T.C.

YEDİTEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF PHYSIOTHERAPY AND REHABILITATION

RELATIONSHIP BETWEEN CERVICAL PAIN AND TEMPOROMANDIBULAR DYSFUNCTION, CRANIOVERTEBRAL ANGLE, JAW FUNCTIONAL LIMITATION AND CERVICAL MOBILITY

MASTER THESIS

IŞIL EZGİ GÜNGÖR

İSTANBUL – 2021

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İSTANBUL- 2021

THESIS APPROVAL FORM

Institute : Yeditepe University Institute of Health Sciences

Programme : Physiotherapy and Rehabilitation / Master Programme

Title of the Thesis : Relationship Between Cervical Pain and Temporomandibular Dysfunction Craniovertebral Angle, Jaw Functional Limitation and Cervical Mobility

Owner of the Thesis : Işıl Ezgi GÜNGÖR

Examination Date : 15.06.2021

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DECLARATION

I state that this thesis is my own work and that I did not act unethically at any stage from ethical and academic rules, and that I refer to all the information I quoted. I declare that I have included it in the list of references in the thesis and that I do not violate copyright.

15.06.2021
Işıl Ezgi GÜNGÖR

ACKNOWLEDGEMENTS

My thesis consultant, Assoc. Prof. Dr. Feyza Şule Badıllı Demirbaş worked sincerely and was always there when I needed her.I am proud to be her student and would like to meet her in future scientific studies.

I am thankful to Prof. Dr. Feryal SUBAŞI as she provided our evaluation measurements in Yeditepe University.

I would like to thank my mother Arife Işık, my father Kadir Işık and my sister Berna Işık for their effort during my studies. I would like to thank my dear husband Yakup Güngör for their technical and emotional support during the preparation of my thesis.

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LIST OF SYMBOLS AND ABBREVIATIONS

ALL	Anterior Longitidunal Ligament
CVA	Cranio Vertebral Angle
DC/TMD	Diagnostic Criterias for Temporomandibular Dsiorders
FAI	Fonseca Anamnestic Index
FHP	Forward Head Posture
JFL	Jaw Functional Limitation
JFLS-20	Jaw Functional Limitation Scale-20
NPDS	Neck Paind and Disability Score
PLL	Posterior Longitidunal Ligament
PTR	Physiotherapy and Rehabilitation
RC/TMD	The Research Diagnostic Criteria for Temporomandibular Disorders
ROM	Range Of Motion
SCM	Sterno Cleido Mastoideus
TMD	Temporo Mandibular Dysfunction
TMJ	Temporo Mandibular Joint
WHO	World Health Organization

ABSTRACT

Güngör, I. E. (2021). Relationship between Cervical Pain and Temporomandibular Dysfunction Craniovertebral Angle, Jaw Functional Limitation and Cervical Mobility Yeditepe University, Institute of Health Science, Department of Physiotherapy and Rehabilitation MSc Thesis, İstanbul.

This study was conducted with 129 individuals (mean age 34.08:years, M/F=52/77) to determine the possible relationships between Cervical Pain and Temporomandibular Dysfunction, Craniovertebral Angle, Jaw Functional Limitation and Cervical Mobility.

In our study, the Neck Pain and Disability Questionnaire was used to determine the frequency and severity of cervical pain symptoms and inclusion criteria. Fonseka Anamnestic Index was used to define TMD criteria. Cervical range of motion measurements were made with goniometer for Cervical Mobility Measurement. JFSL-20 questionnaire was used to determine the functional limitation of the jaw. Craniovertebral Angle measurement was made by photographic method.

Statistical analysis. It was implemented in IBM SPSS Statistic 26 package program. As a result of our work; There is a statistically significant difference between the distribution rates of the FONSECA groups within the control and study groups. ($\chi 2$ = 13,171, p = 0.004 <0.05). There was no statistically significant difference between the control and study groups in terms of the rates of those with mild, moderate and severe disorders (p> 0.05). There is a statistically significant difference between the means of flexion of the control and study groups (t = 3.762, p = 0.000 <0.05). There is a statistically significant difference between the means of left lateral flexion of the control and study groups (t = 3.518, p = 0.001 <0.05). There is a statistically significant difference between the rotation left medians of the control and study groups (U = 1734.00, p = 0.001 <0.05). As a result of the analysis, there was no statistically significant difference between the mean of extension, lateral flexion and right rotation and the medians. (p> 0.05). According to the results of the t test, there was no statistically significant difference between the mean KVA values of the control and study groups. (t = -0.956, p = 0.341> 0.05). There is no statistically significant difference between the JFLS-20 averages (t = -0.956, p = 0.341> 0.05).

Key words: Cervical pain , TMD, Craniovertenral Angle,Jaw Functional Limitation

ÖZET

Güngör, I. E. (2021). Servikal Ağrı ile Temporomandibular Disfonksiyon, Kraniovertebral Açı, Çene Fonksiyonel Limitasyonu ve Servikal Mobilitenin İlişkisi Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü, Fizyoterapi ve Rehabilitasyon ABD., Master Tezi. İstanbul.

Bu çalışma Servikal Ağrı ile Temporomandibular Disfonksiyon, Kraniovertebral Açı, Çene Fonksiyonel Limitasyonu ve Servikal Mobilitenin olası ilişkilerini belirlemek amacıyla 129 birey (yaş ort 34,08:yıl, E/K=52/77) ile yapılmıştır. Çalışmamızda, servikal ağrı semptomlarının şiddetini, sıklığını ve çalışmaya dahil edilme kriterlerini belirlemek amacıyla Boyun Ağrı ve Disabilite Anketi kullanılmıştır. TMD kriterlerini belirlemek için Fonseka Anemnestik İndeks kullanılmıştır. Servikal Mobilite Ölçümü için servikal eklem hareket açıklığı ölçümleri gonyometre ile yapılmıştır.Çene fonksiyonel limitasyonunu belirlemek amacıyla JFSL-20 anketi kullanılmıştır. Kraniovertebral Açı ölçümü fotoğrafik metodla yapılmıştır.

İstatistiksel analiz. IBM SPSS Statistic 26 paket programında gerçekleştirilmiştir. Çalışmamızın sonucunda; FONSECA gruplarının kontrol ve çalışma grupları içindeki dağılım oranları arasında istatistiksel olarak anlamlı fark vardır. ($\chi2 = 13.171$, $p = 0.004 < 0.05$). Hafif, orta ve şiddetli rahatsızlığı olanların oranları açısından kontrol ve çalışma grupları arasında istatistiksel olarak anlamlı bir fark yoktu ($p > 0,05$). Kontrol ve çalışma gruplarının fleksiyon ortalamaları arasında istatistiksel olarak anlamlı bir fark vardır ($t = 3.762$, $p = 0.000 < 0.05$).Kontrol ve çalışma gruplarının lateral fleksiyon sol ortalamaları arasında istatistiksel olarak anlamlı bir fark vardır ($t = 3.518$, $p = 0.001 < 0.05$).Kontrol ve çalışma gruplarının sol rotasyon medyanları arasında istatistiksel olarak anlamlı bir fark vardır ($U = 1734.00$, $p = 0.001 < 0.05$).Analiz sonucunda, ekstansiyon, lateral Fleksiyon ve sağ rotasyon ortalamaları ile medyanlar arasında istatistiksel olarak anlamlı bir fark bulunmamıştır. ($p > 0.05$). T testi sonuçlarına göre, kontrol ve çalışma gruplarının ortalama KVA değerleri arasında istatistiksel olarak anlamlı bir fark bulunmadı. ($t = -0.956$, $p = 0.341 > 0.05$). JFLS-20 ortalamaları arasında istatistiksel olarak anlamlı bir fark yoktur ($t = -0.956$, $p = 0.341 > 0.05$).

Anahtar Kelimeler: Servikal Ağrı, TMD, Kraniovertebral açı, Çene Fonksiyonel Limitasyon

1.INTRODUCTION AND PURPOSE OF THE STUDY

The stomatognathic system includes the temporomandibular joint, cervical region muscles, masticator muscles and ligaments, which perform important tasks such as swallowing, chewing, speaking and breathing. It may affect the entire stomatognathic system due to any problem that may occur in the area where these interrelated structures are located. The most complex joint seen in humans is known as the temporomandibular joint.It is thought to be used 1500-2000 times a day. (1).The prevalence of TMD among adults in the Turkish population is 31%. (2)Again in the Turkish population, one or more clinical signs or symptoms of TMD are reported in one out of every for children. (3)

In studies conducted on the subject, it has been found that cervical pain and temporomandibular joint problems are mutually affecting. . Clinicians need to understand the importance of the relationship between the neck and spine and the disorders associated with craniomandibular complaints associated with TMJ (temporo mandibular joint) dysfunction. TMD (temporomandibular dysfunction) signs and symptoms can contain regional pain in TMJ and chewing muscles, restricted mouth movements, headache, and TMJ sounds. (4)

TMD may be chronic or acute, unfortunately permanent or simple.Cognitive, psychosocial and behavioral factors should be considered in the treatment of chronic TMD cases. (5) TMJ pain is a common pain that can be seen at any age and.It is seen in 15% of women and 8% in men . (6)

In the data of the World Health Organization (WHO), Neck pain was identified as the second most common disease after low back pain. Neck pain is a common worldwide condition and one of the leading causes of disability. (7,8)

Neck pain is a pain that is mostly benign. Although the duration of pain is self-limited, it is a common problem. It usually causes less disability than low back pain.Neck pain has a significant effect on the quality of life of people by creating chronic symptoms. Limited mobility is one of the most widespread symptoms in patients with cervical pain, Most clinical trial results focus on the level of ROM limitation. Neck pain is characterized by some symptoms in the cervical spine. Examples of these are abnormal movements in the joint, abnormal neck posture and increased tone, decreased tenderness and muscle length, or altered muscle strength. If poor posture is present, tension of the sternocleiodomastoids,suboccipital muscles , upper trapezius, levator scapulae, and pectoral muscles can occur, accompanied by increased activation of the deep neck flexors and weakness of the lower scapula stabilizers. (9) If we want to improve quality of people and the functional situation, we must understand which structures can produce pain and disability. (10)

'American Academy of Orofacial Pain' guidelines prioritize the relationship between TMD and the cervical spine. A functional junction is formed with TMJ thanks to the cervical region, muscle and ligament connections. Atlanto-occipital joint and cervical vertebra movements occur simultaneously with the activation of the jaw joint and chewing muscles. The link between craniocervical posture changes and TMD has been discussed for a long time in the literature. Due to the poor posture, the muscles and tendons are affected and the jaw has been shown to change its position. This situation may cause load on TMJ and this lead to dysfunction. When we look at the changes related to TMJ, we see an increase in the forward head posture, an increase in the posterior rotation of the cranium with increased cervical angulation (hyperlordosis), and a decrease in the suboccipital distance. (11)

Multidisciplinary approach is known as an important requirement for TMD Treatment. (5)For the treatment of TMJ pain, the team should include dentists, physiotherapists (PTs), speech pathologists, doctors and psychologists. For an optimal treatment preference, the rate of invasive intervention and its cost should be low. Factors such as inadequate posture,parafunctional habits, depression pain distribution and sleep quality should be included during TMJ examination. (12)

The relationship between the jaw and neck region has also been supported by studies explaining the relationship between cervical disorders and jaw joint disorders. Sensory motor tasks related to the jaw, mouth opening, bite function, and chewing state require the contraction of both the jaw and neck muscles. (13)Subjects with TMD reporting having significantly more cervical pain than subjects without TMD. (14)

The most important contribution of physiotherapists to TMD is to reveal the musculoskeletal part that contribute to the patient's symptoms.Physiotherapists can treat the pain associated with TMJ with some interventions. Physical therapy includes multiple modalities to treat TMJ pain, chewing muscle pain, TMJ hypo / hypermobility, disc movement.Through systematic reviews, we can find the effectiveness of physiotherapy in reducing TMJ dysfunction and pain, and improving mobility or function. Alliance between dentists and physiotherapists for the treatment of TMJ pain plays an important role in improving the treatment of patients with TMD.All dentists, physical therapists and physiotherapists should have increased awareness of this issue. (15)

The aim of this study is to examine temporomandibular dysfunctions, jaw functional limitation, cervical mobility and craniovertebral angles and possible relations between individuals with cervical pain and individuals without cervical pain and to compare the this four variables between the two groups.

First aim in this study is to detect the cervical mobility, head posture (craniovertebral angle), jaw joint functions and possible signs of temporomandibular dysfunction and to examine the relationship between cervical pain in people with cervical pain problems.

Secondary aim is to contribute to the literature in revealing other factors that may cause cervical pain and accompanying a problem affecting the majority of the population, such as TMD.

When both domestic and foreign sources are examined, there are very few studies examining the situation of individuals with cervical pain in this broad scope.

In the light of the data obtained in our study, it was thought that while planning the diagnosis and treatment programs of patients with cervical pain, it would help to make a wider examination and to create an appropriate program. The intention of this study is to give an idea that there may be other underlying reasons for cervical problems.

