Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/18854
DOI URL: http://dx.doi.org/10.21474/IJAR01/18854

RESEARCH ARTICLE

EXPLORING THE INTERPLAY BETWEEN TEMPOROMANDIBULAR JOINT (TMJ) FUNCTIONALITY AND IMPACTED THIRD MOLARS: A SCOPING REVIEW

Gokilla Priya M., Priyadharshini C., Amritha Lenin, Devadarshini Gopinath, Prema Anbarasu and Saravanakumar Subramanian

Manuscript Info

Manuscript History
Received: 10 April 2024
Final Accepted: 14 May 2024
Published: June 2024

Key words:-
TMJ, Impacted Third Molar, TMD, Pain

Abstract

Background: The TMJ and impacted third molars are integral to the masticatory system, yet their specific influence on each other remains a captivating area requiring comprehensive exploration.This scoping review investigates the intricate relationship between impacted third molars and temporomandibular joint (TMJ) functionality.

Methodology: Implemented following the Arksey and O'Malley Framework, a systematic search across PubMed, Scopus, and ProQuest databases to identify studies exploring the relationship between impacted third molars and temporomandibular joint disorders (TMD). Inclusion criteria covered clinical studies, prevalence studies, and randomized control trials, focusing on patients with impacted third molars and TMD.

Results: A rigorous screening process identified 11 relevant studies, including systematic reviews, prevalence studies, and randomized control trials. Key factors influencing TMD outcomes encompassed third molar location, degree of impaction, surgical difficulty, patient demographics, and psychological status.

Conclusions: The intricate interplay between impacted third molars and TMJ functionality, reveals a complex relationship influenced by various factors. Certain types of impaction (Disto-verted), supra-erupted third molars, and extracting specific types (horizontal) of impacted third molars may positively impact TMJ-related symptoms. Further research, particularly randomized clinical trials, is essential to validate these associations and contribute to evidence-based guidelines for TMD management.

Copy Right, IJAR, 2024,. All rights reserved.

Introduction:-

The temporomandibular joint (TMJ) and the dentition are integral components of the complex masticatory system, contributing significantly to oral function and overall well-being [1]. In recent years, a growing body of evidence has suggested a potential interrelationship between the TMJ and impacted third molars, commonly known as wisdom teeth. While the impact of third molars on oral health has been extensively studied, the specific influence on TMJ function is an intriguing area that warrants comprehensive exploration [2].

The TMJ, characterized by its unique combination of hinge and glide movements, plays a crucial role in facilitating diverse functions such as speaking, chewing, and swallowing. Simultaneously, impacted third molars, due to their

Corresponding Author:- Gokilla Priya M.

posterior location and potential for impaction against adjacent structures, have long been associated with various dental complications[3]. The proximity of these molars to the TMJ raises intriguing questions about the potential biomechanical and anatomical implications on TMJ function [4].

Understanding the intricate relationship between the TMJ and impacted third molars necessitates a multifaceted approach. This review aims to amalgamate existing knowledge from dental, orthodontic, and maxillofacial perspectives to shed light on the potential impact of impacted third molars on TMJ function. By synthesizing findings from clinical studies, imaging modalities, and biomechanical analyses, we seek to unravel the complex interactions between these anatomical entities.

As we delve into this exploration, it becomes evident that the influence of impacted third molars on TMJ function extends beyond mere proximity. Various factors, including occlusal changes, inflammatory processes, and adaptive responses, may contribute to alterations in TMJ dynamics. Recognizing the clinical relevance of this interplay is crucial for not only dental and maxillofacial practitioners but also for researchers aiming to enhance our understanding of oral health as a holistic concept.

In this review, we aim to provide a comprehensive synthesis of current literature, delineating the intricate relationship between the TMJ and impacted third molars. Through a nuanced examination of clinical evidence and biomechanical considerations, we aspire to contribute valuable insights that may inform clinical practices, preventive strategies, and future research directions in the realm of oral health.

