score.

The present study also showed that MWM group had a more significant functional improvement (a decrease in pain from 5.9 to 2.7 points compared to 6.0to 3.6 points for the KT group and 6.0 to 5.0 points in control group) and improvement in lumbar range of

motion[m. schober test] (from 4.20 to 7.20 and compared to 4.30 to 6.20for the KT group, and compared with 4.50 to 5.25 control group) and decrease in modified ODI (from 33.40 to 25.40 points compared to 34.70 to 27.40 points in the KT group and compared with 34.90 to 31.10 in control group[CG].[Table-IV]

Table 2: Pre-treatment group comparison

Scale	Control group(A)		MWM Group(B)		KT Group(C)		
	MEAN	SD	MEAN	SD	MEAN	+SD	P VALUE
NPRS	6.0	1.37	5.9	0.99	6.0	0.94	0.96
Modi. ST	4.5	0.85	4.2	0.78	4.3	0.67	0.68
Modi. ODI	34.9	3.07	33.9	2.28	34.7	3.05	0.71

Table-3: Post treatment group comparison

Scale	Control group(A)		MWM group(B)		KT group(C)		
	MEAN	SD	MEAN	SD	MEAN	+SD	P VALUE
NPRS	5.00	0.77	2.7	1.16	3.6	0.96	0.000
Modi.ST	5.25	0.92	7.2	0.63	6.2	0.63	0.000
ODI	31.1	2.28	25.4	2.54	27.4	3.06	0.000

Table –4: Intra Group VAS, Lumbar flexion and m.ODI Comparison [group A,B&C]

CONTROL GROUP(A)					MWM GROUP (B)			KINESIOTAPING GROUP (C)		
Scales		Mean	±SD	P- Value	Mean	±SD	P-value	Mean	±SD	P-value
VAS	PRE	6.00	1.00	0.005	5.90	0.994		6.00	0.943	0.004
	POST	5.00	0.77		2.70	1.159	0.004	3.60	0.966	
Modi.ST	PRE	4.50	0.84	0.004	4.20	0.788		4.30	0.675	0.002
	POST	5.25	0.92		7.20	0.632	0.004	6.20	0.632	
m.ODI	PRE	34.90	3.07		33.90	2.283		34.70	3.05	0.004
	POST	31.10	2.28	0.005	25.40	2.547	0.004	27.40	3.06	

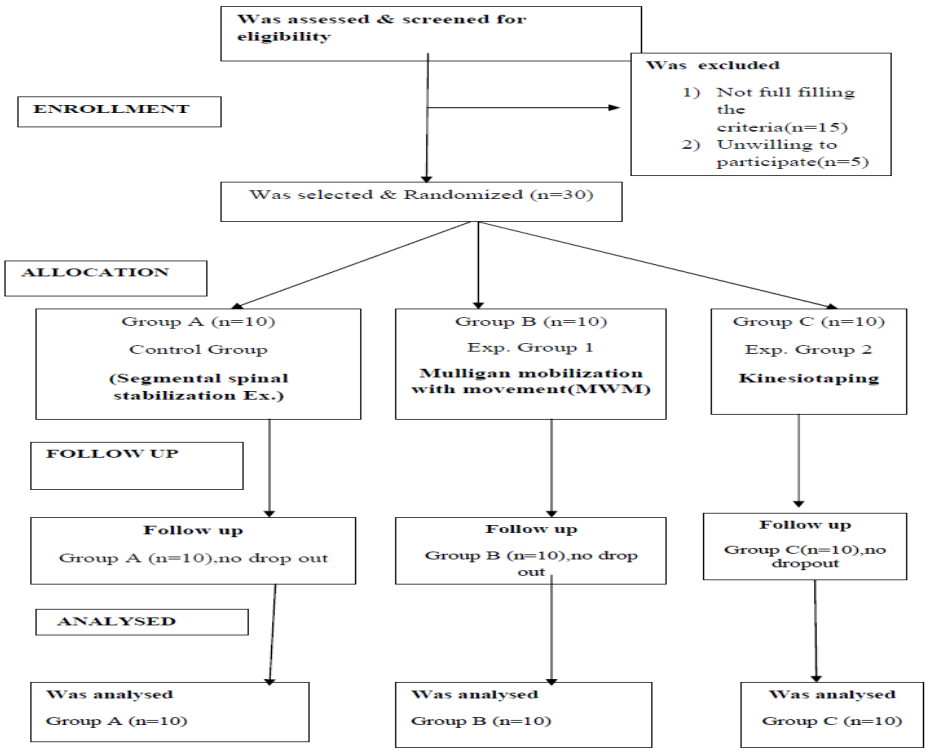

Fig 1: consort format [Randomization]

