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EFFECT OF RESISTANCE BAND EXERCISES ON NECK PAIN,DISABILITY AND FORWARD HEAD POSTURE IN DENTISTS WITH CHRONIC NECK PAIN

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ABSTRACT:

Background : Dentists experience daily neck pain largely due to their awkward postures and high work demand.This puts extra strain on the muscles and predispose to development of faulty posture and muscle imbalance.So to avoid all these problems an exercise plan is needed,which can be easily performed even at the workplace.The purpose of this study was to determine the effects of resistance band exercises on neck pain, disability, and forward head posture in dentists with chronic neck pain.

Methodology: Fifty dentists between the ages of 25 -50 participated in this study. They were randomly assigned to either an experimental (25) or a control group (25). The experimental group participated in resistance band exercises program while control performed conventional exercises for 10 weeks.

Evaluation of neck pain and disability was done by Numeric pain rating scale(NPRS) and Neck Disability Index(NDI) respectively. Forward head posture was measured by digital photography technique.

Results: The paired t-test was used to compare within group differences and unpaired t-test was used to compare the between group differences.Significant differences found between experimental and control group in all three variables.($p<0.05$).

Conclusion: The results of this study suggested that the use of resistance band exercises along with conventional exercises may be helpful in reducing neck pain, disability, and correcting forward head posture in dentists.

Key words: Resistance band,chronic neck pain and forward head posture.

INTRODUCTION:

Musculoskeletal disorders have become increasingly common worldwide during the past decades. These problems are caused by repetitive, awkward, or stressful motions. Among the healthcare professionals, dentists are at high risk for developing profession-related disorders such as musculoskeletal injuries. Dentists experience daily neck pain largely due to their awkward postures and high work demand. Common musculoskeletal disorders include : muscle strain, abhorrent neck and back postures, repetitive stress injuries of the neck and shoulder girdles, and psychosocial stressors for back, neck, and shoulder complaints.[1]According to Fejer et al lifetime prevalence of neck pain ranges from16.7% to 75% with an annual adult experience of between 12% and 34%.[2]In a study by Fejer R et al. it was shown that 55% of the dentists

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experience neck pain. A career in dental profession is considered an occupational risk factor for neck pain,which can begin as early in their educational training.[3] Repeated unnatural, deviated, or inadequate working postures, forceful hand movements, inadequate equipment or workplace designs, and inappropriate work patterns are likely to be the particular risk factors for musculoskeletal disorders among dental professionals.[4] Occupational health problems in india estimates have shown that musculoskeletal disorders contributes to about 40% of all costs towards the treatment of work related injuries.Musculoskeletal problems have become significant issue for the profession of dentistry.[5] Neck disability index (NDI) has been found to be both a reliable and valid outcome tool for assessing neck disability.[6] Forward head and rounded shoulder posture in dentistry is very common that predisposes them to a muscle imbalance which develop between the neck and shoulder muscles.These muscles tend to fatigue quickely and weaken with prolonged forward head posture and rounded shoulder posture.Thus forward head posture is the most common cause of craniofacial pain, headache, neckache, and shoulder pain and leads to decline in cervical joint motion. Digital photography is a form of photography that uses cameras containing arrays of electronic photodetectors to capture images focused by a lens.Many researchers have used digital photography technique as a method of assessment for forward head posture.[7]

There are many treatments options available for alleviating neck pain such as: electrotherapy includingTENS,Hotpacks,laser,manipulation, ultrasound, manual therapy techniques(8) and acupuncture therapy. According to Ferreira G.E., Barreto R.G. et al multimodal physiotherapy programme (including exercises, education, and ergonomics) was found as a better treatment option for reduction of chronic neck pain.[9] Strengthening exercises may decrease pain and increase neck range of motion and muscle performance.According to Carrie M Hall et. al isometric exercise is commonly used to increase muscle performance. Posture correction is recommended to dentists with poor neck postures.This leads to physical and psychological comfort to dentist during execution of clinical act.In dentists protracted posture causes overstress in the lower part of cervical spine so retraction exercises and nodding exercises are recommended as posture correction exercises.[10,11] Body weight, resistive bands, pulleys and weight machines are a few modes of dynamic resistive exercises.According to Marieke H. et al. strength training is beneficial in decreasing neck pain and also specific strength training with theraband has been considered preventive regarding neck pain among military pilots and office workers.[12,13] A Theraband is an elastic band used for strength training.