Review Objective:-

The primary aim of this scoping review is to comprehensively investigate and evaluate existing studies and literature concerning the risk factors associated with temporomandibular joint (TMJ) disorders. The focal point of this examination is the exploration of the intricate relationship between TMJ pain and impacted third molars. In alignment with the scoping review methodology, this study will not include a formal critical appraisal of individual studies. Instead, it will adopt a synthesis approach, collating information from a diverse array of clinical studies, trials, and reviews. By doing so, the review aims to provide clinically relevant insights that contribute to a better understanding of the multifaceted etiologies of TMJ disorders, particularly emphasizing the association between TMJ pain and impacted third molars.

Review Question:

Utilizing the PCC (Population, Concept, Context) framework for scoping reviews, the following review question was formulated:
Population: Clinical patients with impacted third molars.
Concept: Temporomandibular joint disorders (TMD).
Context: Exploration of the relationship between TMJ pain and impacted third molars.

Modified Review Question:

To what extent does the presence of impacted third molars contribute as a risk factor for the development of TMJ pain and disorders in clinical populations?

Materials and Methods:-

The execution and documentation of this scoping review adhered to the Arksey and O'Malleyframework methodology, a recognized approach for conducting scoping reviews. Additionally, we followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines to ensure transparent and comprehensive reporting of our review process. It is to be noted that scoping reviews are not eligible for registration with Prospero.

Inclusion Criteria:

In defining the inclusion criteria for study selection, we utilized the PCC framework alongside considerations for study types:

Population:
Studies involving patients with impacted third molars were included, with no restrictions on gender or age. Impaction classifications considered parameters such as maxillary or mandibular third molar, types of impaction, eruption status, and difficulty of removal.

Table 1:- Comprehensive Search Terms based on the PCC Framework.

Population	Concept	Context
Impacted third molar	TMD	RISK FACTOR
Candidate patient for molar impaction surgery	TMD	RISK FACTOR
Malocclusion	TMD	RISK FACTOR
Pre diagnosed TMD	TMD	RISK FACTOR
Neck pain	TMD	RISK FACTOR
Dentition status	TMD	RISK FACTOR
Boolean Operators 'OR' used between rows, 'AND' between columns		

Concepts:
The focus of inclusion criteria was on understanding various etiologies of temporomandibular disorders (TMD), with a particular emphasis on exploring the impact of impacted third molars on TMD development.

Context:
All relevant information about impacted third molars as a potential risk factor for TMD was considered in this scoping review.

Types of Sources:
Clinical studies, including experimental (uncontrolled prospective interventional studies, controlled trials, and randomized control trials) and observational studies (descriptive case series, analytical case-control, or cohort studies), were eligible for inclusion. The language restriction for studies was set to English to maintain consistency and clarity in the review.

Exclusion criteria:
The exclusion criteria are:
1. Congenital TMJ disorders
2. TMJ pathology (abscess, cyst, osteomyelitis)
3. Jaw injury
4. Habits
5. Orthognathic surgery
6. Condylar displacement (non-working occlusal contact)
7. Dental infections mimicking TMD
8. Animal studies

Search strategy and implementation:
A comprehensive search strategy was meticulously developed for the retrieval of published, ongoing, and unpublished studies, utilizing a combination of controlled vocabulary (MeSH terms) and free-text terms. The search strategyincludes Comprehensive Search Terms based on the PCC Framework provided in Table 1. An information specialist (GP) and one reviewer (PA) collaborated to tailor the search strategy for each database. No restrictions were imposed on publication dates and the search was limited to studies published in the English language.

The initial execution of the search strategy occurred on Sep 20, 2023, and subsequent updates were conductedregularly, maintaining consistency in methodology, search strategy, and information sources. Electronic databases searched included PubMed, Scopus, and Proquest. Additionally, a manual inspection of reference lists from identified studies and other relevant systematic reviews was performed to identify additional studies. Google

Scholar was also searched for comprehensive coverage. Table 2 outlines the search strategy specifically adapted for PubMed.

This rigorous and recurrent search strategy aimed to ensure a thorough retrieval of relevant literature, allowing for a comprehensive synthesis of studies addressing the relationship between impacted third molars and temporomandibular joint disorders.

