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EFFECT OF DISC DISPLACEMENT TEMPOROMANDIBULAR JOINT DYSFUNCTION ON THE MAXIMUM ISOMETRIC STRENGTH OF THE CERVICAL RETRACTORS

Reham S.M. Abdel-Mageed *; S.F. Abdelmajeed ** ; H.R. Hassanien * ; S.S.A. Zahran**** and M.M.A. Hegazy *****

* Demonstrator in the department of Physical Therapy for Musculoskeletal Disorders and its Surgery, faculty of Physical Therapy, Cairo University;

** Professor in the department of Physical Therapy for Musculoskeletal Disorders and its Surgery, Faculty of Physical Therapy, Cairo University;

*** Professor of oral and maxillofacial surgery, Faculty of dentistry, Cairo University;

**** Lecturer of Orthopedic Physical Therapy, Faculty of Physical Therapy, Cairo University;

***** Lecturer of Orthopedic Physical Therapy, Faculty of Physical Therapy, Cairo University;

***E-mail- reham92salah@gmail.com**

ABSTRACT

Background: Temporomandibular dysfunction (TMD) is a major and complicated health problem affects 20-25% of the population that affects the temporomandibular joint (TMJ) and muscles of mastication, resulting in pain and disability. **Objective:** to investigate the effect of TMD on cervical retractor muscles maximum isometric strength among adults. **Methodology:** Twenty-two participants of both genders with moderate to severe disc displacement TMDs diagnosed according to revised Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) algorithm (group A) and 22 healthy subjects (group B) who had no problems in the TMJ or facial pain. The pain intensity was assessed by the Arabic version numerical pain rating Scale and the Lafayette Hand held dynamometer was used to assess the isometric muscle strength. **Results:** There was a statistically significant difference between the two groups in the mean value of retractors' force; the disc displacement group had lower retractor strength. **Conclusion:** There is a significant effect of the disc displacement temporomandibular dysfunction on the strength of cervical retractors.

Key Words: Temporomandibular disorders, temporomandibular dysfunction, muscle strength, cervical spine, cervical retractors.

INTRODUCTION

A considerable percentage of population ranged from 20 to 25% has symptoms of TMD **(Ingawale and Goswami, 2009)**. Symptoms of TMDs include pain in the TMJ, periauricular area and/or masticatory muscles. It can disturb social behavior, increase living costs, and limits patient's activities **(De Magalhães *et al.,* 2009 and Durham *et al.,* 2011)**. Individuals with TMD have a lower quality of life and higher levels of depression, anxiety and sleep disturbance **(Conti et al., 2012 ; Dubrovsky *et al.,* 2017 ; Gumay *et al.,* 2017 ; Natu *et al.,* 2018 and Ekici, 2020).**

Common symptoms of TMD are joint pain, clicking, and lateral deviation during opening and limited mouth opening less than 3 finger-widths **(Catanzariti *et al.,* 2005)**. TMD are divided to three subgroups myogenous, disc displacement or internal derangement and articular disorders **(Molinari et al., 2007 ; Tanaka *et al.,* 2008 ; Armijo-Olivo & Magee, 2012 and Poveda-Roda, *et al.,* 2012).** Women have TMD 4 times more than men **(Chisnoiu *et al.,* 2015)**.

The temporomandibular joint is directly connected with the cervical and scapular area through a common neuromuscular system. Afferents of the masticatory system project to the accessory nerve nucleus, which innervates the sternocleidomastoid and trapezius muscles **(Gangloff *et al.,* 2000)**.

Convergence of primary afferents of the first 3 cervical roots with those of the trigeminal within the spinal tract of the trigeminal nucleus and subnucleus caudalis of the medulla. The upper cervical nerves supply the mandibular angle. That means a structural relationship exists between the trigeminal and cervical afferents **(Yin *et al.,* 2007 and Iwata, *et al.,* 2017).**

A pathophysiological link exists between the masticatory system and cervical spine **(Catanzariti *et al.,* 2005)**. Occlusal interference or other masticatory problems may be an underlying factor of some chronic cervical complaints and vice versa **(Yin *et al.,* 2007)**.

