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RESEARCH ARTICLE

EFFECT OF SNAGS TECHNIQUE ON HEART RATE AMONG PATIENTS WITH UPPER CERVICAL DYSFUNCTION.

MitaliBabulkar BPT[1],Dr. Maneesh Arora[2] and Dr. Parul Raj Agarwal[3].

1. Department Of Physiotherapy, SardarBhagwan Singh Post Graduate Institute of Biomedical Research HNB Garhwal University, Dehradun.
2. Professor, Department Of Physiotherapy, SardarBhagwan Singh Post Graduate Institute of Biomedical Research HNB Garhwal University, Dehradun.
3. MPT,PhD, Associate Professor Department of Physiotherapy, SardarBhagwan Singh Post Graduate Institute of Biomedical Research HNB Garhwal University, Dehradun).

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Abstract

Background: Cervical spine dysfunction may lead to misalignment most commonly of upper cervical joint complex especially the atlas.Many vital structures pass through the upper cervical joint complex, upper cervical joint complex, one of the most important being the vagus nerve. Any misalignment of atlas vertebra in the upper cervical joint complex leads to effect on vagal action which consequently does not carry out its function of antagonist to the sympathetic system properly, causing increased heart rate. Mulligan's mobilization techniques are thought to increase the range of motion as well as correct the alignment of spine. The aim of this study was to investigate the effect of SNAGS technique on heart rate among patients with upper cervical dysfunction with vagus nerve impingement.

Methodology: 80 subjects participated in the study. Heart rate was taken as an outcome measure which was recorded prior to SNAGs technique given to the patient's atlas vertebrae to side it was stuck. The HR was compared with the post intervention HR. Data was analyzed using SPSS version 16. Descriptive statistics was used to summarize the variables. Paired T Test was used to see the effects of intervention on heart rate in our study population

Result: There was reduction in heart rate by 5.2 beats/min following SNAGs technique which was found to be highly significant ($p < 0.001$) statistically.

Conclusion: The study concluded that SNAGS technique was effective in correcting the impingement caused to vagus nerve as measured through HR in patients with upper cervical dysfunction.

Introduction:-

The cervical spine dysfunction is a common condition. It is represented by a group of signs and symptoms that involve pain and limitation of range of the physiological movements, tenderness and/or pain on cervical muscles at palpation[1].

Corresponding Author:-Parul Raj Agarwal.
Address:-MPT,PhD, Associate Professor Department of Physiotherapy, SardarBhagwan Singh Post Graduate Institute of Biomedical Research HNB Garhwal University, Dehradun).

There is a variety of reasons for cervical spine pain apart from obvious trauma or a history of trauma. These include mainly postural or degenerative causes. An increasing proportion of the population spend long periods sitting or in sustained positions. This occurs in both the work and social environment which in fact, is creating an increase in these types of conditions seen, specifically in the younger and more sedentary population.

Conditions contributing to cervical dysfunction are cervical spondylosis[2], neck pain as a result of forward head posture which could also lead to Cervicogenic headaches[1], Prolapsed intervertebral disc, Muscle imbalances and trigger points [3], Vertigo etc.

Cervical spine dysfunction may lead to misalignment most commonly of upper cervical joint complex especially the atlas. Many vital structures pass through the upper cervical joint complex, upper cervical joint complex, one of the most important being the vagus nerve. Vagus nerve exits the skull through the jugular foramen and passes vertically down the neck within the carotid sheath, lying between the internal jugular vein and internal carotid artery as far as upper border of thyroid cartilage, and then between the same vein and common carotid artery until it reaches the roof of the neck. In the neck the vagus gives cardiac branches, two or three in number from superior and inferior cervical levels.[4] the vagus provides heart with its parasympathetic supply.

Thus any misalignment of atlas vertebra in the upper cervical joint complex leads to effect on vagal action which consequently does not carry out its function of antagonist to the sympathetic system properly, causing increased heart rate, also painful stimuli is carried by unmyelinated 'c'fibers to synapse with pressor area of 'vasomotor cortex' therefore, their activation causes sympathetic stimulation producing tachycardia and rise in BP. Normal heart rate for an adult is 70 – 80 beats / min. [3]

Cervical spine pain is a common ailment seen these days. Medically, this is often diagnosed by radiography and treated with anti-inflammatory medication. While medication assists in short term pain relief, symptom relief, and masking of pain, it does not address or treat the underlying causes of cervical spine dysfunction. Therefore numerous techniques such as muscle energy techniques, chiropractic manipulation, Maitland mobilization, stretching, and myofacial release, kneeding, SNAGS, NAGS, MWM'S, traction etc. have now been developed for correction of misaligned spine.

SNAGS is technique which first distracts (opens) and then compresses (closes) the zygapophyseal joint ipsilateral to the side of pain, and perhaps slightly distracts the uncovertebral cleft.[6]

The therapist applies the appropriate accessory zygapophyseal glide while the patient performs the symptomatic movement. This must result in full range pain free movement. SNAGs are most successful when symptoms are provoked by a movement and are not multilevel. They are not the choice in conditions that are highly irritable.[6] Although SNAGs are usually performed in weight bearing positions they can be adapted for use in non-weight bearing positions.[7]

To best of our search there is dearth of literature pertaining to the involvement of vagus nerve at the upper cervical complex dysfunction and thus its effect on heart rate. Impingement of vagus nerve due to misalignment of atlas vertebrae can also influence the function of Gastro Intestinal system and Cardio Vascular systems affecting the Heart Rate so, upper cervical complex evaluation for impingements should also be considered while looking for dysfunctions related to Heart Rate caused by decreased vagal tone.