It is thought that it will have positive aspects in terms of referring to dentistry when it is necessary, increasing the effectiveness of the treatment, saving time and reaching results

2. LITERATURE REVIEW

2.1. Cervical Spine Anatomy

It is the name given to the neck basis cranii and the lower edge of the mandible between the apertura thoracis superior.It contains visceral structures such as pharynx, larynx, trachea, oesophagus, glandula thyroidea and glandula parathyroidea. (16)

The cervical spine consists of the first 7 vertebrae, named C1-C7, as the main bone components. Connecting to the immobile thoracic spine can be shown as providing mobility and steadiness to the head.The cervical spine can be examined in 2 parts, upper and lower

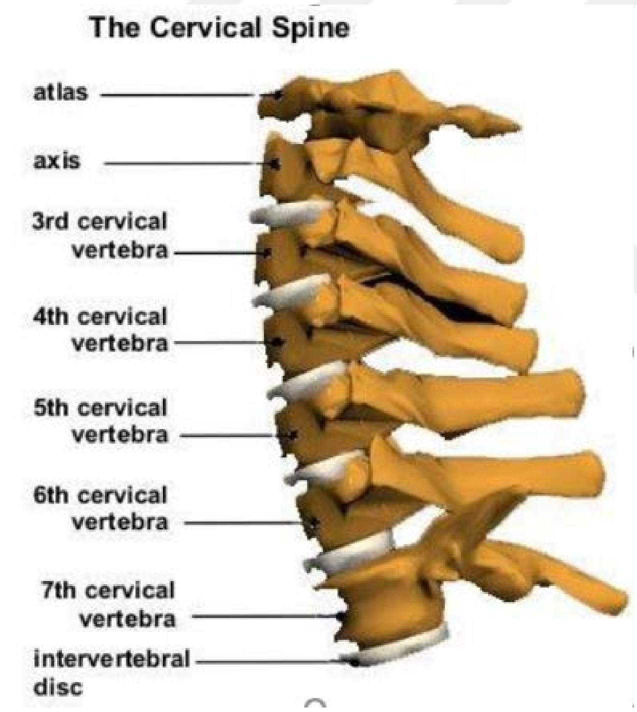

Figure 1. Cervical Spine Anatomy (17)

2.1.1.Upper Cervical Spine

The upper cervical spine take place of axis(C2) and atlas (C2) sections. It is known that the first 2 vertebrae are different from other parts of the cervical spine.

Atlantooccipital joint: It is expressed superiorly by atlas and occiput. It is known that the atlanto-occipital joint is accountable for 50 percent of extension and flexion.

Atlantoaxial joint: It is expressed inferiorly with the axis . It is known that joint is responsible for half of all cervical rotation.

Atlas (C1): is a vertebra that does not have a body like other annular vertebrae. Remains in the atlas have become part of C2, called the odontoid dens. If we look at the contents of the atlas, we encounter a thick anterior arch, , two prominent lateral masses ,a thin posterior arc and two transverse processes.The transverse foramina, which is known to pass through the vertebral artery, is surrounded by a transverse process, and at the level of the atlas, it is known that the odontoid process, the spinal cord occupy one third of the spinal canal and the subarachnoid space .

Axis (C2) : The axis includes the odontoid process (dens). It is known to have a large vertebral body. The odontoid process is attached to the anterior arch of the atlas by the anterior joint facet and by the transverse ligament.   The axis consists of the vertebral body, pedicles, laminas and transverse processes known as portion points for muscles

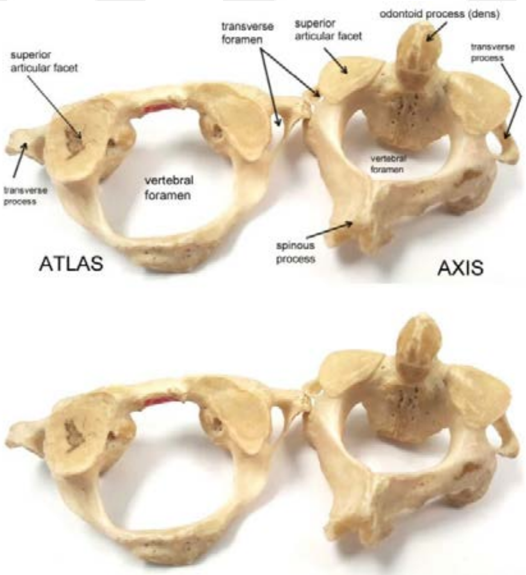

Figure 2 .Upper Cervical Spine Bones (18)

2.1.1.1.Ligaments of upper cervical spine

With the help of internal and external ligaments, the atlantoaxial joints and the craniocervical connection are fixed.The external ligaments contain atlantooccipital, anterior atlantooccipital and anterior longitudinal ligaments. It is stated that there are 5 components of internal ligaments .

The Transverse Ligament has the task of fixing the odontoid process against the posterior atlas and holding it in place. It is responsible for preventing anterior subluxation of C1 in C2.

Accessory Ligaments emerge from the back of the transverse ligament and with it and lateral direction of the atlantoaxial joint.

The Apical Ligament is located in front of the entrance to the foramen magnum and is located at the crest of the odontoid process

Pairs of alar ligaments place and fix the crest of the odontoid in the anterior foramen magnum.

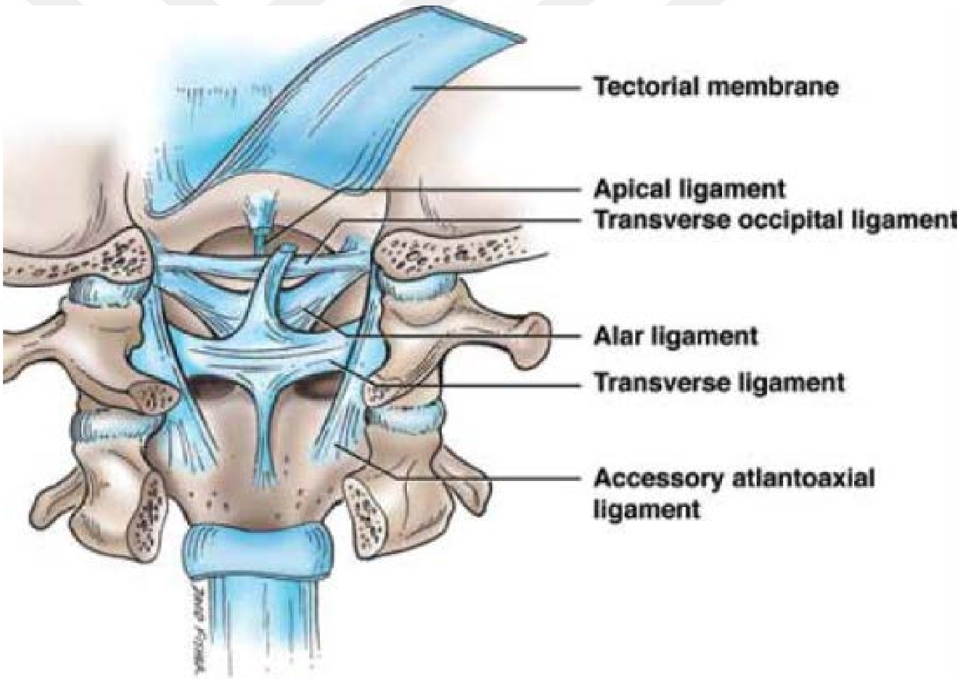

Figure 3.Ligaments Of Upper Cervical Spine (19)

2.1.2.Lower Cervical Spine

The 5 cervical vertebrae are known as components of the lower cervical spine.C3-C7 vertebrae are similar to each other. These vertebraes are distinctly different from C1 and C2. Each vertebra has a concave vertebral body on the upper surface and a convex vertebral body on the lower surface. The spinous processes of C3-C6 are commonly known as bifidThe spinous process of C7 is known as non-bifid.

2.1.2.1.Facet joints

The facet joints at the cervical spine are known as fibrous encapsulated diarthrodial synovial joints.The joint capsules are loose in the lower part of cervical spine relative to other parts of the spine to let the facets to slide.Alignment in the joint is important in weight bearing. (20)

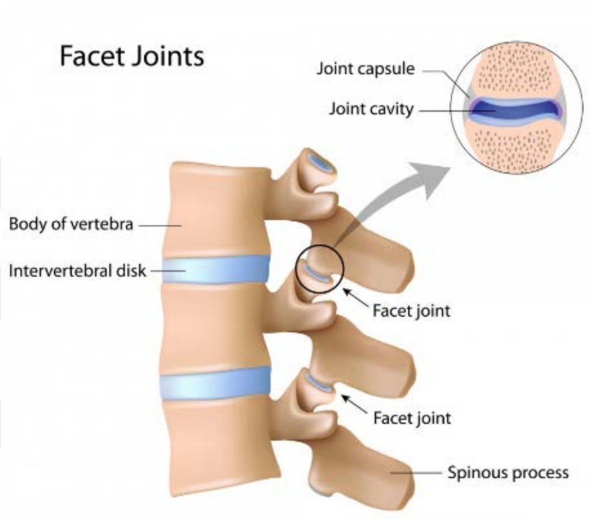

Figure 4.Facet Joints of Lower Cervical Spine (21)

2.1.2.2.Intervertebral discs

The intervertebral discs are took place between the C2 and C7 vertebral bodies. The vertebral body is known to be in the shape of the caudade to the axis.Although the intervertebral discs consist of 4 parts: the first is the nucleus pulposus in the middle, the second is the annulus fibrosus circumambient the nucleus, and the last is fixed to the adjacent vertebral bodies.Discs are known as thicker anteriorly. This thickness also contributes to the normal cervical lordosis. Considering the functions of the intervertebral discs, it contributes to the movement of the cervical spine, as well as the stability of the spine and weight bearing. (22)

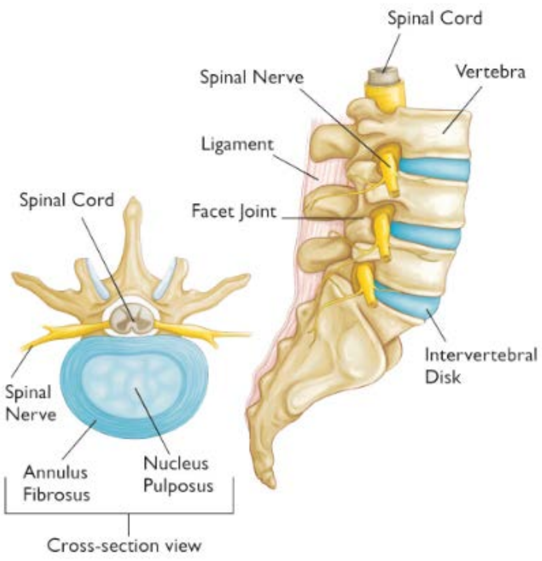

Figure 5.Intervertebral discs (23)

2.1.2.3.Ligaments

The cervical spine is known to consist of 7 cervical vertebrae that are spaced apart by intervertebral discs. The ligamentous mesh provides integrity to the bony elements. The cervical spine can be seen as consisting of the posterior and anterior and middle columns.

It forms the anterior column with the longitudinal ligament and fits within the anterior two-thirds of the vertebral bodies and the annulus fibrosus and intervertebral discs. The middle column contains and forms the posterior longitudinal ligament and the posterior third of the spine. Annulus fibrosus and intervertebral discs are known to be located here.

The posterior column includes the posterior arches, including pedicles, transverse processes. There are articulated faces, laminas, and spinous processes. (24). It is necessary to mention several ligaments of the cervical spine that play a role in stability and proprioceptive feedback. (25)

The transverse ligament passing as the main part of the cruciate ligament, the transverse ligament emerges from the tubercles in the atlas and runs along its anterior ring while holding the odontoid ridge (dens) against the anterior arch**.**It is known that there is a synovial space between the dens and the transverse process.

The transverse ligament located in the Atlas is involved in stabilizing the cervical spine at the time of intense flexion, extension and lateral bending. The most important ligament to prevent abnormal anterior translation is known as the transverse ligament. (26)

The alar ligaments It is one of the known facts that it starts from the lateral aspects of the alar ligament dens and extends towards the ipsilateral medial occipital condyles and towards the ipsilateral atlases.

While allowing flexion and extension, they have a role in preventing excessive lateral and rotational movement. With damage to the alar ligaments, the joint complex becomes more hypermobile.

This causes the vertebral arteries to bend and can result in stimulation of the nociceptors and mechanoreceptors.

The posterior longitudinal ligament (PLL) and the anterior longitudinal ligament (ALL) are known as stabilizers of the main intervertebral joints. Both ALL and PLL are located along the extend of the spine.

ALL adheres to discs more tightly than PLL. ALL is unfortunately not well developed in the cervical spine.PLL is involved in preventing excessive distraction and flexion (27)

The supraspinous ligament Ligamentum flavum and interspinous ligaments are responsible for maintaining the continuity of the stability among the vertebral arches.The supraspinous ligament is located by holding along the ends of the spinous processes.

The interspinous ligaments set to work between adjacent protrusions and attach by the anterior surface of the ligamentum flavum. Interspinous ligament plays rol to control extreme anterior translation and flexion. (28)

The ligamentum flavum when viewed from the ventral angle, the ligamentum flavum binds to the facet joint capsules and strengthens it.