Resistance band training is now used widely as part of general fitness and strength training. Typically the bands are colour coded to show different levels of resistance and users need to select an appropriate level and are Simple to use and their light weight allows people to easily carry them if traveling and continue with routine sessions for strength training.

Purpose of the study

The purpose of this study was to determine the effects of resistance band exercises on neck pain, disability, and forward head posture in dentists with chronic neck pain.

Need of Study

Neck pain is the major problem in dentists so to avoid neck related problems like pain, disability and faulty posture they need to stick to the exercises. There is dearth of the studies which have evaluated the efficacy of theraband based exercises on neck pain, disability and forward head posture (FHP) in dentists with chronic neck pain .

MATERIALS AND METHODS:

Study design

Comparative study design

Sample

A total of 50 subjects were randomly selected and assigned into two groups. Each group having 25 subjects named as Group A and Group B

Group A –Conventional exercises (Control group- Stretching exercises,strengthening and posture correction exercises were given)

Group B – Theraband exercises + Conventional exercises (Experimental group)

Sampling

Convenience random sampling

Inclusion criteria

- Age group:25-50 years
- Chronic mechanical neck pain
- Symptoms more than three months in duration
- NDI Score 14/50
- NPRS Score 5/10
- Males and females both
- Forward head posture(CV angle <50 degrees)

Exclusion criteria

- Previous history of whiplash injury
- Previous history of injury to cervical spine
- Diagnosed with osteoporesis
- Malignancy or other spinal infection
- Patients on medication for neck pain
- Diagnosed with cervical radiculopathy

Outcome Measures

Pain was measured by using Numeric pain rating scale (NPRS)

Functional Status was measured by using Neck pain disability index (NPDI)

Forward Head Posture was measured by using Digital photography technique

Procedure

The subjects who fulfilled the inclusion criteria were included in the study.The whole procedure was explained to them and the informed consent was taken from them. 50 subjects were randomly selected using convience random sampling and assigned into two groups named as group A and group B.

Intervention

Group A: CONTROL GROUP

Hot fomentation was given by applying cervical hot pack over the area in prone lying position for 15 minutes followed by conventional exercises. These included Isometrics exercises for neck including flexors , extensors, lateral flexors and Postural correction exercises included-Nodding,shoulder shrugs and shoulder bracing exercises.

Streching of trapezius muscle was also given to control group.Hot fomentation and postural correction exercises was given to both the groups.

GROUP: B Experimental group

Resistance band exercises- In addition to conventional exercises, resisted exercises using elastic band were given.The training program included four training exercises for the prime movers of the neck during cervical flexion, extension and lateral flexion.Exercises were performed with a head harness using different color-coded elastic resistance bands. Cervical flexion was performed seated.(Figure-1).

Fig-1 Demonstration of resistance band exercises for neck side flexion

Both groups performed exercises 5 times a week for 10 weeks .Resistance band exercise groups gradually increased resistance to next level when they were able to performed 5 to 6 sets of 8 to12 repetitions [13].

Exercise was performed with the color band that was prescribed for the patient, or with a color that allowed him or her to complete 2 to 3 sets of 10 to 15 repetitions with mild fatigue on the last set. Then Progression was done to the next color band when patient was able

to complete the 3 sets of 10 to 15 repetitions [14].

Data was collected on baseline,5th week and last day of 10th week.

Data was analysed using SPSS version 21.

RESULTS:

The Mean and standard deviations for age ,height,weight, and body mass index (BMI) are shown for both groups in Table-1.

Table .1 Mean comparison of Age,Height,Weight and BMI

	Mean ±standard deviation	t-value	p-value
Age-groupA Group B	37.8±7.12 40.72 ±7.17356	1.862	0.15^{NS}
Height- Group A Group B	1.66±0.03187 1.6608 ±0.03187	0.552	0.58^{NS}
Weight-GroupA Group B	58.56±4.112 58.12 ±4.12634	0.472	0.68^{NS}
BMI- Group A Group B	21.2±1.681 21.088 ±1.62923	0.095	0.98^{NS}

*p<.05(Significant)NS (Not significant)

Comparison of change in NPRS

The between group analysis of the NPRS using unpaired t-test showed that there was no significant difference seen between both groups at baseline and 5th week (p>0 .005), but a highly significant difference was seen on 10th week(p<0.01).(Table .2).

