JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue

JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

COMPARISON OF PILATES EXERCISES AND MC GILL EXERCISES IN TREATMENT OF NON-SPECIFIC LOW BACK PAIN IN YOUNG ADULTS

[1]Niharika Rajvanshi, [2*]Sohrab Ahmed Khan, [3]Nilofar Rasheed

[1]Student, Department of Rehabilitation Sciences, School Of Nursing Sciences & Allied Health, Jamia Hamdard (Deemed University)

[2*]Associate Professor, Department of Rehabilitation Sciences, School Of Nursing Sciences & Allied Health, Jamia Hamdard (Deemed University)

[3]Assistant Professor, Department of Physiotherapy, SNHS, Noida International University, Greater Noida

Abstract

Objective: To compare the effectiveness of Pilates and Mc Gill exercises on pain, disability, lumbar flexibility, patient specific functional independence and global impression of recovery in young adult patients of non specific low back pain.

Method: In this prospective, comparative study, subjects were tested in week 0 (pre intervention phase), end of week 3 and week 6 for pain, disability, lumbar flexibility, patient specific functional independence and global impression of recovery. The data was analyzed to find out which of the two protocols was better in pain reduction, disability reduction, increasing lumbar flexibility, enhancing patient specific functional independence and global impression of recovery inpatients.

Results: The result of our study showed significant improvement in all the outcome measures through week 0 to week 3 to week 6 in both the groups, when the parameters were assessed within the groups ($p<0.001$). When compared between the two groups, the results showed significant reduction in pain

percentage through Mc Gill Exercises over Pilates exercises ($p<0.001$), but for rest of the outcome measures both the groups showed equalimprovement.

Conclusions: This study concludes that though both the exercise interventions work efficiently in improving the dependent variables, individually. On comparison, the Mc Gill & Pilates regime, Mc Gill exercises were found to be better than Pilates exercises in giving pain relief to the young adult patients suffering from nonspecific low back pain but for rest of the parameters both are equally effective.

***Key Words: Pilates exercises, Mc Gill exercises, non-specific low back pain, young adults.**

Introduction

Low back pain (LBP) is one of the most common costly health problems due to the considerable impact on daily functioning, sickness absence, and work disability.The prevalence of LBP and the number of patients seeking care with physical therapy has increased overthe last two decades [1]. Non-specific low back pain represents 90% of all cases. Multiple factors can affect the mechanical balance of the lumbar region leading to instability that can trigger low back pain.According to many guidelines for diagnosing and treating low back pain, conservative treatment including rest, pharmacological pain relief, surgery, and rehabilitation can be performed[2]. Pilates is an exercise involving mind and body that enhances core stability, strength, and flexibility, by paying attention to muscle control through drawing maneuver, posture, and breathing [3]. Pilates training consists of the exercises that focus on improving flexibility and strength in all the body organs, without increasing the mass of muscles or destroying them. This training method consists of controlled movements that form a physical harmony between the body and brain, and can raise the ability of the body of people at any age [4].

In addition, people who do Pilates exercise would have better sleep and less fatigue, stress, and nervousness. This training method is based on standing, sitting, and lying positions, without intervals, jumping, and leaping; thus, it may reduce injuries resulting from the joint damage because the exercise movements in the ranges of motion in the above three positions are performed with deep breathing and muscle contraction [5]. However, McGill has designed exercises in lumbo-pelvic region, based on the global muscle stabilization, in order to increase stability and coordination of the trunk muscles without any load on lumbar spine and to improve the function of the anterior, posterior, and lateral lumbar muscles [6]. In our study, we have compared the Stuart McGill approach with the Pilates approach in terms of pain relief, disability and functional independence on non-specific low back pain in young adults.

Given these two therapeutic approaches, the present study aimed to investigate and compare the effectiveness of two programs of therapeutic exercise (Pilates Exercises and McGill exercises) on non - specific low back pain in young adults.