Till the author's knowledge very limited number of studies about cervical strength deficits in TMDs patients was founded; only 5 studies have been identified. **Armijo-Olivo *et al.,* 2010 & 2011** found no significant association between maximal cervical flexor strength and TMDs, they stated that studies are required to evaluate other groups' strength such as cervical extensors, rotators, and lateral flexors, and in more severe degree of jaw disability.

MATERIALS AND METHODS:

Design of the Study:

The study design was Cross-sectional study- observational analysis.

Subjects:

According to a pilot study and G power analysis; Twenty two participants of both genders with moderate to severe disc displacement TMDs diagnosed according to revised RDC/TMD algorithm **(Schiffman *et al.,* 2010)** and 22 healthy subjects who had no problems in the TMJ or facial pain. Their age ranged from 18-45. They were assigned to the study groups. Those patients referred to the Department of Oral and Maxillofacial Surgery of the faculty of dentistry, Cairo University and out clinic of the faculty of physical therapy, Cairo University Giza, Egypt at the 21th of December 2021 till 30th January 2022. Each participant signed informed consent before starting the study. The Ethical committee approval number is **(No: P.T.REC/012/003520)**. All subjects signed an informed consent prior to the beginning of assessment for ethical issues. Subjects recruited based on the following inclusion and exclusion criteria:

Inclusive criteria:

1-Participants with myogenic and disc displacement TMD of both genders.

2-Age of participants between (18 - 45) **(Lövgren et al., 2016).**

3- Moderate or severe pain in the masticatory muscles, pain score of ≥3 on the numerical rating scale (NRS**) (Armijo-Olivo et al., 2010)**.

4- Chronic TMJ and or masticatory muscles pain (lasting at least for 3 months) (**Grondin *et al.*, 2015 and Gil-Martínez *et al.*, 2016)**.

5- Body mass index (18:25) **(Armijo-Olivo *et al.*, 2012)**.

Exclusive criteria:

1-Recent acute trauma, previous fracture or major surgery to the TMJ.

2- Active inflammatory cause (rheumatoid arthritis), or previous infection **(Armijo-Olivo *et al.*, 2010)**.

3- Cognitive deficits **(Greghi *et al.*, 2018)**.

4-Severe cervical spine conditions (radiculopathy, acute herniation, degenerative lesion)

5-Recent physical therapy for cervical spine disorder **(Ferreira *et al.*, 2019)**.

6- Systemic disease that is may affect the mobility of the cervical spine such as ankylosing spondylitis **(Greenbaum *et al.*, 2017)**.

7-Posture deformities except mild degrees of forward head posture.

8- Medication intake (analgesics, anti-inflammatory or muscle relaxant drugs).

Instrumentation:

(A)Evaluation instrumentation:

1- Arabic version numerical pain rating Scale (ANPRS):

The Arabic numerical pain rating scale is a valid and reliable scale for measuring pain level; good to excellent reliability (ICC value 0.89) and (SEM 0.71) and (MDC 1.96)**.** The ANPRS was highly correlated (r ¼ 0.93–0.94) with the visual rating scale and verbal rating scale, can evaluate the pain level. **(Alghadir *et al.*, 2016).** The NRS is easy to be administered verbally and is a familiar clinical tool; it has shown an acceptable level of validity for assessing pain intensity **(Bijur *et al.*, 2003 and Miró *et al.*, 2009)**.

2-Hand held dynamometer (HHD):

Hand held dynamometer (Model 01163, Lafayette Instrument Company, Indiana) is an easy device to assess cervical maximal isometric strength in both clinical and research settings, showed good to excellent reliability with ICCs were 0.86 (95% CI, 0.72–0.93) for neck flexion, 0.93 (95% CI, 0.85–0.97) for neck extension, 0.82 (95% CI, 0.65–0.91) for right lateral flexion and 0.73 (95% CI, 0.50–0.87) for left lateral flexion **(Vannebo *et al.*, 2018)**.