Table 5: Treatment protocol for segmental stabilization group) (Control group)

For specific muscle	Exercise	Intervention dosage
Strengthening of the Transverse Abdominis (Tr A) and lumbar mulifidi(LM)	1. Exercises for the TR A in four point kneeling. 2. Exercises for the TrA in dorsal decubitus with flexed knees. 3. exercises for the LM in ventral decubitus 4. Co-contraction of the TrA and LM in the upright position.	Each exercise was done 5 series with 10 repetitions.

Segmental stabilization exercise [control group-A]

Fig 2: [Four point kneeling exs]

Fig 3: [dorsal decubitus with knee bending exs]

Fig 4: [ventral decubitus exs]

Fig 5: [upright position exs]

Fig 6: [Muligan MWM application] [For Group B]

Fig 7: [kinesiotaping application] [For group C]

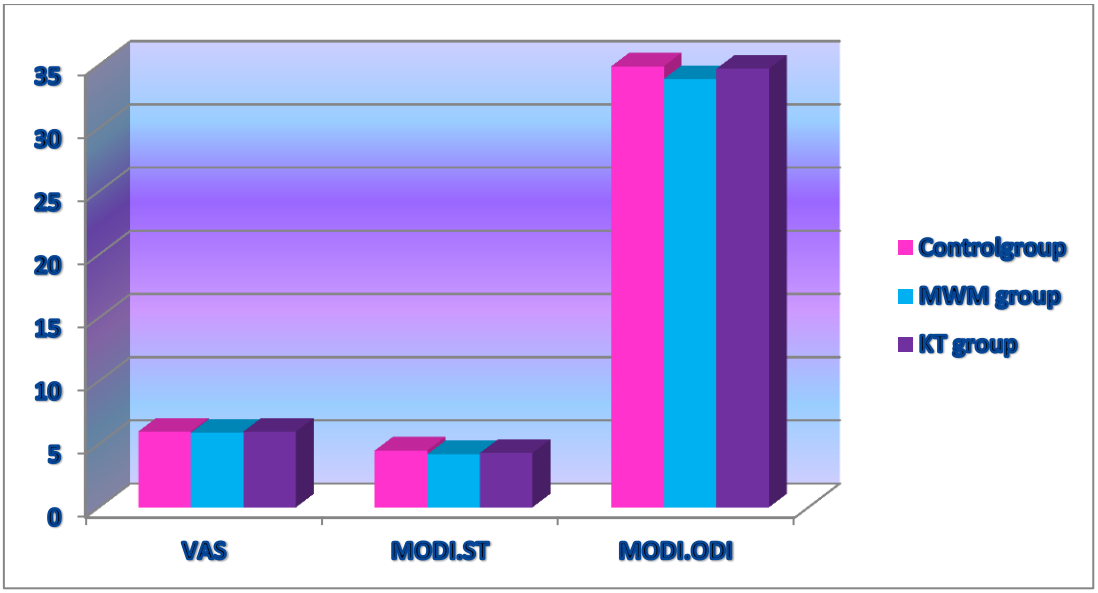

Fig-8: Pre treatment group comparison

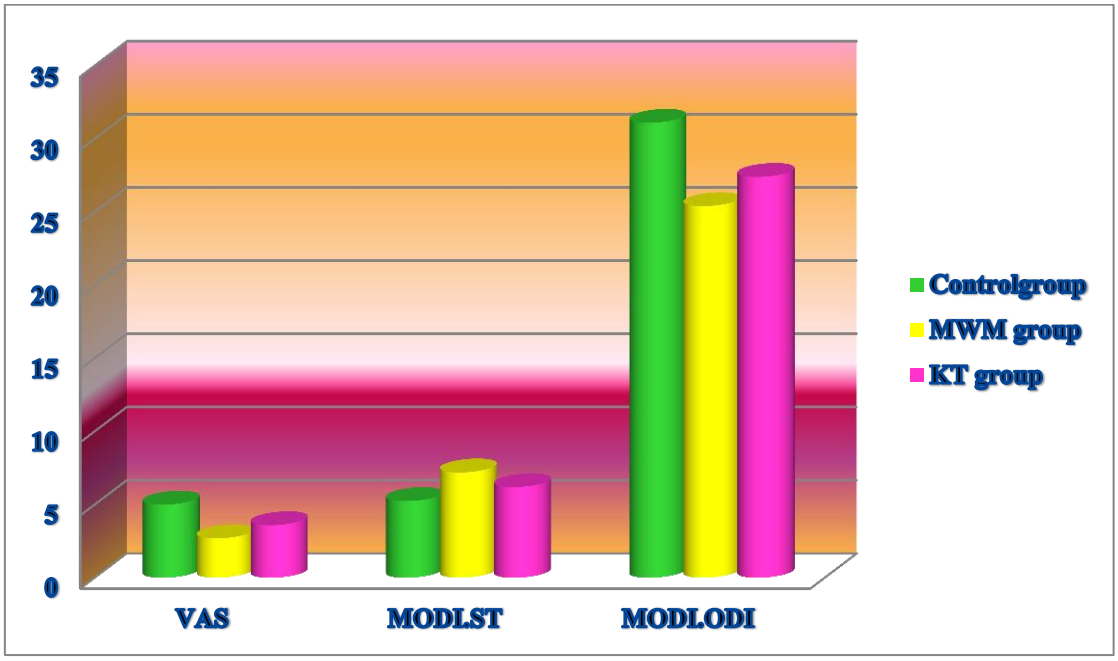

Fig-9: Post treatment group comparison

DISCUSSION

This current study results indicate that there is significant improvement in lumbar ROM and lumbar function and reduction of pain in patients with chronic low back pain in patients at end of 2weeks in all the three groups after SSE alone(group A), MWM with SSE(group B) and KT with SSE(group C). All the three treatment groups obtained successful outcomes as measured by significant improvements in lumbar ROM and lumbar functional and reduction of pain after 2 weeks of supervised treatment program.

Chronic low back pain is one of the conditions which can be treated by a wide variety of physiotherapy methods. It is still difficult to formulate all proof guidelines for the management of chronic low back pain. Various joint mobilization and soft tissue mobilization and other interventions are exists with own claims of success without any attempts of comparing the maximal effective methods.