Subjects and Methods

The sample consisted of 20 patients (n=20, 5 males, 15 females) in each and exercises about the best way to retrain the core and recover from Nonspecific back pain. Patients were divided into two groups (Pilates and Mc Gill) and were given a 6 week exercise protocol of Pilates intervention and Mc Gill intervention respectively, for 6 weeks, twice in a week, with exercises progressed on weekly basis. It was a comparative study comparing the effect of the two protocols on patients randomly distributed post age, gender and BMI matching (sample design- sample of convenience) into two groups, one as Pilates group and other as Mc Gill group. The levels of pain were measured by Numeric Pain Rating Scale, disability through Modified Oswerstry Scale, lumbar flexibility through Modified Modified Schober's test, patient specific functional independence by use of Patient Specific Functional Independence Scale and global impression of recovery were measured using Global Impression of Perceived Effect scale. The patients, post their screening for exclusion criteria, were asked to mark their current levels of pain on Numeric Pain Rating Scale ranging from 0-10, with 0 being no pain and 10 being unbearable pain. Disability levels were assessed by marking one of the 6 options of the 10 questions regarding his/her functional activities. Lumbar flexibility was measured by through Modified Modified Schober's test, by calculating distance between the two reference points marked on patient's body. Patient specific functional independence was assessed by use of Patient Specific Functional Independence Scale. Total score was calculated by taking average of the scores of three difficult activities for the patient, ranging from 0 to 10, with zero marked as one cannot do the activity and 10 marked as can do it as if no pain. Global impression of recovery was measured using Global Impression of Perceived Effect scale, ranging from -5 (worst possible) to + 5 (completely recovered). The reassessment was done at end of 3 and 6 weeks as well. The data was collected before intervention, at end of 3 weeks and at end of 6 weeks, for both the groupsin data collection forms, and on completion, it was analyzed.

Results

The obtained results were expressed as mean ± standard error (SE). All the data (of pain score, pain percentage, percentage of disability,flexibility, patient specificfunctional independence score, global impression of recovery score) was analysed using Analysis of Variance (ANOVA) followed by Tukey's Test. Values of $p<0.05$ were considered as significant. The demographic data was analysed

using Wilcoxon test. All the statistical analysis was performed using Graph Pad Prism 5 software (Graph Pad Software Inc., San Diego, LA, USA). Analysis of collected data leads to following resultThe mean age of patients in Pilates group and Mc Gill group was 26.05±1.017 and 26.20±1.007 respectively. There was no significant difference in the age of the two groups (p value > 0.05). The mean BMI of patients in Pilates group was 22.37±0.6618 and in Mc Gill group it was 22.73±0.6705. There was no significant difference between the BMI of patients in the two groups (p value > 0.05).

Pilates (n=20)			Mc Gill (n=20)			
Variable	Me dian	Mean ± SE	Variable	Me dian	Mean ± SE	p value
Age	25.50	26.05± 1.017	Age	25.50	26.20± 1.007	0.8560
BMI	22.51	22.37± 0.6618	BMI	23.00	22.73± 0.6705	0.7228
Wei ght	59.50	60.25± 1.900	Weight	63.00	61.73± 1.928	0.4204
Height	164.2	164.1± 1.200	Height	164.9	164.8± 1.345	0.6143

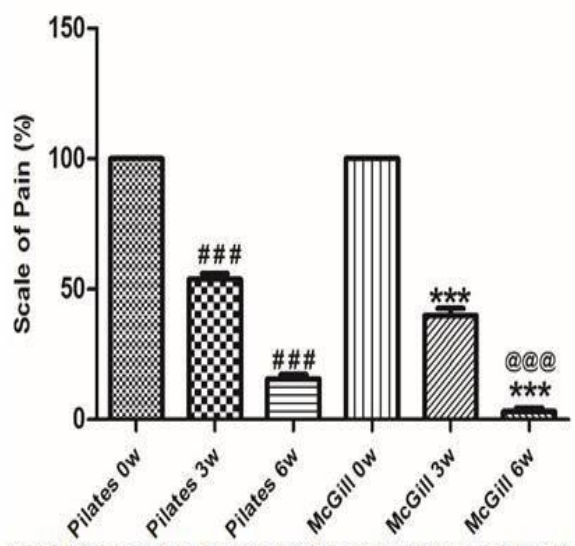
Outcome measures: -

PAIN:

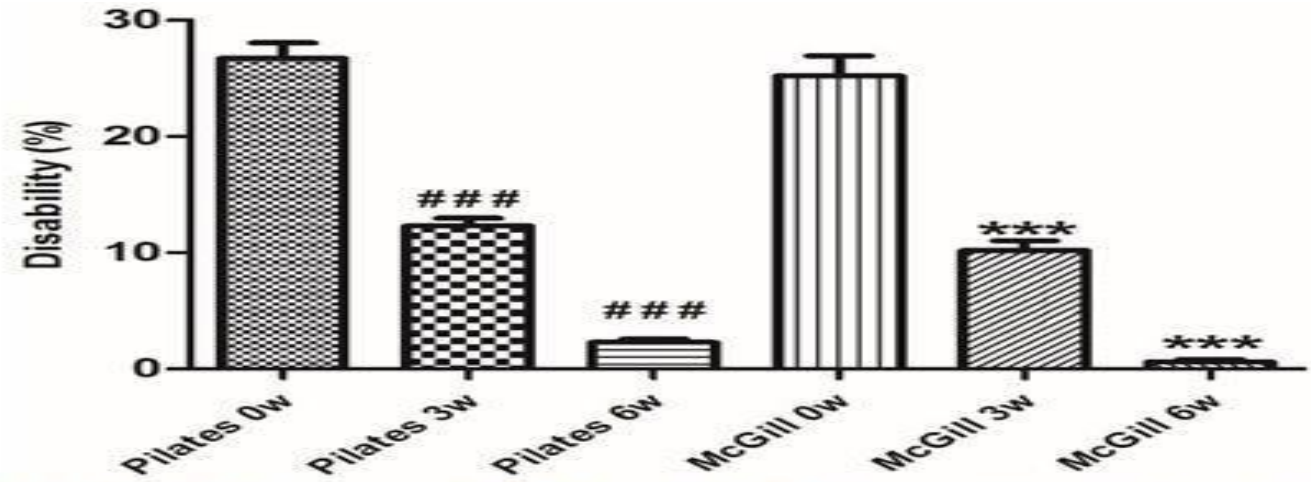
In both Pilates and Mc Gill groups, there was significant reduction in pain when seen within group from week 0 to week 3 to week 6. In Pilates group, the pain was reduced from week 0 Mean ± SE (6.150±0.2835) to Mean ± SE (0.9000±0.1933) in week 3, showing significant reduction in pain ($p<0.001$). The pain levels are further reduced from week 3 to week 6Mean± SE (5.950± 0.1000), further showing significant lowering of pain ($p<0.001$). Similarly, in Mc Gill group, there was reduction in pain levels from week 0 Mean ± SE (5.950±0.2854) to week 3 Mean ±SE (2.450±0.2348), $p <0.001$; and from week 3 to week 6 Mean ±SE (0.2000±0.09177), showing significant difference with $p <0.001$.

On calculation of pain percentage (to equalize the starting level in both groups), it was found that there was significant difference in residual pain percentage in Mc Gill group compared to Pilates group starting from week 3 and reducing it further by week 6. Mc Gill exercise protocol showed more relief in pain.

DISABILITY: Within the two groups, there was significant reduction observed inthe disability score from week 0 Mean±SE (26.70±1.348) to week 3 Mean±SE (12.30±0.6692) to week 6 Mean±SE (0.6000±0.2103) in Pilates group, similar to Mc Gill group from week 0 Mean±SE (25.20±1.707) to week 3 Mean±SE (10.20±0.8448) to week 6 Mean±SE (2.300±0.3000). Graphically, it could be appreciated that disability levels were better reduced in Mc Gill group at the end of 6 weeks, compared to just Mean ±SE (39.89±2.811) in week 3 than Pilates Mean ±SE(53.81±1.736) in week 3; $p<0.001$. Similarly in week 6, Mc Gill group just had Mean ±SE (3.006±1.391) residual pain compared to Pilates group having Mean ±SE (15.60±2.089) residual pain; $p<0.001$. There was no significant difference observed between the disability scores of the two groups, when compared at 0, 3 and 6 weeks.