The standard error measurement ranged from 0.43 to 1.81 and the MDC from 1.49 up to 4.61 **(De Oliveira *et al.*, 2018).** Intra-rater correlation coefficient (1, 1) of the hand held and isokinetic dynamometer measurements as shown in figure **(1) (Hirano *et al.*, 2020).**

Figure (1): Lafayette Handheld dynamometer

(B)Evaluation Procedures:

1- Assessment of pain intensity:

Patients was asked to record the severity of pain by reporting a number that closely represented it, on a 'horizontal scale'' of 0–10 in Arabic numerals with two ends, the left (0 representing no pain at all) and right (10 representing the worst pain ever) as shown in appendix number **(I)** (**Bijur *et al.*, 2003 and Alghadir *et al.*, 2016).**

2-Assessment of isometric cervical muscle strength using the (HHD):

During assessment of isometric cervical retractors strength, participants assumed the supine position. . To prevent the upper body movement during the test 2 straps was used one placed across the chest at the 6^{th} thoracic vertebrae (T6) level and the anterior superior iliac spine level. One strength test was performed for each direction to avoid the potential for fatigue and recorded in kilogram unit **(Shahidi *et al.*, 2012)**. The dynamometer was resettled before each test. To encourage the participant the examiner said the word push 3 times, the attempt maintained for 5 seconds **(Strimpakos *et al.*, 2004)**.

Participants were positioned in supine with their limbs extended. The HHD was placed below the most prominent area of the occipit. Risers were positioned under the device if required to maintain the patient looking straight up using the nose - ear orientation; the nose perpendicular on the ear lobe. Then they were asked to retract their head and neck into the HHD under the instructions to draw your chin and head down into the plinth as shown in figure **(2) (Tudini *et al.*, 2019)**.

A **B**

Fig. (2): Assessment of isometric strength of cervical retractors; illustrating placement of the straps and HHD (a) without riser and (b) with riser to maintain nose ear alignment.

Statistical analysis:

- One Way ANOVA-test was conducted for comparison of age and BMI between the two groups.
- Fisher exact test was conducted for comparison of sex between the two groups.
- One Way ANOVA was carried out to compare retractors force between the two groups.
- Chi squared test was conducted for comparison of forward head posture distribution between the two groups.
- The level of significance for all statistical tests was set at $p < 0.05$.
- All statistical tests were performed through the statistical package for social studies (SPSS) version 25 for windows. (IBM SPSS, Chicago, IL, USA).

RESULTS

- General characteristics and demographic data of the subjects:

Group A:

Twenty-two subjects with disc lesion were included in this group. Their mean ± SD age and BMI were 25.18 ± 6.44 years and 23.95 ± 1.74 kg/m² respectively. (Table 1).

Group B:

Twenty-two normal subjects were included in this group. Their mean ± SD age and BMI were 23.45 ± 3.07 years and 23.32 ± 1.83 kg/m² respectively. (Table 1).

Comparing the general characteristics of the subjects of the two groups revealed that there was no significance difference between the two groups in age and BMI ($p > 0.05$).

Table 1. Comparison of age and BMI of the group A and B.

	Group A	Group B	F- value	p-value	Sig
	$\bar{X}$ ±SD	$\bar{X}$ ±SD			
Age (years)	25.18 ± 6.44	23.45 ± 3.07	0.83	0.44	NS
BMI (kg/m²)	23.95 ± 1.74	23.32 ± 1.83	0.69	0.5	NS

$\bar{X}$: Mean SD: Standard deviation p value: Probability value NS: Non significant

- Sex distribution:

The sex distribution of the group A revealed that there were 21 (95.5%) females and 1 (4.5%) male. Women have 4 times more signs and symptoms of TMD than men **(Chisnoiu *et al.*, 2015)**.The sex distribution of the group B revealed that there were 20 (91%) females and 2 (9%) males. The sex distribution of the group C revealed that there were 20 (91%) females and 2 (9%) males. There was no significant difference in sex distribution between group A, B, and C ($p = 1$). (Table 2).

Table 2. The frequency distribution and Fisher Exact test for comparison of sex distribution between group A and B.

