

RESEARCH ARTICLE

Levels of Awareness, Current Treatment Trend and Knowledge of Malaysian Physiotherapists in Treating Patients with Temporomandibular Joint Disorder (TMD)

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Abstract:

Temporomandibular disorders (TMD) is a musculoskeletal disorder involving the muscles of masticatory, temporomandibular joint (TMJ) and other associated structures that affect at least a quarter of the general population and the management of TMD are available surgically and non-surgically. In contrast, the most recommended approach would be non-surgical, which is physiotherapy. The main goal of physiotherapy is to regain normal mandibular function. Managing TMD is known to be challenging to practitioners, and knowledge frequently has influenced it. This study aims to investigate the levels of awareness, current treatment trends, and knowledge of Malaysian physiotherapists in treating patients with temporomandibular joint disorder (TMD). A total of 94 physiotherapists in Malaysia participated in this study. A questionnaire consists of four parts related to awareness, knowledge, and treatment approach of TMD distributed via Google form. Overall results showed a fair level awareness and fair level of knowledge among physiotherapists. The current treatment approach of TMD was found to be jaw exercise and manual therapy. There was no significant difference in the qualification of study and the number of years of working as a physiotherapist between the levels of knowledge, awareness, and treatment approach. Based on the findings, it is recommended that physiotherapists to update their knowledge and be more aware of current treatment of TMD regardless of different qualification of study and the different number of years working in clinical settings.

Keywords: Awareness, physiotherapy, temporomandibular joint, temporomandibular joint disorder

1. INTRODUCTION

Temporomandibular disorders (TMD) is a musculoskeletal disorder that involves the muscles of masticatory, temporomandibular joint (TMJ), and other associated structures [1]. Disturbances to these structures would affect the dynamic balance and thus lead to numerous signs and symptoms. The most common symptoms of TMD are a pain of facial, TMJ, masticatory muscles, and headache. TMD would cause a limited range of motion on the jaw, noise at the jaw, and locking of joint [2].

A quarter of the general population would have TMD at some point [3]. There would be roughly 10% of the population experiencing pain in the TMJ; however, only 3.6%-7% will seek treatment [4]. In India, 27.7% of the population is affected by TMD [5]. TMD is most common among people within the age of 20 until 40 years. Also, they often occur in women compared to men [1].

The management for TMD are available surgically and non-surgically. The most recommended approach would be a non-surgical approach. The non-surgical procedures include

education, drug therapy, splint, and physiotherapy. Physiotherapy is most commonly used in the management of TMD. The main goal of physiotherapy is to regain normal mandibular function. This can be achieved by reducing neuromusculoskeletal pain, reduce inflammation, and promote the healing process [3]. Various physiotherapy interventions are available to date such as jaw exercises, ultrasound, laser therapy, manual therapy, and more. The most preferred intervention in the study were jaw exercises, ultrasound, and manual therapy [3].

TMD patients most commonly refer to oral surgeons (62%) for the treatment. The dentist did not refer a patient to a physiotherapist due to a lack of awareness about the benefits of physiotherapy in treating TMD [4]. With fewer cases of TMD in clinical settings, physiotherapists are not able to experience handling TMD cases frequently. The current treatment approach would probably be backdated as they did not keep up to date with current evidence-based practice since they did not practice it at their workplace.

Other than that, fewer TMD cases in clinical settings would probably lead to misdiagnosis or ineffective of the treatment.

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The reason is, TMJ is one of the most complex joints in the human body, and its unique component is associated with muscles and ligaments makes it even more vulnerable to get afflicted by disorders [1]. Thus, physiotherapists need to have an adequate level of knowledge and awareness of TMD to avoid any misdiagnosis and ineffective treatment. A recent study has reported that 69% of physiotherapists did not receive an adequate amount of education related to TMD during their studies [6].

Therefore, the findings from this study provide the overview of current physiotherapist knowledge, awareness, and treatment approaches, which can help educational institutions, researchers or responsible administrative managers emphasise temporomandibular joint disorder learning syllabus to enhance the expertise in current and future physiotherapists.

2. MATERIALS AND METHODS

2.1 Study design

This study design was a cross-sectional study design using a convenient sampling design.

