ABSTRACT

Background: In this advanced era, neck and back pain has become a common musculoskeletal problem. These symptoms have a high prevalence in the community and now they are affecting even our adolescents leaving a major impact on youth's functional and educational activities. Nevertheless, the burden of these musculoskeletal pains, which relates not only to its prevalence but also to increase in physiological and psychological stress among them, distressing their creativity. Madrassa students have a daily exposure to neck and back pain due to poor posture. The McKenzie method is a popular treatment for back and neck pain among physical therapists. So, the intention of this study is to test the effectiveness of McKenzie exercises in neck and back pain, because hardly any data is available on McKenzie technique and its outcome in Pakistan. The objective of the study is to determine the effectiveness of McKenzie exercises in reducing neck and back pain among madrassa students.

Methods: The students were recruited from Madrassa Darul Akram (Baldia town) and Jamia Ashraf-ul-madrassa (Gulshan-e-Iqbal) Karachi. One sixty three students aged between 12–18 years of both genders who were fulfilling the inclusion criteria were selected from Madrassa Darul Akram (Baldia town) and Jamia Ashraf-ul-madrassa (Gulshan-e-Iqbal). The participants received McKenzie exercises programs intervention for three consecutive weeks. Outcome Measure: Neck Disability Index (NDI), Modified Oswestry Low Back Pain Disability Index (ODI) and Numeric Pain Rating Scale (NPRS)

Results: The present study showed significant results in all three scales in both genders (p<0.001). Among sections, the Hafiz students revealed greater score in all 3 scales before treatment as compared to ‘Alim/Alima’ and ‘Nazra’ students and after treatment showed significant results in all 3 domains (p<0.001).

Conclusion: Findings of this study revealed that madrassa students were more prone to develop neck and back pain. This might be either because of strict enforcement by teachers or usual poor sitting habit. Most of the time, it is difficult for students to come regularly for therapy sessions. It is concluded that McKenzie exercises had significantly reduced the neck and back pain among madrassa students.

Keywords: Neck pain, Back pain, Ergonomics, McKenzie, Neck and back Pain, Teacher.

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INTRODUCTION

Neck and back pain is a very common non-specific symptom globally which is increasingly being reported amongst adolescents. Neck and back pain primarily occurs due to muscular tightness in both the neck and back [1]. Occurrence of neck pain amongst students was noted to be significantly high as demonstrated by annualized global burden ranging from 34.5% to 71.5% [2,3]. Globally, 30% of all neck and back pain cases reported are students, of which 15.8% to 22.1% are amongst adolescents [4]. A study conducted in northwest England in 11-14 year-old schoolchildren revealed an incidence of 24% [5]. In Iran the prevalence of nonspecific low back pain (LBP) and associated risk features in 11-14 years old children was 17.4% [6]. A study conducted in Finland amongst 12-18 year old secondary-school students found the incidence of non-traumatic neck pain to be 9.4%, and in Canada the same occurrence was reported to be 10% whereas prevalence of lower back pain was 13% [7].

In Finland a prospective study was conducted on secondary-school teenagers aged between 12–18, to assess annual collective pain frequency for all musculoskeletal sites and found neck pain to be maximum (28%). Due to these significant figures, it is expected that in the future neck and back problem in adults would get more attention. This matter is even more essential since today’s school going students are going to be grown-up workers of the future [8]. Physical or anatomical cause of neck pain can be multifactorial neck pain is distinct from typical musculoskeletal pain warning signs. Its incidence increases with age and this propensity starts as initial as pre-adolescence. Many incorrect postures adopted for certain tasks can lead to distress.