	Group A	Group B	χ^2 value	p-value	Sig
Females	20 (91%)	20 (91%)	0.61	1	NS
Males	2 (9%)	2 (9%)			

χ^2: Chi squared value p value: Probability value NS: Non significant

- Comparison of retractors' force between group A and B:

The mean value ± SD of retractors' force of group A and B were 4.49 ± 2.29 and 7.8 ± 3.17 kg respectively. There was a significant difference between the two groups in the mean value of retractors' force ($p = 0.0001$). (Table 3).

The mean difference between group A and B was -3.31 kg. There was a significant increase in retractors' force of group C compared with that of group B (p = 0.0001). (Table 3).

Table 3. Comparison of retractors' force between group A and B:

Retractors' force (kg)					
$\bar{X}$ ±SD			F- value	p- value	Sig
Group A		Group B			
4.49 ± 2.29		7.8 ± 3.17	9.42	0.0001	S
Post hoc test (Tukey)					
	MD	p- value		Sig	
Group A vs group B	-3.31	0.001		S	

$\bar{X}$: Mean SD: Standard deviation MD: Mean difference
p value: Probability value S: Significant NS: Non significant

- Association between forward head posture and cervical condition:

14 (64%) subjects of group A had forward head posture and 11 (50%) subjects of group B had forward head posture. There was no significant association between forward head posture and cervical condition (p = 0.65). (Table 4).

Table 4. Association of forward head posture and cervical condition.

	Group A	Group B	χ^2 value	p - value	Sig
Forward head posture	14 (64%)	11 (50%)	0.86	0.65	NS
Normal head posture	8 (36%)	11 (50%)			

χ^2 : Chi squared value p value: Probability value NS: Non significant

DISCUSSION:

The purpose of the study was to assess the effect of chronic disc displacement TMD with moderate to severe pain intensity on the cervical retractors isometric strength. The pain intensity was measured by ANPRS and the isometric strength by the Lafayette HHD. The findings of this study revealed that there was a significant difference between disc displacement TDM and healthy individuals; they had lower retractor muscles strength.

Active trigger points (TrPs) for temporalis, masseter, upper trapezius and sternocleidomastoid and suboccipital muscles which radiate pain to the surrounding structures **(Fernández et al., 2010 and Alonso-Blanco *et al.*, 2012)**.

It also can be explained by central inhibition as; the experimental induced muscle pain is centrally mediated and inhibits maximal isometric force by central mechanisms **(Graven *et al.*, 2002)**. High levels of muscle tenderness in upper trapezius and temporalis muscles correlated with high levels of jaw and neck dysfunction **(Silveira *et al.*, 2015)**. Muscle pain causes a gradual decrease of motor unit firing rates and induces a reflex central inhibitory mechanism **(Farina *et al.*, 2004).**

Also a neural link exists between the neck, jaw, and masticatory muscles all have common neural innervation and closely related anatomical structures **(Speciali and Dach, 2015)**. Nociceptive neurons in the C1 receive excitatory afferent from trigeminal and cervical **(Mørch *et al.*, 2007)**.

The majority of the disc displacement TMD patients had ligamentous laxity and hypermobility. In generalized joint hyperlaxity (GJH); more elastic and fragile connective tissue and it leads to associated with muscle weakness, **(Scheper *et al.*, 2013).** Ligament laxity is associated with deficits in power and proprioception **(Witchalls *et al.*, 2013).**

There is agreement with this study with Individuals with **Shahidi *et al.*, 2012;** they founded that neck pain patients have greater neck disability index (NDI) scores and lower cervical muscles isometric strength**.** The NDI was higher in the moderate/severe TMD. The more dysfunction and pain in the TMJ region, the greater level of the neck dysfunction on some neck functional tests **(von Piekartz *et al.*, 2016)**.

Isometric craniocervical flexion test (CCFT) is impaired in neck pain patients **(O'Leary *et al.*, 2007).** Women with TMDs, showed limited ROM of the flexion and extension, poor deep cervical flexor performance and limited upper cervical spine mobility **(Ferreira *et al.*, 2019)**.

Generalized hyperlaxity syndrome may adversely affect the function of connective tissue. It is the most common cause of chronic pain and one of the most challenging to treat **(Grahame, 2009)**. Hyperlaxity is considered a sort of instability **(Johnson and Robinson, 2010).**

In contrast with this study, **(Armijo-Olivo *et al.*, 2010&2012)** founded that there is no significant difference between mixed and myogenous TMD patients and healthy subjects in the cervical flexor strength.