Table .2 Between group comparison of NPRS

	Group	Mean ±Standard deviation	t-value	p-value
Baseline NPRS	Control	7.92±1.038	0.140	0.889^{NS}
	Experimental	7.96±.978		
5th week NPRS	Control	5.80±1.041	0.141	0.889^{NS}
	Experimental	5.76±.970		
10th week NPRS	Control	4.44±.651	12.97	0.000**
	Experimental	1.52±.918		

**p<0.01 HS (Highly significant) NS- not significant

Comparison of change in NDI between both groups: The between group analysis of the NDI using unpaired t-test showed that there was no significant difference seen at baseline and 5th week ($p>0.05$), but a highly significant difference was seen on 10th week ($p<0.01$).(Table -3).

Table .3 Between group comparison of NDI

	Group	Mean±Standard deviation	t-value	p-value
Baseline NDI	Control	38.76±2.047	0.944	0.350^{NS}
	Experimental	39.36±2.430		
5th week NDI	Control	32.00±3.253	0.778	0.440^{NS}
	Experimental	31.36±2.515		
10th week NDI	Control	23.84±3.325	7.674	0.000**
	Experimental	18.16±1.625		

**p<0.01 HS (Highly significant)

NS- not significant

Comparison of change in CV angle:The between group analysis of the CV angle using unpaired t-test showed that a significant difference was seen at 5th week ($p<0.05$), but a highly significant difference was seen on 10th week($p<0.01$).(Table -4).

Table -4 Between group comparision of CV angle

	Group	Mean± Standard deviation	t-value	p-value
Baseline cv angle	Control	25.48±3.864	1.002	0.321^{NS}
	Experimental	26.56±3.754		
5th week Cv angle	Control	30.08±2.753	4.549	0.02*
	Experimental	34.08±3.761		
10th week CV angle	Control Expermental	34.44±2.256 44.92±4.291	10.809	0.000**

**p<0.01 HS (Highly significant)

NS- not significant

DISCUSSION:

A work-related musculoskeletal disorder (WRMD) is defined as a musculoskeletal injury that results from a work-related event. This may result from prolonged work time. These types of injuries are common among dentists.[15] Musculoskeletal problems have become a significant issue for the profession of dentistry and dental hygiene. Reported prevalence of work-related musculoskeletal disorders (WRMD) is about 63 to 93 percent among dental professionals and the

prevalence of general musculoskeletal pain ranges between 64% and 93%. The most prevalent regions for pain in dentists have been shown to be the back (36.3–60.1%) and neck (19.8–85%). This study compared two types of exercises protocols (conventional versus resistance band) in reducing pain, disability and forward head posture in dentists with chronic neck pain.The subjects in this study had similar baseline values of all dependent variables suggesting that all groups had homogenous distribution of patients. The results of this study revealed that although both the groups improved significantly at the end of the 10th week but addition of resistanc band exercises(Group B) to the conventional exercises yielded improved NPRSand NDI outcomes, and an increase in forward head angle measured by craniovertebral angle compared to control group (Group A).