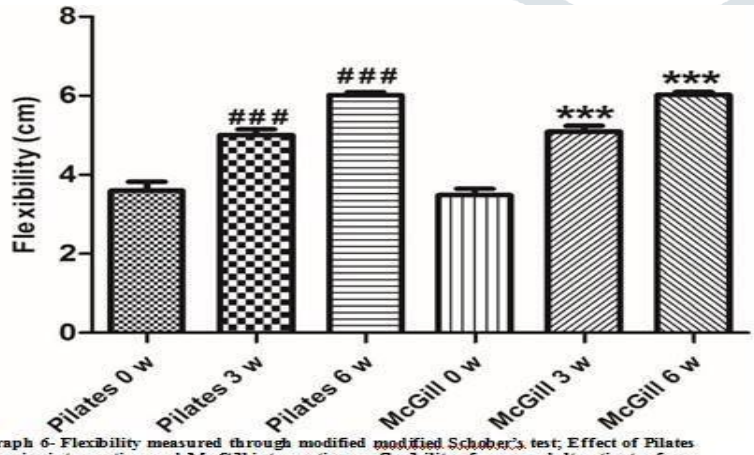
Graph 4- Pain scores calculated as pain percentage; Effect of Pilates exercise intervention and Mc Gill intervention on young adult patients of non specific low back pain. Each value is represented as Mean±SE (n=20). Different Bars represent remaining pain percentage levels at different weeks 0, 3 and 6 in pilates and Mc Gill group. Significant differences were indicated by ### p<0.001 when compared with Pilates(pre intervention, week 0) group; significant differences were indicated by *** p<0.001 when compared with Mc Gill (pre interv ention, week 0) group and significant differences were indicated by @@@ p<0.001 when compared with Pilates group (week 6).



Graph 5- Disability measured on Modified Oswestry Scale (10 questions with each scoring from 0-6) ; Effect of Pilates exercise intervention and Mc Gill intervention on disability levels of young adult patients of non specific low back pain. Disability percentage calculated as [(Sum of items scored/Sum of sections answered) x 100]. Each value is represented as Mean±SE (n=20). Different Bars represent remaining disability levels (in percentage) at different weeks 0, 3 and 6 in pilates and Mc Gill group. Significant differences were indicated by ### p<0.001 when compared with Pilates(pre intervention, week 0) group and significant differences were indicated by *** p<0.001 when compared with Mc Gill (pre interv ention, week 0) group.

FLEXIBILITY

There was a significant increase in flexibility of lumbar spine of the patients from week 0 Mean±SE (3.595±0.2252) to week 3 Mean±SE (5.010±0.1407) to week 6 Mean±SE (6.020±0.06943) in Pilates group and week 0 Mean±SE (3.480±0.1644) to week 3 Mean±SE (5.095±0.1439) to week 6 Mean±SE (6.025±0.07141) in Mc Gill 121 group. There was no significant difference found between the two groups neither at week 0, week 3 nor week 6.