Limitations

This study has a few limitations. First; this study lacked a blind assessor. Second; the cross-sectional study design (assessment has been done once), adopted in this study. It is required to assess through repeated times to confirm the consistency of the results. There may be variations in test performance across days due to fluctuation of symptom severity. Third; the exclusion of patients with chronic diseases, that we cannot draw any conclusions for those patients

CONCLUSION:

There is a statistically significant effect of the disc displacement temporomandibular dysfunction on the strength of cervical retractors.

Recommendation

It is recommended to investigate the following issues in the future studies:

1- Effect of TMD on the cervical rotator isometric strength.
2- Effect of TMD on the dynamic cervical muscle strength.
3- Replication of the study on the other subgroups of the TMD.
4- Replication of the study on the mild pain intensity level or acute and subacute patients.
5- Cohort type of study and measuring in different situation to confirm the consistency of results and the association between TMD and cervical dysfunction.

REFERENCES:

Alghadir, A.H. ; S. Anwer and Z.A. Iqbal (2016). The psychometric properties of an Arabic numeric pain rating scale for measuring osteoarthritis knee pain. Disability and Rehabilitation, 38(24): 2392-2397.

Alonso-Blanco, C. ; C. Fernández-De-Las-Peñas ; A.I. de-la-Llave-Rincón ; P. Zarco-Moreno ; F. Galán-del-Río and P. Svensson (2012). Characteristics of referred muscle pain to the head from active trigger points in women with myofascial temporomandibular pain and fibromyalgia syndrome. The J. Headache and Pain, 13(8): 625-637.

Armijo-Olivo, S.L. ; J.P. Fuentes ; P.W. Major ; S. Warren ; N.M. Thie, and D.J. Magee (2010). Is maximal strength of the cervical flexor muscles reduced in patients with temporomandibular disorders. Archives of Physical Medicine and Rehabilitation, 91(8): 1236-1242.

Armijo-Olivo, S. and D. Magee (2012). Cervical musculoskeletal impairments and temporomandibular disorders. J. oral & Maxillofac. Res., 3(4): e4.

Armijo-Olivo, S. ; J.P. Fuentes ; B.R. da Costa ; P.W. Major ; S. Warren ; N.M. Thie and D.J. Magee (2010). Reduced endurance of the cervical flexor muscles in patients with concurrent temporomandibular disorders and neck disability. Manual Therapy, 15(6): 586-592.

Armijo-Olivo, S. ; S. Warren ; J. Fuentes and D.J. Magee (2011). Clinical relevance vs. statistical significance: using neck outcomes in patients with temporomandibular disorders as an example. Manual Therapy, 16(6): 563-572.

Bijur, P.E. ; C.T. Latimer and E.J. Gallagher (2003). Validation of a verbally administered numerical rating scale of acute pain for use in the emergency department. Academic Emergency Med., 10(4): 390-392.

Catanzariti, J.F. ; T. Debuse and B. Duquesnoy (2005). Chronic neck pain and masticatory dysfunction. Joint Bone Spine, 72(6): 515-519.

Chisnoiu, A.M. ; A.M. Picos ; S. Popa ; P. D. Chisnoiu ; L. Lascu ; A. Picos and R. Chisnoiu (2015): Factors involved in the etiology of temporomandibular disorders - a literature review. Clujul. Med. 88(4): 473–478.

Conti, P.C.R. ; L.M.S. Pinto-Fiamengui ; C.O. Cunha and A.C.D.C.F. Conti (2012). Orofacial pain and temporomandibular disorders: the impact on oral health and quality of life. Brazilian Oral Res., 26: 120-123.

De Magalhães, B.V. ; P.I. Seraidarian ; M.I. de Souza Côrtes and de L. V. Paula (2009). The impact of orofacial pain on the quality of life of patients with temporomandibular disorder. J. Orofacial Pain, 23(1): 28-37.

