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Effect of alexithymia and its impact on oral health: a systematic review

<sup>1</sup>Dr. M. Monica Gurupriya, MDS Student, Ragas Dental College, Chennai

<sup>2</sup>Dr . Kiran Iyer, MDS, Reader, Ragas Dental College, Chennai

<sup>3</sup>Dr. P.D. Madankumar, MDS, Professor and Head, Ragas Dental College, Chennai

Corresponding Author: Dr . M. Monica Gurupriya, MDS Student, Ragas Dental College, Chennai

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### Abstract

**Objectives:** Alexithymia has also been found to be related to a poor oral health-related quality of life and dental fear which causes anxiety; the latter could lead to the avoidance of oral health services. The results of earlier studies suggest that alexithymic people may be inclined to report poorer OHRQoL than non-alexithymic people with similar dental health conditions. We aimed to undertake a systematic review of the published literature and scientific evidences with the purpose of knowing the impact of alexithymia on oral health.

**Materials and Methods**: Exposure was limited to those alexithymic trait assessed by TAS questionnaire. Any type of experimental design, investigating outcomes due to alexithymia was included. Outcome was a measure of oral health status among alexithymic individuals.

**Results**: Electronic search of 3 databases, with citation snowballing, identified 175 titles and abstracts. After reading title and abstracts, full texts of 13 articles were obtained for further review. On basis of inclusion and

exclusion criteria 11 articles were included in this systematic review. Among those 2 articles excluded, one article had not used TAS questionnaire to assess alexithymia. Full text of one article was not available on search.

**Conclusions**: The results of this study showed that, those with higher levels of alexithymia were more likely to have a poorer oral health.

**Keywords:** Alexithymia, oral health, depression, periodontitis, glossodynia, burning mouth syndrome, TMJ disorders.

### Introduction

Depression is among the most prevalent chronic disease worldwide. It is a well-established and important risk factor for many systemic conditions; including obesity, sleep disturbance and other chronic diseases. Major depression in the general population has a lifetime prevalence ranging from 10% to 15% with an increased rate in females.[1] According to the World Health Organisation, depression affects people of all ages, from all walks of life and in all countries. In order to make mental health a priority; WHO had focussed on 'Depression' as the World Health Day theme for the year 2017.

Alexithymia, is a personality trait involving difficulties in emotional regulation [difficulties in identifying feelings, difficulties in describing feelings, and externally oriented thinking].[1] In major depression(MD), the rate of alexithymia ranges between 45-46% during the acute phase of illness. Significant relationships have been found between alexithymia and depression in the general population and in clinical samples. In the general population, depressive symptoms explained almost 36% of the variance of alexithymic features and were significantly correlated with all alexithymic dimensions. In clinical samples, some studies observed a decrease in the alexithymia scores with the improvement of symptoms in depression and anxiety.[2]

There are at least two explanations for the observed relationship between alexithymia, anxiety and depression. Alexithymia may be a temporary response to a stressful condition, such as an illness episode; in this view "secondary alexithymia" can represent a defense or a strategy to cope with distress (emotional pain, aversive memories and physiological arousal) associated with a mental disorder. In the second hypothesis, the relationship between alexithymia and depression may represent an artifact of the method and measures used, since, particularly, this is associated with different measures of negative effects. Therefore, individuals with negative emotional states (i.e. anxiety and depression) might score higher on the alexithymic dimensions. Alexithymia, can be more a measure of negative affect rather than a measure of deficit in the cognitive processing of emotions across different mental disorders.[2]

According to Ricciardi et al. (2015), the prevalence of alexithymia in the general population is approximately 10%. The prevalence of alexithymia in working-age populations is 9%–17% for men and 5%–10% for women. The prevalence figures of alexithymia in older age-groups are notably higher; over 20% or even over 30% in the oldest populations. Besides older age, alexithymia is also associated with male sex, lower socioeconomic status, fewer years of education, single marital status, and poorer perceived health. Therefore, it has been claimed that alexithymia may be a state-dependent phenomenon. Moreover, alexithymia is normally-distributed in the general population in both sexes.[3]

On the other hand, alexithymia has also been associated with several medical conditions, such as inflammatory bowel disease, essential hypertension, migraine, and diabetes mellitus. Health is an essential component of quality of life. A growing trend is to measure the outcomes of healthcare multidimensionally, including the subjective experience of the patient. Health economists require generic (non-disease-specific) single-dimensional utility measures to compare the costs and benefits of treating different diseases. The health-related quality of life (HROoL) measurement aims to meet these demands. Alexithymia has been associated with a lower overall quality of life (QOL) in the general population, in patients with coronary heart disease, patients with brain injury and in outpatients with depression. A negative association between alexithymia and HRQoL has been found in medically ill patients and in patients with inflammatory bowel disease, breast cancer, and with end-stage renal disease. Alexithymic individuals had lower levels of physical functioning, more limitations due to emotional problems, less energy, poorer emotional wellbeing, poorer social functioning, more pain, and poorer general health than the non-alexithymic persons.[3]

In addition to the general health conditions, oral diseases have also been associated with depression.[1] The result of a systematic review and meta-analyses[1] showed a positive association between depression and oral diseases like dental caries, tooth loss and edentulism in adults and elders.[4] The problem of poor oral hygiene is not limited to the patients suffering from severe mental disorders and presenting limited management skills, but pertains also to patients affected by mild psychiatric disturbances.[5]

According to earlier studies, alexithymia is associated with somatization. Somatizing people report medically unexplained symptoms or amplify symptoms that have organic aetiology. It has been found that, in the elderly, somatization is associated with poorer overall OHRQoL as well as physical pain and functional limitation. This is of particular interest with regard to the self-reporting of OHRQoL. The results of earlier studies suggest that alexithymic people may be inclined to report poorer OHRQoL than non-alexithymic people with similar dental health conditions. Consequently, if not recognized, there is a risk that the alexithymia-related reporting of poorer OHRQoL will have a deleterious effect on the patient– dentist relationship.[6]

Thus, understanding the oral health of alexithymic people can help improve patient-dentist relationship. Since to date there are no studies on the impact of alexithymia on oral health, this article is aimed to review the published literature and scientific evidences with the purpose of knowing the impact of alexithymia on oral health.

#### Materials and methods

#### Design

A systematic review was undertaken using objective and transparent method as per the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, to identify, evaluate and summarize all relevant research findings. The protocol for this review was registered with PROSPERO (International prospective register of systematic reviews). Registration number is: CRD42019121019.

Eligibility criteria

On applying the PICO analysis to the articles searched, the criteria were set as shown below:

#### **PICO** Analysis

- Population People affected with Alexithymia
- Intervention/ Interest- Alexithymia assessed by Toronto Alexithymia Scale (TAS)questionnaire
- Comparison- General population
- Outcome- Oral health status among alexithymic individuals [assessment of Glossodynia by General Health Questionnaire (GHQ), Burning mouth syndrome by Visual Analogue Scale (VAS), TMJ disorders by Facially expressed emotion labelling (FEEL) test, Periodontitis by Clinical attachment level (CAL)].