Table 2:- Search Strategy Adapted for Pubmed.

Search strategy for pubmed	(((((tmj) OR (tmd)) OR (tmj problem))) OR (tmj pain)) AND (third molar)

Data Collection and Analysis

Study Screening and Selection:

After eliminating duplicates, two reviewers (PA and SK) independently assessed the titles of identified articles for eligibility based on predefined inclusion and exclusion criteria. Subsequently, abstracts of potential articles were independently reviewed by the same reviewers. Full texts of articles deemed relevant or potentially relevant were obtained, and eligibility was assessed independently by PA and SK. Disagreements were resolved through discussion.

Data Charting:

Data extraction, aligned with the scoping review methodology, was independently performed by PA and SK using customized forms in Microsoft Excel. The form included fields with predetermined options or free-text boxes. Any discrepancies were resolved through discussion between PA and SK. Authors of studies were contacted for clarification, missing data, or additional information.

Form Refinement and Inter-Rater Reliability:

For training, both reviewers independently charted the first 20 studies, compared their findings, and discussed them for form refinement. Inter-rater reliability was assessed through percent agreement statistics. The refined charting form was utilized for subsequent data extraction.

Screening Process Facilitation:

The screening process was facilitated using the web-based application Rayyan (www.rayyan.ai) which provides details of Excluded studies and Includedstudies thatwere recorded during the full-text screening stage (Fig 1)

This rigorous screening and data charting process ensured a comprehensive and systematic approach to identifying relevant studies, contributing to the synthesis of information regarding the relationship between impacted third molars and temporomandibular joint disorders.

Figure 2 shows the number of studies identified at each stage of the screening process following the original and the updated search processes. It includes the number of Excluded studies, the reason for exclusion, and the number of included studies, that were recorded during the full-text screening stage

Results:-

Results of the search:

Table 3 lists the study characteristics and outcomes of the included studies.

Characteristics of journal of publication:

The journals of publication include Cureus, Journal of medicine, Journal of Oral Health, Journal of Clinical Oral Investigations, Journal of Advanced Medicine and Dental Research, Public Library of Science San Francisco, Journal of Craniomandibular and Sleep Practice, journal of Dental Hypothesis.

Characteristic of specific study type:

Prevalence studies, cohort studies, systematic reviews, randomized control trials.

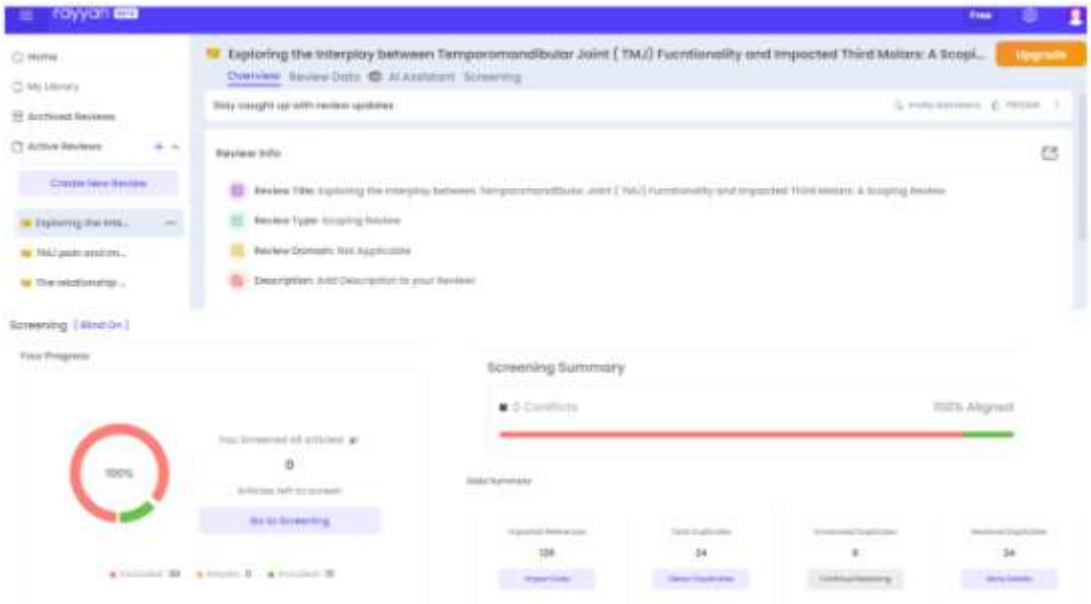

Fig 1:- The screening process facilitation using the web-based application Rayyan.