The ligamentum nuchae Ligamentum nuchae is known as the cephalal attendance of the supraspinous ligament and is the structure that stabilizes the cervical spine with a pronounced retraction. (29)

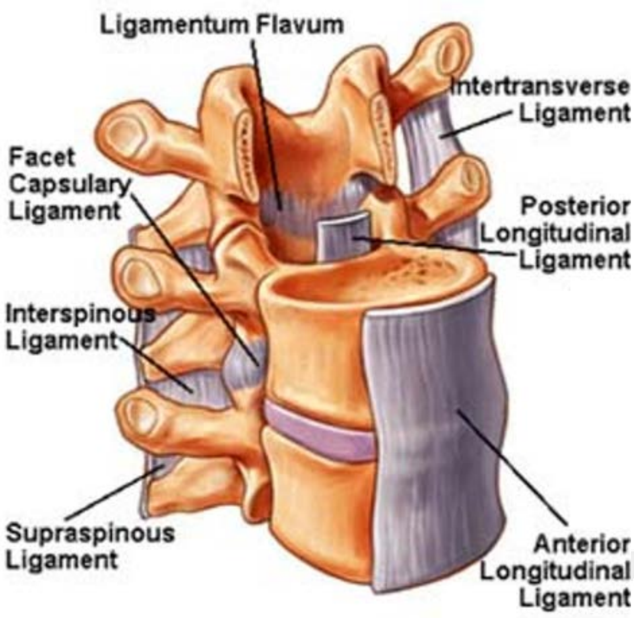

Figure 6.Ligaments of Cervical Vertebrae (30)

2.1.3.Muscles of Cervical Region

2.1.3.A. Superficial Cervical Muscles

Anterolateral view

Sternocleidomastoid splenius capitis

Levator scapula

Anterior scalane

Posterior scalene

Trapezius

It is known that the superficial muscles in the anterior of the neck have various functions. This large form and large structures are located extending towards the clavicula, base of upper spine and the skull.Protects underlying structures In the region, flexion takes a role in revealing lateral flexion and rotation movements (31)

Sternocleidomasteideus If it works one-sided, it turns the face to the opposite side and tilts the head to the same side.When it works double-sided, it tilts the head forward. (16)

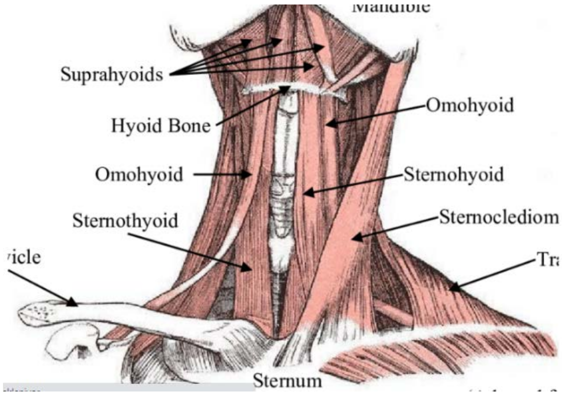

Figure 7.Anterior Superficial Cervical Muscles (32)

Posterior view

Semispinalis

Trapezius

Splenius capitis

Splenius cervicis

Levator scapula

Trapezius muscle is located posterior to the neck.This muscle is involved in the movement of the head, neck and scapula. It is possible to view the sternocleidomastoid muscle from the side.It brings the head forward and tilts it laterally and creates the rotation of the head. Under, splenius capitis ,trapezius and splenius cervicis are located.The task of these muscles is to provide extension to the head, lateral bending and rotation in the direction of the shoulder (31)

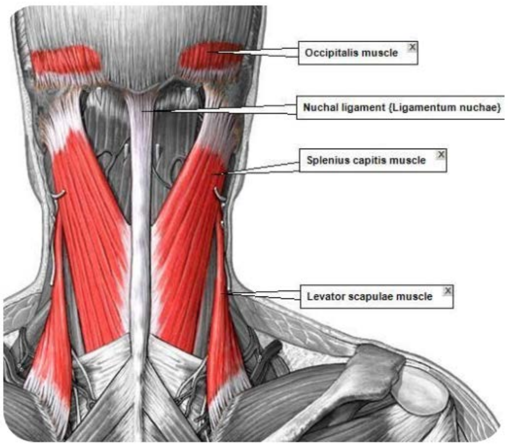

Figure 8. Posterior Sıperficial Cervical Muscles (33)

2.1.3.B. Middle layer cervical muscles

Anterior view

Digastric

Geniohyoid

Thyrohyoid

Omohyoid

Sternohyoid

Swallowing muscles are located in the muscular layer at the front of the neck. These muscles are known as the suprahyoid and infrashyoid muscles. They are located in the middle of the front muscle layer. Since the hyoid is close to the bone, hyoid is mentioned in their names.They help chewing , swallowing and speaking (31)

Digastric Muscle helps depression and retraction of the mandible.Omohyoid ,in addition to causing depression for os hyoideum, it also plays a role in larynx depression.Sternohyoideus causes depression for the os hyoideum and makes depression for the layrnx. (16)

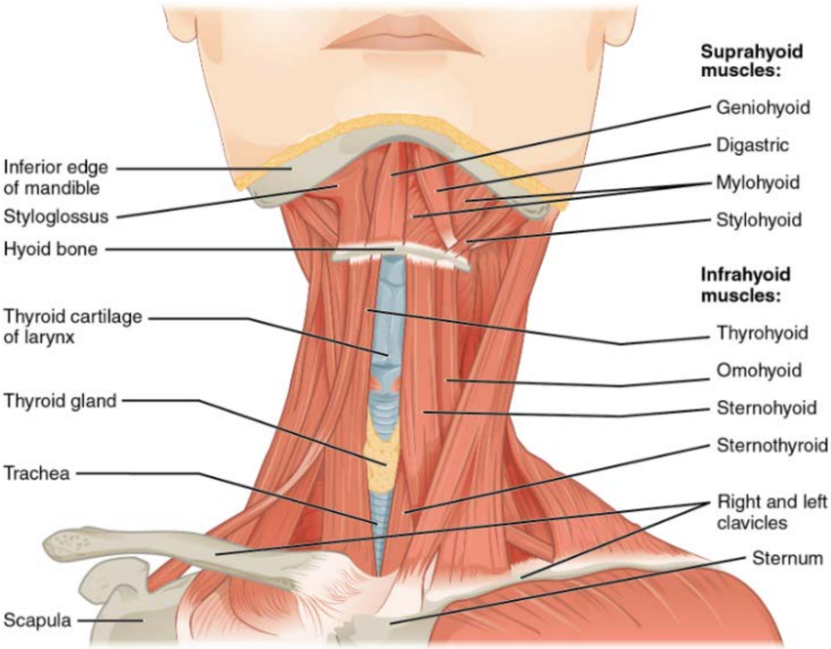

Figure 9. Anterior Midlayer Cervical Muscle (34)

Posterior view

Semispinalis capitis

Middle scalene

Posterior scalane

Splenius capitis

Splenius cervicis

The middle layer at the back of the neck comes from long and wide muscles. It extends towards many joints and takes part in extension, lateral flexion and rotation movements in the region. (31)

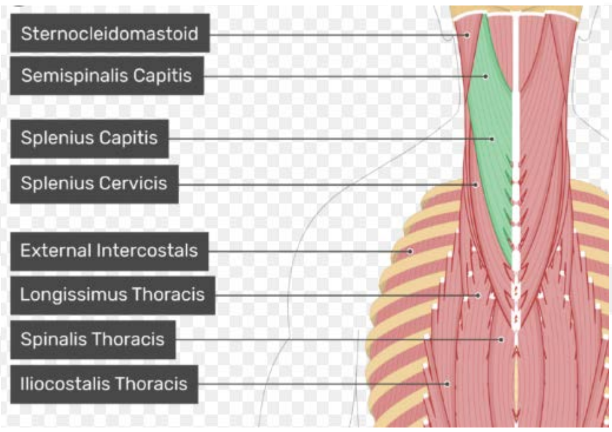

Figure 10.Posterior Midlayer Cervical Muscles (35)

2.1.3.C. Deep Cervical Muscles

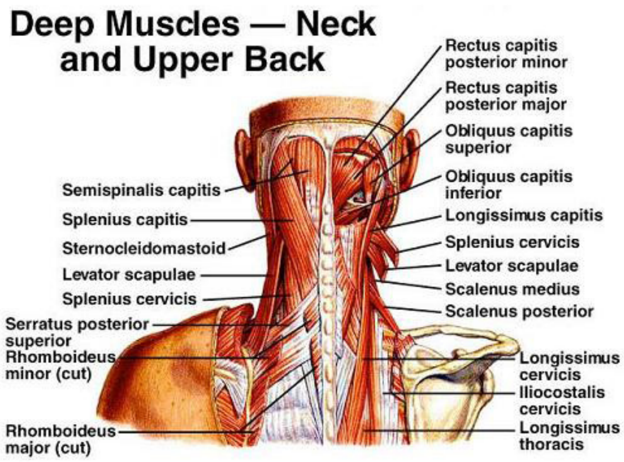

Figure 11.Deep Cervical Muscles (36)

Anterior view

Longus colli

One or two deep muscles are responsible for connecting the anterior surface of the skull and the vertebra. These muscles ensure the continuity of the smoothness of the cervical vertebra. In this area, smooth flexion and lateral flexion take place. (31)

Longus colli muscles aid in flexion and rotation of the neck. It includes the upper oblique inferior oblique and mid-vertical division. (16)

Posterior view:

Multifidi
Cervical and thorasic rotators
Longissumus capitis
Obliquus capitis superior and inferior
Rectus capitis major and minor
Middle scalene
Posterior scalene
Semispinalis cervicis

The suboccipital and semispinalis muscles of the neck work together with the rotator and multifidi to stabilize the head and neck on the posterior side. These specialized small-sized muscles play a role in maintaining the integrity of the skull and vertebra. They can perform smooth and sufficient extension, lateral flexion and rotation movements in this area. (31)

Posterior scalane takes part in lateral flexion of the neck.Middle scale takes part in lateral flexion of the neck and provides elevation of the first rib. (16)

2.2.TMJ Anatomy

It is a joint TMJ that has only limited mobility in the body and can perform translational movement (ginglimo-arthrodial movement) as well as rotation movement. (37) The temporomandibular joint is the articulation of the os temporale between the pars squamosa and the mandible.TMJ components; os temporal squamosa, discus articulari, mandible condyle and ligaments.

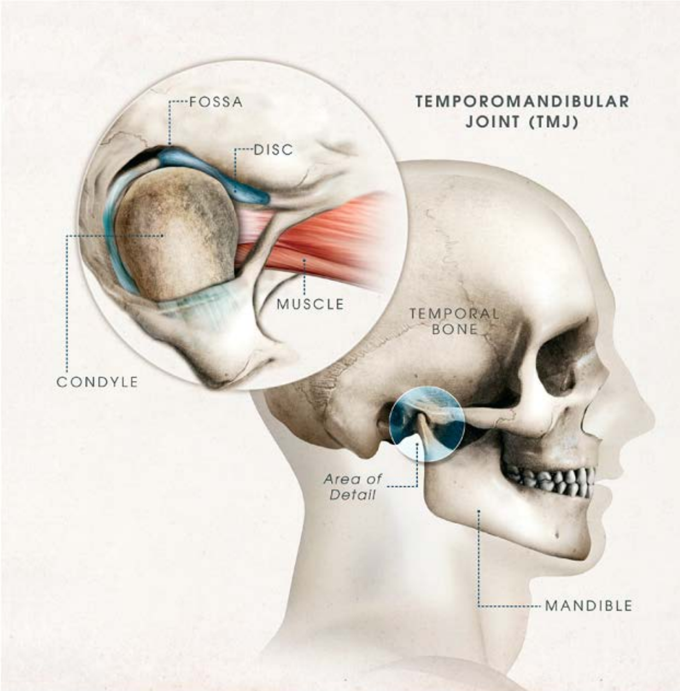

Figure 12. TMJ Anatomy (38)

TMJ consists of bony elements such as mandibular condyle, glenoid fossa and articular eminence, articular disc and articular ligaments are composed of soft tissue elements such as retrodiscal tissues

Morphologically, it is a joint that can vary from person to person and on the right and left sides of the same person(39,40)

There are two parts among upper joint space and lower joint space, through the joint space articular disc. The upper joint space is more responsible for translational movements.Lower joint space is also responsible for hinge movement and rotation .
Structures that make up TMJ are bones, ligaments, muscle groups, disc and capsule (41).

2.2.1.Mandibular Condyle

The upper and anterior surfaces of the mandibular condyle form the articular surface of the condyle.When viewed from above, the condyle head may be round or flat.It is more round in young people than in adults.Frequent asymmetry is possible between the right and left condyles. (42,43)

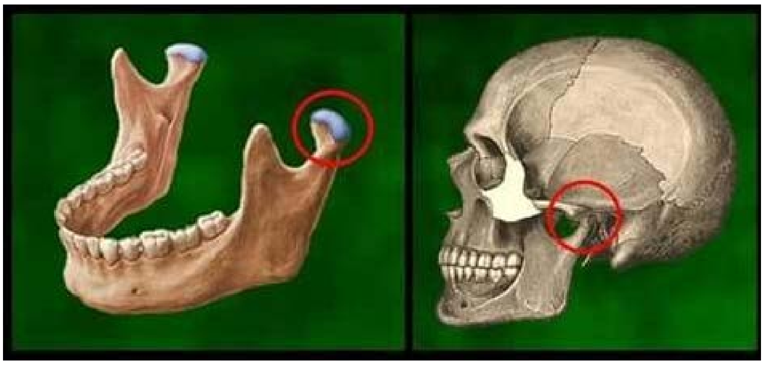

Figure 13 .Mandibular Condyle (44)

2.2.2.Glenoid Fossa

The glenoid fossa is the temporal part of the temporomandibular joint. It is a concave area under the lamellar part of the temporal bone.The glenoid fossa, also known as the mandibular fossa, is located on the temporal bone and is the concavity where the mandibular condyle sits.