Based on the inclusion criteria studies that assessed the oral health status of patients affected with alexithymia assessed using TAS/TAS-20/TAS-26 questionnaires formed the study interest. Studies that enrolled individuals above 16 years, which assessed influence of alexithymia on oral health as their primary and secondary objective were included. Studies done from the time of introduction of TAS questionnaire (1994) were only included, which included case control, cohort, cross-sectional study design. All the articles published in English language in the last 23 years from 1995 to 2018 were included.

Exclusion criteria included studies which assessed the effect of alexithymia on general health. Further studies which had participants taking medicines for systemic illness or conditions were excluded. Publications with no abstract and those which were widely out of scope of the study were eliminated. Studies that required translation to English language were excluded.

The studies were sorted on basis of their title and abstract. Finally, those studies in which the abstract fulfilled all inclusion criteria were selected for full-text reading. In those articles in which the study met the eligibility criteria but the information in the abstract was insufficient, full texts of the articles were also obtained. Further literature search was performed based on the bibliography of the selected articles.

#### Search strategy

Relevant studies were included from the period of January 1995 to February 2018 via MEDLINE (PUBMED), COCHRANE and GOOGLE SCHOLAR. A detailed search strategy was developed for MEDLINE through the use of MeSH terms and was revised for Google Scholar and Cochrane. The first set of terms include 'influence of alexithymia', 'oral health' separated by Boolean operator AND. The second set included the term 'impact', 'influence' separated by Boolean operator "OR" 'and the third set included the term 'oral health', 'dental health', 'caries', 'periodontitis', 'gingivitis', 'decay', 'caries', 'quality of life', 'TMJ' separated by Boolean operator OR .

Table 1 depicts the search applied in terms of MeSH terms and search words for each database.

Data searches were done at September 2018 and again at March 2019. Hand searches of reference lists of included studies were conducted to ensure additional relevant references were identified. Where multiple publications reporting on the same study existed in different databases, data from the study were extracted and reviewed only once. Duplication of article was identified using Mendeley software(1.19/2018). Finally 11 articles were selected for data extraction.

#### **Study selection**

Study selection was conducted by two authors who independently screened titles and abstracts against the inclusion/ exclusion criteria and identified relevant papers. Then the same two authors independently reviewed the full text studies unable to be excluded by title and abstract alone. Comparison of papers was completed between the two authors with no disagreements regarding inclusion.

#### Data extraction

The data extraction from final 11 articles was done using a data extraction form. It included the first author name, year of publication of the article, objectives of the study, study design, study population, sampling method, inclusion and exclusion criteria, method of obtaining relevant information (Assessment Tool), type of analyses and results (Table 2).

#### Quality assessment of the included studies

Eleven articles were included in the final analysis of which 7 were case-control studies, 2 cohort studies and 2 descriptive cross sectional studies respectively. Articles included in data extraction were further assessed for quality using Newcastle-Ottawa Quality Assessment Scale(NOS) for case-control and cohort studies and the modified Newcastle-Ottawa scale for descriptive crosssectional studies.

Among the 7 case-control studies assessed by NOS scale, 2 studies [7,8] was of high quality (score >7) and the remaining 5 studies[5,9,10,11,12] was of moderate quality (score 5-7). Each of the 2 cohort studies[13,14] had a score of 3 according to NOS scale indicating low quality studies (score <5). Both descriptive cross-sectional studies[6,15] had a high quality (>7) according to modified NOS scale.

Table 3 shows the quality assessment of the 7 case-control studies, 2 cohort studies and 2 descriptive cross-sectional studies taken for analysis.

#### Results

#### Search results

The search generated a total of 175 articles from three different electronic bases: PUBMED, COCHRANE and GOOGLE SCHOLAR. PUBMED produced 64 articles, COCHRANE produced 1 article and Google Scholar produced 110 articles.

Figure 1 shows the search strategy according to PRISMA guidelines

After reading the title, 13 articles were obtained for further review. On basis of inclusion and exclusion criteria 11 articles were included in this systematic review. Among those 2 articles excluded, one article had not used TAS questionnaire to assess alexithymia. Full text of one article was not available on search. Bibliographical search of the selected articles yielded no eligible study for inclusion.

#### **Main findings**

All the included studies reported alexithymic traits among subjects with Burning Mouth syndrome, periodontitis, temporomandibular disorders, glossodynia and poor oral health related quality of life (OHRQL).

### Assessment tool

All the 11 studies utilized TAS questionnaire to assess alexithymia. The 20-item Toronto Alexithymia Scale (TAS) is a reliable instrument consisting of three subscales assessing alexithymia: subscale (I) assessing the difficulty in identifying feelings; subscale(II) assessing the difficulty in describing feelings; subscale (III) assessing externally oriented thinking and the lack of introspective capacities. A total score of 61 and above indicates an alexithymic state. Scores between 51 and 60 indicate a condition of borderline alexithymia.[5]

In each study TAS was applied along with different questionnaires to assess different oral health conditions. In one study, TAS was applied along with Visual Analogue Scale-VAS [which assesses the patient's health state subjectively using a scale ranging from 0 to 10 with 0 being the worst possible state of health and 10 better] to assess Burning Mouth Syndrome [BMS][13] and with Oral Health Impact Profile [OHIP-14] to assess Oral Health Related Quality of Life [OHRQL][6]. It was used with Facially Expressed Emotion Labelling [FEEL] test as test instrument for Facial Emotion Recognition [FER] which is an applicable tool to detect impairments in emotional processing in patients with Temporomandibular Disorder [TMD][8] and with Experience Sampling Methodology [ESM] to assess pain severity among people with painful TMD[7]. Along with Symptom Checklist [SCL-90-R], it was used as Research Diagnostic Criteria for Temporomandibular Disorders to assess signs of TMD and Research Diagnostic Criteria for Temporomandibular Disorders Questionnaire [RDC-TMD][11].

# Alexithymia and oral health conditions Burning mouth syndrome

A case-control study reported that the TAS-20 score of the BMS group revealed a significantly higher average score and higher prevalence of alexithymic traits. The pain intensity [VAS score] was not related to the TAS-20 score[9]. A cross-sectional study, reported mean VAS for pain as 132mm [range 10-200mm] and for general well-being as 135 [range 53-200]. Fourteen patients were registered with manifestation of alexithymic traits (>73). Two exceeded the cut-off score for non-alexithymic individuals ( $\leq$ 62) and were registered with latent alexithymic traits. The study demonstrated no correlation between alexithymic traits in pain and well-being[13].

#### Glossodynia

Patients with glossodynia scored significantly higher on the TAS than the healthy control subjects[10].