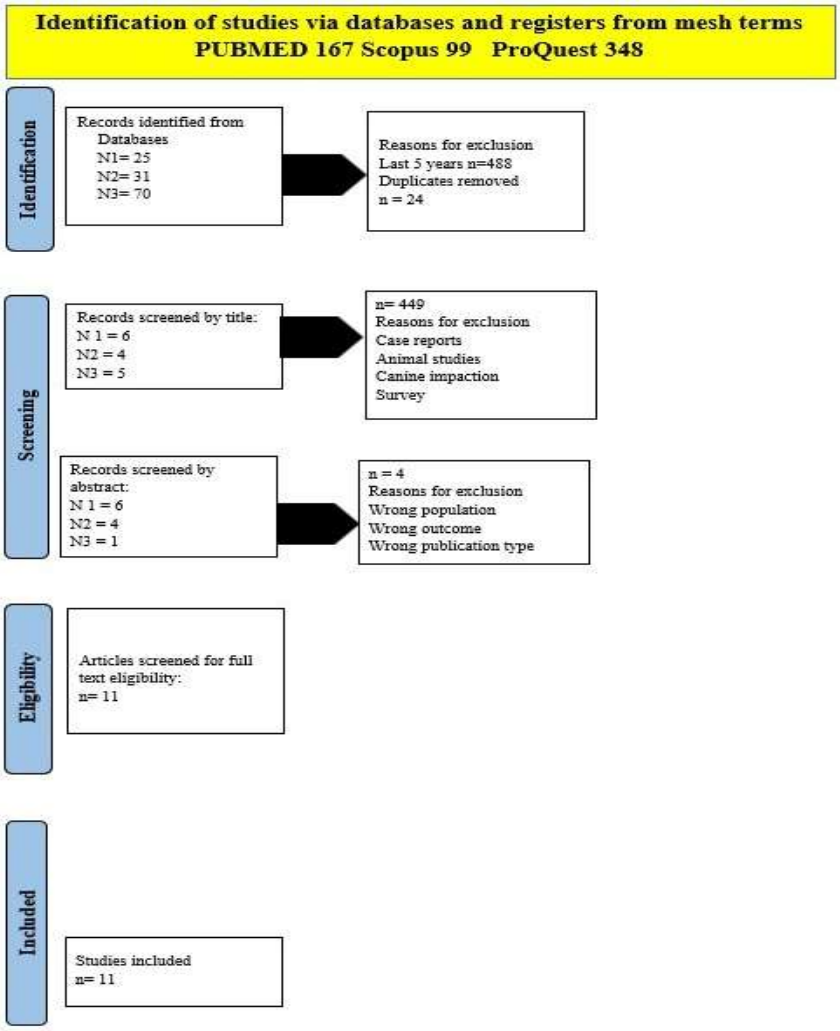

Fig 2:- Prisma Flow Chart.

Table 3:- Study Characteristics and Outcomes of the included studies.