High level prevalence of neck pain is associated with a high level of neck flexion as well as static and awkward postures during sitting [9]. A persistent flexed posture can lead towards the soft tissue stress on the spine. Prolonged flexed neck posture is common amongst school students. These children complain of distress and increasing muscular fatigue in the neck [10]. Subjects with low-back pain in whom the main cause of pathological development cannot be recognized are labeled as “non-specific low-back pain” (NSLBP) [11]. The clinical practice guideline recommends self-management and paracetamol (acetaminophen) for early onset of NSLBP [12]. Non-steroidal anti-inflammatory drugs (NSAIDs), spinal manipulation and muscle relaxants are typically suggested as second-line management [13]. Furthermore, exercises for patients with acute NSLBP are not recommended, exercises are often advised by general practitioner [14]. A study conducted in Sri Lanka showed that about 36% children complained of frequent musculoskeletal pain, which possibly resulted from prolonged effects of maintaining stability while seated in mismatched furniture [15]. During most work related tasks, ergonomic seating and correct positioning is very important, but in school classrooms no such arrangements were made despite constant sitting requirement throughout the duration of education.

For reducing neck and back pain several conventional treatment methods are used world-wide. The McKenzie technique is generally believed as very successful program for the undefined spinal pain patients [16]. The concept of McKenzie for neck and back pain offers benefits of self-treatment, constant self-assessment, patient independence and control over their pain [17]. It conceptualizes the pain into postural syndrome, whereby pain symptoms are felt in the lower back without any substantial impairment or injury to the tissues. Postural syndrome patients only feel an ache or pain throughout the activities which place constant tension on normal tissue [18].

Exercise therapy by the McKenzie method is a popular treatment for back pain among physical therapists. Therefore, the intention of this study is to test the effectiveness of the McKenzie exercises not only in management of back pain but also in neck pain, since there is hardly any data available on the McKenzie technique and its outcomes on neck pain. As far as author’s knowledge is concerned there is no local study conducted on McKenzie exercises in Pakistan. In this advanced era, neck and back pain is expanding as a common musculoskeletal problem. These symptoms are not only increasing in the general community, but are also affecting adolescents and have a major impact on their functional and educational activities.

Nevertheless, the burden of these musculoskeletal pains is also responsible for making physiological and psychological stress among them, distressing their creative abilities. Lack of awareness amongst general population regarding neck and back pain manifestations increases the risk of interconnected secondary impairments and reduces quality of life. The effectiveness of various treatments is still being interrogated and there is a constant argument about the degree to which one treatment technique is more effective than the other. It is essential to recognize which is the best evidence-based treatment approach for such target population. This research was intended to be a contributor to the field of curative medicine for our madrassa students. This drives the forceful demand of efficient treatment strategies that limits their pain and postural problem among these adolescent.

METHODOLOGY

The Students were recruited from Madrassa Darul Akram (Baldia town) and Jamia Ashraf-ul-madrassa (Gulshan-e-Iqbal). Students (both genders) having neck and back pain aged between 12 to 18 years. Students who are having congenital abnormalities, Spinal traumatic injury and Joint abnormalities were excluded from this study. The duration of the study was six (6) months. The McKenzie exercise program was given for three weeks; it was followed up with their neck and back pain. Later on the data was processed, appraised and examined. IRB of DUHS gave approval of this research on 14th April 2012
PROCEDURE

The students having neck and back pain were selected through purposive sampling technique. Informed consent from each student was taken and information was provided regarding the study. McKenzie exercises program for dysfunctional syndrome was given as intervention to the students. The base line assessment was done with Neck Disability Index (NDI) and back pain through Modified Oswestry Low Back Pain Disability Index (ODI), Numeric Pain Rating Scale for pain measuring. McKenzie exercises were taught to the students by a qualified physiotherapist with the help of exercise protocols and information handouts. Thereafter, it was ensured through subsequent follow-ups that exercise regime is followed regularly by the selected students. Moreover, the medical in charge of Madrassa students were instructed to monitor and make sure that exercises are being performed. After three weeks, the outcome measures were documented and the results reviewed as a difference of the pre and post scoring.