#### Periodontitis

Statistically significant relationship was present between the participant's Clinical Attachment Level(CAL) and their TAS- 20 total score. There were no significant association between the total TAS- 20 and factor scores and age, probing depth, periodontal index, and bleeding on probing[12]. With regard to the correlation between periodontal status and alexithymia, it was demonstrated that 55.2% of depression subjects with alexithymia presented a poor plaque index score versus 12.5% of depression subjects without alexithymia and 15.4% of depression subjects with borderline alexithymia. A significant difference was also found when considering periodontal index, only 17.2% of depression subjects with alexithymia presented an excellent periodontal index, versus 53.8% of depression subjects with borderline alexithymia and 37.5% of depression subjects without alexithymia[5].

#### Temporo-mandibular disorders (TMD)

Patients with temporo-mandibular disorders rated themselves as significantly more alexithymic than did the healthy controls using the TAS-26. Analyses of the three factors of the TAS-26 revealed that the patients had significantly more difficulty 'identifying feelings'. The results of the TAS (I) subscale were highly significant versus controls. However, the TAS (II) subscale ('describing feelings') did not show significant differences between the groups versus controls. Likewise, the TAS (III) subscale ('externally oriented thinking') was not different between patients and controls versus controls[8]. The result of a study comparing 49 painful TMD participants with 52 pain-free controls on alexithymia showed that the two groups did not differ on TAS-20 total, but differed in opposite directions on two facets; DIF (Difficulty Identifying Feelings) was significantly higher, but EOT (Externally Oriented Thinking) was significantly

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lower, in the painful TMD group than controls. The group difference in DIF was completely eliminated, but the painful TMD group continued to have lower EOT scores than controls. TAS-20 scores were correlated with jaw pain severity on 43 participants with painful TMD. The TAS-20 total, DIF, and EOT correlated positively with pain severity[7].

TMD-related symptoms was associated significantly with alexithymia. Alexithymia was also significantly more prevalent among those who reported having tender teeth (p<0.01). According to logistic regression, the probability of alexithymia was significantly positively associated with pain symptoms (p<0.05) and painless TMD-related symptoms (p<0.01)[11].

Alexithymia was moderately to strongly associated with temporomandibular joint pain, frequency and severity of facial pain. TAS- 20 scores  $\geq$ 52 points occurred in 187 subjects (12.5%), TAS- 20 scores  $\geq$ 61 points or alexithymia occurred in 37 subjects (2.5%)[15].

Significantly greater difficulty in speaking was present in alexithymic patients than in other patients[14].

Oral health related quality of life (OHRQL)

Higher DMF index, higher TAS-20 score, as well as higher DIF (Difficulty Identifying Feelings), DDF (Difficulty Differentiating Feelings) and EOT (External Oriented Thinking) scores had statistically significant association with poorer OHRQoL measured by all dichotomous OHIP-14 variables. The associations between all OHIP-14 variables and all alexithymia variables were statistically significant in unadjusted analyses. In adjusted analyses, all associations remained significant (p< 0.001) for TAS- 20, DIF, and DDF, whereas EOT was not significantly associated with any dimension. According to the Poisson regression analyses, all standardized alexithymia variables were statistically significantly (p< 0.001) associated with the continuous OHIP-14 score. In unadjusted analysis, the incidence rate ratio (IRR unadjusted) for the TAS-20 score was 1.49 (95% CI, 1.47–1.51), and in adjusted analysis, the incidence rate ratio (IRR adjusted) for the TAS-20 score was 1.32 (95%CI, 1.30–1.35)[6].

#### Discussion

Several possible explanations have been suggested for the elevation of alexithymia in patients with various health problems. One hypothesis has related alexithymia to the avoidance of the regulation of negative emotions, resulting in increased negative affect, elevated resting sympathetic arousal, and immune impairments, all of which may contribute to the development or exacerbation of somatic disease. Another hypothesis proposed that alexithymia may lead to somatic diseases as a result of behavioral, maladaptive strategies, and unhealthy actions[12]. According to this suggestion, alexithymia may prompt people to engage in behaviors that have a potentially adverse effect on health, such as failing to seek prompt medical assistance when necessary. For all the above reasons, alexithymia may represent a general risk factor for somatic diseases. Alexithymia may contribute to the progression of periodontal disease via psychological, immunological, or behavioral mechanisms, or a combination of these mechanisms. As the development of periodontal disease is related to psychological conditions that alter the host's resistance to periodontopathic bacteria, immune impairment associated with alexithymic features may negatively affect the host's response to periodontal diseases. Alexithymia may increase behaviors that promote periodontal disease, for example, by neglecting oral hygiene or dental care. In addition, the characteristics of alexithymia may lead to a delay between the onset of symptoms and clinical consultation for periodontal diseases and the delay in the treatment of early periodontal lesions may result in disease progression. The features of alexithymia can also worsen the dentist-patient relationship[12]. Scientific evidence also proves there is a significant association between alexithymia and glossodynia[10], temporomandibular disorders[11] and burning mouth syndrome[13].

In the present review, the search based on PRISMA guidelines narrowed down on a set of 7 case-control studies, 2 cohort studies, and 2 descriptive cross sectional studies which suggested the effect of alexithymia on oral health.

Studies have quoted poor oral health status among alexithymic individuals. The reason could be due to a variety of factors influencing in this trait. One publication has associated alexithymia with somatization. Patients with temporomandibular disorders who had possible proximity with somatoform disorders rated themselves as significantly more alexithymic than did the healthy controls using the TAS-26[8].

Alexithymic people may be inclined to report poorer OHRQoL which could lead to the avoidance of oral health services. It was stated that if a person is not able to describe his or her feelings (Difficulty Describing Feelings-DDF), the only way to express emotional distress may be to describe poorer physical and functional states. It is possible that poorer OHRQoL may be associated with difficulties in emotional processing rather than explicitly with objective oral health problems[6].

All the 11 studies assessed different oral health disturbances due to alexithymia. Glossodynia patients were more alexithymic than controls[10], whereas a study reported that a majority of burning mouth syndrome (BMS) patients included were rated as alexithymic and confirmed earlier reports on BMS being associated with anxiety and depression[13]. The results were comparable to the study which confirmed a significant link between BMS with occurrence of alexithymic traits of 79.3% in

BMS subjects compared to 6.9% of controls[9].

In this systematic review, 5 studies reported association between alexithymia and temporomandibular disorders. Alexithymia and depressive mood were positively associated with several pain symptoms and painless TMDrelated symptoms[11]. Alexithymia may help explain variations in pain severity among those with TMD[7]. Patients with temporomandibular disorders rated themselves as significantly more alexithymic than did the healthy controls[8].

One might speculate that because painful TMD is a focal pain disorder that is literally "in one's head", people with painful TMD become less externally focused and instead, attend more internally which is consistent with a study of TAS-20 scores in patients with another focal disorder (migraine headaches) compared to people with systemic, "bodily" pain disorders of rheumatoid arthritis or systemic lupus[7]. Another explanation could be that affect regulation failure, characterising alexithymia, is linked with chronic pain. Empirical studies have confirmed that psychological factors – that is, emotional dysregulation – play an important role in the presence of pain in patients with TMD[14].