It was a strong finding of the study that there was more reduction in pain,disability and forward head posture,which was found to be (1.92%),(29%) and(23%) respectively in experimental group after the intervention as compared to group A. The results of our study are in accordance with the result of the study done by D Falla et al.In this study they compared the effect of neck muscles strength training on neck pain and disability.They found that 4 weeks of strength training resulted in reducing pain, disability in subjects suffering from chronic neck pain.[16] According to Anderson et al. resistance training with resistance band for shoulder muscles have shown increase in muscle power in novice lifters. This study showed that there were positive effects of resistance training on muscular performance of novice lifters.[17] Our results are further supported by the study done by Nelson et al.They investigated the effects of strength training on pain sensitivity. In this experiment, 62 women (40 with shoulder pain, 20 without) participated in either a general exercise program or specific strength training for their shoulders and results of the study revealed that Pain tolerance increased in response to strength training in the women who started out with pain.[18] Strength training with elastic bands have been proven effective in reducing pain according to the results of a study done by Mats Hagberg et al in 2002 .They studied the effect of strength training on function of chronically painful muscles. Results of the study revealed that the strength training as therapy for shoulder pain had positive results in women with shoulder pain. Researchers found that “specific strength training with the aid of resistance band relieved pain and increases maximal activity and their pain was reduced by 42–49%.[19] Ylinen et al studied the effect of specific training with elastic bands to reduce Chronic Neck Pain and disability.They divided female office workers with chronic neck pain into three groups: one group did strength training with elastic bands (lateral shoulder raise) another did endurance training, and a third did nothing. They found that “both strength and endurance training decreased perceived neck pain and disability in office workers.[20]

NicoloEdoardoMagni et al. studied the effects of resistance training on muscle strength, joint pain, and hand function in individuals with hand osteoarthritis.They found that resistance training has a significant effect on grip strength or hand function.[21] In the study performed by Daniele Magistro et al, they found the effects of resistance band training on women having sedentary life style. According to this study, healthy adaptations can occur using resistance band exercise.The results indicated that a resistance exercise can provide healthy muscle adaptations.[22] Bhuvan Deep gupta et al. in his study concluded that in people with neck pain, addition of conventional strength and high-load endurance retraining of muscles leads to reduction in neck pain and associated symptoms.[23] In a study performed by Lidegaard et al.involving office workers, it was found that only a little exercises say for 2 minutes daily for 10 weeks with resistance band can effectively reduce neck and shoulder pain.In this study subjects were asked to perform resistance band based exercises for 2 minutes daily for a period of 10 weeks, and it has led to a significant decrease in neck and shoulder pain.[24] Our results are also supported by Kim et al. they investigated the effects of elastic band exercises program on the posture of subjects with rounded shoulder and forward head posture. The results of the study suggested that the strength training with the aid of elastic band was helpful in correcting rounded shoulder and forward head posture and it showed a significant result.[25] To conclude both groups were found to be effective in reducing pain,disability and forward head posture.Results of the study revealed that addition of resistance band exercises as a mode of resistance training program when added to conventionally given exercises which includes (stretching, isometrics and posture correction exercises) brings better improvements in terms of reducing pain, disability and improving forward head posture.

Limitations of the study

1.Sample size was small.

2.Follow up of the subjects was not done to see if the effects are retained.

3.Specification of the work is not mentioned.

Future research

1.Study can be done on the wider sample.

2.Study can be done on different subjects and different age groups and other population like bankers,IT workers etc.

3.Study can be done on the basis of specifications of the work like in oral surgeons,endodontics etc.

4.Further research can be done on the long term effects of the resistance band training on the subjects with chronic neck pain.

CONCLUSION:

This study compared the effectiveness of conventionally given exercises to resistance band exercises in reducing pain,

disability and forward head posture in dentists with chronic neck pain. The results showed that resistance band exercises are more effective. They are beneficial for muscle strengthening and posses the added advantages of their ease of use, variability of tension, and portability. Our research hypothesis has been verified and our null hypothesis rejected.

1.Neck pain decreased in both the groups ,Group B improved much better than group A.

2.Neck disability was reduced in both the groups but group B showed better results than group A.

3.There was a reduction in extent of forward head posture in both the groups,but group B showed more better results.

Overall we conclude that Resistance band exercises are more effective than conventionally given exercises in reducing pain,disability and forward head posture.Thus research hypothesis has been verified that resistance band exercises are more effective in reducing neck pain,disability and forward head posture as compared to conventional exercises and null hypothesis is rejected that there is no significant difference between resistance band exercises and conventional exercises.

Resistance bands has many advantages as exercises using resistance band are very helpful in building strength and it comes with variety of resistance in different colour codes according to the need of the patient.Reistance bands are light weight and easily portable so it can be carried while travelling and it is cost effective too.Resistance bands can replace the weights and it is easy to use alone as it can be used at home and work place.Resistance bands are ideal for exercising any time.

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