EXERCISES FOR NECK PAIN

1. Neck Retraction: Sitting straight up in a chair, but at the back of the seat and back resting against the chair, start with head in perfect alignment with the spine slowly pull the head backward away from alignment with the spine (like you smell something bad) return the head to the starting position. The patient performed 2 sets per day; each set had 8-10 repetitions with holding time for 5 seconds each time.

EXERCISES FOR BACK PAIN

1. Single Knee to Chest: First of all raise one knee toward the chest, by actively contracting hip muscles. Hold for at least 3 seconds. Then grasp the knee with both hands and pull toward the chest. At the same time, be sure to push the back into the floor, flattening it out. Hold for 5 seconds. Finally try extending the other leg so it lies flat on the floor. Hold for 5 seconds. The patients performed 2 set per day, each time it was repeated five to fifteen times.

2. Both Knees to Chest: Begin by raising both knees toward your chest, by actively contracting the hip muscles. Grasp both knees with the hands and pull towards the chest. Push the small of the back into the floor while doing so. Hold for 5 seconds. The patients performed 2 set per day, each time it was repeated five to fifteen times.

3. Standing Lumbar Flexion: Patient stands upright with feet spread shoulder width apart and slowly bends forward, sliding the hands down the legs, until tension is felt at the back. Patient performed 2 set per day, each time five repetition with 5 second hold.

4. Prone Lying on Elbows: Lie on the stomach with weight on their elbows and forearms and the hips touching the floor or mat. Relax the lower back. Remain in this position 5 to 10 minutes. Patient performed this exercise at least once a day.

5. Standing Extension: While standing, place the hands in the small of the back and lean backward. Hold for 20 seconds and repeat. Patient performed this exercise twice a day. Use this exercise after normal activities during the day then place the back in a flexed position: lifting, forward bending, sitting, etc.

DATA ANALYSIS AND RESULT

Data has been analyzed on SPSS version 16.0. For quantitative data results are expressed as mean and standard deviation (SD). The initial measurement were taken at baseline and compared with post measurement after three weeks by using non parametric 2 related sample Wilcoxon sign rank test.

This was a quasi-experimental study, in which 163 subjects of aged 12-18 years were enrolled from two Madrassa’s. Mean age of study population was 15 years old with SD of 2.07. The number of male students was 72(51.43%) and female students was 68(48.57%) respectively. 23 students were absent on the follow-up visit whereas 140 participants completed their pre and post treatment assessment.
The assessment was done subjectively as pre and post scoring of Modified Oswestry Low Back Pain Disability Index (ODI), Neck Disability Index (NDI), and Numerical Pain Rating Scale (NPRS)

**AGE VARIABLES OF THE GROUPS**

Mean age of this study population was 15 years old with SD of 2.07. The age variable distribution in this study were: 18 subjects with percentage of (12.9%) aged (12 years), 23 subjects with percentage of (16.4%) aged (13 years), 15 subjects with percentage of (10.7%) aged (14 years), 21 subjects with percentage of (15%) aged (15 years), 21 subjects with percentage of (15%) aged (16 years), 14 subjects with percentage of (10%) aged (17 years), 28 subjects with percentage of (20%) aged (18 years) respectively.

**GENDER VARIABLE:** In this study both male and female madrassa students were enrolled. Percentage of male students with neck and back pain was 72(51.43%) as compared to female students 68(48.57%).

**The Differences between Means and Standard Deviation of Oswestry disability index (ODI), neck disability index (NDI) and numeric pain rating scale (NPRS) In Population at Pre and Post Treatment**

The Wilcoxon sign rank test for 2 related samples were used between the pre and post treatment scoring of Oswestry Disability Index (ODI), Neck Disability Index (NDI) And Numeric Pain Rating Scale (NPRS) among both gender.