In our study, we found that MWM and KT along with segmental stabilization exercise (both) were effective in reducing pain, disability and improving lumbar ROM in chronic LBP patients.

According to Brian Mulligan, SNAG which means sustained repositioning of one articular surface on its neighbor while a movement is undertaken which

helps to corrects the positional faults occurred in the lumbar spine 5. Once the pain generator (propericeptor) is released, normal function returns and the muscle spasm surrounding the affected joint is resolved [8-9].

According to Norris (2008) primary stabilizers are characterized by slow twitch fibers, deep and close to the joints [20-21]. Segmental stabilization exercise (SSE) is based on a motor learning model whereby the faulty movement patterns are identified; the components of the movements are isolated and retrained into functional tasks specific to the patient's individual needs [22].

This effect is similar to previous author's research report [5, 8-9] so, these interventions can be applied in clinical set up for better healthy life.

Limitations

1. Small sample size 2. Long term follow up was not done.

Conclusion

our study leads to conclusion that after 2weeks of treatment both mobilization with movement, Kinesiotaping along with segmental stabilization exercise were effective in the chronic low back pain but mobilization with movement along with segmental stabilization exercise was superior than the Kinesiotaping.

Acknowledgement:

Our best wishes to those valuable study participants & supporters of this study.

Financial support and sponsorship: Nil

Conflict of interest:

We declare that there were no conflicts of interest in the entire journey of the study.

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