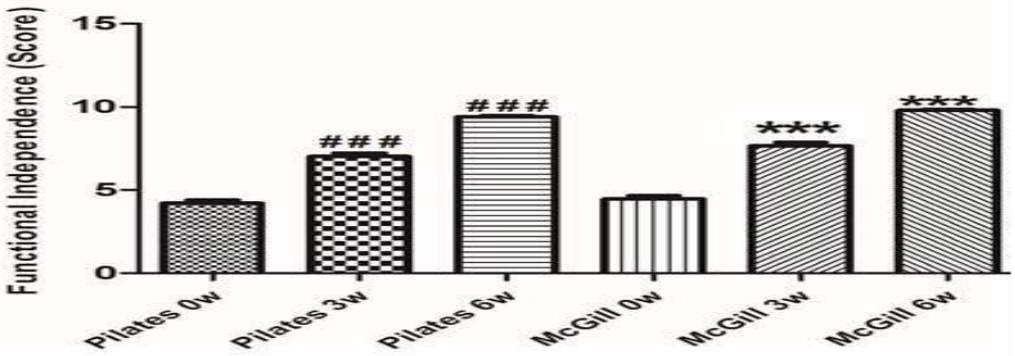


Graph 6- Flexibility measured through modified modified Schober's test; Effect of Pilates exercise intervention and Mc Gill intervention on flexibility of young adult patients of non specific low back pain. Flexibility (cm) calculated by taking average of three readings calculated by measuring the distance between the marked points. Each value is represented as Mean±SE (n=20). Different Bars represent improved flexibility levels (in cm) at different weeks 0, 3 and 6 in pilates and Mc Gill group. Significant differences were indicated by ### p<0.001 when compared with Pilates(pre intervention, week 0) group and significant differences were indicated by *** p<0.001 when compared with Mc Gill (pre intervention, week 0) group.

PATIENT SPECIFIC FUNCTIONAL INDEPENDENCE SCORE

The score improved significantly in each group, after each re-assessment. In Pilates group the mean values of patientspecificfunctional independence score improved from week 0 Mean±SE (4.225±0.1844) to week 3 Mean±SE (7.034±0.1994), to week 6 Mean±SE (9.401±0.09879).

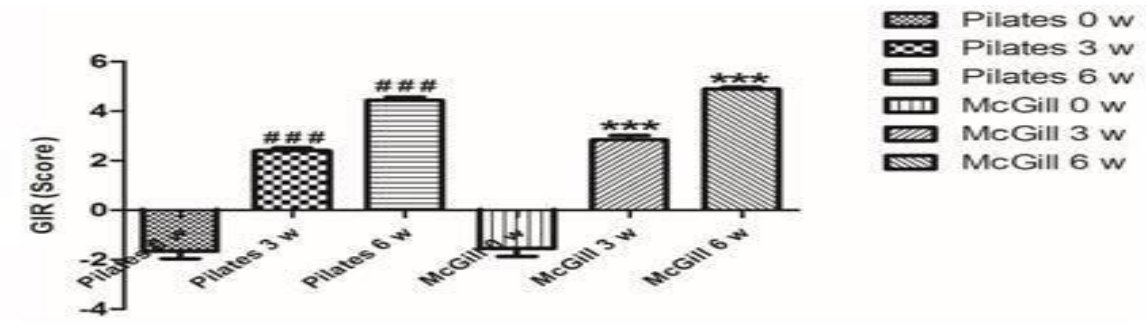
Similarly in Mc Gill group the mean values of patient specific functional independence score improved from week 0 Mean±SE (4.468±0.1833) to week 3 Mean±SE (7.667±0.2026), to week 6 Mean±SE (9.801±0.06111). There was no significant difference found in improvement of the patient specificfunctional independence score in between the two exercise groups, be it week 3 or week 6.



Graph 7- Patient Specific Functional Independence score measured through Patient Specific Functional Independence Scale; Effect of Pilates exercise intervention and Mc Gill intervention on patient specific functional independence of young adult patients of non specific low back pain. Patient Specific Functional Independence score calculated by taking average of the score given to the number of activities found difficult by patient to perform. Each value is represented as Mean±SE. (n=20). Different Bars represent improved patient specific functional independence levels at different weeks 0, 3 and 6 in pilates and Mc Gill group. Significant differences were indicated by ### p<0.001 when compared with Pilates(pre intervention, week 0) group and significant differences were indicated by *** p<0.001 when compared with Mc Gill (pre intervention, week 0) group.