The outcomes of these scales are displayed in the table. The mean and standard deviation in ODI scoring before the treatment among male was 10.36±4.6 and in females was 11.07±4.7. After the treatment it reduced to 6.80±5.7 in male and 6.45±5.5 in females, which was significant at 5% level of significance (p-value < 0.001). In NDI scoring the mean and standard deviation before the treatment in male was 10.33±4.0 and in female was 9.58±4.3, after the treatment it reduced to 6.43±5.0 in male and 5.8±4.2 in female, which was a significant at 5% level of significance (p-value < 0.001). In NPRS scoring the mean and standard deviation before the treatment in male was 3.62±1.4 and in female was 3.57±1.1, after the treatment it reduced to 2.44±1.5 in male and 1.94±1.4 in female, which was significant at 5% level of significance (p-value < 0.001).

![Figure 1](image1.png)

**Figure 1:** Pie chart showing age distribution

![Figure 2](image2.png)

**Figure 2:** Pie chart showing gender distribution.

**Table 1:** Mean And Standard Deviation Of Oswestry Disability Index (ODI), Neck Disability Index (NDI) And Numeric Pain Rating Scale (NPRS) For Both Genders Baseline And After Treatment

| Characteristics n (%) | OSEWESTRY DISABILITY INDEX (ODI) | NECK DISABILITY INDEX (NDI) | NUMERICAL PAIN RATING SCALE (NPRS) |
|-----------------------|---------------------------------|-----------------------------|---------------------------------|
|                       | Pre Mean ±SD | Post Mean ±SD | P value | Pre Mean ±SD | Post Mean ±SD | P value | Pre Mean ±SD | Post Mean ±SD | P value |
| **Gender**            |                 |                |        |                 |                |        |                 |                |        |
| Male 72(51)           | 10.36±4.6      | 6.80±5.7       | <0.01  | 10.33±4.0       | 6.43±5.0       | <0.01  | 3.62±1.4       | 2.44±1.5       | <0.01  |
| Female 68(48)         | 11.07±4.7      | 6.45±5.5       | <0.01  | 9.58±4.3        | 5.58±4.2       | <0.01  | 3.57±1.1       | 1.94±1.4       | <0.01  |

The mean and standard deviation in ODI scoring before the treatment among Alim\ Alima was 9.92±6.0, Hifz was 11.26±5.5 and Nazara was 10.92±4.8, after the treatment reduced to 5.80±4.5 in Alim\ Alima, 7.66±5.5 in Hifz and 5.76±3.4 in Nazara, which was significant at 5% level of significance (p-value < 0.001). In NDI scoring the mean and standard deviation before the treatment in Alim\ Alima was 8.80±4.3, Hifz was 11.25±4.5 and Nazara was 9.16±4.8, after the treatment reduced to 5.03±4.3 in Alim\ Alima, 7.25±3.7 in Hifz and 4.96±4.1 in Nazara, which was significant at 5% level of significance (p-value < 0.001).
In NPRS scoring the mean and standard deviation before the treatment in Alim\ Alima was 3.62±1.4, Hifz was 3.57±1.5 and Nazara was 3.64±1.6, after the treatment reduced to 2.44±1.5 in Alim\ Alima, 1.94±1.5 in Hifz and 1.92±1.1 in Nazara, which was significant at 5% level of significance (p-value < 0.001)

| Characteristics (n%) | (ODI) | (NDI) | (NPRS) |
|----------------------|-------|-------|--------|
|                      | Pre Mean ±SD | Post Mean ±SD | P Value | Pre Mean ±SD | Post Mean ±SD | p-value | Pre Mean ±SD | Post Mean ±SD | p-value |
| Section              |       |       |        |       |       |        |       |       |        |        |
| Alim \Alima 52(37)   | 9.92±6.0 | 5.80±4.5 | <0.01 | 8.80±4.3 | 5.03±4.3 | <0.01 | 3.62±1.4 | 2.44±1.5 | <0.01 |
| HifZ 63(45)          | 11.26±5.5 | 7.66±5.5 | <0.01 | 11.25±4.5 | 7.25±3.7 | <0.01 | 3.57±1.5 | 1.94±1.5 | <0.01 |
| Nazara 25(18)        | 10.92±4.8 | 5.76±3.4 | <0.01 | 9.16±4.8 | 4.96±4.1 | <0.01 | 3.64±1.6 | 1.92±1.1 | <0.01 |