2.2 Inclusion and exclusion criteria

The inclusion criteria are physiotherapists who are currently working in clinical practice and aged between 21-60 years old, while the exclusion criteria are physiotherapists who are practicing abroad.

2.3 Participants

The 94 physiotherapists responded and completed the survey (response rate of 24%). The mean \pm standard deviation of participants' age was 28.9 ± 6.28 . Most of the participants were female 74 (78.7%), and male 20 (21.2%).

2.4 Research instruments

The questionnaire used was a self-administered questionnaire, which was adapted from Francesca questionnaire and from an article by Patil, Iyengar & Ramnik (2016) and Rashid, Matthews and Cowgill (2013).

The questionnaire consisted of four parts in total (A, B, C, and D). Part A was regarding demographic data. Demographic data included the respondent's name, gender, age, number of years in practice, or working as a physiotherapist, qualification of study, and current practice area.

In Part B, the items in this section reflected the respondents' knowledge with regard to TMD. In this session, there was an evaluation of knowledge on etiology, risk factors, signs and symptoms, clinical features that may present in patients with TMD.

Meanwhile, in Part C, there were six items. In this section, each item was provided with two options, either 'YES' or 'NO'. In this part, every respondent ticked the best option according to their experience in conducting an assessment for patients with TMD.

Lastly, Part D was regarding awareness, practice, and perception for each respondent. In this part, the questionnaire was divided into two sections; Section A and Section B. Section A was regarding the awareness. There were seven items under this section, and each item was provided two options, either 'YES' or 'NO'. In this part, every respondent ticked the best option according to their current awareness level on the temporomandibular joint disorder (TMD). Meanwhile, under Section B, there were 14 items altogether. In this section, the options for the answer were divided into five classes, which were never, sometimes, rarely, often, and often. The responses from this section reflected the respondents' practice and perception of clinical practice. Among all 14 items, the first two questions evaluated on experience, whereas the rest were more focused on understanding or reasons behind their practice. These sections also determined the factors that contributed to their clinical factors, for instance, lack of time, lack of counseling skills, or they feel their treatment may not change patient's behavior.

2.5 Data collection

The questionnaire was made available in Google form. It was distributed to all Malaysian physiotherapists via the Malaysian Physiotherapy Association (MPA)'s official Facebook page. The data collection started in August 2019.

2.6 Data analysis

All data analyses were interpreted using Statistical Package for the Social Sciences (SPSS Version 24.0). Descriptive statistical analysis was conducted to report the means (M), standard deviation (SD), and percentages of the related demographic data. Pearson chi-square was used to identify the association of different categories of qualification among Malaysian physiotherapists affects the level of awareness, knowledge, and current treatment trend of TMD, as well as the number of years in practice, affects the level of awareness, knowledge and current treatment trend of TMD.

2.7 Research ethics

This study was conducted with the approval of ethics from the Universiti Teknologi MARA Research Ethical Committee (REC UiTM).

3. RESULTS AND DISCUSSION

3.1 Demographic data

The mean \pm standard deviation of the number of years of working as a physiotherapist was 6.28 ± 6.39 , and the number of working hours each week was 36.61 ± 14.54 . Physiotherapists working in government sector was 38 (40.4%), private sector was 20 (21.3%), semi-private sector was 2 (2.1%), district clinic was 1 (1.1%), private centre was 23 (24.5%) and part-time/locum was 10 (10.6%). Area of the practice of the physiotherapists was the musculoskeletal area which was 79 (84%), paediatrics area was 41 (43.6%), the

cardiopulmonary area was 48 (51.1%), geriatrics area was 63 (67%), the neurological area was 66 (70.2%), and specific health issue area was 23 (24.5). The highest qualification of study earned was a master's degree, which was 1 (1.1%), bachelor's degree was 50 (53.3%), and the diploma was 43 (45.7%).