Studies reported correlation and association between alexithymia and poor periodontal health respectively[5,12] **Limitation** 

The articles included in this review were different in terms of study design and methods used to assess alexithymia and oral health had high level of heterogeneity. The authors of the included articles have used different scales such as Visual Analogue Scale (VAS) for burning mouth syndrome (BMS), Experience Sampling Methodology (ESM), Facially Expressed Emotion Labelling (FEEL) test, Guidelines by the Academy of Orofacial Pain for Temporomandibular disorders (TMD), Oral Health Impact Profile-14 (OHIP-14) for Oral Health Related Quality of Life (OHRQoL), Plaque Index (PI), Clinical Attachment Level (CAL), Bleeding On Probing (BOP) for periodontitis.

The effect of confounders on the relationship between alexithymia and oral health have been controlled with regression analysis only in five out of eleven studies[6,8,11,14,15]. Alexithymia variables were significantly (p<0.001)associated with the continuous OHIP-14 score[6]. TAS-26 score had a significant influence on the Facially Expressed Emotion Labelling (FEEL) scores[8]. Difficulty Identifying Feeling (DIF) was associated with pain, frequency and severity of facial pain and Externally Oriented Thinking(EOT) was the strongest alexithymia exposure for migraine but associations between Difficulty Describing Feeling (DDF) and pain were uncertain[15]. Physical symptom variable was associated significantly with alexithymia[11]. In a study, when pain was the dependent variable, alexithymia and age were both significant[14]. The remaining studies have not accounted for the effect of confounders. Overall, different studies have confirmed that there is a significant relationship between alexithymia and oral health.

Although the validity of the TAS scale for alexithymia have been shown to be good, one limitation in the present study was that all the alexithymia assessments were selfreports. It may not be possible to make psychiatric diagnostic assessments using questionnaires alone.

Another limitation of this review were the few numbers of articles available associating these issues and the lack of studies about alexithymia itself. This situation points to the need for new studies that seek to understand alexithymia and existing associations and phenomena between it and oral health, in larger series. A better understanding of these two conditions may increase the possibility of diagnosis, leading to more effective approach and appropriate intervention with consequent

improved life quality.

#### Conclusion

The results of this review showed that subjects with alexithymia had higher levels of oral disturbances when compared to non-alexithymic individuals, indicating a higher level of morbidity among those patients.

The recognition of alexithymia among dental patients is important, as it can worsen the dentist-patient relationship, especially among dentally anxious patients. In the future, works including actual effect of alexithymia on oral conditions could improve our further understanding of these relationships. Also, it seems necessary to revise dental health services in favour of the alexithymic individuals.

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## **Legends Figure and Tables**

Table 1: The search applied in terms of MeSH terms and search words for each database.

Database	Search pattern
PubMed	(((influence[All Fields] OR ((impact[All Fields] AND ("alexithymia" [Text word]
	AND ("oral health" [MeSH Term] OR "oral" [Text word] AND "health" [MeSH
	Term]))) OR ("dental health"[Text word] OR (( "dental"[Text word] AND
	"health" [MeSH Term )) OR ("orodental" [All Fields])))
Cochrane	ID Search
	#1 MeSH descriptor: alexithymia
	#2 influence
	#3 impact
	#4 MeSH descriptor: oral health
	#5 dental health
	#6 #1 and #2 or #3
	#7 #4 or #5
	#8 #5 and #6 and #7
Google Scholar	(influence OR impact of "alexithymia" on Oral health OR Dental health)

Table 2: The data extraction from final 11 articles.

Author	Title	Aim	Study design	Inclusion and	Assessment tool	Result
-year			&Subjects	exclusion criteria		
			&Sampling			
			method			
Miyaok	A Psychiatric	To obtain a	Case-	Inclusion	Eysenck Personality	The mean
a et al.,	Appraisal of	psychiatric	control	Age-36-73yrs	Questionnaire(EPQ),	EPQ
1995	"Glossodynia"	profile of	Cases-50	*Pain or burning	General Health	neuroticis
		female patients	female	sensation on	Questionnaire(GHQ),	m score of
		with	outpatients,	surface of tongue,	Toronto Alexithymia	the
		"Glossodynia "	Keio	*Absence of local	Scale(TAS)	patients
			university	or systemic		tended to
			hospital,	diseases		be higher
			Tokyo	*No		and that
			Controls-	administration of		their
			24female	any drugs more		extraversi
			employees	than 4weeks		on score
			of a single	before first		was lower

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			company	attendance.		than those	
						of the	
						control	
						subjects.	
						No	
						significant	
						difference	
						in the	
						mean	
						GHQ	
						score	
						between	
						patients	
						and the	
						controls.	
						Patients	
						were more	
						alexithymi	
						a than	
						controls	
Jerlang,	Burning mouth	To examine the	Cohort	Inclusion	Beck's depression	Majority	
1997	syndrome(BMS	occurrence of	20 women	Age-54-72yrs	inventory,	of patients	
	)and the concept	alexithymic	registered as	Exclusion	Spielberger's state-	included	
	of alexithymia -	traits in a group	BMS	*malignant	trait anxiety scale,	are rated	
	a preliminary	of BMS	subjects.	disease	Toronto alexithymia	as	
	study	subjects		*chronic pain	scale (TAS-26),	alexithymi	
				other than BMS	Pain intensity-VAS	c and	
				*severe physical	score	confirm	
				handicap	Interviewer blinded	earlier	
				*severe		reports on	
				drug/alcohol		BMS	
				abuse/severe		being	
				dementia/hearing		associated	
				problems		with	
						anxiety	(
						2	

						and depression
Ahlberg	Associations of	To analyse	Case-control	Inclusion	Toronto Alexithymia	Both
et al.,	perceived pain	whether	Cases-	Age-42-45	Scale(TAS-20),	alexithymi
2004	and painless	previously	employees	C	Symptom	a and
	TMD-related	emerged pain	in irregular		Checklist(SCL-90-R)	depressive
	symptoms with	0 1	shift(n=750)		· · · · · · · · · · · · · · · · · · ·	mood
	alexithymia and	painless	•			were
	depressive	temporomandib	Controls-			positively
	mood in media	ular	Randomly			associated
	personnel with	disorder(TMD)	selected			with
	or without	symptoms are	controls in			several
	irregular shift	associated with	regular 8-h			pain
	work	alexithymia and	daytime			symptoms
		self-rated	work(n=750			and
		depression	).			painless
		among media				TMD-
		personnel in or				related
		not in irregular				symptoms
		shift work.				in non-
						patient
						working
						personnel.
Glaros	Alexithymia and	To clarify the	Case-control	Inclusion	Toronto Alexithymia	Alexithym
&	pain in	relationship of	Cases-	Age-39-40yrs	Scale(TAS-20),	ia may
Lumley,	temporomandib	global	People with	People diagnosed	Depression subscale	help
2005	ular disorder	alexithymia and	painful	with TMD	SCL-90,	explain
		its facets with	TMD(n=49),	Exclusion	Pain severity -ESM -	variations
		pain, assesses	Control1-	*Evidence of	0-10	in pain
		prospectively	Pain-free	osteoarthritis /		severity
		using	somatic	osteoarthrosis of		among
		experience	controls(n=2	the TMJ.		those with
		sampling	4),	*History of major		TMD, but
		methods(ESMs	Control2-	trauma to the		other