Table:2 Mean and standard deviation of oswestry disability index (odi), neck disability index (ndi) and numeric pain rating scale (nprs) in population at pre and post stage among section

McKenzie exercises for neck and back have got valuable effects in reducing pain intensity and functional limitations due to pain in neck and back among Madrassa students. The data were analyzed using Wilcoxon signed rank test. The subsequent tables & graphs demonstrate the mean, standard deviation and p-values of the different parameters. These results indicated that McKenzie exercises significantly reduce the severity of neck and back pain after following 3 weeks of exercise protocol.

DISCUSSION

The principal idea of this research study was to evaluate treatment of neck and back pain among Madrassa students by a specific technique and to identify the severity of musculoskeletal pain among them. To the best of author’s knowledge there are numerous studies regarding the treatment approaches of neck and back pain but in this study McKenzie approach was selected for the treatment because it was inconvenient for the targeted population (Madrassa student) to take clinical sessions for the therapeutic management of neck and back pain. Therefore it was essential to introduce a hands-off treatment approach which was feasible and cost-effective for them.

After three weeks of McKenzie exercises protocol, students had achieved effective outcomes in relation to the degree of disability and the intensity of their pain which were defined and statistically shown as a tremendous difference on Modified Oswestry Back Pain Index (ODI), Neck Disability (NDI) and Numerical Pain Rating Scale respectively. All three scales showed reduction in ODI, NDI and NPRS of pre and post scoring (p=<0.001). Participants of the study were adolescent studying at Madrassa having neck and back pain which was reaching the level of moderate intensity pain and mild to moderate level of disability. Both genders were equally affected but pre scoring of ODI was higher in female participants as compared to male participants, whereas NDI pre scoring was slightly higher in males than in female participants, while post scoring of ODI and NDI was approximately same in both genders. As far as third scale NPRS is concerned difference between pre and post scoring of male and female was approximately the same.

As Spinal mobility is habitually assumed related with LBP, overall there is comparatively little data to support this. Giannini and Brewer et al concluded the fact that Joint hyper-mobility intensely predict pain recurrence in females but not in males because females at all ages illustrate more joint mobility and therefore hyper-mobility syndrome is more widespread between females. However, sufficient statistical power for evaluating the difference between genders regarding to musculoskeletal pain recurrence is required [19].

Harreby et al reported that hyper-mobility is related to severe LBP, but there is no association with non-severe low back pain [20]. Kujala et al conducted a longitudinal study which was done on 98 children in Finland stating that decreased lumbar flexion in boys, and decreased extension in girls is associated with the onset of low back pain [21]. Mellin and Poussa, exposed the fact that girls and boys had different thoracic spine measurement at age of 13 and their thoracic spine is less kyphotic, although these authors did not create a direct association with posture, their work was substantial because they studied thoracic and lumbar spine mobility during an important period of student’s skeletal development [22].

This study showed that ODI, NDI and NPRS scoring were all high in hafiz students including both genders in comparison to Nazara and Alim/Alima students which is due to increased and continuous flexion at spine that elicits neck and back pain. The postural syndrome is characterized by intermittent spinal pains, which is created by static positioning of the spine and reduces by moving the patient out of the static position. Treatment consists of patient education and avoidance of the provocative postures [23,24]. Murphy et al. 2004 stated that sitting posture adopted by students can contribute to the development of Musculoskeletal Pain among them. When student’s posture was compromised due to awkward body position during sitting, along with the lifting of heavy school bags it could introduce impairment and risk to the student musculoskeletal system [25].

