



## ORIGINAL ARTICLE

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## Prevalence of neuropathic symptoms in patients referred for temporomandibular disorder in a Chilean hospital, 2014-2015.

**Abstract:** Aim: To determine the prevalence of neuropathic symptoms in the orofacial region in patients referred for painful temporomandibular disorder at Hospital Base Valdivia in 2014 and 2015. Materials and method: An observational study was conducted on patients referred for painful temporomandibular disorder by general dentists working in primary dental health care at Hospital Base Valdivia, during October 2014 and March and April 2015. Patients were asked to complete the LANSS pain scale by one of the examiners. The variables age, sex and location of pain were measured and registered. Results: Of the 84 patients surveyed, 88.1% were women, with a mean age of 38.2 years. The median score obtained with the LANSS scale was 3.0 [0-8.75]. A 20.2% had neuropathic pain symptoms. They were all women with an average age of 36.7. The most recurrent painful area was the right mandibular dermatome of the trigeminal nerve in patients with neuropathic pain symptoms. Conclusion: The prevalence of symptoms of neuropathic pain was 20% in patients referred for painful temporomandibular disorders. Dentists should evaluate neuropathic symptoms to provide a proper management of the condition.

**Keywords:** *Temporomandibular Disorders, Facial Pain, Neuropathic Pain, LANSS scale.*

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### INTRODUCTION.

The International Association of the Study of Pain (IASP) defines neuropathic pain (NP) as "pain caused by lesion or disease of the somatosensory nervous system"<sup>1</sup>. It is considered a clinical description or a symptom, which requires a demonstrable lesion or disease<sup>2</sup>.

Prevalence rates of NP range between 0.9% and 17.9%<sup>3</sup>; however, its prevalence in the orofacial region is unknown, and has been scarcely reported in studies conducted on the general population<sup>2</sup>. Common neuropathic pains in dental practice are trigeminal neuralgia and traumatic neuropathy<sup>4</sup>. Diagnosis and treatment are difficult due to the complexity of their neural mecha-

nisms<sup>5</sup> and the lack of clear diagnostic criteria<sup>6</sup>.

There is no single method to make a definitive diagnosis of NP, but there are validated assessment tools that enable quick identification<sup>7</sup>. Among these, we find the LANSS scale (Leeds Assessment of Neuropathic Symptoms and Signs) that was developed as a practical tool to discriminate NP from nociceptive pain<sup>6</sup>.

The pain from temporomandibular disorders (TMD) often has the same signs and symptoms as other types of orofacial pain (OFP). The possible presence of neurological and/or systemic pathologies makes differential diagnosis difficult<sup>8</sup>.

The data obtained from this research will provide refe-

rence and descriptive values that will enable the development of future studies.

The aim of this study is to determine the prevalence of orofacial neuropathic symptoms in patients referred for painful TMD to Hospital Base de Valdivia in 2014 and 2015.

## MATERIALS AND METHODS.

An observational study was conducted during October 2014, March and April 2015 at Hospital Base de Valdivia. The participants were a group of consecutive patients referred with a diagnosis of painful TMD, by general practitioners in primary health care, to the Temporomandibular Joint Dysfunction (TMJD) Unit of the Dental Service.

To date there are no reports on the prevalence of neuropathic symptoms in patients with TMD. Thus, a prevalence of 50% was considered in order to maximize sample size, with an accuracy of 11% and a confidence interval of 95%, resulting in a minimum of 80 patients. Sampling was done for convenience. Inclusion criteria were patients older than 18 years, referred for TMD, with painful symptoms. Exclusion criteria were patients with mental disabilities, those who did not sign the informed consent, and those who refused to participate.

All patients were asked to complete the LANSS pain scale questionnaire (Leeds Assessment of Neuropathic Symptoms and Signs), translated and validated in Spanish<sup>9</sup>. This comprises a total of 7 items, divided in a questionnaire section and sensory testing section. The first section contains 5 dichotomous questions (yes/no), each with a score of 1-5 if the answer is yes, and 0 if the answer is no. The second part explores the sensory attributes of pain (allodynia and hyperalgesia) by stimulating the patient with cotton wool or a needle; a negative answer is scored 0, and a positive is scored 5 and 3, respectively. By adding the partial scores of each item of the 2 sections a total score (from 0 to 24 points) is obtained. There are no summary scores for each section with partial interpretation. A total score  $\geq 12$  indicates the possible presence of mechanisms that contribute to neuropathic pain. The

evaluation was applied by a trained examiner. The examiner read and explained the questionnaire to the patient and made sure that everything was clearly understood. After the patient completed the questionnaire, the examiner continued with the sensory testing section.

The variables age, sex and location of pain were registered on a printed diagram of the head and neck, with front, profile and back view (Figure 1).

Data were collected and tabulated by an examiner in Google Drive (Google Inc., Mountain View, CA, USA). The data were treated confidentially and could have been excluded if the patient would have requested it.

Results were presented as mean (standard deviation) in parametric variables and median [interquartile range] in the non-parametric variables. The distribution of the results was assessed by the Kolmogorov-Smirnov statistical test, and the mean age was analyzed using t-Student, with a significance level of  $p < 0.05$ .

This study was approved by the Ethics Committee of Servicio de Salud de Valdivia (Valdivia Health Service) (code N° 396, 2014).