Physiotherapists who had attended TMJ/TMD related courses were 15 (16%), while 79 (84%) had never participated in any courses related to TMJ/TMD. Physiotherapists who had the experience of treating TMD patients frequently were 5 (5.3%), rarely was 63 (67%), and never was 26 (27.7%). Physiotherapists that have ENT specialist available at their current working place was 45 (47.9%) while 49 (52.1%) have no specialist available at the current working place. Physiotherapists who had received a referral from the dentist/ENT specialist for a patient with TMD problem frequently were 5 (5.3%), rarely was 53 (56.4), and never 36 (38.3). Table 1 shows detailed demographic data and characteristics of all participants.

Table 1: Demographic data and characteristics of participants

Demographic Characteristics (N=94)	Mean	SD	n	Percentage (%)
Age	28.9	6.28		
Gender				
Male			20	21.3
Female			74	78.7
Number of years of working as a physiotherapist	6.28	6.39		
Number of working hours each week	36.61	14.54		
Working sector				
Government			38	40.4
Private			20	21.3
Semi-private			2	2.1
District clinic			1	1.1
Private centre			23	24.5
Part-time/locum			10	10.6
Area of practice				
Musculoskeletal			79	84
Paediatrics			41	43.6
Cardiopulmonary			48	51.1
Geriatrics			63	67
Neurological			66	70.2
Specific health issue			23	24.5
Qualification of study				
PhD			0	0
Master			1	1.1
Bachelor's Degree			50	53.2
Diploma			43	45.7

Had attended any TMD/TMJ specific course

Yes	15	16
No	79	84

Had treated patient with TMD

Frequently	5	5.3
Rarely	63	67
Never	26	27.7

Have ENT specialist available at current working place

Yes	45	47.9
No	49	52.1

Had received a referral from dentist/ENT specialist for a patient with TMD problem

Frequently	5	5.3
Rarely	53	56.4
Never	36	38.3

3.2 The levels of awareness of TMD among Malaysian physiotherapists

The main results obtained from the awareness section showed that the majority of physiotherapists (94.7%) agree that physiotherapy is an effective modality for TMD patients (see Figure 1). A previous study showed that patients with TMD who underwent physiotherapy management had greater improvements in reducing pain and improving range of mouth opening [7]. Most physiotherapists are not designated physiotherapists for TMJ dysfunction (85.1%) and never provide any in-house teaching/training for physiotherapists regarding TMD (79.8%). However, the majority of the physiotherapists prescribe exercise for TMD patients (66%). As for the similarity of TMD symptoms and cervical joint pain, half of the therapists did not know (50%), and slightly more than half (55.3%) did not know how to differentiate the symptoms of both conditions. Physiotherapists should know the similarity of symptoms and how to differentiate so as the previous study had shown that the symptoms of both conditions are influenced by the identical contributing factors and by each other [8].

As for the assessment section in the questionnaire, physiotherapists were asked whether they had assessed TMJ in patients with cervical joint pain. For most of the questions, half of the response was yes, and the other half was the opposite (see Figure 2). TMD had been proven to have an association with cervical joint pain in previous studies. For example, a previous study had significantly shown an improvement of TMD when neck pain is treated and thus proving that TMD and neck pain are related to each other [9]. Thus, it is considered best for the therapist to assess TMJ when treating cervical pain patients.

The practice and perception of TMD section, discussing the benefits of physiotherapy and suggesting to patient ways to reduce TMD impairment, were often acknowledged by

physiotherapists who were 35.1% and 39.4%, respectively (see Figure 3). Also, 39.4 % of physiotherapists often know how to give general advice to patients in managing TMD, and 42.6% often feel confident in suggesting specific physiotherapy modalities to patients. This indicates that physiotherapists recognize their role in managing TMD. Physiotherapists need to recognize their role in managing patients to achieve maximal outcomes since physiotherapy has been proven to be effective in treating TMD in numerous previous studies. However, a percentage of 28.7% rarely know to assess patients with TMD. Since TMD has multifactorial etiology, the diagnosis would need more effort and skills. Therefore, the assessment of TMD could be difficult not only for a physiotherapist but also for dental practitioners [10].

From the survey, physiotherapists rarely admit that lack of time is rarely the reason for not treating TMD patients (33%). They, however, sometimes lack counseling skills in treating TMD patients (42.6%). This could be an indication to include more theory and practical sessions in managing TMD for therapists in training and perhaps a workshop of TMD to be held for therapists currently in practice. A total of 36.2% of therapists claimed they never feel a lack of interest in the TMD treatment approach. This probably can be considered as a positive perception as a therapist should keep up with the current evidence-based regarding the certain condition in order to achieve treatment goals.