Year Published	Country Study Conducted in	Journal Published (by discipline)	Specific Study Type	Journal	Study characteristics	Main outcome
2020	Brazil	clinical oral investigations	systematic review	Is the extraction of third molars a risk factor for the TMJ disorders?A systematic review	Third molar extraction	TMD can be aggravated according to the third molar location, the degree of impaction and surgical difficulty, age, and gender. This systematic review highlights the need to perform randomized clinical trials with diagnostic criteria and standardized surgical procedures.
2023	portugal	Medicine	prevalence	Prevalence of Clinical Signs and Symptoms of Temporomandibular Joint Disorders Registered in the EUROTMJ Database: A Prospective Study in a Portuguese Center	gender and age	female and pyschological status are associated and development of dc tmd for adolescent patients
2022	India	cureus	randomized control study	The Role of Supraerupted and Distoverted Maxillary Third Molars in the Treatment of Temporomandibular Disorder: A Randomised Controlled Trial	type of impaction	extraction of supra erupted and/or distoverted maxillary third molars is a prerequisite for treating TMD
2023	Canada	Craniomandibular & Sleep Practice	Editorial	The relationship between third molar extractions and TMD: Or is there one?	third molar impaction and extraction	Extraction of the third molar causes TMD
2023	Iran	Dental hypotheses	prevalence	Prevalence of Temporomandibul	Partially or fully	extraction of the

				ar Joint Problems in Candidate Patients for Impacted Third Molar Surgery With and Without the Previous Temporomandibular Disorder.	impacted	third molar is a risk factor for TMD, protocols should be taken to avoid TMJ injuries
2019	Iraq	Oral health	prevalence	Effect of the impacted third molars on the development of temporomandibular joint (TMJ) clicking.	type of impaction	Impacted third molars are not considered to be an effective factor in the occurrence or development of TMJ clicking or sounds.
2019	Iraq	J Korean Assoc Oral Maxillofac Surg	prevalence	Mischievous mandibular third molars camouflaging temporomandibular joint disorders	Type of impaction	type of impacted mandibular third molar is factor in the development of temporomandibular joint
2023	Amritsar	Advanced medicine and dental research	cohort	Evaluation of dentition status and temporomandibular joint disorders in patients with chronic neck and back pain	TMJ pain presented as neck pain	type of impacted mandibular third molar is factor in the development of temporomandibular joint
2021	San Francisco	Public library of Science, San Francisco	prevalence	Revisit incidence of complications after impacted mandibular third molar extraction: A nationwide population-based cohort study	extraction of impacted the third molar	complexity of surgery and history of gingivitis or pericoronitis are the two independent risk predictors associated with DS
2019	Saudi Arabia, Sweden, Netherlands	Oral rehabilitation	cohort	The impact of oro-facial pain conditions on oral health-related quality of life: A systematic review	orofacial pain	third molar extraction is one of the orofacial pain that impacts the quality of life
2022	Amritsar	Advanced medicine and dental research	prevalence	Assessment of dentition status and temporomandibula	TMD	High prevalence of disturbed dental status in patients with tmj

				r joint disorders in patients with chronic neck and back pain		disorders causing neck and back pain

Synthesis of the results:
The synthesis of the results from the provided information suggests a multifaceted relationship between third molar impaction, extraction, and temporomandibular disorders (TMD). Several key factors appear to influence TMD outcomes, including the location of the third molar, the degree of impaction, surgical difficulty, age, gender, and psychological status.

The extraction of third molars is identified as a risk factor for TMD. Protocols should be implemented to minimize the risk of temporomandibular joint (TMJ) injuries during extraction procedures
[5]

TMDs are a group of dysfunctions that affect a considerable part of the population nowadays, mainly younger female patients. In the subjects included in this study, TMDs were shown to be a group of disorders with a broad spectrum of clinical manifestations, pathophysiology, and associated comorbid conditions. Significant associations between TMDs signs and symptoms with intrinsic characteristics, such as age, gender, and parafunctional habits, such as clenching and bruxism, have been made. Risk factors such as wisdom tooth removal, orthodontic treatment, jaw trauma, tracheal intubation, and orthognathic surgery may increase the susceptibility to developing TMDs clinical symptoms. However, more studies are needed to understand such associations. We believe this data will serve as a milestone in providing helpful information for researchers and healthcare providers treating patients with TMDs[6].

Extraction of supraerupted and/or distoverted maxillary third molars in the study group during phase II showed a 96% reduction in TMD when compared to the control group who did not undergo extraction [7].

TMJ pain, often presented as neck pain, is prevalent in patients with disturbed dental status and temporomandibular joint disorders. This suggests a potential connection between dental health and TMD, emphasizing the need for comprehensive assessments in TMD studies [8,9].