De Oliveira, C.A.P. ; D. Bevilaqua-Grossi ; A.I.S. Oliveira ; G.F. Carvalho ; C. Fernández-De-Las-Peñas and L.L. Florencio (2018). Intrarater and inter-rater reliability of maximal voluntary neck muscle strength assessment using a handheld dynamometer in women with headache and healthy women. J. Manipulative and Physiological Therapeutics, 41(7): 621-627.

Dubrovsky, B. ; M.N. Janal ; G.J. Lavigne ; D.A. Sirois ; P.E. Wigren ; L. Nemelivsky and K.G. Raphael (2017). Depressive symptoms account for differences between self-reported versus polysomnographic assessment of sleep quality in women with myofascial TMD. J. Oral Rehabilitation, 44(12): 925-933.

Durham, J. ; J.G. Steele ; R.W. Wassell ; C. Exley ; J.G. Meechan P.F. Allen and M.A. Moufti, (2011). Creating a patient-based condition-specific outcome measure for temporomandibular disorders (TMDs): oral health impact profile for TMDs (OHIP-TMDs). J. Oral Rehabilitation, 38(12): 871-883.

Ekici, O. (2020). Association of stress, anxiety, and depression levels with sleep quality in patients with temporomandibular disorders. CRANIO®, 1-9.

Farina, D. ; L. Arendt-Nielsen ; R. Merletti and T. Graven-Nielsen (2004). Effect of experimental muscle pain on motor unit firing rate and conduction velocity. J Neurophysiology, 91(3): 1250-1259.

Fernández-de-Las-Peñas, C. ; F. Galán-del-Río ; C. Alonso-Blanco ; R. Jiménez-García ; L. Arendt-Nielsen and P. Svensson (2010). Referred pain from muscle trigger points in the masticatory and neck-shoulder musculature in women with temporomandibular disorders. The J. Pain, 11(12): 1295-1304.

Ferreira, M.P. ; C.B. Waisberg ; P.C.R. Conti and D. Bevilaqua-Grossi (2019). Mobility of the upper cervical spine and muscle performance of the deep flexors in women with temporomandibular disorders. J. Oral Rehabilitation, 46(12): 1177-1184.

Gangloff, P. ; J.P. Louis and P.P. Perrin (2000). Dental occlusion modifies gaze and posture stabilization in human subjects. Neuroscience Letters, 293(3): 203-206.

Gil-Martínez, A., Grande-Alonso, M., López-de-Uralde-Villanueva, I., López-López, A., Fernández-Carnero, J., and La Touche, R. (2016). Chronic Temporomandibular Disorders: disability, pain intensity and fear of movement. The journal of headache and pain, 17(1), 1-9.

Grahame, R. (2009). Joint hypermobility syndrome pain. Current Pain and Headache Reports, 13(6): 427-433.

Graven-Nielsen, T. ; H. Lund ; L. Arendt-Nielsen ; B. Danneskiold-Samsøe and H. Bliddal (2002). Inhibition of maximal voluntary contraction force by experimental muscle pain: a centrally mediated mechanism. Muscle & Nerve: Official J. American Association of Electrodiagnostic Med., 26(5): 708-712.

Greenbaum, T. ; Z. Dvir ; S. Reiter and E. Winocur (2017). Cervical flexion-rotation test and physiological range of motion–a comparative study of patients with myogenic temporomandibular disorder versus healthy subjects. Musculoskeletal Sci. and Practice, 27: 7-13.

Greghi, S.M. ; A.A. Dos Santos ; C. Bataglion ; G.N. Ferracini ; R. La Touche and T.C. Chaves (2018). Brazilian Portuguese version of the craniofacial pain and disability inventory: cross-cultural reliability, internal consistency, and construct and structural validity. J Oral Facial Pain Headache, 32(4): 389-399.

Grondin, F. ; T. Hall ; M. Laurentjoye and B. Ella (2015). Upper cervical range of motion is impaired in patients with temporomandibular disorders. Cranio, 33(2): 91-99.

Gumay, R.A. ; I. Tanti and H. Koesmaningati (2017). The Relationship between temporomandibular disorders and quality-of-life–related orofacial pain. J. Int. Dental and Med. Res., 10: 677-682.

