

Comparison Of Various Conservative Treatment Modalities For Occupational Low Back Pain And Their Feasibility In Daily Dental Practice

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Abstract: This study investigates the efficacy of McKenzie's exercise protocol, Ergonomic recommendations or a combination of both with a control group in reducing low back pain due to job related stress amongst dentists. Forty subjects between the age group of 22 to 29 years were selected for this study. They were randomly allotted into three study groups and one control group, each consisting of ten subjects each. The study group I was advised to follow Ergonomic recommendations protocol, group II McKenzie's postural exercise protocol and group III was a combination of both protocols for reducing low back pain. The control group was not given any form of recommendations. The recommendations were followed for a period of 15 days. Pretest and post test pain values were determined from each subject by using Numeric pain rating (NRS) scale. The test values were evaluated and compared by t test. There was stastically significant difference among all the groups. All the groups showed significant decrease in pain except the control group in whom no intervention has taken place. This study shows the effective way to control occupational low back pain among dentists.

Keywords: Dentists, ergonomic recommendations, low back pain, musculoskeletal disorders.

1 INTRODUCTION

The back is a notorious area in which physicians have difficulty providing relief and is part of the body which is never seen and is complex to touch. It is turned for defense, used for punishment and enclosed in love or sympathy. Physiologically, pain is a forewarning of bodily dysfunction, and if overlooked and untended can lead to more serious dysfunction which may prove harder to treat. It is well known that the life time incidence of low back pain is extraordinarily soaring, but those who incur the greater part of the cost, both personally and economically, are the persons who suffer recurrent and persistent or chronic pain^[1]. Musculoskeletal disorders are among the most common medical problems, affecting at least 7% of the population and accounting for 14% of all doctors visits^[2]. Most of us do not relish our periodic visits to the dentists. In these situations sympathy usually lies fairly with the patient. What many people fail to appreciate, however, is that these situations place considerable musculoskeletal demands on dentists. Musculoskeletal pain is more frequently noted by oral health providers than any other occupational hazard. A constructive relationship exists between fixed postures and a musculoskeletal disorder including pain, weakness and paresthesia and this has been documented for a number of occupations^{[3],[4]}. A number of studies from Canada, Denmark, Sweden, United States of America, and Great Britain have characterized different parameters of pain in dentists^{[5], [6]}. For instance, the prevalence of back pain in dentists has been reported as ranging from 36^[7] to 72 percent^[5] of the sample investigated. Initially, dentists commonly stood to practice. Sitting, as the favored position for the dentists to adopt, was introduced in 1960's in an effort to reduce the fatigue and musculoskeletal problems associated with dental practice^{[6],[8]}.

Static work in sitting posture requiring spinal flexion and rotation has been associated with amplified risk of low back pain. Sitting increases loads on soft tissues structures of lumbar spine and discs. In addition, extensor muscle activity in lumbar spine in the unsupported sitting posture is immense than in standing^[9]. Presently there are two preferred conservative approaches to spinal care, the McKenzie's and the Ergonomic method. These methods can help the dentists to avert work related back pain and back injury and to keep them healthy. Therefore the study was aimed to evaluate the efficacy of McKenzie's exercise protocol, Ergonomic recommendations or a combination of both with a control group in reducing back pain due to job related stress among dentists. The overall goal is to enable dentists to identify aspects of job tasks that may increase the risk of developing musculoskeletal disorders, and to participate in the development of strategies to control or prevent them.

2 Materials and method

This study was conducted among post graduate dental students between the age group of 22 to 29 years of a dental College. The investigator personally met the dental students and explained the programme, objectives and significance of the study. The consent of all the subjects allowing the investigation was then procured. Before starting the study, a questionnaire survey was used to obtain the data regarding the prevalence of cumulative trauma disorders among the dental students. In that survey low back pain topped, followed by neck, upper back, leg and shoulder pain. From the survey data, as low back pain is the most concerning problem, among dentists, it was selected for the study. 105 subjects were screened and 40 were selected for the study. Patients who come under "postural syndrome" in McKenzie's assessment protocol (Appendix A) were exclusively selected. Pain evaluation of all the subjects was recorded by using numeric pain rating scale. The Pain NRS is used to assesses the levels of pain intensity perceived by the patient through an 11-point scale (ranging from 0 to 10), being 0 classified as "no pain" and 10 as "the worst pain possible". The participants were informed to report their levels of pain intensity based upon the numeric pain rating scale which was considered as pre test values.

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Exclusion criteria

1. Subjects in whom Pain is induced or aggravated by movement.
2. Subjects with constant pain and referred pain.
3. Subjects should not be under any form of treatment during the study period.

The subjects were randomly allotted into 3 study groups and one control group, each group consisting of 10 subjects. The control group was not given any form of recommendations. The study groups were given following protocols.