In the group with TMD, the click had a significant increase 1 week after the surgery. However, 6 months after the surgery, the incidence of clicks decreased significantly compared to 1 month after the surgery. The reduction in MMO and increase in VAS score in patients with TMD were evident compared to patients without TMD. Furthermore, it seems that the surgical trauma resulting from the removal of the third molars is a predisposing factor for developing TMD[10].

According to this study, impacted third molars were not considered to be an effective factor in the occurrence or development of TMJ clicking or sound, the number of cases with a recent history of TMJ clicking with bilateral partially impacted third molars and in patients with bilateral fully impacted third molars were taken. Distribution of patient's samples showed that the number of cases with TMJ clicking is small as compared with that without TMJ clicking in total dental impaction samples. Therefore, this may give an initial impression that both variables are independent. Hence, statistical analysis was performed here to detect whether there is a relationship between the presence of impacted third molars and development of TMJ clicking. It was conducted by using Pearson's chi-squared test and the value of $P < 0.05$ was considered statistically significant. The statistical analysis showed that no significant relationship was found between the presence of impacted third molars and development of TMJ clicking. This means that the presence of impacted third molars has no effect on TMJ clicking [11].

Oral Health Impact Profile (OHIP) has been used to assess the impact that oral health problems can have on an individual's life. Different theoretical models were proposed to evaluate the results with values ranging from 0-14. Studies were included if they reported Oral Health Impact Profile (OHIP) mean or median domain scores for patients with odontogenic pain, oral mucosal pain/burning mouth syndrome (BMS), third molar extractions, or temporomandibular disorders (TMD). OHIP scale with the highest reported impact for pain after 3rd molar extractions was recorded between 0-8 scale. This review provides standardized information about OHRQoL impact

from four oro-facial pain conditions as a model for the Orofacial Pain dimension. The results show a moderate impact on the pain dimension of OHRQoL in patients with common oro-facial pain conditions[12].

An association of third molar surgery with TMD does not prove causation. However, since there is a higher pre-surgical incidence of TMD in the patients seeking third molar extractions, the importance of including a full temporomandibular joint pre-surgical assessment may lead to a reduced incidence of TMD in this patient population [13]

In the 80 patients, 63.8% (51/80) of TMJ disorders were found in the horizontal group, 46.3% (37/80) in the mesioangular group, 42.5% (34/80) in the distoangular group, and 30.0% (24/80) in the vertical group of impacted mandibular third molars. The study concluded that the type of impacted mandibular third molar is a factor in the development of temporomandibular disorders[14].

Prophylactic surgical extraction of the impacted third molar before the occurrence of gingivitis or pericoronitis is encouraged. However, our results do not find older age patients have higher risks of these complications[15].The prevalence of TMD is high (30%-50%) worldwide.

Discussion:-

The scoping review aimed to explore the association between impacted third molars and temporomandibular joint (TMJ) pain, synthesizing findings from studies identified through a comprehensive search strategy across three databases—PubMed, Scopus, and ProQuest. The search initially yielded a substantial number of articles, with 167 from PubMed, 99 from Scopus, and 348 from ProQuest. After narrowing down the search to the last 5 years, the number of relevant studies decreased to 25 in PubMed, 31 in Scopus, and 70 in ProQuest.

The screening process involved title screening, which further reduced the number of potential studies. After screening titles, 6 studies from PubMed, 4 from Scopus, and 1 from ProQuest were considered for abstract screening. During the screening process, 126 studies were excluded for not being relevant to the mesh terms, 99were excluded for having the wrong study design, and 24 duplicates were removed.

Ultimately, 11 studies were included in the scoping review after the eligibility assessment based on full-text readings. The synthesis of results from these studies highlighted several key aspects of the association between impacted third molars and TMJ pain.