The bone crest of the glenoid fossa is much thinner than the surrounding bones. Thanks to the thinness of this area, it prevents excessive condylar loading. (42,43)

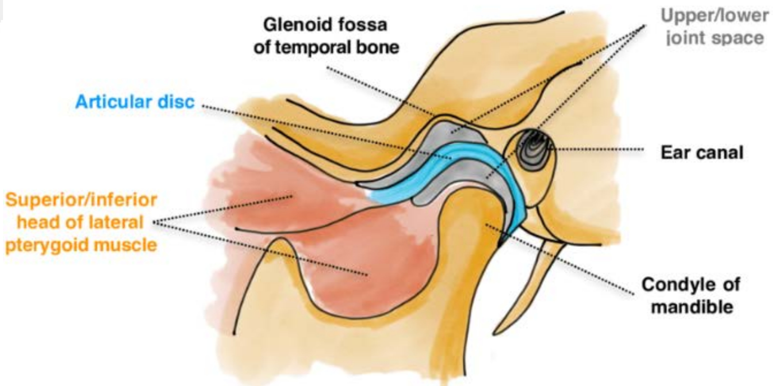

Figure 14.Glenoid Fossa (45)

2.2.3.Articular Eminence

The articular eminence creates the posterior part of the zygomatic arch and the anterior wall of the articular fossa.Joint surface is wide. Its side view is convex, and slightly concave from the front and back.The articular eminence is covered with a thick and tight fibrous tissue.All of these situations reveal that the articular eminence is constantly under load with the articular surfaces of the condyle, disc, and squamous part of the temporal bone. (46)

2.2.4.Ligaments

TMJ has three functional ligaments.

2.2.4.A.Functional ligaments

Collateral (discal) ligaments

The function of collateral ligaments is to prevent the disc from moving away from the condyle.It also plays a role in the passive movement of the disc with the condyle while the condyle slides back and forth. This type of ligament is responsible for the hinge movement between the condyle and the articular disc.

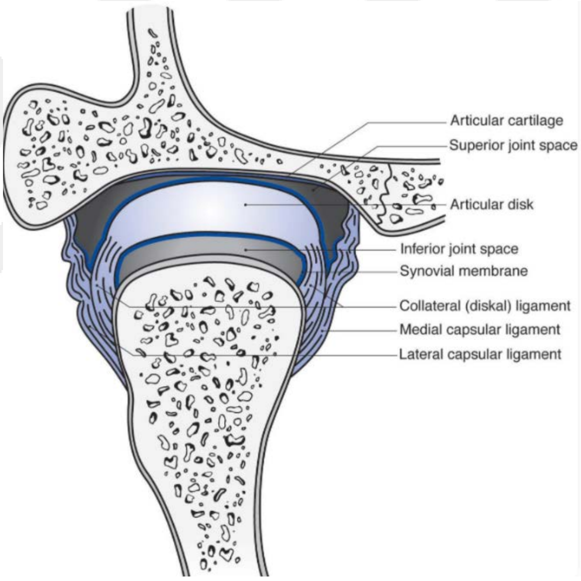

Figure 15.Collateral Ligaments (47)

Capsular ligament

The capsular ligament surrounds the TMJ and synovial fluid.

It separates the articular surfaces or resists internal, external, or downward forces that tend to dislocate between these surfaces.

It is a ligament rich in free nerve terminations, it contains proprioceptive nerve fibers and through these it allows the perception of joint position and movement.

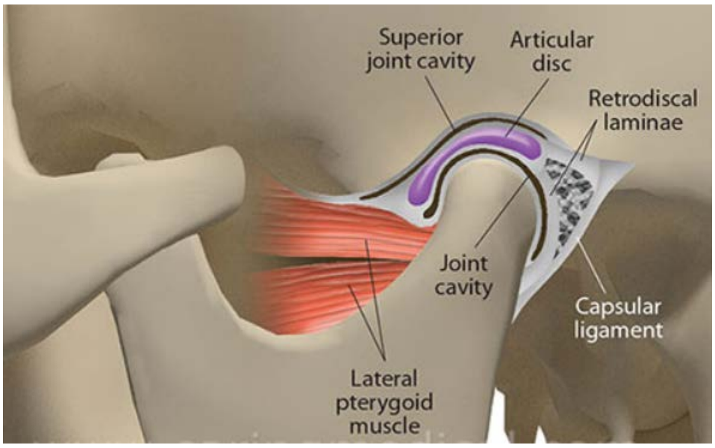

Figure 16 . Capsular Ligament (48)

The temporomandibular ligament

The lateral part of the capsular ligament strengthens and forms the temporomandibular ligament. The temporomandibular ligament consists of two parts, oblique (outside) and horizontal (inside).

The oblique part prevents the condyle from descending too much and also limits the opening of the mouth.The horizontal part limits the movement of the condyle and the disc towards the posterior. However, it protects the retrodiscal tissue from the trauma caused by the condyle's displacement towards the posterior (49)

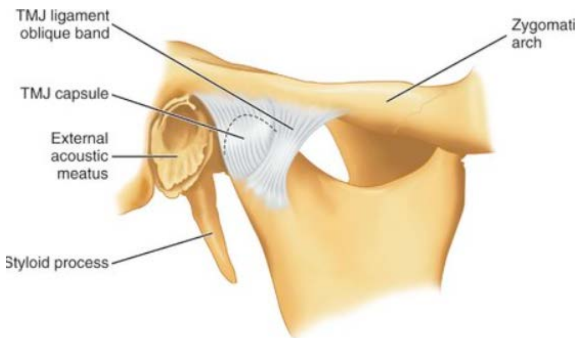

Figure 17.Temporomanbidular Ligament (50)

3.2.5.Muscles of TMJ

The 5 main muscles that contribute to TMJ movements are;

1.Temporalis: Its task is the elevation of the mandible. the front fibers pull the chin up and the posterior fibers back.The temporalis, as a muscle, is a structure originating from the lateal surface of the head and temporal fossa.

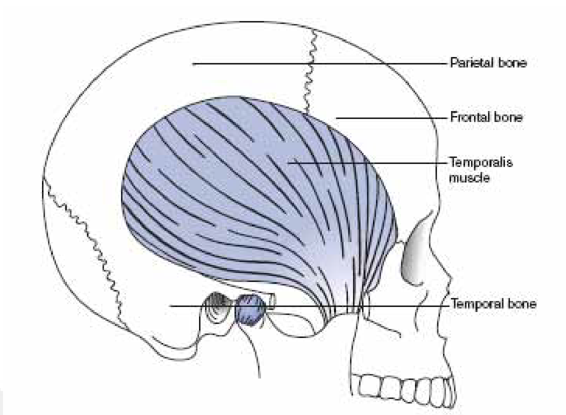

Figure 18 .Temporalis Muscle (51)

2.**Massater:** Its primary task is to raise the mandible.It can be said that the superficial fibers contribute to the protrusion.Deep fibers are responsible for stabilizing the condyle against joint strength.It is divided into two as deep and superficial. The superficial masseter attaches downward to the lower border of the mandibular ramus and the lateral face of the mandible. The deep masseter sticks to the higher lateral of the mandible and to the coronoid.

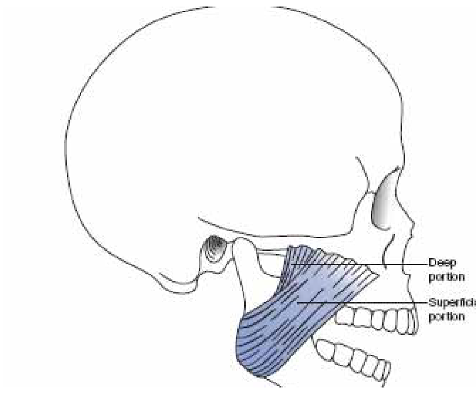

Figure 19.Masseter Muscle (51)

3.Medial pterygoid: If its fibers contract, the mandible rises and teeth come into contact. Secondly, it provides forward movement of the mandible. It is one of the elevator muscles

4.Lateral pterygoid: It consists of two parts.With the unilateral contraction of the inferior lateral pterygoid, lateral movement of the mandible in the opposite direction occurs. The superior lateral pterygoid muscle pulls the disc and condyle medially.

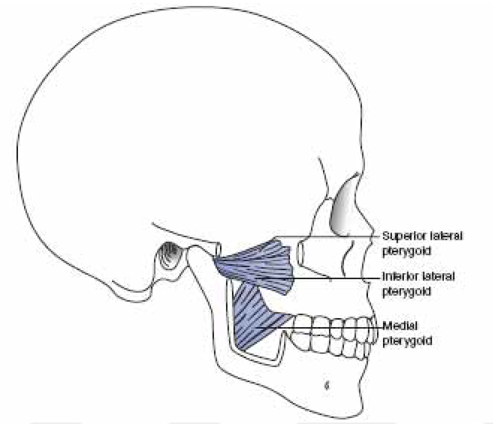

Figure 20 Medial and Lateral Pteryogoid Muscles (51)

5.**Digastric:** Pulls the mandible down and back (51)

Suprahyoid (anterior and posterior digastric, geniohyoid, mylohyoid and stylohyoid) muscles and infrohyoid muscles (muscles in the larynx, trachea, thyroid region) help the mandible by contracting. (52)

2.2.6. Disc of TMJ /Discus articularis

It consists of dense fibrous tissue. It is known that this structure is located between the squamous part of the temporal bone and the condyle. It lacks vascular and nervous aspects in the middle part, but it is vascularized and innervated in the peripheral parts, which have a minimum rolein supporting the load.The joint disc rotates and clings to the capsule.

It consists of 3 main parts;

-It is thick in the anterior band and is in front of the condyle with the mouth closed.

-Thinnest in the intermediate band and extends along the eminentia articularis with the mouth closed

-It is a thick part in the posterior band. It is positioned on the condyle when the mouth is closed. (16)

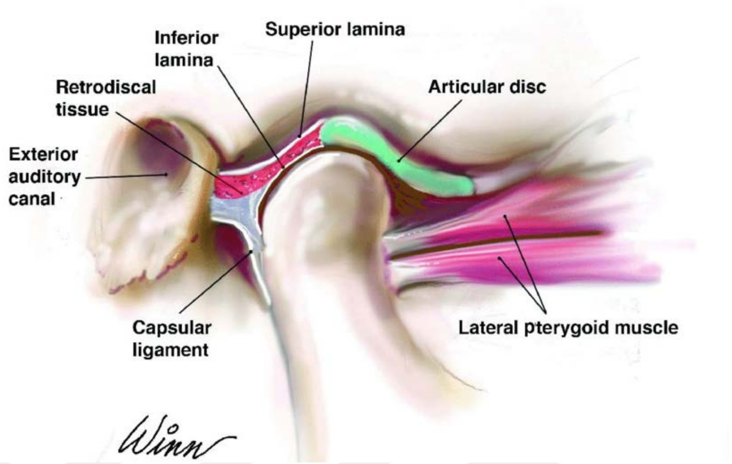

Figure 21. Disc Of TMJ (53)

2.2.7. Capsule of TMJ

It completely covers the joint surfaces of the temporal bone and the condyle. It consists of fibrous connective tissue.

It is strengthened by ligaments in the medial and lateral directions. It is surrounded by an arterially rich synovial membrane. It contains various sensory receptors. (16)

Joint capsule; It is fibroelastic, rich in vascularity and innervation, dense, connective tissue. The capsule is attached to the zygomatic tubercle, glenoid fossa and postglenoid fossa on its lateral surface.

The lateral capsule continues medially to the midsagittal plane, and then the anterior bilaminar supported by the superior and inferior heads of the lateral pterygoids Iit is closer to the anterior in the layer. (54)

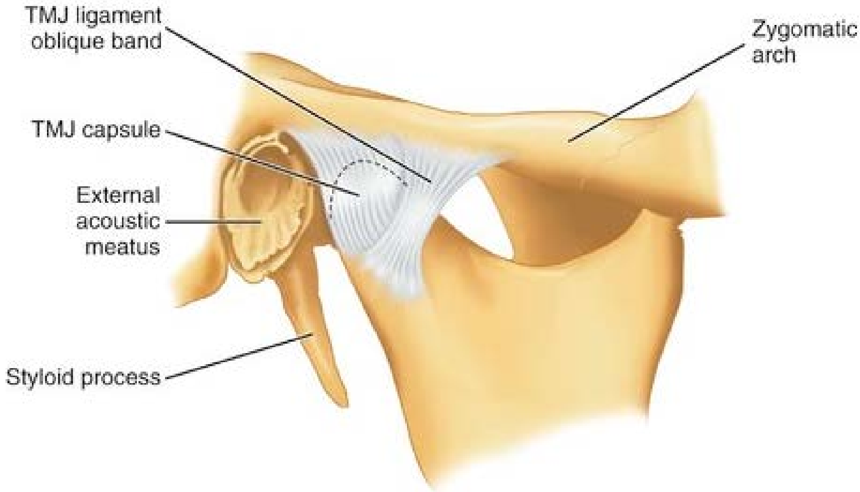

Figure 22.Capsule of TMJ (55)

2.2.8. Temporomandibular Joint Movements

For temporomandibular joint movement, it is important that the cervical region muscles, craniomandibular region muscle and joint structures and the occlusal relationship are compatible.Basic movements of the mandible; depression, protrusion and lateral movements.

There are two types of movements of the temporomandibular joint: translation and rotation.

Rotation occurs between the articular disc and the condyle of the mandible.

Translation occurs between the disc-condyle complex and the temporal bone.

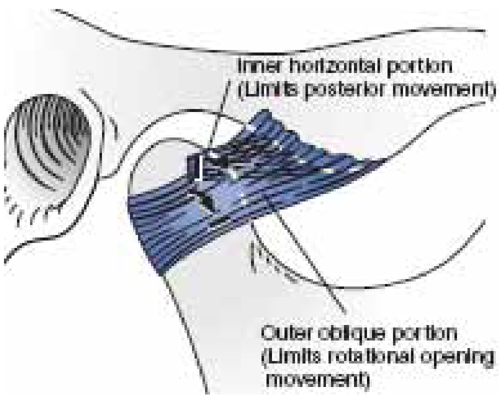

Figure 23.Temporomandibular Joint Movements (56)

Normal mandibular opening is 35-50 mm. The resting position of the temporomandibular joint; The mouth is in a slight gap, the lips are in a combined position, the teeth are not in contact with each other, the first half of the tongue is on the palate. (56)

2.3.Cervical Pain

Bones, nerves, ligaments, and tendons are an arrangement of the cervical region. The spine in the cervical area is thin and delicate, as well as the spinal cord that sends messages to the brain to control parts of the body that pass through the cervical spine.The neck region starts at the base of the skull and consists of seven vertebrae that connect to the thoracic spine. The cervical spine is faced with the possibility of a range of painful conditions due to trauma, daily activities, pressures and forces affecting it. It is governed by the cervical spine, brain and spinal cord.