GLOBAL IMPRESSION OF RECOVERY (GIR)

The GIR score improved from week 0 Mean±SE (-1.650±0.3101) to week 3 Mean±SE (2.400±0.1124) to Mean±SE (4.450±0.1141) in Pilates group as well as in Mc Gill group, it improving from week 0 Mean±SE (1.550±0.3202) to week 3 Mean±SE (2.850±0.1666) to Mean±SE (4.900±0.06882). But there was no significant difference in the scores between the two groups even when compared at week 3 and week 6, post intervention.



Graph 8- Global Impression of Recovery measured through Global Impression of Perceived Effect Scale (ranging from -5 to +5); Effect of Pilates exercise intervention and Mc Gill intervention on global impression of recovery of young adult patients of non specific low back pain. Each value is represented as Mean±SE (n=20). Different Bars represent improved global impression of recovery levels at different weeks 0, 3 and 6 in pilates and Mc Gill group. Significant differences were indicated by ### p<0.001 when compared with Pilates(pre intervention, week 0) group and significant differences were indicated by *** p<0.001 when compared with Mc Gill (pre intervention, week 0) group.

Discussion

Young adults are a major part of population suffering from non-specific low back pain. (7)They are also responsible for the economic growth of the nation. (8) Hence, they need a sure, specific and long-lasting cure for their low back pain. The purpose of the present study was to compare the effectiveness of McGill and Pilates approach with respective of pain Relief, Functional independence and flexibility of Lower back. In Our study its has been proven that both Pilates and Mc Gill exercise regimes are beneficial in treating patients suffering from non-specific low back pain its also suggested by Jeffries et al in 2007 (10).

The studies performed by Sonosky S et al. in 2008, evaluation of how yoga and Pilatesmay be helpful in managing patients with LBP. It is important to note, however, that all of the above trials focus on nonspecific LBPWhile Stuart Mc Gill (2007) found that Bracing stability was always greater than hollowing stability,Heconcluded that Bracing plays more crucial role than Drawing In, for enhancement of spinal stability with minimal compression and thus, in pain relief (as spinal stability increases) (11). In a study by Mohammad Reza Nourbakhsh et al. studying the relationship between mechanical factors and incidence of low back pain, it was found that endurance of the back extensor muscles had the highest association with low back pain and the associated disability (12). Mc Gill also supporting Mohammad Reza Nourbakhsh et al. findings focus onacquisition of endurance, trying to understand the cause of disability and removing it altogether. In the current study, disability levels are significantly reduced in boththegroups, from week 0 to week 3 ($p<0.001$) to week 6 ($p<0.001$). On comparison of the results between the two groups there was no significant difference between the disability levels in the two groups, but as the weeks progressed with the exercise protocols, graphically and clinically it could be appreciated that by end of the 6th week, Mc Gill regime was better in reducing the disability of the patients than Pilates group. But the difference was not significant statistically. The reason behind this statistical insignificance can be associated to the relationship of disability with other factors like reduced

lumbar flexibility and functional activities limitation, wherein the later two also showed no statistical difference when compared between the two groups and also to a small sample size (13,14). With respective of Flexibility Pilates training improves lumbar flexibility significantly, be it in sedentary females, or active athletes. (15,16). Similarly, Mc Gill while focusing on corrective motor patterns, enhancement of endurance ofmuscles work towards reduction of low back pain and reduced lumbar flexibility (17).

According to Chae-Woo Lee et al. the decreased pain level that was observed in their research showed that Pilates exercises prevent amyotrophia by lessening the patient's pain, hence preventing inactivity. (18).Mc Gill intervention works on reduction of pain and disability, it enhances lumbar flexibility and hence work on improvement of functionality of an individual (19,20).

Conclusion

The current study further enhances the benefit of Pilates Exercises and Mc Gill exercises in treating young adult patients of their non specific low back pain. Both the protocols work efficiently in reducing pain levels and percentage of disability, in improving flexibility of lumbar spine, in enhancing patient specific functional independence and his global impression of recovery. When the two protocols were compared, it was found that Mc Gillgroup had a significant reduction in pain percentage over the Pilates group. But for rest of the outcome measures,i.e. disability, flexibility, patient specific functional independence and global impression of recovery, null hypothesis was accepted. Both the interventions had equal effect on the rest of the outcome measures.