		•••••		•••••		
		),in	Healthy	head/neck		factors are
		temporomandib	controls(n=2	*Current use of		probably
		ular disorders.	8)	intraoral		more
				appliance		important.
				*Active		
				orthodontic		
				treatment		
				*Daily use of any		
				analgesic,		
				antidepressant		
				,muscle relaxant		
				*Any chronic		
				pain condition		
				other than TMD		
Mattila	Difficulties in	To investigate	Cross-	Inclusion	Oral Health Impact	Study
et al.,	emotional	the association	sectional	Age->30yrs	Profile(OHIP-14),	suggest
2012	regulation:	between	Two stage		Toronto Alexithymia	that
	association with	alexithymia and	stratified		Scale(TAS-20)	alexithymi
	poorer oral	OHRQoL.	cluster			c people
	health-related		sample.			may be
	quality of life in		n=8028			inclined to
	the general					report
	population					poorer
						OHRQoL
						than non-
						alexithymi
						c people
						with
						similar
						dental
						health
						conditions
Haas et	Alexithymic and	Study suggest	Case-control	Inclusion	Facially Expressed	Study
al.,	somatisation	dysfunctional	Cases-20	Age-18-65yrs	Emotion	points to a
2013	scores in	emotional	patients with	Patients who	Labelling(FEEL) test,	possible
L	1		1	I	1	