The cervical area is designed to withstand the strength, stability of the brain impulses of the rest of the body. If it contributes to the pressure on the cervical area and pressure on the nerve roots, the problem occurs.

These problems can cause disruptions in the correct transmission of the nerve signal, causing pain in the shoulder, head, arm and hand. Generally, spinal problems in the cervical region can develop over time due to the injuries and weak muscles accumulated in the neck area. (57)

According to the published data of the World Health Organization (WHO), it is the second most common musculoskeletal disorder pain after low back pain. Cervical pain is one of the common pains around the world. Its worldwide prevalence is between 16.7% and 75.1%. (58)

Factors affecting cervical pain include psychopathology sleep problems genetics smoking sedentary lifestyle previous back and neck problems.Neck pain can be classified in a variety of ways.It may be associated with or unrelated to acute or chronic or occipital headaches. Based on the data obtained from a study on the cervical region, 43 percent of the patients have non-neuropathic pain, 7 percent of have neuropathic pain, and 50 percent of have mixed pain. A higher level of functional impairment was found in people with neuropathic pain. (59)

2.4.TMD

It affects about 25 percent of the population.Causes may include arthritis, trauma, infection, bruxism, and disc displacement. TMD is more common in women (16)Although symptoms are observed in all age groups, they are more common between the ages of 20-40 . (60)

In this case, it has been suggested as an important reason for the high level of estrogen hormone in women. Because the estrogen hormone, which is in the etiology of TMD, is associated with the tone of the ligaments. (61)

Temporomandibular disorder (TMD) is a clinical condition in which chewing muscles, temporomandibular joint and the struc-tures surrounding this joint are affected. (62)

It has been stated that as the time to fall asleep and the number of awakening increases, the pain experienced in TMJ becomes more severe.They reported that the pain decreased with the increase in sleep efficiency, and the pain was higher in women and those using hypnotic drugs.It has been determined that the two most important predictors of pain complaints in TMT are advanced age and low sleep efficiency . (63)

Surgical treatment options in TMB are as low as 5%. In other words, 95% of patients are treated with conservative treatment methods . (64)The most common symptom observed in TMD and causing the need for treatment is pain. (65)

While one dimension of this pain is originated from the disease, another dimension is originated from psychosomatic disease. (66)

The pain can affect areas such as the eyes, throat and ears, resulting in neck pain, headaches and facial pain,Physical factors may include infection, traumatic secondary synovitis, and similar inflammatory problems.TMD may also be associated with reduction or non-reduction disc dysfunction. (67)

In order to reach a common decision about TMD, a reliable and basic diagnostic criteria with international validity have been prepared. These diagnostic criteria, developed by the American National Dental and Craniofacial Research Institute, are called Research Diagnostic Criteria for Temporomandibular Disorders (RDC / TMD). (68)

RDC / TMD is a biaxial system that makes diagnosis and classification within the biopsychosocial model. Axis 1 defines the main TMD subgroup while Axis 2 defines biopsycosocial factors. (69

2.4.1. Classification of Temporomandibular Disorders

It was made by Bell and is used today with the contributions of Okeson . (37)

I.Chewing muscle irregularities

1) Protective muscle contraction (muscle splinting)

2) Local muscle pain (non-inflammatory myalgia)

3) Myofascial pain (trigger point myalgia)

4) Myospasm

5) Myocyte (inflammatory myalgia)

II. Intra-articular irregularities

1) Condyle-disc complex irregularities

a) Disc displacement

b) Reduced disc displacement

c) Disc displacement without reduction

2) Mesh incompatibilities of articular surfaces

a) Shape Changes

• Disc

• Condyle

• Fossa

b) Adhesions

• Adhesion of the disc to the condyle

• Adhesion of the disc to the fossa

c) Spontaneuous Dislocation

d) Subluxation

3.Inflammatory joint diseases

a) Synovitis

b) Capsulitis

c) Retrodiskit

d) Inflammatory arthritis

III. Chronic mandibular hypomobilitis

1) Ankylosis

a) Bony

b) Fibrous

2) Muscle contraction

a) Myofibrotic

b) Myostatic

3) Coronoid inhibition

IV. Growth

1) Congenital and developmental bone disorders

a) Neoplasia

b)Hyperplasia

c) Hypoplasia

d) Agenesis

2) Congenital and developmental muscle disorders

a) Hypertrophy

b) Hypotrophy

c) Neoplasia

2.5.Cervical Pain and Temporomandibular Dysfunction(TMD)

The finding of 90.0% of TMD prevalence ,there is a relationship between cervical pain and postural alterations and TMD. The stomatognathic system depends on the anatomical and biomechanical interaction between the head and neck region. Pain in the orofacial and cervical structures accompanies various oral problems, including malocclusion. Incorrect habits in TMJ or the cervical spine posture observed in this study cause local pain in the stomatognathic region and pain radiating from TMJ . (5)

It has been shown that the restrictions of the cervical spine are segmental and tender points in the cervical muscles are more widespread in patients with TMD than in patients without TMD.

In the literature, mean values for cervical lordosis were accepted as 21–34 °.Values below 20 degree and above 40 degree are known to be associated with cervicogenic symptoms. (70)

Pain in the cervical spine was the most common (44%) followed by headache.(32%). Headaches can also be a symptom of many people.Disorders affecting the chewing system and especially among patients with TMD are common . (71)

2.6.Cervical Pain and Cervical Mobility(ROM)

Cervical pain causes range of motion (ROM) reduction, which known as mechanical restriction between vertebraes. Restriction can be caused by pain or muscle spasm. Cervical posture imbalance resulting from shortening and increased activation of muscles. (72)

Physiological motion of neck involves movement at upper thoracic spine. Chronic and untreated cervical pain leads to poor body mechanics (5,73).
The presence of tension points in these structures that cause painful symptoms elsewhere prevents all range of motion.

Cervical ROM should be measured when patients having neck pain . To measure ROM helps the physiotherapists to determine the diagnosis, determine the prognosis, and evaluate the efficacy of treatment. Objective measurements help to be informed about development. (74) The presence of tension points in these structures that cause painful symptoms elsewhere prevents all range of motion. (57)

2.7.Cervical Pain and Jaw Functional Limitation(JFL)

TMD acts directly on the neck and jawmuscles as a result of insufficient movement of the head and suprahoid muscles, and laryngeal activity may change. Speech resulting from this incompatibility is dangerous. With prolonged use of the voice, severe laryngeal tension occurs. Pain symptoms and difficulty in performing jaw movements may occur in TMJ. It is known that temporomandibular dysfunction and orofacial pain are two factors that affect the majority of the population. Problems in these individuals are those with clinical findings that limit jaw movements. (75)

The amplitude and sensitivity of the mandibular movements are relevant to the wholeness of the TMJ and the movement of the neck skeletal muscles .The joint is prone to unfavorable conditions as it supports and contains other structures around the cervical region. Functional movements have the capacity to change and exceed the structural and functional tolerance of the TMJ. In this case, changes may occur in stomatognatic functions andmandibular movements .The presence of pain causes a decrease in range of motion of cervical region. (76)

Upward movement of the face is associated with neck extension, and lower facial movement is associated with neck flexion. Neck rotation is effective in stimulating the facial muscles on the side to which it is rotated.Limited mouth opening, temporomandibular pain (TMP),General symptoms of masseter and temporal muscle hypertrophy and destruction are chin click while opening the mouth, sliding of the mouth muscles to one side, pain in the cheek muscles and uncontrollable movements of the jaw. Along with the pain here, neck problems, shoulders and back, lack of mobility in the neck, stiffness and pain may occur. (77)

2.8.Cervical Pain and Craniovertebral Angle(CVA)

Neck pain causes a physical impairment of the musculoskeletal system caused by inappropriateness or functional restricted posture. (78)

Posture is known to be highly correlated with muscle length.Posture is also affected by changes in muscle strength, abnormal sternocleidomastoid (SCM), tension of the suboccipital muscle, weakness of the deep cervical flexors, and scalene muscle function.FHP is an indication that the head is in front of an imaginary vertical line in a horizontal plane coming from the center of gravity of the body. (79)

FHP (Forward head posture) results in an elongated head and a posture in which the upper cervical and lower cervical vertebrae are tilted causing dysfunction with shoulder and neck pain. FHP has been reported to cause functional limitation of movement and pain in the neck and head area.The degree of forward head posture according to the craniovertebral angle (CVA) is an important indicator in determining the functional limitation that occurs in the neck. (78)

An inverse relationship is noted between the craniovertebral angle and anterior displacement The craniovertebral angle is an appropriate measurement method for evaluating head position. Using a simple and cost-effective photographic technique, measurement is possible by aligning the craniovertebral angle and head with sagittal. (80)

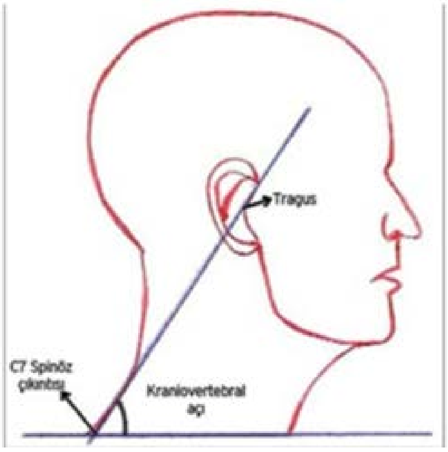

Figure 24. CVA Angle (81)

3.MATERIALS AND METHODS

3.1. Type of Research

Observational Research

3.2. Research Questions / Hypotheses

• H1: Temporomandibular dysfunctions of individuals with cervical pain are more than the control group.

• H2: The cervical mobility of individuals with cervical pain has decreased compared to the control group.

• H3: The craniovertebral angle values of the individuals with cervical pain decreased compared to the control group.

• H4: The jaw functional limitation of individuals with cervical pain is higher than the control group

3.3. Research Variables

Dependent variables: Cervical ROM, Jaw functional limitation scale (JFLS-20) values, Fonseca Anemnestic index values, Craniovertebral Angle values.

Independent variable: neck pain and disability scale

3.4. Place of Study

This study was carried out in Yeditepe University Institute of Health Sciences, Department of Physical Therapy and Rehabilitation. Permission was obtained from the head of the department for the study to be carried out in the laboratory.(Annex-

In order to conduct the study, approval was obtained from Marmara University Medical Ethics Committee, Non-Interventional Clinical Research Ethics Committee.Meeting dated 28/10/2020 and numbered 62 (Appendix 1)

3.5. Duration of Study

This study was conducted between November 2020-March 2021.

3.6. Participants

All individuals in the study were included on a voluntary basis.All participants were informed about the study before the evaluations and the consent form was signed (Appendix-).All necessary evaluations for the study were carried out on the same day.During the study, both the participants in the study group and the participants in the control group completed the evaluation completely.No health problems were observed in any participant during and after the evaluations.

3.6.1. Universe Sample of the Research

In the theoretical power analysis of the study, the power ratio was determined to be at least 0.80, the alpha error probability was accepted as 0.05 and the effect size under operating conditions as 0.50.As a result of the analysis, the minimum number of participants was calculated as 128 people, 64 in the study group and 64 in the control group, for the study conducted in the G * power program (version 3.1.9.4.).

3.6.2. Number of volunteers

Total number of volunteers are 128.

Women,: 77 /Man: 52

Study group: 64/Control Group: 65

3.7. Inclusion Criterias

3.7.1.Study Group:

Neck pain disability score of 15 and above

Volunteering to participate in the study

Being in the age range of 18-50

3.7.2.Control group:

Neck pain disability score below 15

Not having painting problem for TME

Being in the age range of 18-50

Volunteering to participate in the study

3.8. Exclusion Criterias

Study and Control Group

The presence of any problem other than cervical pain that may affect the evaluation

The presence of any orthopedic and / or neurological problem that may prevent evaluations.

Being diagnosed with any psychiatric disorder

Situations that will prevent evaluation or communication

Illiterate individuals

Head, neck and maxillofacial surgery operation history

Conditions in systemic pathological conditions such as malignant condition, fracture and rheumatoid arthritis

3.9. Evaluation Methods

The evaluations of the people included in the study were made in the Yeditepe University PTR laboratory with the permission of the department head.Neck pain and disability scale were evaluated for the individuals to be included in the study.Participants will be included in the study and control groups according to the score of the NPDS .For this study, the population without cervical pain or with a cut off value of less than 15 for neck pain and disability score(NPDS) will be selected as the control group. NPDS score above 15 will be selected as study group. It will be included in the study group as the population that can cause a disability from cervical pain is counted. (82)

Answers to the hypotheses / research questions were found with the data collected from the individuals included in the study with the inclusion and exclusion criteria in the control and study groups.

3.9.1.Evaluation Materials

For cervical pain-related TMD dysfunctions, fonseca anamnestic index assessment(FAI) jaw functional limitation questionnaire (JFLS-20), cervical ROM assessment and photographic craniovertebral angle assessment (CVA) will be performed.These measurements will be made in both control and study groups.

3.9.1.A.Evaluation of Cervical Pain

Neck Pain and Disability Scale (NPDS):

The Turkish version of the Neck Pain and Disability Scale (NPDS), developed by Wheeler et al., was used for individuals with neck pain. The severity of neck pain is evaluated on a 5-point Likert scale; where 0 indicates "no pain" and 4 indicates "very severe pain".