The identified studies in the scoping review presented a diverse landscape in terms of methodologies, populations studied, and outcomes assessed. This heterogeneity emphasizes the need for a comprehensive exploration of the association between impacted third molars and TMJ pain. The synthesis of results from the scoping review and the provided information suggests that TMJ pain is likely influenced by multiple factors, including the location of third molars, degree of impaction, surgical difficulty, patient demographics (such as age and gender), and psychological status. Some studies highlighted the significant benefits of extracting certain types of impacted third molars, such as supra-erupted and distally tilted maxillary molars, This finding underscores the potential role of surgical intervention in managing TMJ-related symptoms. The scoping review identified certain risk factors and predictors associated with TMJ pain after the extraction of impacted third molars[5]. The complexity of surgery, along with a history of gingivitis or pericoronitis, emerged as independent risk predictors for disturbed dental status (DS) following extraction[14]. The findings from this scoping review and the synthesis provide valuable insights for clinicians, suggesting that the extraction of certain types of impacted third molars may have positive effects on TMJ-related symptoms[7]. An association of third molar surgery with TMD does not prove causation. However, since there is a higher pre-surgical incidence of TMD in the patients seeking third molar extractions, the importance of including a full temporomandibular joint pre-surgical assessment may lead to a reduced incidence of TMD in this patient population[13]. However, caution is advised, considering the multifactorial nature of TMJ pain and the identified risk factors.

Third Molar Location and Impaction Type:

The study indicates that the location of the third molar and the type of impaction play crucial roles in TMD outcomes. Extracting supra-erupted and/or distally tilted maxillary third molars is associated with significant benefits, reducing headache and neck pain in TMD patients.

The association between gender and psychological status, particularly in female adolescents, is highlighted as a relevant factor in the development of disc displacement-related TMD. This emphasizes the importance of considering psychological factors in TMD studies, especially among specific demographic groups.[7]

TMJ Pain and Dental Status:
TMJ pain, often presented as neck pain, is prevalent in patients with disturbed dental status and temporomandibular joint disorders. This suggests a potential connection between dental health and TMD, emphasizing the need for comprehensive assessments in TMD studies [8, 9].

Extraction as a Risk Factor:
Third molar extraction can be associated with the development of TMD signs and symptoms. Furthermore, TMD can be aggravated according to the third molar location, the degree of impaction and surgical difficulty, age, and gender. This systematic review highlights the need to perform randomized clinical trials with diagnostic criteria and standardized surgical procedures. Interestingly, risk factors such as wisdom tooth removal, orthodontic treatment, jaw trauma, tracheal intubation, and orthognathic surgery may increase the susceptibility to developing TMDs clinical symptoms. However, more studies are needed to understand such associations. We believe this data will serve as a milestone in providing helpful information for researchers and healthcare providers treating patients with TMDs

The extraction of third molars is identified as a risk factor for TMD. Protocols should be implemented to minimize the risk of temporomandibular joint (TMJ) injuries during extraction procedures [5] horizontal type of impaction is more assosciated with the development of TMD.

Risk Predictors for TMD:
The complexity of surgery and a history of gingivitis or pericoronitis are identified as independent risk predictors associated with disturbed dental status (DS) following the extraction of impacted third molars. This underscores the importance of considering surgical factors and pre-existing conditions in predicting TMD outcomes[15].

There may be a possibility that there were other factors in addition to the impacted third molars may be responsible for the development of TMJ sounds or clicking in spite of the detection of some cases with TMJ clicking [11].

Orofacial Appearance and Psychosocial Impact information, the provided data can serve as framework to put current and future studies using the concept OHRQoL into perspective [12].

Scope for future research:
The synthesis underscores the need for randomized clinical trials with standardized diagnostic criteria and surgical procedures to further investigate and validate the observed associations. This could contribute to a more comprehensive understanding of the factors influencing TMD development and outcomes.

Conclusion:-

This scoping review underscores the intricate interplay between impacted third molars and TMJ functionality, revealing a complex relationship influenced by various factors. Certain type of impaction (Distoverted), supra erupted third molar and extracting certain type (Horizontal) of impacted third molars with female predilection may positively impact TMJ related symptoms, but caution is advised due to multifactorial nature of TMJ pain. Further research, particularly randomized clinical trials, is essential to validate these associations and contribute to evidence – based guidelines for TMD management.