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Importantial key factor in recruited in in the TMD Scale (TAS-26), Screening for TMD and somatofor region for at least Screening for TMD and somatofor correlate with ular TMD controls- Exclusion Symptoms(SOMS- m   disorder disorder(TMD) Healthy Medical Symptoms(SOMS- m disorders.   emotion emotion enotion Controls- Exclusion Symptoms(SOMS- m   emotion enotion controls(30e disorders, mental Questionnaire Hamilton Depression   recognition To evaluate Cohort Inclusion Toronto Alexithymia Study   2013 pain, poor alexithymia and diagnosed "Diagnosed with be accidents, sociatio n between considerin grain, bit op pain severity m between considerin grain, bit op pain severity "TMD a ad pain conditions other the accidents, bit op pain severity "TMD a as a and pain conditions other the and independe the active pain conditions other the active pain condition pain conditions other the active pain conditions other the active pain conditions other the active pain condition pain conditions other the active pain condition pression and pain conditions other the active pain condition pain conditions other the active pain condition pain pain condition pain pain condition pain pain condition pain conditions other the active pain condition pain conditions other the active pain conditio			· · · · · · · · · · · · · · · · · · ·				· • • • • • • • • • • • • •
ularpainthe actiology of temporomanibi orderconsecutive forderregion for at least forderScreeningfor SomatoforTMD and somatoforcorrelatewith deficits in facial deficits in facial emotion recognitiondisorder(TMD) isorder(TMD)Healthy uro paid)Medical disorders, mental uro paid)Symptoms(SOMS- alsorders, mental illness.Suptoms(SOMS- alsorders, mental pating Scale (HAMD- 21)misorders.Mingare Hi et al., partly predicts social difficulties in ular disordersTo evaluateCohort diagnosedInclusionToronto Alexithymia pain, poor alexithymia and its components its components with TMD.Nace-39-53yrs tim TMD.Scale(TAS-20), associatio roscaled are associated are associated due to accidents, pre-surgical temporomanibiStudyStudyLuca et al., 2014Nothing to evaluate the smile aboutPrimary-To evaluate the depression and patients with in patients with in patients with in patients with al., temporomanibiPrimary-To evaluate the case-50Case-control Age-56-72yrsThe Hamilton Rating Scale for Depression scale for Depression demostra independed nt variableLuca et al., 2014Nothing to evaluate the case-50Primary-To scale for Depression alexithymia on periodontal statusCase-control scale for Depression ingact of depression and periodontal statusInclusion- texter and scale for Depression scale for Depression scale for Depression depression and alexithymia on periodontal status		patients with	processing as a	TMD were			proximity
disorder correlate with deficits in facial genotion recognitiontemporomandib ularorder Controls- Healthy uro paid)Somatoform Exclusion disorders, mental illness.Somatoform Symptoms(SOMS- 2a),Germansomatofor m disorders, Hamilton Depression Rating Scale (HAMD- 21)Mingare Ili et al., partly predicts socialTo evaluate is components is components or alexithymia and diagnosedCohort Inclusion TMD.Inclusion TMDToronto Alexithymia Scale(TAS-20), Pain scale 0-10Study2013 patients with in patients with temporomandib ular disordersTo o pain severity patients with in patients with in patients with in patients with in patients with impatients with impatients with impatientsTo o pain severity patientsThe Hamilton Rating scale for Depression a as calindepende and conditions other than TMD.The Hamilton Rating scale for Depression depression a as a a scale conditions other than TMD.Study scale for Depression depression depression alexithymiaLuca et al., 2014Nothing to primary-To impact of periodontal periodontal periodontal periodontal scale for Depression periodontal periodontal periodontal periodontal periodontal periodontal periodontal periodontal periodontal periodontal periodontal periodontal possible impact of personality individualsInclusion- tectors-40 promothes transmite and complexes promothes scale(TAS), to make a scale to		temporomandib	key factor in	recruited in	in the TMD	Scale (TAS-26),	between
correlate with deficits in facial emotion recognitionular disorder(TMD)Controls. Healthy uro paid)Exclusion Medical disorders, mental uro paid)Symptoms(SOMS. Healthy uro paid)m Actionare Hamilton Depression Rating Scale (HAMD) 21)Minger lift et al., partly predictsTo evaluate whetherCohortInclusionToronto Alexithymia diagnosedStudy11 et al., partly predictsTo evaluate its components ocialCohortInclusionToronto Alexithymia pain, poordiagnosed"Diagnosed with pains color its components uro paid)With TMDTMDassociation a and pain conditions other tremporomandibits components its components with TMD."TMJ disorders pre-surgical treatments or any conditions other treatments or any conditions other tal and the treatments or any conditions other the alexithymia or pre-surgicalThe Hamilton Rating conditions other treatments or any conditions other the alexithymia a conditions other the alexithymiaStudyLuca et al., 2014Nothing to primary-ToPrimary-ToCase-control control presurgicalThe Hamilton Rating conditions other the alexithymiaStudy2014Primary-To impact of periodontal <th></th> <th>ular pain</th> <th>the aetiology of</th> <th>consecutive</th> <th>region for at least</th> <th>Screening for</th> <th>TMD and</th>		ular pain	the aetiology of	consecutive	region for at least	Screening for	TMD and
deficits in facial emotion recognitiondisorder(TMD) emotion 		disorder	temporomandib	order	6months	Somatoform	somatofor
emotion recognitionremotion recognitionControls(30e uro paid)disorders, mental uro paid)Questionnaire Hamilton Depression Rating Scale (HAMD- 21)Mingare Ili et al., parity predictsTo evaluateCohortInclusionToronto AlexithymiaStudy confirms2013pain, poor health and difficulties in patients with temporomandib ular disordersTMD.TMDScale (TAS-20), Pain scale 0-10confirms association2014difficulties in to pain severityin patients with temporomandib ular disordersin patients with temporomandib ular disordersTMD.TMD.TMD.Luca et al., 2014Nothing to pression and evaluate the depression and patientsPrimary-To exacts-00Case-control case-50Inclusion- treatments or any chronic pain conditions other treatments or any chronic pain conditions other treatments or any chronic pain conditions other treatments or any chronic pain conditions other treatments or any chronic pain conditions otherThe Hamilton Rating correlationLuca et al., 2014Nothing to primary ToCase-control depression alexithyInclusion- treatments or any chronic pain conditions other treatments or any chronic pain conditions otherThe Hamilton Rating correlation2014Nothing to primary To depression and patientsCase-50 age-56-72yrsScale for Depression demostra depression2014Nothing to periodontal periodontal periodontal priodontalrefered to psychiatry <br< th=""><th></th><th>correlate with</th><th>ular</th><th>Controls-</th><th>Exclusion</th><th>Symptoms(SOMS-</th><th>m</th></br<>		correlate with	ular	Controls-	Exclusion	Symptoms(SOMS-	m
recognition uro paid) illness. Jamilton Depression Rating Scale (HAMD- 21)   Mingare li et al., partly predicts To evaluate whether Cohort Inclusion Toronto Alexithymia Study   2013 pain, bealth alexithymia and its components To gensole with TMD. TMD Pain scale 0-10 associatio n between alexithymia and pain considerin patients are associated to pain severity *TMJ disorders Pain scale 0-10 associatio n between alexithymin a and pain considerin pre-surgical treatments or any chronic and pain conditions other   Luca et al., 2014 Nothing to Primary-To Primary-To Case-control Inclusion- than TMD. The Hamilton Rating treatments or any conditions other Study   Luca et al., 2014 Nothing to Primary-To Primary-To Case-control Inclusion- timpact of alexithymia on periodontal Inclusion- than TMD. The Hamilton Rating treatments or alexithymia Study   2014 Primary-To Case-control Inclusion- timpact of alexithymia on periodontal Inclusion- than TMD. The Hamilton Rating treatments or alexithymia Study   2014 Primary-To Case-control impact of alexithymia on periodontal Inclusion- than TMD. The Hamilton Rating treatments or alaxity(HRSA), Study <td< th=""><th></th><th>deficits in facial</th><th>disorder(TMD)</th><th>Healthy</th><th>Medical</th><th>2a),German Pain</th><th>disorders.</th></td<>		deficits in facial	disorder(TMD)	Healthy	Medical	2a),German Pain	disorders.
Ningare AlexithymiaAlexithymia roTo evaluate evaluateCohort to its to patiny predictsInclusion to social are associated are associated difficulties in to pain severity patients with in patients with in patients with temporomandib ular disordersTo evaluate to patiny predictsTo evaluate to pain severity to patients with in patients with in patients with temporomandib al., 2014To ro evaluate to patientsTo evaluate to patients with in patients with in patients with temporomandib temporomandibPrimary-To to to case-control than TMD.Rating Scale (HAMD- 21)Study scale(TAS-20), to pain scale 0-10Study associatio alexithymi a and pain considering pre-surgical treatments or any chronic pain conditions other than TMD.To to treatments or any chronic pain conditions other than TMD.To to treatments or any chronic pain conditions other than TMD.The Hamilton Rating studyStudy study2014Nothing to impact of depression and periodontal periodontal periodontal periodontal periodontal periodontal possible impactCase-control terred to suffering from scale cancer and Anxiety(HRSA), to control Alexithymia variables scale(TAS), and poor investigate the possible impact of personality individualsIndividuals terred to terred to suffering from terred and terred and terred to scale(TAS), terred to terred to tartionCase-for between terred to scale for terred to terred to terred to scale for terred		emotion		controls(30e	disorders, mental	Questionnaire	
ImageAlexithymiaTo evaluateCohortInclusionToronto AlexithymiaStudy2013partly predictswhether132 patientsAge-39-53yrsScale(TAS-20),confirms2013pain, pooralexithymia anddiagnosed*Diagnosed withPain scale 0-10associationhealthandits componentswith TMD.TMDExclusionPain scale 0-10associationsocialare associatedwith TMD.TMDExclusiona and paindifficulties into pain severity"TMJ disordersand painpatients within patients withTMD.reatments or any chronic pain conditions othera as anular disordersPrimary-ToCase-controlInclusion-The Hamilton Rating2014Smile aboutevaluate theCases-50Age-56-72yrsScale for Depressional.,smile aboutevaluate theCases-50Age-56-72yrsScale for Depressional.,smile aboutevaluate theCases-50Age-56-72yrsScale for Depressional.,statusunit, Sicily,acquired orToronto Alexithymiavariablesstatusunit, Sicily,acquired orToronto Alexithymiavariablesstatusunit, Sicily,acquired orToronto Alexithymiavariablesfineytigate theControls-40maxillofacialThe oral health impactperiodontalstatusof personalityindividualsToronto Alexithymiaratibles <th></th> <th>recognition</th> <th></th> <th>uro paid)</th> <th>illness.</th> <th>,Hamilton Depression</th> <th></th>		recognition		uro paid)	illness.	,Hamilton Depression	
MingareAlexithymiaToevaluateCohortInclusionToronto AlexithymiaStudy11i et al.,partly predictswhether132 patientsAge-39-53yrsScale(TAS-20),confirms2013pain,pooralexithymia anddiagnosed*Diagnosed withPain scale 0-10associatiohealthandits componentswith TMD.TMDFain scale 0-10associatiosocialareassociatedExclusion*TMJdisordersadifficultiesinto pain severity*TMJdisordersand painpatientswithin patients within patients withreaments or anyconsiderinular disordersTMD.TMD.pre-surgicalgular disordersTMD.reatments or anyconditions otherindependeular,smile aboutPrimary-ToCase-controlInclusion-The Hamilton RatingStudy2014Frimary-Tocase-50Age-56-72yrsScale for Depressiondemonstra2014impactofdepressionExclusion-(HRSD),Theteddemonstra2014Exclusionreferred tosuffring fromScaleforbetweenalexithymia onreferred tosuffring fromScale forbetweendemonstraintegeringstatusunit, Sicily,acquired orToronto Alexithymiavariables2014FriedontalpsychiatrycanceradAnxiety(HRSA),psy						Rating Scale (HAMD-	
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healthandits components are associated are associated are associated difficulties in patients with temporomandib ular disordersTMD.TMD Exclusion and pain treatments or any chronic pain conditions other than TMD.n between alexithym a and pain considerin g alexithym a as a independe than TMD.Luca et al., 2014Nothing maxile aboutPrimary-To evaluate conduct the conditionsCase-control conditions chronic than TMD.The Hamilton Rating chronic pain conditions other than TMD.Study chronic than TMD.2014Primary-To evaluate impactCase-control depression alexithymia on periodontal psychiatry statusInclusion- controls-40 suffering from scale for scale for toronto Alexithymia variables alexithymia on periodontal psychiatry statusIndividuals maxillofacial the oral health impact possible impactIndividualsinvestigate the possible impactControls-40 Healthy individualsThe oral health impact profie(OHIP-14)Primact periodontal periodontal patientsThe oral health impact periodontal patients	lli et al.,	partly predicts	whether	132 patients	Age-39-53yrs	Scale(TAS-20),	confirms
social difficulties in patients with temporomandib ular disordersare associated to pain severity in patients with temporomandib TMD.Exclusion *TMJ disorders due to accidents, pre-surgical treatments or any chronic pain conditions other than TMD.alexithym a and pain considerin g alexithym a as au independe nt variableLuca et al., 2014Nothing to impact of depression and preciodnal impact of alexithymia on periodnal prefered to suffering from statusThe Hamilton Rating congenital suffering from Scale for Depression Scale for Depression demonstration depression and periodnal psychiatry statusSuffering from scale for transitorial scale(TAS), and poo periodnatstatus possible impact investigate the possible impact for personality individualsControls-40 maxillofacial pathologiesThe oral health impact periodontal profile(OHIP-14)status possible impact possible impact for personality individualsControls-40 maxillofacial pathologiesThe oral health impact periole(OHIP-14)	2013	pain, poor	alexithymia and	diagnosed	*Diagnosed with	Pain scale 0-10	associatio
difficulties in patients with temporomandib ular disordersto pain severity in patients with temporomandib TMD.*TMJ disorders due to accidents, pre-surgical treatments or any chronic pain conditions other than TMD.*TMJ disordersa and pain considering g alexithym a as au independe nt variableLuca et al., 2014Nothing to impact of depression and preidental preidental impact of depression and prefered to suffering from statusThe Hamilton Rating ularity in the statusStudy comparison considering treatments or any chronic pain conditions other than TMD.Luca et al., 2014Nothing to impact of depression and patientsPrimary-To depression patientsCase-control depression periodontal psychiatryInclusion- Exclusion-The Hamilton Rating correlation Scale for Depression demonstration depression and periodontal psychiatryStatusIndividuals congenitalHamilton Rating scale for between periodontal psychiatry congenitalScale(TAS), and poo periodontal possible impact for personality individualsThe oral health impact periodontal pathologiesProfile(OHIP-14)Health.		health and	its components	with TMD.	TMD		n between
patients with temporomandib ular disordersin patients with in patients with TMD.due to accidents, pre-surgical treatments or any chronic pain conditions other than TMD.due to accidents, pre-surgical treatments or any chronic pain conditions other than TMD.considering g alexithym a as an independe nt variable.Luca et al., 2014Nothing to evaluate the depression and periodontal alexithymia on alexithymia on referred to suffering from statusThe Hamilton Rating scale for Depression demostration correlationStudy correlation2014Primary-To depression and alexithymia on statusCases-50 periodontal psychiatryAge-56-72yrs cancerScale for Depression demostrationBudy correlation2014Primary-To depression and periodontal periodontal possible impactInclusion- terfered to suffering from scaleThe Hamilton Rating scale for Depression between depression1Primary-To depression and periodontal possible impactIndividuals terfered to suffering from scale(TAS),Budy termina periodontal possible impact1Healthy possible impactControls-40 Healthy pathologiesThe oral health impact periodontal profile(OHIP-14)Priodontal periodontal periodontal profile(OHIP-14)		social	are associated		Exclusion		alexithymi
ItemporomandibTMD.pre-surgicalpre-surgicalgular disordersTMD.pre-surgicaltreatments or any chronic pain conditions other than TMD.gLuca etNothing maile aboutPrimary-ToCase-controlInclusion-The Hamilton RatingStudy2014smile aboutevaluate impactCase-s50Age-56-72yrsScale for Depressiondemonstration2014impact epression and alexithymia on alexithymia on statusreferred tosuffering suffering fromScaleforbetween periodontal2014Finestigate than periodontalpatientsIndividualsHamilton scaleRating periodontalcorrelation periodontal2014Finestigate than periodontalreferred tosuffering suffering fromScaleforbetween periodontal2014Finestigate than possible impactItaly.congenital maxillofacialScale(TAS),periodontal periodontal2014Finestigate than possible impactItaly.congenital maxillofacialScale(TAS),and pool periodontal2014Finestigate than possible impactItaly.congenital maxillofacialScale(TAS),and pool periodontal2014Finestigate than <br< th=""><th></th><th>difficulties in</th><th>to pain severity</th><th></th><th>*TMJ disorders</th><th></th><th>a and pain,</th></br<>		difficulties in	to pain severity		*TMJ disorders		a and pain,
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Luca etNothingtoPrimary-ToCase-controlInclusion-The Hamilton RatingStudyal.,smile aboutevaluatetheCase-50Age-56-72yrsScale for Depressiondemonstration2014impactofdepressionExclusion-(HRSD),Theteddepression andpatientsIndividualsHamilton Ratingcorrelationalexithymia onreferred tosufferingScaleforbetweenperiodontalpsychiatrycancerandAnxiety(HRSA),psychiatrigstatusunit, Sicily,acquiredorToronto AlexithymiavariablesSecondary-ToItaly.congenitalScale(TAS),and poolinvestigatetheControls-40maxillofacialThe oral health impactperiodontalpossible impactHealthypathologiesprofile(OHIP-14)I health.		ular disorders			treatments or any		alexithymi
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depression and alexithymia on periodontalpatientsIndividualsHamilton Rating ScaleRating correlationperiodontal statuspsychiatrycancerand congenitalAnxiety(HRSA),psychiatric variablesSecondary-To investigateItaly.congenitalScale(TAS),and poolinvestigatethe controls-40maxillofacialThe oral health impactperiodontalpossible impactHealthy individualspathologiesprofile(OHIP-14)1 health.	al.,	smile about	evaluate the	Cases-50	Age-56-72yrs	Scale for Depression	demonstra
alexithymia on periodontal statusreferred to psychiatrysuffering from cancerScalefor between psychiatrystatusunit, Sicily, statusacquired or congenitalToronto Alexithymia scale(TAS),variables and poor periodontal and poor investigate the possible impactControls-40 Healthy individualsmaxillofacial pathologiesThe oral health impact profile(OHIP-14)periodontal periodontal	2014		impact of	depression	Exclusion-	(HRSD),The	ted a
periodontalpsychiatrycancerandAnxiety(HRSA),psychiatriestatusunit, Sicily,acquiredorToronto AlexithymiavariablesSecondary-ToItaly.congenitalScale(TAS),and poorinvestigatetheControls-40maxillofacialThe oral health impactperiodontapossible impactHealthypathologiesprofile(OHIP-14)1 health.			depression and	patients	Individuals	Hamilton Rating	correlation
statusunit, Sicily, Secondary-ToacquiredorTorontoAlexithymiavariablesSecondary-ToItaly.congenitalScale(TAS),and poolinvestigatetheControls-40maxillofacialThe oral health impactperiodontapossibleimpactHealthypathologiesprofile(OHIP-14)1 health.ofpersonalityindividualsItaly.Italy.Italy.Italy.			alexithymia on	referred to	suffering from	Scale for	between
Secondary-ToItaly.congenitalScale(TAS),and poorinvestigatetheControls-40maxillofacialThe oral health impactperiodontapossible impactHealthypathologiesprofile(OHIP-14)1 health.ofpersonalityindividualsIndividualsIndividualsIndividuals			periodontal	psychiatry	cancer and	Anxiety(HRSA),	psychiatric
investigate the Controls-40 maxillofacial possible impact Healthy pathologies profile(OHIP-14) 1 health.			status	unit, Sicily,	acquired or	Toronto Alexithymia	variables
possible impact of personalityHealthy individualspathologiesprofile(OHIP-14)1 health.			Secondary-To	Italy.	congenital	Scale(TAS),	and poor
of personality individuals			investigate the	Controls-40	maxillofacial	The oral health impact	periodonta
			possible impact	Healthy	pathologies	profile(OHIP-14)	l health.
disorders on from concret			of personality	individuals			
			disorders on	from general			