The Neck Pain and Disability Scale is a 20-item scale measuring the severity of disability due to neck pain on a 10 cm Visual Analogue Scale. Item scores are between 0 and 5, and the minimum and maximum scores are 0 and 100, in order of.The score being considered 0 for patients without neck pain. (83)

The score is higher in those with upper extremity symptoms.The cut-off value of this scale was set to 15 to detect disability-related neck pain.The cut-off value is mandatory to evaluate a patient or a particular group of patients for clinically significant neck pain by distinguishing it from insignificant pain. (82)

3.9.1.B. Evaluation of TMD

Fonseca Anamnestic Index (FAI):

Fonseca Anamnestic Index (FAI) is an index used to diagnose patients.Low costly, easy to use in TMD patients who will be preferred in the diagnosis process.It is a questionnaire consisting of 10 questions, including pain during the period, parafunctional habits, movement restriction, clicking, malocclusion, emotional stress. (84)

In this study, clinical signs relevant to each severity category of Fonseca's anamnestic index were used to detect the frequency of symptoms and to characterize the symptoms and clinical findings of TMD.The Turkish version of Fonseca's Anamnestic Index (FAI) questionnaire was used to assess the symptom severity. (84)

Volunteers are asked to answer ten questions by selecting one of the answers showing different TMD grades are;

No (0 points) and

Sometimes (5 points).

Yes (10 points)

The sum of the points is used to classify participants into four categories:

Without TMD (0 to 15 points);

Mild TMD (20 to 40),

Moderate TMD (45 to 60),

Severe TMD (70 to 100).

In the statistical analysis part, it is appropriate to accept the positive answers to the questionnaire as equal (as one point) and the negative answers as zero points.

3.9.1.C. Evaluation of Cervical Mobility

Cervical range of motion (ROM)

ROM was considered to evaluate cervical mobility. A full circular manual goniometer was used to evaluate the cervical region flexion, extension, rotation (left and right) and lateral flexion (left and right) movements. Measurement with goniometer is a valid and reliable method used in the evaluation of cervical range of motion. (85)

While evaluating flexion, extension and lateral flexion and movements in the cervical region, the goniometer is placed at the top of the head as a pivot point. the participant makes to the movement to its end actively and actively return to the its first position.

For rotation movement, the participant is placed on the participant's pivot point in the supine position and the patient is asked for rotational movement. The note measured on the goniometer is taken. It is compared with the normative values of these angles. whether there is limitation and the status of mobility are evaluated. (86)

Normative valus of cervical range of joint movements degrees

Cervical flexion :0-45 degree

Cervical extansion :0-70 degree

Cervical lateral flexion right and left :0-45 degree

Cervical rotation right and left : 0-80 degree (31)

Figure 25. Cervical Flexion(87)

Figure 26. Cervical Extansion(87)

Figure 27. Cervical Left&Right Lateral Flexion(87)

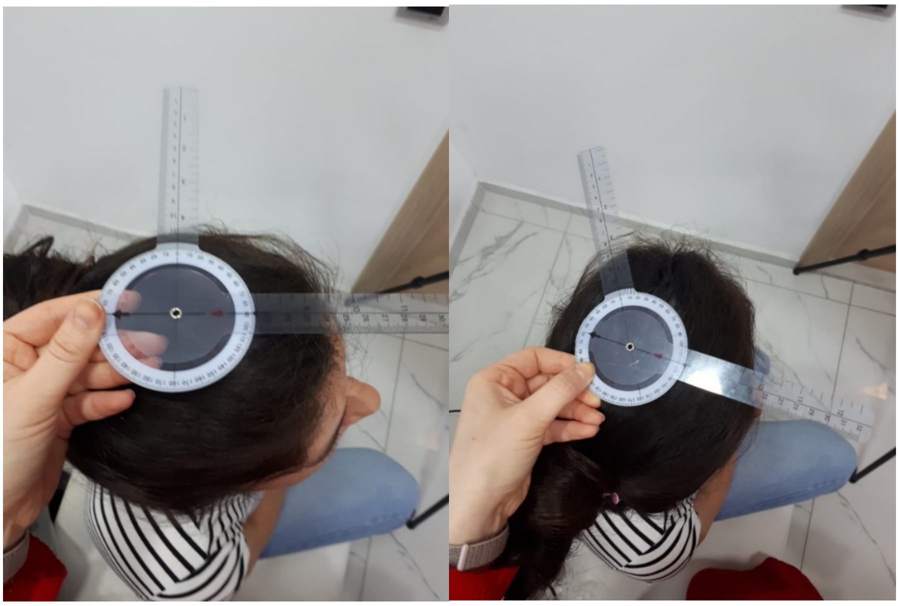

Figure 28. Cervical Left&Right Rotation (87)

3.9.1.D. Evaluation of Jaw Functional Limitation

To assess temporomandibular joint-related dysfunctions, pain, symptoms, limitation, and diagnostic criteria functions in the Turkish version of the DC / TMD temporomandibular disorders assessment tools were used. DC / TMD protocol is the new diagnostic tool used in the literature at a high rate in the evaluation of TMD. This protocol consists of two main assessment axes. In this study, JFLS -20 sections II. used from the axis.

JFLS-20: Jaw Functional Limitation Scale:

The JFLS was developed as an 8-item scale for general functional limitation in the jaw.In the light of the obtained items and supporting psychometric data, it has been expanded and re-developed to include the verbal and non-verbal communication limitations that occur in a 20-item tool.(88)

JFLS-20 is a tool with three structure contents (chewing, vertical mobility of jaw state and emotional and verbal statement) to evaluate functional state.Difficulty performing a determined task is graded from 0 (without limitation) to 10 (severe limitation). Higher scores are a more serious sign of functional limitation. The latest diagnostic criteria for TMD (DC / TMD) suggest the use of the JFLS to evaluate TMD functional limitations. JFLS is a globally valid functional limitation tool. (89),

There are a total of 20 items including three-level functional limitation: chewing section (6 items), jaw mobility section (4 items), verbal and emotional expression section (10 items).

3.9.1.E. Evaluation of Craniovertebral Angle

It is one of the methods used to evaluate the head posture. It is used to measure the forward head position / forward head value, and the greater the value of this angle, the further the head is positioned on the neck, it is in protrusion. (90)

The craniovertebral angle (CVA) was defined as the angle made by the horizontal line of the line connecting the spinous process of the cervical seventh vertebra to the ear tragus. The reduction of the craniovertebral angle indicates that the head is in an anterior tilt position. CVA is measured by photographing method while transferring equal load to both feet. The camera is fixed and placed at a distance of 1.5 m on a flat surface.The camera is fixed so that it is level with the humeral head of each participant. Participants are asked to do the head flexion-extension movement in order to find neutral head posture and articipants are encouraged to remain in the most suitable position for them. A marker is placed on the spinous process, namely the pivot point, for easy identification in the photograph. Photographs of the participants are taken 3 times at the left shoulder level. CVA is measured with the photographs taken and noted in degrees. the mean of the angles is taken and written. (91)

A review of the medical literature recommends that a craniovertebral angle of less than 50 degrees when standing is generally considered the forward / protrusion head posture. (92) Ginifab, an online angle measurement program between two points, was used. (93)

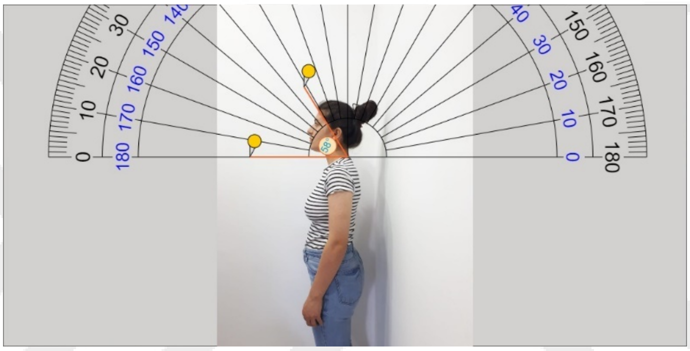

Figure 29. Evaluation Of CVA (93)

Figure 30.Evaluation of CVA Method

3.10. Statistical Analyse

In statistical analysis, the questionnaire data of 129 participants, 64 with neck disability and 65 people without neck disability, were analyzed. Data analysis was performed in IBM SPSS Statistic 26 package program.

First of all, Cronbach Alpha analysis was applied to see the internal consistency of the scales “Neck Pain and Disability”, “Jaw Functional Limitation”, “Fonseca Anamnestic Index” and the reliability of the scale responses was guaranteed.

In the hypothesis tests, the assumptions of normal distribution and variance homogeneity for each group were first examined.

The normal distribution assumption was checked according to kurtosis and skewness values. Levene test was used for the assumption of variance homogeneity.

The mean comparison of the ROM and CVA angle variables, which were found to be compatible with the assumptions, was made by the Independent Samples T Test.

In cases where no compliance was found, Mann Whitney U test was preferred.

In order to compare the rates of FONSECA cases in the study and control groups, Pearson Chi-Sqaure test was preferred because the expected values per cell were of sufficient magnitude.

When a significant difference was observed, paired comparisons were made using the “Bonferroni Adjusted Z-Tests For Column Proportions” module in the SPSS program as post hoc analysis in multiple comparisons.

The significance level was given as 0.05 in all analyzes. (94,95)

4. RESULTS

4.1. Descriptive Statistics of Participants

Table 1. Demographic Statistics

N=129		n	%
Gender	Male	52	40,3
	Female	77	59,7
		Ort.	SS
Age		34,08	9,50
Height		172,09	5,86
Weight		78,57	14,15

52 men and 77 women with a mean age of 34.08 participated in the study.While the average height of the participants was 172.09 ± 5.86, the average weight was 78.57 ± 14.15.

4.2. Trust Statistics

Table 2. Alpha Coefficients for Reliability Analysis of Scales

Scales	N of Items	Cronbach's Alpha
Neck Pain and Disability	20	0,975
Jaw Functional Limitation	20	0,951
Fonseca Anamnestic Index	10	0,882

For a scale, Cronbach's Alpha value in the range of 0.80-0.90 is interpreted as "highly reliable", while it is interpreted as being in the range of 0.90-1.00 as highly reliable (K). Accordingly, it can be said that the internal consistency of the 3 scales used is at a very good level, in other words, the answers collected through the scales are reliable.

4.3. Comparison of Measurements Between NPDS Groups

4.3.1. Comparison of Jaw Functional Limitation Mean Scores Between NPDS Groups

Table 3. Normality and Variance Homogeneity Tests of JFLS Scores

Measure	NPDS	Normality		Levene Test	
		Kurtosis	Skewness	F	P
JFLS-20	Control	1,942	1,548	,147	0,702
	Experiment	1,670	1,374		

Kalaycı (2018: 6) stated that the coefficients of skewness-kurtosis being in the ± 3 range can be evaluated within normality.Accordingly, it can be said that the JFLS values of the control and study groups are normally distributed.

As a result of the Levene test, it is seen that the assumption of variance homogeneity of the groups is provided (p> 0.05.)In the light of this information, t test, which is a parametric method, can be preferred for group comparison.Hypothesis test results are shared in Table 4.

Table 4. Hypothesis Test Results for Comparison of JFLS Averages According to Neck Pain and Disability Status

Measure	NPDS	n	Mean	SD	t	df	P
JFLS	Control	65	21,14	28,17	-,956	127	0,341
	Experiment	64	25,81	27,35			

Independent Samples T Test

According to the results of the t test, there is no statistically significant difference between the CFLS averages of the control and study groups (t = -0.956, p = 0.341> 0.05).

Accordingly, no significant relationship was found between neck pain and disability and jaw functional limitation.

4.3.2.Comparison of FONSECA Group Proportions Between Groups

Table 5. FONSECA * NPDS Crosstabs Results

			FONSECA				χ^2	sd	P
			None	**Mild**	**Moderate**	**Severe**			
NPDS	Control	**n**	**15_a**	30_a	15_a	5_a	13,171	3	0,004*
		%	**23,1%**	46,2%	23,1%	7,7%			
	Experiment	**n**	**2_b**	29_a	24_a	9_a			
		%	**3,1%**	45,3%	37,5%	14,1%			

Pearson Chi-Square Test

*significant at the 0,05 level

Each subscript letter denotes a subset of FONSECA categories whose row proportions do not differ significantly from each other at the ,05 level.

According to the results of the hypothesis tests;

There is a statistically significant difference between the distribution rates of the FONSECA groups within the control and study groups. ($\chi2$ = 13.171, p = 0.004 <0.05). Accordingly, there is a relationship between neck disability and temporomandibular joint disorders.In the post hoc analysis conducted to see which level groups the difference seen as a result of the chi-square analysis stemmed from, the rate of individuals without temporomandibular joint disorder in the control group (23.1%) was statistically higher than the rate in the study group (3.1%).

A part from this, there was no statistically significant difference between the control and study groups for the rates of people with mild, moderate and severe discomfort (p> 0.05).

4.3.3.Comparison of Central Tendencies of Cervical Active Joint Range of Motion Measurements Between NPDS Groups

Table 6. Normality and Variance Homogeneity Tests for ROM Measurements

Measure	NPDS	Normality		Levene Test	
		Kurtosis	Skewness	F	P
Flexion	Control	2,846	-1,380	0,259	0,611
	Experiment	-,782	-,126		
Extansion	Control	,080	-,783	1,663	0,200
	Experiment	-,585	-,588		
Lateral Flexion Right	Control	-,814	-,274	,534	0,466
	Experiment	-,975	-,082		
Lateral Flexion Left	Control	,326	-,791	1,580	0,211
	Experiment	-,348	-,416		
Rotation Right	Control	19,615	-3,422	0,009	0,926
	Experiment	-,396	-,407		
Rotation Left	Control	-,796	-,763	12,182	0,001

When Table 6 is examined, it is seen that the "rotation right" variable is not normally distributed in the control group and the "rotation left" variable does not provide the assumption of variance homogeneity.