Group-1: Ergonomic recommendations which was attached in Appendix B, (figure I and figure II).

Group-2: McKenzie's Postural exercise protocol which was attached in Appendix C, (figure III and figure IV).

Group-3: Combination of Ergonomic and McKenzie's postural exercise recommendations.

Group-4: No recommendations and served as control.

Figures

Figure I: wrong way of sitting and ergonomic advices for correct way of sitting

Figure II: wrong way of standing and ergonomic advices for correct way of standing

Figure III: wrong way of sitting and McKenzie's advices for correct way of sitting

Figure IV: wrong way of standing and McKenzie's advices for correct way of standing



Figure I



Figure II



Figure III



Figure IV

The subjects were requested to follow these recommendations for 13 days, but they were started this protocol two days prior to this period so that they could familiarize themselves with these interventions and thus increasing the reliability of the study. Further subjects were requested to follow these recommendations and to apply the same during their practice. Day to day follow up was done by the researcher. The recommendations were followed by the subjects for a period of 15 days. After the specified period, Pain evaluation of all the subjects were recorded by using numeric pain rating scale and were considered as post test values.

3 Data analysis

Pre test and post test values were tabulated and analyzed using descriptive and inferential statistics. Student's 't' test was used to compare the mean and standard deviation value changes between before and after treatments. There was a statistically significant difference among all the groups. $P < 0.05$ (Table 1)

Table 1: Comparison of mean and standard deviation values of different groups before and after treatments.

Group	Before treatment		After treatment		t-test	P- Value
	M	SD	M	SD		
Group -1	5	1.89	3.4	1.65	5.237	<0.001
Group -2	5.2	1.03	3.8	0.92	3.50	<0.01
Group-3	4.6	1.43	2.2	1.40	6.466	<0.001
Group-4	5.1	0.99	5.7	1.34	2.714	<0.01

M:mean, SD: standarad deviation

4 Results

After treatment, the mean and standard deviation values of experimental groups were less when compared with pretreatment values. But in case of control group, the mean and standard deviation values of post treatment were at a higher level when compared to pretreatment values. This indicates that all the groups showed significant decrease in pain except the control group in whom no intervention has taken place.

5 Discussion

The high prevalence of musculoskeletal symptoms in dentists is a common feature of visually dependent occupations in which the visual demands require the adoption of fixed postures for extended period of time^[5]. Karwaski^[10] reported that the symptoms are a result of prolonged static posture, repetitive movements, suboptimal lighting, poor positioning, genetic predisposition, mental stress as well as age. Repeated prolonged static postures thought to initiate series of events that results in pain, injuries or even in career ending problems. With the onset of four handed dentistry, the operator's static seating posture for a longer period of time resulting in higher frequency of musculoskeletal pain. In the current study also, all the subjects used to work in a static seating posture, resulting in a dramatic rise of musculoskeletal symptoms. For years, it has been known that Ergonomics and McKenzie's postural exercise protocols are the best conservative spinal care treatments available^{[11],[12]}. Researches also proved that both are effective in reducing low back pain. Conservative spinal care with booklet method had similar effects marginally, when compared with the physical therapy and manipulation benefits^[13]. Although these studies were carried out in different situations, I believe that these findings are of value for understanding the effectiveness of this advices. McKenzie method is widely considered to be a highly effective program for patients with nonspecific spinal pain^{[14],[15]}. This therapy uses assessment techniques to categorize patients into postural, dysfunction, and derangements syndromes^{[15],[16],[17]}. Once a patient's dysfunction is classified into one of these syndromes, treatment is directed accordingly to improve

patient outcomes and increase health system efficiency. Identifying which treatment works best for whom ^[18] in low back pain has been an on-going aim of clinicians and has been a research priority over the last decade. In the present study, McKenzie's Postural exercise protocol recommendations for reducing low back pain was compared with other experimental groups and it was proved to be less effective because the current study did not categorize the subjects into any one of these syndromes and were informed the subjects to follow McKenzie's therapy recommendations during clinical sessions. Hence specific exercise recommendations in that particular syndrome was not performed on these subjects, and it can be one of the reason for less effectiveness of McKenzie's therapy for reducing low back pain. With the McKenzie approach, exercise is not used to strengthen the back muscles, but to promote rapid symptomatic relief. A key principle is to teach the patient various strategies to self manage their pain. In this study, other causes for least effectiveness of McKenzie recommendations group can be due to, some subjects were not very good at doing prescribed exercises either because of lack of time, effort or some of them had practical difficulty to implement them during their dental practice sessions. Ferreira found that manipulative or chiropractic therapy was more effective than McKenzie therapy in the acute phase of low back pain ^[19]. In this study, ergonomic recommendations did fairly well when compared with the McKenzie's advice, because of the practical ease in its application. I believe that the key to prevent work related musculoskeletal disorders is Ergonomics. Multi-component interventions described by Tveito *et al* ^[20] are ones that apply a range of different measures to prevent low back pain or its consequences. This makes it easy for them to be applied at more than one level of prevention. Thus the study done by Ijzelenberg *et al* ^[21] applied the biopsychosocial model through education and training and through provision of immediate treatment along with ergonomics advice to low back pain cases. In this study the multi disciplinary intervention was followed by combination of McKenzie's recommendations along with the Ergonomics advice, and was proved to be very effective, as participants practiced McKenzie's postural correction exercises during the non working times, while Ergonomic advices were implemented during clinical session. The control group, in whom no intervention was taken up, showed the same pain intensity level and some with increase in pain intensity when checked on numeric pain rating scale.