		dental status	population			
Sezer et	Relationship	To investigate	Case-control	Inclusion-	Toronto Alexithymia	The study
al.,	between	the potential	Cases-114	Age-21-63yrs	Scale (TAS-20),	points to
2015	Alexithymia and	relationship	chronic	Exclusion-	Plaque index	an
	Chronic	between	periodontitis	*Acute	(PI),Probing pocket	associatio
	Periodontitis	alexithymia and	patients.	Necrotizing	depth(PD),Clinical	n between
		chronic	Controls-	Ulcerative	Attachment	alexithymi
		periodontitis in	108	Gingivitis,	Level(CAL),Bleeding	a and
		adult subjects	participants	*Systemic/Psychi	On Probing(BOP).	periodonta
			with no	atric disorder		l disease.
			history of	*Medicines		
			periodontitis	related to		
			Convenienc	periodontal		
			e sample	alterations or		
				psycho-trophic		
				drugs,		
				*Pregnant,		
				*Periodontal		
				therapy in last 6		
				months,		
				*<18 Teeth		
Marino	Peculiar	To assess the	Case-control	Inclusion	Visual Analogue	Study
et al.,	alexithymic	occurrence of	Cases-58	Age-50-75yrs	Scale(VAS),	confirms a
2015	traits in burning	alexithymic	BMS	*isolated	Toronto Alexithymic	significant
	mouth	traits in BMS	subjects	complaint of	Scale(TAS-26),	link
	syndrome :case-	subjects and to	Controls-	chronic	Hamilton Anxiety	between
	control study	correlate	Healthy	burning/pain in	Rating Scale(HARS),	BMS and
		alexithymic	controls	oral mucosa	Montgomery and	the
		traits to anxious	Recruiters	Exclusion	Asberg Depression	occurrence
		and depressive	unaware of	*Subjects with	Rating	of
		traits in BMS	hypothesis	diabetes not	Scale(MADRS)	alexithymi
		subjects		under		c traits.
				pharmacological		
				control		
				*Local effect of		