For this reason, comparison of the values of these 2 measurements between groups was carried out with the non-parametric Mann Whitney U test.

On the other hand, Independent Samples T test was used to compare Flexion, Extansion, Lateral Flexion Right and Lateral Flexion Left variables, which provided parametric test assumptions.The values obtained are shared in Table 7.

Tablo 7. Hypothesis Test Results for Comparison of Central Tendency Measures of ROM Measurements According to Neck Pain and Disability Status

Measure	NPDS	n	Mean	Std. Deviation	Median	Test Value	df	p
Flexion	**Control**	65	41,89	3,032	43,00	3,762 [a]	127	0,000*
	Experiment	64	39,81	3,246	40,00			
Extansion	**Control**	65	64,42	4,264	66,00	1,345 [a]	127	0,181
	Experiment	64	63,33	4,902	64,50			
Lateral Flexion Right	**Control**	65	40,65	3,033	41,00	1,585 [a]	127	0,116
	Experiment	64	39,77	3,274	39,50			
Lateral Flexion Left	**Control**	65	42,00	2,312	43,00	3,518 [a]	127	0,001*
	Experiment	64	40,44	2,719	41,00			
Rotation Right	**Control**	65	74,34	5,212	76,00	1734,00 [b]		0,102
	Experiment	64	73,55	4,178	74,00			
Rotation Left	**Control**	65	75,00	3,482	76,00	1569,00 [b]		0,015*
	Experiment	64	72,84	4,592	72,00			

a.Independent Samples T Test
b.Mann Whitney U Testi
* 0,05 düzeyinde anlamlı p değeri

When Table 7 is examined, there is a statistically significant difference between the flexion averages of the control and study groups (t = 3.762, p = 0.000 <0.05).

Accordingly, the flexion angle average of the control group (41.89) is higher than the average of the study group (39.81).In addition, there is a statistically significant difference between the lateral flexion left averages of the control and study groups (t = 3.518, p = 0.001 <0.05).

Accordingly, the average lateral flexion left angle of the control group (42.00) is higher than the average of the study group (40.44).

Finally, there is a statistically significant difference between the rotation left medians of the control and study groups (U = 1734.00, p = 0.001 <0.05).

Accordingly, the control rotation left angle median (76.00) is higher than the median of the working group (72.00).As a result of the analysis, no statistically significant difference was found between the extension, lateral Flexion rigth and rotation right averages and medians of the control and study groups (p> 0.05).

In these measurements, it cannot be said that there is a change according to the NPDS status of the people.

4.3.4. Comparison of Means of Craniovertebral Angle Between NPDS Groups

Table 8. Normality and Variance Homogeneity Tests for CVA Measurements

Measure	NPDS Group	Normality		Levene Test	
		Kurtosis	Skewness	F	P
KVA	Control	1,441	-,094	0,339	0,561
	Experiment	-,190	,572		

When Table 8 is examined, it is seen that the CVA values of the control and study groups are normally distributed and the assumption of variance homogeneity of the groups is also provided. (p> 0.05) T test results are shared in Table 9.

Table 9. Hypothesis Test Results for Comparison of CVA Means According to Neck Pain and Disability Status

Measure	NPDS	n	Mean	SD	t	df	P
CVA	Control	65	51,05	8,85	1,033	127	0,303
	Experiment	64	49,52	7,94			

Independent Samples T Test

According to the results of the t test, no statistically significant difference was found between the mean KVA of the control and study groups. (t = -0.956, p = 0.341> 0.05). Accordingly, there is no significant relationship between neck pain and disability and craniovertebral angle.

5. DISCUSSION AND CONCLUSION

Musculoskeletal pain is a very common problem and is thought to affect the functionality and well-being of the person negatively. (96). Neck pain is known as one of the most common problems affecting the quality of life in different age groups . (97)

The study was planned to interpret the effect of cervical pain on TMD status, jaw functional limitation, craniovertebral angle value, and cervical mobility of individuals.

Results from the study showed that individuals with cervical pain negatively affect their cervical mobility.It also showed that the presence of TMD was higher in individuals with cervical pain.

Temporomandibular joint; as an important joint, it provides functions such as speaking, eating and stretching.Difficulties such as pain, limitation of mouth opening, difficulty in chewing, and noise from the joint in individuals with temporomandibular joint symptoms directly affect the psychosocial state and quality of life of the patient. (98)

It is one of the known facts that there is a connection between the temporomandibular joint and the cervical region.It has been determined that dysfunction in the temporomandibular joint area affects dysfunctions in the cervical region. In addition, dysfunctions in the cervical area affect the masticator area. Due to the proximity of the regions, it can be expected that the functionality and mobility of the cervical region will be affected in individuals with temporomandibular joint dysfunction. (99)

The muscles in the neck area are connected with the muscles surrounding the jaw joint.

There is a possibility that the mobility and head posture of the cervical region may be affected in a problem that occurs around this connection of the mandible. (100)

When the cervical region mobility of the individuals with cervical pain in the study was examined, it was found that the range of motion in the cervical region was more limited compared to the healthy individuals. It was seen that the results of the study were supported by other studies in the literature .

De Laat et al. Compared the cervical mobility of 30 individuals with TMD and 30 healthy individuals in their study.They applied passive segmental mobility test and facet mobility test to evaluate cervical region mobility.As a result of the studies, they stated that the cervical segments were more hypomobile than healthy individuals. (101)

Walczyńska et al. Randomized 60 individuals with temporomandibular joint dysfunction, pain in the cervical region and limitation of movement in the cervical region in two groups.While a program was applied to one group for the treatment of temporomandibular joint dysfunction, placebo treatment was applied to the other group.

As a result of the examinations performed after the treatment, there was an improvement in the pain and limitation of movement in the cervical region of the individuals in the study group.As a outcome of the study, Walczyńska et al. recorded that temporomandibular joint dysfunctions are related to cervical region movements, similar to our study. (102)

It is assumed that TMD affects the head posture, which is caused by TMD affecting the position of the mandible and causing changes in the cervical spine due to increased muscle activity. (103)

In our study, no statistically significant difference was found between the head postures of the group of individuals with cervical pain compared to the group of healthy individuals.

CVA is one of the factors that significantly affects pain in people. Decreased CVA in individuals with FHP results in a forward position of the cervical vertebrae, which, if sustained for a period of time, results in increased load on the extension muscle and surrounding connective tissues. (78)

When comparing participants who experienced pain with normal posture or FHP in previous studies, all participants in this study had FHP, whether painful or painless. (104)

Pain around the neck may result in mechanical limitations in the cervical joint area, which may cause physical limitations in the loss of ROM.However, it has not been confirmed whether FHP affects the range of motion limitations that cause pain. Secondly, variables that may cause pain in the cervical region (with the exception of CVA and ROM) could not be examined separately and so many participants were not included in this study.

More scientific efforts are needed to investigate variables that may affect the development of pain in participants with FHP. (105)

The literature refers to a connection between advanced HP(head posture) and CP, but the scientist using measurements of anatomical landmarks as supply use for prospective HP.

The arguments for a connection appear to be situated on arguments that forward HP can cause the build-up of pressure exerted on physical stimuli and / or pain. Potential pain mediators include stretching of the anterior structures of the neck area, shortening of the posterior muscles, tiredness of the muscles that balance a straight tendency of the head, and intense increase on the cervical joints and vertebral posterior faces. (20,106,107)

Empirical proof of a correlation between Head Posture and Cervical pain is ineffective.For example, advanced HP does not always result in CP, and the relationship between HP, muscle activity, and pain is not clear. . Woodhull et al. (1985) digitally photographed 15 asymptomatic subjects and found that the tragus was displaced (mean ± standard deviation (SD)) as well as 5.9 ± 1.6 cm ahead of the optimal baseline.

Harrison et al. (1996) and McLean (2005) preferred to use plumb aligments to mark the optimal reference aligment.As a result of their study, they found that the tragus deviated (mean ± SD) 8.1 ± 2.6 cm (n = 41).They also claimed that muscle inequality can contribute to neck pain.

Falla et al. (2004) represented that there is a change in the activation of deep part of cervical flexor muscles at reaction to arm movements in individuals with neck pain, and this change occurs as a deviation.They stated that this deviation was also delayed.However, further investigation is needed to investigate whether HP deviations impress imbalance and muscle function between the anterior and posterior muscles, or whether superficial and deep part of muscles are affected.

(108)

Photographs are known as one of the most known techniques that used in research studies to evaluate vectors of neck posture. With regard to the use of photographs, the assumption is made that the exterior landmarks exactly reflect the alignment of the interior structures. Van Niekerk et al, in their study, found that the C7-tragus-horizontal vector taken from photographs and radiographs was selected as the tragus-eye-horizontal vector, and they compared the measurements for the angles between the two vectors in three positions.

The high correlation coefficients found for both angles indicate that the usage of photographs is an alternation to radiographs as an sign of the spherical alignment of the structures. This alternative has been considered valid. In addition to these, the photographs taken are not clearly indicative of the spine structure and alignment.

(109)

Armijo et al. have reviewed in detail possible associations among cervical spine disorders and temporomandibular disorders (TMD). The aim of their study is to seek an answer to the question of whether there is any connection between neck disability (NPDS) values evaluated using JFLS. 154 people participated in this study. All study participants were asked to complete the NDI, JFS, jaw injury checklist, and chronic disability level of TMD (chronic pain degree disability questionnaire in RDC ⁄TMD).A strong correlation was found between neck insufficiency and jaw functionality and cervical pain (r = 0Æ82). A subject with a high level of TMD deficiency (grade IV) increased NDI by approximately 19 points compared to a person without TMD disability. It can be said that these results have implications for clinical practice.In patients with TMD, if there is a problem in the neck as well as jaw insufficiency, the treatment should be applied to both areas as one of them heals and the other can be affected positively. (110)

In our study There is no correlation found between NPDS AND JLFS scores.

There are many links between the cervical spine and the craniofacial region, and the source of pain may vary between the two regions. Facet joints, discs, and cervical spine muscles may reason pain in the craniofacial region. It is still nameless which of these structures known to cause cervical pain plays the most effective role.

In addition, functional status and disability are linked not only on physical signs and symptoms, but also on social and physiological factors. The etiology of disability is thought to be multifactorial.In a study conducted by Scott et al, it was determined that physical and mental status are important agents of disability, as the lifestyle of individuals and environmental factors may be concerned to disability.

If we look at the examples given, we may not have a direct connection in our study, since functionality will not only depend on neck pain. In further studies, it will be useful to examine the neck circumference in more detail, to evaluate the physical and psychological factors in detail, and to create more homogeneous groups, to find more significant correlations and relationships between the two variables. Treatment of a patient with a jaw restriction and neck injury involves a broader management that takes into account the entire craniocervical and mandibular system.

The incidence of temporomandibular disorder is higher in people with neck disability associated to the control group. However, there is no proportional change between the two groups in terms of symptom severity (mild / moderate / severe).

It was found that the Flexion angle , Left Lateral Flexion angle , Left and Left Rotation angles of people with neck disability were smaller than healthy individuals.

No significant relationship was found between neck pain and disability and jaw functional limitation. There is no significant relationship between neck pain and disability and craniovertebral angle.

• Hypothesis 1 is proven ; Temporomandibular dysfunctions of individuals with cervical pain are more than the control group.

• Hypothesis 2 is proven ;The cervical mobility of individuals with cervical pain has decreased compared to the control group.

• Hypothesis 3 ist not proven;The craniovertebral angle values of the individuals with cervical pain decreased compared to the control group.

• Hypothesis 4 is not proven; The jaw functional limitation of individuals with cervical pain is higher than the control group.

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7. APPENDICES

7.1. Appendix1-.Ethical Approval

REPUBLIC OF TURKEY

MARMARA UNIVERSITY

Health Sciences Faculty

Non-interventional Clinical Studies Ethics Committee

NAME OF THE PROJECT	: "Relationship Between Cervical Pain And Temporomandibular Dysfunction Craniovertebral Angle, Jow Functional Limitation And Cervical Mobility"
PRIMARY INVESTIGATOR	: Şule BADILLI DEMİRBAŞ, PhD.
RESEARHERS	: Işıl Ezgi GÜNGÖR
APPROVAL DATE AND NUMBER	: 28/10/2020/62

Dear: Şule BADILLI DEMİRBAŞ, PhD.

Your project titled : "Relationship Between Cervical Pain And Temporomandibular Dysfunction Craniovertebral Angle, Jow Functional Limitation And Cervical Mobility" with the protocol number "62", was reviewed by the Ethics Committee of our Faculty and it was decided unanimously as ethically appropriate.

Prof. Dr. M. Gülden POLAT
Head of Ethics Committee

Prof. Dr. Mehmet TARIM	Prof. Dr. Ayşen GARGILI KELES	Prof. Dr. Şule EGEVEN ALPAR
Prof. Dr. Ş. Burak BEKAROĞLU	Prof. Dr. Zübeyir SARI	Doç. Dr. M. Emin ALŞAHIN
Doç. Dr. Hasibe KADIOGLU	Doç. Dr. Mehmet DEMİRGÖZ BAL	Doç. Dr. Saime EROL
Doç. Dr. Ayşe YILDIZ ÖZER	Doç. Dr. Ayşe KARAKOÇ	Dr. Öğr. Üyesi Murat D. ÇEKİN
Dr. Öğr. Üyesi K. Burcu ÇALIK TÜMERDEM	Dr. Öğr. Üyesi Şule AKTAÇ	Dr. Öğr. Üyesi S. Kumral ÖZÇELİK

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7.2. Appendix 2-ROM &CVA &General Informations

FORMS (DATA / REGISTRATION FORMS / SURVEY FORMS)

HASTA ADI VE SOYADI :

Demografik özellikler anketi

Yaş :

Cinsiyet:

Kilo :

Boy :

Eğitim durumu :

ÜST SERVİKAL EKLEM HAREKET AÇIKLIĞI (ROM) ÖLÇÜMÜ

AÇI DEĞERİ

Flexion :

Extension :

Side flexionright :

Side flexionleft :

Rotationright :

Rotationleft :

KRANİOVERTEBRAL AÇI ÖLÇÜMÜ

	AÇI DEĞERİ
1. ölçüm:	
2.ölçüm:	
3.ölçüm	
Ortalama :	

7.3. Appendix 3-NPDS SCALE 1

Ek.1.