Materials and methods:-

This was an experimental study to determine the effect of SNAGS Technique on HR among patients with upper cervical complex dysfunction. Prior to starting of the study, ethical approval was taken.130 subjects were screened out of which 80 subjects participated in the study. Subjects were in age group of 20 to 60 years with cervical spine dysfunction due to rotation of C_1-C_2 vertebras. Subjects were selected from a private set up of health care. Simple random sampling was used to select the subject. Subjects with any cardiac conditions altering the heart rate, fractures of the cervical spine, any acute muscle pathology. (e.g. Strain), diagnosed medical or surgical condition in which SNAGS technique couldn't be used, systemic diseases affecting the vertebral column preferably cervical spine (e.g. Infections), vertigo and uncooperative patients were excluded from the study. Procedure was explained in detail to the participants, following which the written informed consent was taken. Patient was made to relax for 5 mins so that anxiety factor doesn't influence the HR reading. Motion palpation was done for cervical vertebrae to

check the side of the stuck atlas (C1) vertebra. Pre intervention heart rate was recorded. SNAGs Technique was given to the participants on their affected side (3 sets of 8 repetitions are performed) Post intervention heart rate was measured within 1 min of the treatment. Data recorded and analyzed. The data was analysed using SPSS version 16 software. Descriptive statistics was used to summarize the variables. Paired T Test was used to see the effects of intervention on heart rate in our study population. p value < 0.05 was considered significant.

Results:-

Mean age of participant was 35.5 years (SD±12.2).The gender distribution in our study was, 41.2% male and 58.8% were female participants.

The mean Heart rate of the participants before the intervention was 80.1 ± 7.2 beats/min and after the intervention the mean heart rate recorded was 74.9 ±7.0 beats/min (table 1).There was reduction in heart rate by 5.2 beats/min which was found to be statistically highly significant ($p < 0.001$).

Table 1 Showing change in heart rate following SNAGS technique:

Heart rate	Mean ± Standard deviation	P value
Pre intervention	80.1 ± 7.2	<0.001 **
Post intervention	74.9 ± 7.0	

** Highly significant

In our present study mean age of participant was 35.7 ± 12.2 years. 41.1% of participants were male and 58.8% were females.

Discussion:-

This study was designed to check the effect of SNAGs technique on heart rate among patients with upper cervical dysfunction with vagus nerve impingement.

The mean age of the participants was 35.7±12.2 years, in which there were 41.1% males and 58.8% females. In the present study the numbers of females were more as compared to males with cervical dysfunction. This was similar to study conducted by Wendy Rheault ,et al (1992) where author reported higher distribution of female population with cervical dysfunction[8].This could be because most of the females are usually involved in task requiring less physical work thereby promoting their sedentary lifestyle which is reported one of the contributory factor for cervical dysfunctions.[9] One of the many reasons for cervical spine dysfunction in females could be due to the misalignment of cervical and thoracic curveswhich could be result of faulty postures developed in females from their early adolescence due to breast development and joint laxity[10] thus inclining their posture towards relative thoracic kyphosis leading to compensatory changes in the cervical spine resulting in forward head posture and neck pain.[11,12]

In addition to above reason Geertje et.al (1992) reported association of neck pain with psychological risk factors. However the psychological factors were not learnt in our study. The recent prevalence data showed that in a general population the 1 year prevalence of neck pain was 15% and 17% of males and females respectively.[13,14,15,17] The prevalence data in occupational setting was even more impressive. Skov et al. (1996) reported 1 year prevalence of neck pain in sales people (n=1304) with females being predominant. [18]

In our study the mean heart rate of participants at baseline was 80±7.2 beats/min which was towards the higher side of normal range of heart rate [3]. Literature revealed the neck pain can influence the sympathetic activity. As all the participants in our study had symptomatic increased neck pain which could have influenced the baseline HR of the participants.[14]

Following SNAGS technique, in our study there was a reduction in heart rate by5.2 beats/min which was highly significant ($p<0.001$) statistically. This decrease in heart rate could be due to reduction in pain which was noted following correction of misaligned spine. Abidet al (2014) reported in study on 102 patients of non specific neck pain that SNAGS technique was very effective with isometric exercises training of the neck .[19]

Other reason for HR reduction could be misalignment or the atlas vertebra being rotated causing impingement of the vagus nerve passing on either side of the upper cervical complex. This impinged vagus nerve on the side of rotated atlas can cause various dysfunctions in the gastrointestinal system, cardiovascular systems etc[2] due to

reduction in the parasympathetic action of the nerve. This decrease in the parasympathetic action cannot be noted by checking the direct action of vagus on the viscera's of our body .This is where the cardiovascular system comes in place. The heart rate is regulated by constant parasympathetic action of vagus on the heart, called vagal tone .[16] when vagus gets impinged in the upper cervical complex; it causes decrease in the parasympathetic action of vagus on the heart causing increase in heart rate.

In our study the cervical misalignment was corrected via SNAGS technique. As compared to other technique SNAGS can be given in sitting or standing which has real advantage. When improvement takes place in functional posture they are more likely to be retained.[7] SNAGS is a pain free technique whereas other techniques like manipulations etc. are painful and can have serious complications if not done correctly and can cause increase in heart rate due to pain.

This shows that our intervention has resulted in significant reduction in heart rate which in turn affirms that the misaligned atlas can result in impingement of the vagus however the anxiety factor could not be measured. Also objective assessment of pain was not done.

Conclusion:-

The present study concluded that SNAGS technique was effective in correcting the impingement caused to vagus nerve as measured through Heart Rate in patients with upper cervical dysfunction.

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