6 Conclusion

In the present study, combination advices did fairly well, followed by Ergonomics advice and the group which showed least effectiveness was McKenzie's advice. This difference in the results can be attributed to the selective ease or difficulty in their implementations during practice sessions. This study could not objectively substantiate that by following the prescribed recommendations, the reduction in factors that predispose to low back pain such as muscle fatigue could be achieved. This would require electromyograph. Hence the results were purely subjective and also time was considered to be the main restraining factor.

7 Appendices

Appendix A

1. Name:
2. Age:
 - A) > 20 years
 - B) 20 – 25 years
 - C) 25 – 30 years
 - D) > 30 years
3. Gender: Male / Female
4. Address and Department:
5. At onset immediate pain (Low back pain only):
 - A) Gradually increasing
 - B) Unchanging
 - C) Worsening after 24 hours
6. Pain started as a result of:
 - A) Lifting weight
 - B) Any injury
 - C) Insidious onset
 - D) Persisting from long time
7. Symptoms:
 - A) Constant
 - B) Intermittent
 - C) Fluctuating
 - D) Increasing
8. Worse:
 - A) On Prolong Bending
 - B) On prolong standing
 - C) On prolong bending + rotations
 - D) As day Progresses
9. Better:
 - A) Changing position
 - B) Changing posture
 - C) Stationar
 - D) As day progresses
10. Sleeping Posture:
 - A) Supine
 - B) Prone
 - C) Side
 - D) Varies
11. Sleeping Surface:
 - A) Firm
 - B) Soft
 - C) Sagging
 - D) Water bed
12. Previous Treatment:
 - A) Medicines only
 - B) Physiotherapy only
 - C) Ongoing now
 - D) All possible treatments tried
 - E) None
13. Numeric Rating Scale for pain Measurement: (NRS)

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1	2	3	4	5	6	7	8	9	10
No pain			Moderate				Severe Pain		

Appendix B Ergonomic Recommendations

1. Alternate between sitting and standing to reduce postural fatigue and make the most of postural diversity, which helps to reduce static muscle fatigue.
2. When sitting or standing, don't lean forwards or stoop in an unsupported posture for extended periods. If you are sitting, sit up straight or recline slightly in a chair with good

back support, and use a good footrest if necessary. If you are standing for prolonged periods try to find something to help you lean against.

3. Avoid having to reach inelegantly to equipment and work close to the patient. Keep the objects used most frequently within a distance of about 20 inches (50 cm). Use assistants to help move equipment into this zone.
4. Use equipment that isn't too heavy, that can be used without awkward upper body posture and that feels comfortable to use. Ergonomically designed equipment helps to minimize stresses on the upper extremities and the back.
5. Avoid long schedules where possible, or intersperse these with frequent breaks in which you alter posture and relax the back.
6. Think about taking a *walk* on your lunch break. Be certain you have a good sitting position at work or in your car. Your knees should not be higher than your hips and make a habit of keeping your hips toward the back of the chair. This prevents slouching. Consider the use of a lumbar roll to keep a good sitting posture.
7. If you are performing any activity that requires prolonged or repeated bending at the waist, straighten your back often and walk around. Intermittently perform a standing backward bending activity (place hands in the small of your back and bend backwards 5-10 times). This offsets the constant pressure in the back caused by bending forward and takes less than a minute to do every twenty to thirty minutes.
8. After activity, *avoid* slouched postures immediately following the activity as your body cools down. Often, this is the time low back pain develops, not during the physical activity itself.

Appendix-3 McKenzie's Recommendations

1. Sit in the posture causing pain. Then by simple act of correcting posture (if sitting, forming lumbar lordosis and retracting head), the dentist is able to feel that pain can be abolished by volition.
2. Using lumbar support in correct way to maintain the 90° position as passively as possible as it is difficult to maintain correct sitting posture for long time.
3. Regular frequent repetitions of the 'slouch/over correct' movements should be done if they are in statically loaded conditions
4. For standing tilt the pelvis backward and raising the chest (placing the finger in the sternal notch).
5. A totally stationary sitting or standing position should not be there.

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