Hirano, M. ; M. Katoh ; M. Gomi and S. Arai (2020). Validity and reliability of isometric knee extension muscle strength measurements using a belt-stabilized hand-held dynamometer: a comparison with the measurement using an isokinetic dynamometer in a sitting posture. J. Physical Therapy Sci., 32(2): 120-124.

Ingawale, S. and T. Goswami (2009). Temporomandibular joint: disorders, treatments, and biomechanics. Annals of Biomedical Eng., 37(5): 976-996.

Iwata, K. ; M. Takeda ; S.B. Oh and M. Shinoda (2017). Neurophysiology of orofacial pain. Contemporary Oral Medicine, Springer International Publishing, 1-23.

Johnson, S.M. and C.M. Robinson, (2010). Shoulder instability in patients with joint hyperlaxity. JBJS, 92(6): 1545-1557.

Lövgren, A. ; B. Häggman-Henrikson ; C.M. Visscher ; F. Lobbezoo ; S. Marklund and A. Wänman (2016). Temporomandibular pain and jaw dysfunction at different ages covering the lifespan–a population based study. European J. Pain, 20(4): 532-540.

Miró, J. ; E. Castarlenas and A. Huguet (2009). Evidence for the use of a numerical rating scale to assess the intensity of pediatric pain. European J. Pain, 13(10): 1089-1095.

Molinari, F. ; P.F. Manicone ; L. Raffaelli ; R. Raffaelli ; T. Pirronti and L. Bonomo (2007). Temporomandibular joint soft-tissue pathology, I: Disc abnormalities. In Seminars in Ultrasound, CT and MRI, 28(3): 192-204.

Mørch, C.D. ; J.W. Hu ; L. Arendt-Nielsen and B.J. Sessle (2007). Convergence of cutaneous, musculoskeletal, dural and visceral afferents onto nociceptive neurons in the first cervical dorsal horn. European J. Neuroscience, 26(1): 142-154.

Natu, V.P.; A.U.J. Yap ; Su, M. H., N.M. Irfan Ali and A. Ansari (2018). Temporomandibular disorder symptoms and their association with quality of life, emotional states and sleep quality in South-East Asian youths. J. Oral Rehabilitation, 45(10): 756-763.

O'Leary, S. ; G. Jull ; M. Kim and B. Vicenzino (2007). Cranio-cervical flexor muscle impairment at maximal, moderate, and low loads is a feature of neck pain. Manual Therapy, 12(1): 34-39.

Poveda-Roda, R. ; J.V. Bagán ; J.M. Sanchis and E. Carbonell (2012). Temporomandibular disorders. A case-control study. Med Oral Patol Oral Cir Bucal., 17(5): e794-800.

Scheper, M.C. ; J.E. De Vries ; R. De Vos ; J. Verbunt ; F. Nollet and R.H. Engelbert (2013). Generalized joint hypermobility in professional dancers: a sign of talent or vulnerability?. Rheumatol., 52(4): 651-658.

Schiffman, E.L. ; R. Ohrbach ; E.L. Truelove ; T. Feng ; G.C. Anderson ; W. Pan, and J.O. Look (2010). The revised research diagnostic criteria for temporomandibular disorders: methods used to establish and validate revised axis I diagnostic algorithms. J. Orofacial Pain, 24(1): 63.

Shahidi, B. ; C.L. Johnson ; D. Curran-Everett and K.S. Maluf (2012). Reliability and group differences in quantitative cervicothoracic measures among individuals with and without chronic neck pain. BMC Musculoskeletal Disorders, 13(1): 1-11.

Silveira, A. ; I.C. Gadotti ; S. Armijo-Olivo ; D. Biasotto-Gonzalez ; and A.D. Magee (2015). Jaw dysfunction is associated with neck disability and muscle tenderness in subjects with and without chronic temporomandibular disorders. Bio. Med Res. Int., 2015.

Speciali, J. G. and F. Dach (2015). Temporomandibular dysfunction and headache disorder. Headache: The Journal of Head and Face Pain, 55, 72-83.

Strimpakos, N. ; V. Sakellari ; G. Gioftsos and J. Oldham (2004). Intratester and intertester reliability of neck isometric dynamometry. Archives of Physical Medicine and Rehabilitation, 85(8): 1309-1316.