Г Г				dental material		
				demai materiai		
Kindler	Alexithymia and	To investigate	Cross-	Inclusion	Toronto Alexithymic	Alexithym
et al.,	temporo-	the associations	sectional	Age-20-79 yrs.	Scale(TAS-20),	ia was
2018	mandibular joint	of alexithymia	1494		Post-Traumatic Stress	moderatel
	and facial pain	and its	participants		Disorder(PTSD),Struc	y to
	in the general	subfactors			tured Clinical	strongly
	population	with signs of			Interview for DSM-	associated
		TMD and with			4(SCID),Mini-mental	with signs
		facial pain,			statement	and
		head pain and			examination,	symptoms
		migraine in the			International	of TMD.
		general			Diagnostic	
		population.			Screener(CID-S)	

Table 3:The quality assessment of the 7 case-control studies, 2 cohort studies and 2 descriptive cross-sectional studies taken for analysis.

New castle ottav	wa scale for case-control stud	ies							
	Study	Miya	oka	Ahlberg et	Glaros &	Haas	Luca	Sezer	Marino
		et	al.,	al., 2004	Lumley,	et al.,	et al.,	et al.,	et al.,
		1995			2005	2013	2014	2015	2015
Selection	Is the case definition	0		0	1	1	0	1	1
	adequate?								
	Representativeness of the	0		0	1	1	0	1	1
	cases								
	Selection of Controls	1		1	1	1	1	0	0
	Definition of Controls	1		1	1	1	1	1	0
Comparability	Comparability of cases	1		1	2	2	1	1	2
	and controls on the basis								
	of the design or analysis								

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Exposure	Ascertainment of	1	1	1	1	1	1	0
	exposure							
	Same method of	1	1	1	1	1	1	1
	ascertainment for cases							
	and controls							
	Non-Response rate	0	0	0	0	0	0	0
New castle of	tawa scale for cohort studies							
		Jerlang,	Mingarelli					
		1997	et al., 2013					
	Representativeness of the	1	1					
	exposed cohort							
	Selection of the non-	0	0					
	exposed cohort							
Selection	Ascertainment of	1	1					
Selection	exposure							
	Demonstration that	0	0					
	outcome of interest was							
	not present at start of							
	study							
	Assessment of outcome	1	1					
	Was follow-up long	0	0					
Outcome	enough for outcomes to							
Outcome	occur							
	Adequacy of follow up of	0	0					
	cohorts							
Modified new	castle ottawa scale for cross-se	ectional studi	es					
		Mattila et	Kindler et					
		al., 2012	al., 2018					
	Sample representation	1	1					
Selection&	Sample size	1	1					
	Ascertainment of	1	1					
exposure	exposure							
	Non-respondents	1	1					
	Assessment of outcome	2	2					

Statistical test	1	1			

Figure 1: The search strategy according to PRISMA guidelines