A total of 46.8% never felt that treatment would not be beneficial for the patient. The role of physiotherapy has been proven to be one of the effective measures among other conservative treatments of TMD [11]. However, 38.3% of physiotherapists sometimes felt that treatment would not change the patient's behavior. This could be because of a lack of cooperation from patients in continuous exercise at home. A total of 34% of physiotherapists admitted that they sometimes increase their level of assessment knowledge regarding TMD after graduation. A study was done previously found that even general dentist practitioners barely refer textbooks or participate in TMD programs after graduation, resulting in low knowledge regarding TMD [10].

Majority physiotherapists (62.8%) claimed they never promote physiotherapy service with any dentistry or orofacial pain specialist in treating patients with TMD, and 74.5% never collaborated with a dentist or orofacial pain specialists in treating TMD. Physiotherapists might not be aware of the dentist's role in treating TMD. This is contra with a previous study done in Florida, which found half of the participating physiotherapists in the study do refer TMD patients to other practitioners such as dentists and oral surgeons [12]. Another previous study mentioned that physiotherapists should refer patients to dentists, whereas tooth-related pain or dental occlusion problems are related to TMD [4].

The author further stated that dentists could provide a patient with a dental splint if the patient developed parafunction habits. In addition to that, the author stated the management of TMD is difficult as it involves multifactorial etiology and associated with multiple factors; hence a multidisciplinary approach is recommended in treating TMD to achieve the best outcome for the patient.

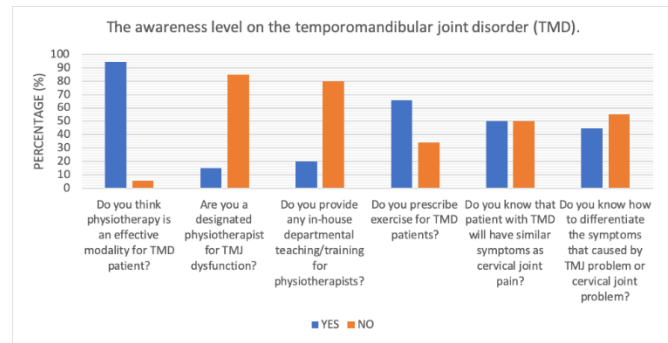


Figure 1: Bar chart of the awareness level on the temporomandibular joint disorder (TMD).

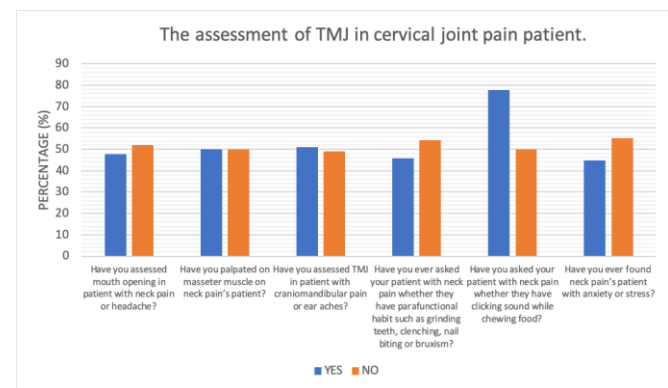


Figure 2: Bar chart of the assessment of TMJ in a cervical joint pain patient.

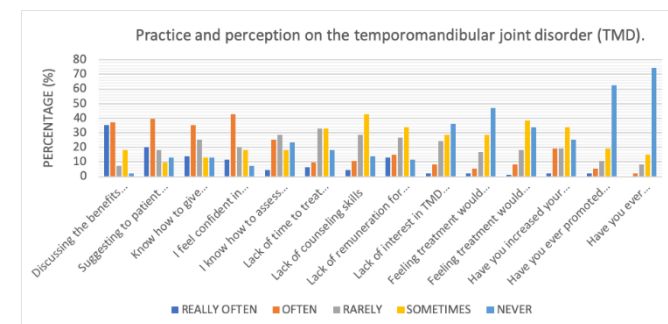


Figure 3: Bar chart of the practice and perception of the temporomandibular joint disorder (TMD).