References

1. Ammar TA. McGill exercises versus conventional exercises in chronic low back pain. Life Sci J. 2012;9(2):393-7.

2. Natour J, Cazotti LD, Ribeiro LH, Baptista AS, Jones A. Pilates improves pain, function and quality of life in patients with chronic low back pain: a randomized controlled trial. Clinical rehabilitation. 2015 Jan;29(1):59-68.

3. da Silva AC, Mannrich G. Pilates on rehabilitation: a systematic review. Phys Ther Movement. 2009;22:449-55.

4.Critchley DJ, Pierson Z, Battersby G. Effect of pilates mat exercises and conventional exercise programmes on transversus abdominis and obliquus internus abdominis activity: pilot randomised trial. Manual therapy. 2011 Apr 1;16(2):183-9.

5. Kloubec JA. Pilates for improvement of muscle endurance, flexibility, balance, and posture. The Journal of Strength & Conditioning Research. 2010 Mar 1;24(3):661-7.

6. McGill SM. Stability: from biomechanical concept to chiropractic practice. The Journal of the Canadian Chiropractic Association. 1999 Jun;43(2):75.

7.Geldhof E, Cardon G, De Bourdeaudhuij I, De Clercq D. Back posture education in elementary schoolchildren: a 2-year follow-up study. European spine journal. 2007 Jun;16(6):841-50.

8.Knight G, Noyes JA. Children's behaviour and the design of school furniture. Ergonomics. 1999 May 1;42(5):747-60.

9.Sorosky S, Stilp S, Akuthota V. Yoga and pilates in the management of low back pain. Current reviews in musculoskeletal medicine. 2008 Mar;1(1):39-47.

10.Jeffries LJ, Milanese SF, Grimmer-Somers KA. Epidemiology of adolescent spinal pain: a systematic overview of the research literature. Spine. 2007 Nov 1;32(23):2630-7.

11.Grenier SG, McGill SM. Quantification of lumbar stability by using 2 different abdominal activation strategies. Archives of physical medicine and rehabilitation. 2007 Jan 1;88(1):54-62.

12. Nourbakhsh MR, Arab AM. Relationship between mechanical factors and incidence of low back pain. Journal of Orthopaedic& Sports Physical Therapy. 2002 Sep;32(9):447-60.

13. Papageorgiou AC, Croft PR, Ferry S, Jayson MI, Silman AJ. Estimating the prevalence of low back pain in the general population. Evidence from the South Manchester Back Pain Survey. Spine. 1995 Sep 1;20(17):1889-94.

14.Kovacs FM, Gestoso M, del Real MT, López J, Mufraggi N, Méndez JI. Risk factors for non-specific low back pain in schoolchildren and their parents: a population-based study. Pain. 2003 Jun 1;103(3):259-68.

15.McGill S. Low back disorders: evidence-based prevention and rehabilitation. Human Kinetics; 2015 Nov 17.

16.McGill SM, Grenier S, Kavcic N, Cholewicki J. Coordination of muscle activity to assure stability of the lumbar spine. Journal of electromyography and kinesiology. 2003 Aug 1;13(4):353-9.

17.Hameed PS. Prevalence of work related low back pain among the information technology professionals in India a cross sectional study. Int J Sci Technol Res. 2013 Jul;2(7):80-5.

18.McGill SM, Karpowicz A. Exercises for spine stabilization: motion/motor patterns, stability progressions, and clinical technique. Archives of physical medicine and rehabilitation. 2009 Jan 1;90(1):118-26.

19.Milanese S, Grimmer K. School furniture and the user population: an anthropometric perspective. Ergonomics. 2004 Mar 15;47(4):416-26.

20.Murphy S, Buckle P, Stubbs D. Classroom posture and self-reported back and neck pain in schoolchildren. Applied ergonomics. 2004 Mar 1;35(2):113-20.