Tanaka, E. ; M.S. Detamore and L.G. Mercuri (2008). Degenerative disorders of the temporomandibular joint: etiology, diagnosis, and treatment. J. Dental Res., 87(4): 296-307.

Tudini, F. ; B. Myers and R. Bohannon (2019). Reliability and validity of measurements of cervical retraction strength obtained with a hand-held dynamometer. J. Manual & Manipulative Therapy, 27(4): 222-228.

Vannebo, K.T. ; V.M. Iversen ; M.S. Fimland and P.J. Mork (2018). Test-retest reliability of a handheld dynamometer for measurement of isometric cervical muscle strength. J. Back and Musculoskeletal Rehabilitation, 31(3): 557-565.

von Piekartz, H. ; A. Pudelko ; M. Danzeisen ; T. Hall and N. Ballenberger (2016). Do subjects with acute/subacute temporomandibular disorder have associated cervical impairments: a cross-sectional study. Manual Therapy, 26: 208-215.

Witchalls, J.B. ; P. Newman ; G. Waddington ; R. Adams and P. Blanch (2013). Functional performance deficits associated with ligamentous instability at the ankle. J. Sci. and Med. Sport, 16(2): 89-93.

Yin, C.S. ; Y.J. Lee and Y.J. Lee (2007). Neurological influences of the temporomandibular joint. J. Bodywork and Movement Therapies, 11(4): 285-294.

تاثير الخلل الوظيفي لانزلاق غضروف مفصل الفك الصدغي علي القوة العظمي للعضلات الساحبه للعنق

ريهام صلاح محمد عبد المجيد* ، سلوى فضل عبد المجيد ، حميده رفاعي حسنين*** ، سماح سعد الموجي زهران****، محمد مصطفي الدسوقي حجازي.**

*معيده بقسم علاج طبيعي لإضطرابات الجهاز العضلي الحركي وجراحتها ، كلية العلاج الطبيعي ، جامعة القاهره.

** أستاذ بقسم علاج طبيعي لإضطرابات الجهاز العضلي الحركي وجراحتها، كلية العلاج الطبيعي، جامعة القاهرة.

*** أستاذ بقسم جراحة الوجه والفكين، كلية طب الأسنان، جامعة القاهرة.

**** مدرس بقسم علاج طبيعي لإضطرابات الجهاز العضلي الحركي وجراحتها، كلية العلاج الطبيعي، جامعة القاهرة.

***** مدرس بقسم علاج طبيعي لإضطرابات الجهاز العضلي الحركي وجراحتها، كلية العلاج الطبيعي، جامعة القاهرة.

الخلفية: تعد مشكلة الخلل الوظيفي لمفصل الفك الصدغي من اهم المشاكل الصحية المعقده حيث انها تصيب نحو 20:25٪ من البشر، وتؤثر علي مفصل الفك وعضلات المضغ و ينتج عنها الألم والوهن. **الهدف:** دراسة تاثير الخلل الوظيفي لمفصل الفك الصدغي علي القوة العظمي للعضلات الساحبه للعنق بين البالغين. **الطريقه:**شارك 22 شخص يعانون من الام بسبب انزلاق العضروف الداخلي لمفصل الفك (محموعة أ) ولقد تم تشخيصهم بواسطة معاير التشخيص البحثي/ لاضرابات الفك الصدغي المعدله واشتملت الدراسه ايضا 22 شخص لا يعانون من اي مشاكل بمفصل الفك او الام بالوجه (مجموعة ب)؛ تتراوح اعمارهم من 18: 45 عام. تم قياس حدة الألم باستخدام النسخة المعربه من مقياس التقييم الرقمي وقياس قوة العضلات باستخدام الدينامومتر لافاييت. **النتائج:** يوجد اختلاف واضح بين المجموعتين في متوسط قوة العضلة الساحبه حيث أن مجموعة الانزياح الغضروفي لديهم قوة عضلية أقل. **الخلاصة:** هناك تأثير قوي لخلل الوظيفي لانزلاق غضروف مفصل الفك الصدغي علي القوة العظمي للعضلات الساحبه للعنق .