3.3 The levels of knowledge of TMD among Malaysian physiotherapists

Most physiotherapists have a fair level of knowledge of 56 (59.6%). Secondly, a good level of knowledge with 24 (25.5%). Of the 11 (11.7%) physiotherapists who have a low level of knowledge, and 3 (3.2%) physiotherapists have been categorized as having a high level of knowledge.

This survey results could be aligned with the survey in the demographic part where the majority of physiotherapists answered that they rarely treat patients with TMD (67%). Also, the majority of therapists never participated in any TMD/TMJ course (84%). This could be an indication that

TMD is not being practiced widely in Malaysia. The possibility of a low case number could be the reason for few numbers of physiotherapists practicing this particular field since the prevalence of TMD was known to be roughly 10% of the population, and only 3.6%-7% will seek treatment [4].

Other than that, TMD is known to be hard to diagnosed as it has multifactorial etiology. A previous study mentioned an assessment of TMD knowledge had been done to a group of general dental practitioners (GDP), and findings showed a low level of knowledge, primarily in the etiology domain [10].

3.4 The current treatment trend of TMD among Malaysian physiotherapists

The treatment approach used by the majority was prescription of jaw exercise and manual therapy, which was 52 (55.3%) and 48 (51.1%), respectively (see Figure 4). In a previous study investigating the perceived effectiveness of physiotherapy in the management of patients with TMD among consultants in oral and maxillofacial surgery, jaw exercise and manual therapy were the preferred technique to be prescribed to TMD patients [3]. The author further states that the purpose of both of these techniques is to improve muscle coordination and strength, as well as to relax affected tense muscles. Other reasons why these two techniques were preferred to be used are the time and cost-saving, non-invasive measures, and it can be easily manageable by the patient at home [13].

The treatment approach, most likely not used by physiotherapists in the clinical setting, was acupuncture (94.7%). A study done stated that despite several systematic reviews done had proven the effectiveness of acupuncture in treating TMD, the validity was insufficient due to the poor quality of the primary studies [14]. The author further recommends practitioners to have adequate knowledge and training in performing acupuncture in order to avoid any side effects post-treatment.

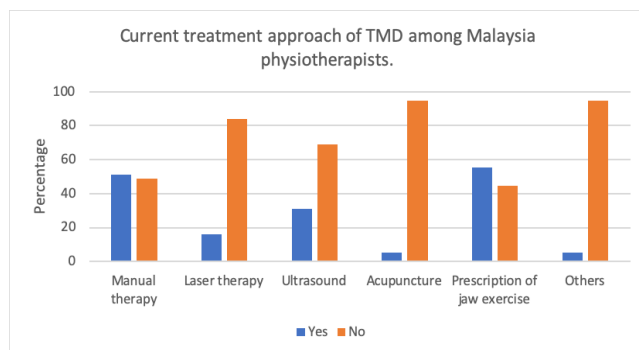


Figure 4: Bar chart of the current treatment approach of TMD among Malaysian physiotherapists.

3.5 Different category of qualification among Malaysian physiotherapists affect the level of awareness, knowledge and current treatment trend of TMD

For all questions asked in the awareness section, almost all the questions showed no significant difference. Awareness level was not influenced by the different qualifications of the study of physiotherapists. For example,

almost all physiotherapists, regardless of varying qualifications of education, do think that physiotherapy is an effective modality for TMD patients. However, one significant difference was found between the different qualifications of study and prescribing exercise for TMD patients ($p=0.046$). This showed different qualification of education has different awareness of prescribing exercise for TMD patients. This might be due to a lack of training and experience in treating patients with TMD. Demographic data showed only 5.3% of physiotherapists frequently treated patients with TMD, whereas the rest rarely do so, and some never did. A previous study showed that half of the participants in the study admitted to having limited clinical experience in treating TMD patients, thus leading to a lack of confidence in treating patients [12].

No significant difference was found between the qualification of study and level of knowledge ($p=0.271$). All physiotherapists possibly received less education of TMD during their study period. A previous study was done to investigate how much TMD content is taught in physiotherapy curricula in the US and found that TMD content is covered in 98.8% of programs, but the hours of study for TMD specifically is insufficient [12].