References:-

1.Murphy MK, MacBarb RF, Wong ME, Athanasiou KA. Temporomandibular joint disorders: a review of etiology, clinical management, and tissue engineering strategies. The International journal of oral & maxillofacial implants. 2013 Nov;28(6):e393.
2.Santosh P. Impacted mandibular third molars: Review of literature and a proposal of a combined clinical and radiological classification. Annals of medical and health sciences research. 2015 Jul 21;5(4):229-34.
3. Latt MM, Chewpreecha P, Wongsirichat N. Prediction of difficulty in impacted lower third molars extraction; review literature. M Dent J. 2015;35(3):281-90.

4.Okeson JP. Management of temporomandibular disorders and occlusion-E-book. Elsevier Health Sciences; 2019 Feb 1.
5.Damasceno YS, Espinosa DG, Normando D. Is the extraction of third molars a risk factor for the temporomandibular disorders? A systematic review. Clinical Oral Investigations. 2020 Oct;24:3325-34.
6. Ângelo DF, Mota B, João RS, Sanz D, Cardoso HJ. Prevalence of clinical signs and symptoms of temporomandibular joint disorders registered in the EUROTMJ database: a prospective study in a portuguese center. Journal of Clinical Medicine. 2023 May 18;12(10):3553.
7. Gururaj N, Subramaniyan P, Hasinidevi P, Janani V, Narayanarao G, Subramanian P, Hasinidevi P. The Role of Supraerupted and Distoverted Maxillary Third Molars in the Treatment of Temporomandibular Disorder: A Randomised Controlled Trial. Cureus. 2023 Jun 29;15.
8. Zargar A, Sharma D, Sharma A. Assessment of dentition status and temporomandibular joint disorders in patients with chronic neck and back pain. Journal of Advanced Medical and Dental Sciences Research. 2022 Oct 1;10(10):31-4.
9. Sruthi M, Nawab A, Ahmed SW, Shanthi C, Satheesh T, Soman A. Evaluation of dentition status and temporomandibular joint disorders in patients with chronic neck and back pain. Journal of Advanced Medical and Dental Sciences Research. 2023;11(1):59-62.
10.Mirmohamadsadeghi H, Alavi O, Karamshahi M, Tabrizi R. Prevalence of temporomandibular joint problems in candidate patients for impacted third molar surgery with and without the previous temporomandibular disorder: a prospective study. Dental Hypotheses. 2019 Apr 1;10(2):29-33.
11. Jasim HH. Effect of the impacted third molars on the development of temporomandibular joint (TMJ) clicking. Journal of International Oral Health. 2019 Nov 1;11(6):393-7.
12. Oghli I, List T, Su N, Häggman-Henrikson B. The impact of oro-facial pain conditions on oral health-related quality of life: A systematic review. Journal of Oral Rehabilitation. 2020 Aug;47(8):1052-64.
13. Marangos D. The relationship between third molar extractions and TMD: Or is there one? CRANIO®. 2023 Jul 4;41(4):287-9.
14. Bhardwaj A, Gupta S, Narula J. Mischievous mandibular third molars camouflaging temporomandibular joint disorders. Journal of the Korean Association of Oral and Maxillofacial Surgeons. 2022 Jun 30;48(3):155-8.
15.Chen YW, Chi LY, Lee OK. Revisit incidence of complications after impacted mandibular third molar extraction: A nationwide population-based cohort study. PloS one. 2021 Feb 22;16(2):e0246625.
16. Huang GJ, LeResche L, Critchlow CW, Martin MD, Drangsholt MT. Risk factors for diagnostic subgroups of painful temporomandibular disorders (TMD). Journal of dental research. 2002 Apr;81(4):284-8.
17**.** Huang GJ, Rue TC. Third-molar extraction as a risk factor for temporomandibular disorder. The Journal of the American Dental Association. 2006 Nov 1;137(11):1547-54.
18.De Leeuw R, Klasser GD, editors. Orofacial pain: guidelines for assessment, diagnosis, and management. Hanover Park, IL, USA: Quintessence Publishing Company, Incorporated; 2018.