BOYUN AĞRI VE DİSABİLİTE SKORU

Adı, Soyadı : Tarih:

Aşağıda , ağrınızın sizin yaşamınızın ne kadar etkilediğini ölçmek için hazırlanmış çizelgelerle, size uygun olanı işaretleyiniz.

1. Bugün ağrınız ne kadar kötü?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   AĞRI YOK — EN ŞİDDETLİ AĞRI

2. Ağrınız genel olarak ne kadar kötü?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   AĞRI YOK — EN ŞİDDETLİ AĞRI

3. Ağrınız en kötü halinde ne şiddette?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   AĞRI YOK — DAYANILMAZ

4. Ağrınız uykunuza engel oluyor mu?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   HİÇ OLMUYOR — UYUYAMIYORUM

5. Ağrınız ayakta dururken ne kadar kötü?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   AĞRI YOK — EN ŞİDDETLİ AĞRI

6. Ağrınız yürürken dururken ne kadar kötü?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   AĞRI YOK — EN ŞİDDETLİ AĞRI

7. Ağrınız sizi araba sürerken rahatsız ediyor mu?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   HİÇ ETMİYOR — SÜREMİYORUM

8. Ağrınız sosyal faaliyetlerinize engel oluyor mu?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   HİÇ OLMUYOR — HER ZAMAN

9. Ağrınız eğlence(hobi), spor türünden faaliyetlerinize engeloluyor mu?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   HİÇ OLMUYOR — HER ZAMAN

10. Ağrınız mesleki yaşantınızı etkiliyor mu?

   0 |__:__|__:__|__:__|__:__|__:__| 5
   HİÇ ETKİLEMİYOR — ÇALIŞAMIYORUM

7.4. Appendix 4-NPDS SCALE 2

11. Ağrınızkişisel bakım faaliyetlerinize (yemek yeme, giyinme, banyo) engeloluyor mu?

0 | : | : | : | : | : | 5
HİÇ OLMUYOR — HER ZAMAN

12. Ağrınız kişisel ilişkilerinizi (aile içi, arkadaş, cinsel v.b.) etkiliyor mu?

0 | : | : | : | : | : | 5
HİÇ OLMUYOR — HER ZAMAN

13. Ağrınız gelecek ve genel hayata bakışınızı (depresyon, ümitsizlik) ne oranda değiştirdi?

0 | : | : | : | : | : | 5
HİÇ DEĞİŞMEDİ — TAMAMEN DEĞİŞTİ

14. Ağrı duygu ve heyecanlarınızı etkiliyor mu?

0 | : | : | : | : | : | 5
HİÇ ETKİLEMİYOR — TAMAMEN ETKİLYOR

15. Ağrınız düşünce ve konsantrasyonunuzu etkiliyor mu?

0 | : | : | : | : | : | 5
HİÇ ETKİLEMİYOR — TAMAMEN ETKİLYOR

16. Boynunuzda sertlik ne oranda?

0 | : | : | : | : | : | 5
SERTLİK YOK — BOYNUMU OYNATAMIYORUM

17. Boynunuzu çevirirken ne kadar zorlanıyorsunuz?

0 | : | : | : | : | : | 5
SORUN YOK — BOYNUMU OYNATAMIYORUM

18. Yukarı ve aşağı bakarken ne kadar zorlanıyorsunuz?

0 | : | : | : | : | : | 5
SORUN YOK — AŞAĞI VE YUKARI OYNATAMIYOR

19. Baş seviyesinin üzerindeki işleri yapmakta ne kadar zorlanıyorsunuz?

0 | : | : | : | : | : | 5
SORUN YOK — BU TÜR İŞLERİ YAPAMIYORUM

20. Ağrı kesiciler size ne kadar yardımcı oluyor?

0 | : | : | : | : | : | 5
AĞRIM TAMAMEN KESİLİYOR — HİÇ KESİLMİYOR

7.5. Appendix 5-Fonseca Anemnestic Index

Hasta Adı ve Soyadı:

Fonseca Anamnestik İndex

	EVET	BAZEN	HAYIR
1. Ağzınızı açarken zorluk çekiyor musunuz?			
2. Alt çenenizi sağa-sola kaydırırken zorluk çekiyor musunuz?			
3. Çiğneme esnasında kaslarınızda yorgunluk/ağrı oluyor mu?			
4. Sık sık baş ağrınız olur mu?			
5. Ense ağrınız veya boyun tutulmanız oluyor mu?			
6. Kulak veya temporomandibular eklem ağrınız oluyor mu?			
7. Çiğneme veya ağız açma sırasında TME'den herhangi bir klik sesi duyduğunuz oldu mu?			
8. Diş sıkma veya gıcırdatma alışkanlığınız var mı?			
9 Dişerinizin düzgün kapanmadığını hissediyor musunuz?			
10. Kendinizi gergin (asabi) biri olarak görür müsünüz?			

Total Puan :

7.6. Appendix 6 -JFLS-20

Çenenin Fonksiyon Kısıtlanma Skalası – 20

Son bir ay boyunca, aşağıdaki her bir madde için kısıtlanma düzeyini belirtiniz. Eğer çok zor olduğu için aktiviteden tamamen kaçınılıyorsa 10'u daire içine alınız. Eğer aktivite ağrı ya da zorluktan başka bir sebepten dolayı yapılamadıysa boş bırakınız.

		Kısıtlama yok										**Ciddi kısıtlanma**
1.	Sert besin çiğnemek	0	1	2	3	4	5	6	7	8	9	10
2.	Sert ekmek çiğnemek	0	1	2	3	4	5	6	7	8	9	10
3.	Tavuk çiğnemek (ör. fırında hazırlanmış)	0	1	2	3	4	5	6	7	8	9	10
4.	Kraker çiğnemek	0	1	2	3	4	5	6	7	8	9	10
5.	Yumuşak besin çiğnemek (ör. makarna, konserve veya yumuşak meyveler, pişmiş sebzeler, balık)	0	1	2	3	4	5	6	7	8	9	10
6.	Çiğneme gerektirmeyen yumuşak besin yemek (ör. patates püresi, elma sosu, puding, püre yapılmış besin)	0	1	2	3	4	5	6	7	8	9	10
7.	Bütün bir elmayı ısırabilecek kadar geniş açmak	0	1	2	3	4	5	6	7	8	9	10
8.	Bir sandviçi ısırabilecek kadar geniş açmak	0	1	2	3	4	5	6	7	8	9	10
9.	Konuşacak kadar geniş açmak	0	1	2	3	4	5	6	7	8	9	10
10.	Bir fincandan içebilecek kadar geniş açmak	0	1	2	3	4	5	6	7	8	9	10
11.	Yutkunmak	0	1	2	3	4	5	6	7	8	9	10
12.	Esnemek	0	1	2	3	4	5	6	7	8	9	10
13.	Konuşmak	0	1	2	3	4	5	6	7	8	9	10
14.	Şarkı söylemek	0	1	2	3	4	5	6	7	8	9	10
15.	Mutlu bir yüz ifadesi takınmak	0	1	2	3	4	5	6	7	8	9	10
16.	Sinirli bir yüz ifadesi takınmak	0	1	2	3	4	5	6	7	8	9	10
17.	Somurtmak	0	1	2	3	4	5	6	7	8	9	10
18.	Öpüşmek	0	1	2	3	4	5	6	7	8	9	10
19.	Gülümsemek	0	1	2	3	4	5	6	7	8	9	10
20.	Kahkaha atmak	0	1	2	3	4	5	6	7	8	9	10

7.7. Appendix 7-INFORMED CONSENT FORM

BİLGİLENDİRİLMİŞ ONAM FORMU

Araştırmanın Adı: Servikal Ağrı ile Temporomandibular Disfonksiyon, Kraniovertebral Açı,Çene Fonksiyonel Limitasyonu ve Servikal Mobilitenin İlişkisi

Sayın Katılımcı, Yukarıda adı yazılı araştırmaya katılmak üzere davet edilmiş bulunmaktasınız. Bu araştırmada yer almayı kabul etmeden önce, araştırmanın ne amaçla yapılmak istendiğini anlamanız ve bu bilgilendirme sonucunda kararınızı vermeniz gerekmektedir. Aşağıdaki bilgileri lütfen dikkatlice okuyunuz, sorularınız olursa sorunuz ve açık yanıtlar isteyiniz.

Bu araştırma ile **Servikal Ağrı ile Temporomandibular Eklem disfonksiyonları ,Çene fonksiyonel limitasyonu,Servikal mobilite ve Kraniovertebral açı arasındaki ilişkiyi bulmak için değerlendirmeler ve anketler uygulanacaktır.** Araştırma boyun ağrılı bireylerde çene ekleminde ağrı ve fonksiyon bozukluklarını değerlendirmek konusunda,boyun hareketliliğinini tespit etmekte,baş postürünü değerlendirmekte fayda sağlayacaktır .Araştırma için Yeditepe Üniversitesi FTR bölüm başkanlığından izin alınmıştır. Araştırmaya sizin dışınızda 127 kişi daha katılacaktır. Sizden bu çalışmada verilen anketleri doldurmanız ve fizyoterapist tarafından yapılacak boyun eklem hareketlerinin değerlendirilmesine ve baş postürünüzü değerlendirmek için fotoğrafınızın belirli kurallar çerçevesinde değerlendirilmesine müsaade etmeniz istenecektir. Bu işlem yaklaşık 15 dakikanızı alacaktır. Bunun size ve yakınlarınıza hiçbir zararı olmayacaktır.Bu çalışmada herhangi bir medikal uygulama ya da tedavi yapılmayacaktır. Çalışma sadece değerlendirme içerir.Gözlemsel bir çalışma niteliği taşır.Çalışmaya katılmakla parasal yük altına girmeyeceksiniz ve size de herhangi bir ödeme yapılmayacaktır.

Bu araştırmaya katılıp katılmamakta tümüyle özgürsünüz. Gerek duyduğunuz tüm bilgileri istemeye ve doğru, açık, anlaşılır bilgi almaya hakkınız vardır. Araştırmaya katılmayı istemezseniz burada size verilen hizmet olumlu veya olumsuz şekilde etkilenmeyecektir. Gerekli gördüğü takdirde araştırmanın herhangi bir kısmında katılımcı araştırmadan çıkabilir, araştırmacı çalışmayı sonlandırabilir. Araştırmanın tüm aşamalarında kimlik bilgileriniz gizli tutulacaktır. Araştırma kapsamında elde edilen bilgiler bilimsel amaçlarla kullanılabilir gizlilik kurallarına uyulmak kaydıyla sunulabilir ve yayınlanabilir.

Araştırma ile ilgili daha fazla bilgiye ihtiyaç duyarsanız araştırmacıya e-posta adresi veya numaralı telefondan ulaşabilirsiniz.

Yukarıda yer alan ve araştırmaya başlanmadan önce katılımcılara verilmesi gereken bilgileri içeren metni okudum (ya da sözlü olarak dinledim). Araştırma kapsamında elde edilen şahsıma ait bilgilerin bilimsel amaçlarla kullanılmasını, gizlilik kurallarına uyulmak kaydıyla sunulmasını ve yayınlanmasını, hiçbir baskı ve zorlama altında kalmaksızın, kendi özgür irademle kabul ettiğimi beyan ederim.

İmza/Tarih	**İmza/Tarih**
Katılımcının adı soyadı	**Araştırmacının adı soyadı**
	Araştırmacı: Fizyoterapist Işıl Ezgi GÜNGÖR
	Yar.Doç.F.Şule BADILLI DEMİRBAŞ
	(Sorumlu Araştırmacı/Yürütücü)

7.8. Appendix 8 -INSTUTIONAL PERMISSION

10/10/2020

MARMARA ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ FAKÜLTESİ
GİRİŞİMSEL OLMAYAN KLİNİK ARAŞTIRMALAR ETİK KURULU'NA

Yeditepe Üniversitesi nolu yüksek lisans öğrencisi olan Işıl Ezgi Güngör'ün Fizyoterapi ve Rehabilitasyon Anabilim Dalı Yüksek Lisans Programı kapsamında hazırlamakta olduğu

''Servikal Ağrı ile Temporomandibular Disfonksiyon, Kraniovertebral Açı,Çene Fonksiyonel Limitasyonu ve Servikal Mobilitenin İlişkisi ''

konulu tez çalışması için veri toplamak amacıyla ekte yer alan ölçme araçlarını / anket ve uygulama çalışmalarına Yeditepe Üniversitesi Bölüm Başkanlığı olarak laboratuarımızda yapılması hususunda gerekli izinleri vermiş bulunuyoruz.

Gereğini ve bilgilerinizi saygılarımızla arz ederiz.

Prof.Dr.Feryal Subaşı

Yeditepe Üniversitesi Fizyoterapi ve Rehabilitasyon Bölüm Başkanı

İnönü Mah, Kayışdağı Cd. No:326A, 34755 Ataşehir/İstanbul