No significant difference was found between the qualification of study and the current treatment trend. Prior to this study, the assumption was made that different education levels would have different treatment approaches since a higher level of education students are usually trained more to refer research articles to find evidence-based treatment methods. Results showed that manual therapy and jaw exercise are the most chosen by all physiotherapists of various qualification of study. In a previous systematic review, despite the low level of evidence from all the randomized control trials (RCT) gathered, it was found that exercises and manual therapy are beneficial for patients as both treatments are safe and simple to be taught to patients [15].

3.6 Number of years in practice affects the level of awareness, knowledge and current treatment trend of TMD

For all questions asked in the awareness section, almost all the questions showed no significant difference. A significant difference was found between the number of years in practice and the assessment of TMJ in patients with craniomandibular pain or ear aches, which was ($p = 0.013$). A recent study mentioned that a survey of self-perceived adequacy of physiotherapists with entry-level education regarding TMD found that 69% admitted they did not have received enough information on TMD during their study period [6]. TMD is found to have a relationship with neck pathologies, and thus TMJ should be assessed while treating neck pain patients and vice versa [9].

A significant difference was found between the number of years in practice and knowing how to assess patients with TMD ($p=0.022$). More years in practice might have had given physiotherapists more experience in clinical settings. They might have come across more TMD patients than therapists who have been working for lesser years. A similar study was done previously in assessing the knowledge, attitude, and practices of dentists regarding TMD. Results

found that dentists' attitude on TMD was influenced by different years in practice [10].

Other than that, a significant difference was found between the number of years in practice and collaboration with any dentistry or orofacial pain specialist in treating patients with TMD/TMJ dysfunction, which was ($p=0.015$). Physiotherapists who had worked longer might be more aware of collaboration with dentists in treating TMD. A study has been made in Florida to identify whether dentists were aware of physiotherapists' role in treating TMD, and results showed that 74% were not aware [12]. The authors further stated that after the survey, 81% would consider referring TMD patients to a physiotherapist. With dentists and physiotherapists being aware of each other's role in treating TMD, future collaboration can be made more frequently in treating TMD patients. A multidisciplinary approach is suggested to be more beneficial in TMD, according to a few previous studies. For example, a previous study found that physiotherapy aids in relieving pain while dentistry aids in treating the stomatognathic system [16].

No significant difference was found between the number of years in practice and the level of knowledge ($p=0.919$). All physiotherapists possibly received less education of TMD during their study period. A previous study found that 69% of physiotherapists in the study admitted not receiving much education regarding TMD during the study period [12].

No significant difference was found between the number of years in practice and the current treatment trend. Prior to this study, the assumption was made that the longer the physiotherapist worked in clinical settings, they would have more experience and thus would have a different treatment approach. Results showed that manual therapy and jaw exercise are the most chosen by all physiotherapists. In a previous systematic review, despite the low level of evidence from all the randomized control trials (RCT) gathered, it was found that exercises and manual therapy are beneficial for patients as both treatments are safe and simple to be taught to patients [15].

3.7 Limitations of the study

The small sample size with the rate of response is low (24%). More representative results will have been achieved if there is a higher rate of reaction. Other methods of distributing the questionnaire should be considered in order to get a higher response rate. Results obtained might not be generalizable when data were analyzed between the different qualifications of study. Future studies should be recommended to set a minimum of participants for each qualification of study.

4. CONCLUSION

From this study, the majority of the physiotherapists have a fair level of knowledge despite their different qualification of study and number of years working as a physiotherapist. For the levels of awareness, the majority of physiotherapists (94.7%) aware that physiotherapy is an effective modality for TMD patients. However, only half of the majority are aware of TMJ's assessment being interrelated with cervical joint pain. Results also showed the majority of physiotherapists did not have the opportunity to update their

education on TMD after graduation. This study helped to create awareness for physiotherapists regarding TMD. Knowledge regarding TMD has to be updated from time to time. Most of the physiotherapists (74.5%) never have the opportunity to collaborate with dentists in treating TMD patients. This study helped physiotherapists to be aware of the benefit of a multidisciplinary approach. This study also helped identify the current treatment trend of TMD in Malaysia, which are jaw exercise and manual therapy.