Falla et al 2007 suggested that exercise program for strengthening the cranio-cervical flexor muscles, among patients with neck pain having lessened ability to sustain an upright posture revealed an improved ability to maintain a neutral cervical posture during prolonged sitting.
In addition; improved cervical posture during sitting may have further long-term benefit of reducing recurrent episodes of neck pain. This is of particular relevance given the high recurrence rate of neck pain [27]. Study evidence implies that PFS (passive flexion stiffness) can amplify in response to prolonged sitting resulted in raised height of the spine and decreased range of lumbar motion [28,29].

Beach et al suggested that persons sitting for extended period of time would be at greater risk of soft tissue stress if full flexion movements are attained after sitting. These changes were marked after one hour of sitting. The benefits of the treatment in this study were achieved in three weeks in both pain and functional disability due to pain. These findings are similar to the study conducted in Brazil on 148 participants with chronic nonspecific low back pain, in which they showed beneficial outcome in the disability due to pain after receiving McKenzie method for four weeks [30]. The systematic review suggested that McKenzie therapy is more effective than other short-term follow-ups. Comparison treatments comprised of non-steroidal anti-inflammatory drugs, educational booklet, and back massage with back care advice, strength training with therapist supervision, spinal mobilization, and general mobility exercises. Clinical evidence recommends that McKenzie treatment is an effective technique for the management back pain in the short term (3 months) as compared with other therapies, to date; no authors have addressed the long-term effects of McKenzie therapy [31].

In some studies, only minor or short-term improvements were induced with active treatments, or the results had been similar to passive pain-relieving treatment methods. Two Systematic reviews concluded that there is little information available from clinical trials to support many of the treatments for mechanical neck pain, and that conservative interventions have not been studied in enough detail to assess efficacy or effectiveness adequately. Nonetheless, in recent studies it has appeared that self-experienced benefits are the most important factors determining the outcome of treatment or rehabilitation of back and neck problems, even when measured as return to work [32].

Another study was conducted on 350 patients having low back pain in which McKenzie method was applied in comparison to spinal manipulation with 2 months follow-up. The McKenzie treatment showed beneficial results (71% improvement) as compared to manipulation (59% improvement) [33]. The study by Long et al with 2 weeks follow up found greater recovery by the McKenzie technique when evaluated with general mobilizing and stretching exercises [34]. A research by Browder et al which was done with 6 months follow-up proposes substantial advantages of the McKenzie technique compared with lumbar strengthening exercises [35]. Schenk et al found greater improvement by the McKenzie method as compared with spinal manipulation. Thirty-one patients with diagnosis of lumbar radiculopathy were randomly assigned to three groups. First group had received joint mobilization and other group performed therapeutic exercises as described by the McKenzie method. The results showed that exercises based on repeated movements might be more beneficial in terms of pain reduction and recovery of function than joint mobilization in the early stages of recovery from lumbar disc derangement [36]. Whereas Erhard et al revealed that there was a great rate of improved response in the manipulation group than in the extension exercise group [37].

Together stretching exercise and manual therapy helps to decreased neck pain and disability in women. The difference in effectiveness between the 2 treatments was minor. Low-cost stretching exercises can be used as first initial exercise to relief pain, which acts as short-term treatment [38]. Fewer researches have been conducted on neck pain, which is approximately half as common as back pain but is sufficiently related to support the recommendations for management of the two conditions to be integrated within one conventional guideline. For neck pain patients, there is insufficient data available to determine the efficacy of the McKenzie technique for cervical pain. Further research which addresses these issues is required [39].

This study has been significant since it explores the existence of neck and back pain in an overlooked population (Madrassa students). Secondly, it explores an effective hands-off treatment like McKenzie approach for these patients who were unable to attend hands-on clinical sessions. The study increased awareness for self-treatment and helped reduce the likelihood of developing acute musculoskeletal disorders in adulthood if left untreated over a period of time.

CONCLUSION: Finding of this study revealed that madrassa students were more prone to develop neck and back pain. This might be either because of strict enforcement by teachers or usual poor sitting habit. Most of the time, it is difficult for students to come regularly for therapy sessions. It is concluded that McKenzie hands-off exercises had significantly reduced the neck and back pain among madrassa students.

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