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REFERENCES

- [1] Gupta, R., Luthra, R., Kaur, D., & Aggarwal, B., "Temporomandibular disorders: A review." *International Journal of Advanced Scientific Research*, 4(2): 22–26, 2019.
- [2] Peliccioli, M., Myra, R. S., Florianovicz, V. C., & Batista, J. S., "Physiotherapeutic treatment in temporomandibular disorders." *Revista Dor*, 18(4): 355–36, 2017.
- [3] Rashid, A., Matthews, N. S., & Cowgill, H., "Physiotherapy in the management of disorders of the temporomandibular joint - Perceived effectiveness and access to services: A national United Kingdom survey." *British Journal of Oral and Maxillofacial Surgery*, 51(1): 52–57, 2013.
- [4] Gadotti, I. C., Hulse, C., Vlassov, J., Sanders, D., & Biasotto-Gonzalez, D. A., "Dentists' Awareness of Physical Therapy in the Treatment of Temporomandibular Disorders: A Preliminary Study." *Pain Research and Management*, 1–8, 2018.
- [5] Krishna, R., Sharma, A., Agarwal, S., Mishra, S., Khan, S., & Graduate Students, P., "Alternative Therapies in the Treatment of Temporomandibular Disorders." *Journal of Dental & Oro-facial Research*, 15, 2018.
- [6] Prodoehl, J., Kraus, S., Klasser, G. D., & Hall, K. D., "Temporomandibular disorder content in the curricula of physical therapist professional programs in the United States." *Cranio - Journal of Craniomandibular Practice*, 1–13, 2019.
- [7] Ya, K., Mi, B., Jo, N., & Je, Q., "Using physical therapy to treat temporomandibular disorders. A cohort study." *Journal of Dental Science, Oral and Maxillofacial Research*, 1(1): 31–35, 2018.
- [8] Storm, C., & Wänman, A., "Temporomandibular disorders, headaches, and cervical pain among females in a Sami population." *Acta Odontologica Scandinavica*, 64(5): 319–325, 2016.
- [9] Aloosi, S. N., Mohammad, S. M., Qaradakhly, T. A., & O Hasa, S., "Contribution of Cervical Spine in Temporomandibular Joint Disorders: A Cross-Sectional Study." *JBR Journal of Interdisciplinary Medicine and Dental Science*, 04(05), 2016.
- [10] Patil, S., Iyengar, A. R., & Ramneek., "Assessment of knowledge, attitude and practices of dental practitioners regarding temporomandibular joint disorders in India." *Journal of Advanced Clinical & Research Insights*, 3: 64–71, 2016.
- [11] Melis, M., "The role of physical therapy for the treatment of temporomandibular disorders." *Journal of Orthodontic Science*, 2(4): 113, 2013.

- [12] Gadotti, I. C., Lakow, A., Cheung, J., & Tang, M., "Physical therapists' self-perceived adequacy of entry-level education and their current confidence levels with respect to temporomandibular disorders: A pilot study." *Cranio - Journal of Craniomandibular Practice*, 2016.
- [13] Wright, E. F., & North, S. L., "Management and treatment of TMDs: a clinical perspective." *The Journal of Manual & Manipulative Therapy*, 17(4): 247–254, 2009.
- [14] List, T., & Axelsson, S., "Management of TMD: Evidence from systematic reviews and meta-analyses." *Journal of Oral Rehabilitation*, 2010.
- [15] Armijo-Olivo, S., Pitance, L., Singh, V., Neto, F., Thie, N., & Michelotti, A., "Effectiveness of Manual Therapy and Therapeutic Exercise for Temporomandibular Disorders: Systematic Review and Meta-Analysis." *Physical Therapy*, 96(1): 9–25, 2016.
- [16] De Toledo Jr., E. G., Salgado, I. O., Silva, D. P., & De Toledo, J. A., "The interrelationship between dentistry and physiotherapy in the treatment of temporomandibular disorders." *Journal of Contemporary Dental Practice*, 13(5): 579–583, 2012.