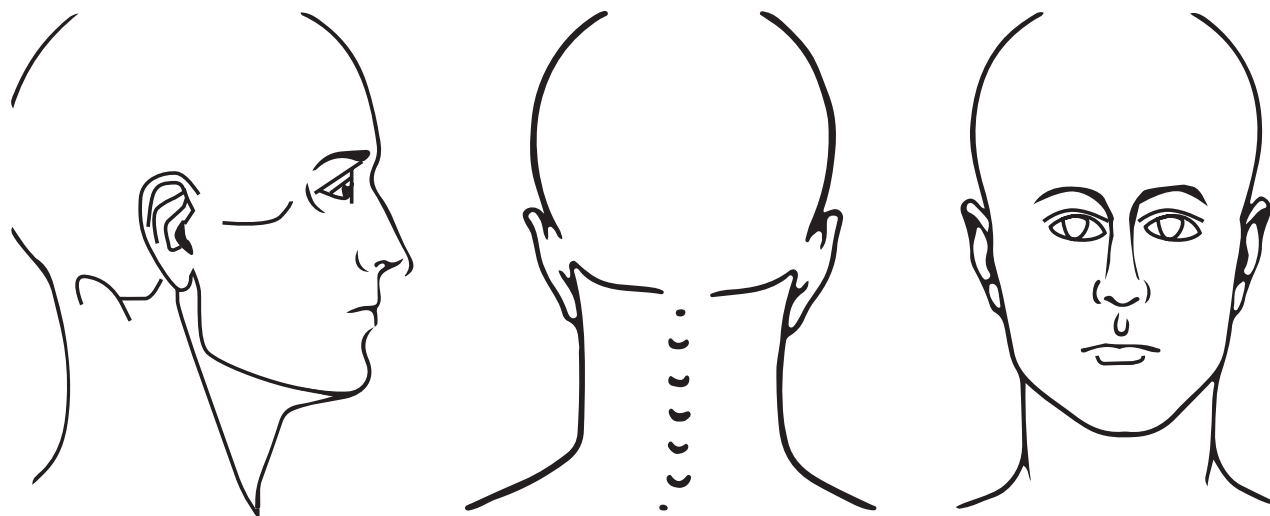
## RESULTS.

A total of 139 patients were referred to the specialist unit. Referrals were mainly labeled "TMD" (46%), "bruxism" (25.9%), "pain in the TMJ" (12.9%), "subluxation" (8.6%) and to a lesser extent "other" (6.5%). Of the total, 84 (60.4%) met the inclusion criteria, none was excluded. Of these, 74 (88.1%) were women. The average age was  $38.2 \pm 16.5$  (18-84) years.

The score on the LANSS scale showed a non-parametric distribution. The median for the entire sample was 3.0 [0-8.75]. The distribution of positive answers is shown in Table 1. Seventeen patients obtained a  $\geq 12$  score (20.2%), all women, with an average of  $36.7 \pm 13.9$  (18-67) years.

Patients with scores  $< 12$  were 67, of whom 57 (85.1%) were women, with an average of  $38.5 \pm 17.1$  (18-84) years. No significant differences in age distribution between patients with and without neuropathic symptoms ( $p = 0.695$ ) were found. The locations of pain are shown in Table 2.

**Figure 1.** Diagram of head and neck, front, profile and back view.



**Table 1.** Distribution of affirmative answers on LANSS pain scale.

Questions (Q) / Evaluations (E)	≥ 12 score (n=17)		< 12 score (n=67)	
	n	%	n	%
P1. Itching, tingling, pricking	15	88.2	17	25.3
P2. Alterations in skin color	7	41.1	2	2.9
P3. Abnormal touch sensation	11	64.7	14	20.8
P4. Sudden onset and in bursts	14	82.2	8	11.9
P5. Burning	8	47	17	25.3
E1. Allodynia	14	82.3	0	0
E2. Hyperalgesia	14	82.3	3	4.4

**Table 2.** Distribution of pain location.

Classification LANSS	Location	N	%
< 12 score (n=67)	TMJ bilateral	24	35.8
	TMJ right	17	25.4
	TMJ left	13	19.4
	Masticatory muscles (temporal-masseter)	8	11.9
	Dermatome V3 right	3	4.5
	Tongue	2	2.9
≥ 12 score (n=17)	Dermatome V3 right	7	41.2
	Dermatome V3 left	3	17.6
	Dermatome V2 right	6	35.3
	TMJ bilateral	1	5.9

V3 = Mandibular branch of the trigeminal nerve, V2 = Maxillary branch of the trigeminal nerve.

## DISCUSSION.

It is estimated that the prevalence of TMD is greater than 5% of the population<sup>10</sup>, of them between 60% and 70% may show signs and symptoms<sup>11</sup>, while 80% has had pain<sup>10</sup>. On the other hand, the literature search found no studies reporting prevalence of orofacial NP. In this study a prevalence of 20.2% of orofacial neuropathic symptoms was found, neither of the patients was referred specifically because of NP.

Currently there is no gold standard for a specific diagnosis of NP<sup>7</sup>. It is the clinical judgment of an expert, which is used as such<sup>12</sup>. The clinician has various instruments (such as the Quantitative Sensory Test), which can establish the presence of NP and help find a specific diagnosis<sup>7</sup>. For easy identification, validated questionnaires are used<sup>7</sup>. The LANSS questionnaire was used in this study, because it has a high sensitivity and specificity<sup>9</sup>; it is simple to use, and provides understandable information on the evaluated symptoms, reducing subjectivity.

Most referred patients with TMD were women (88.1%). This is consistent with other studies on this subject in relation to gender, as the studies carried out by Schmid-Schwab *et al.*<sup>13</sup> in Austria, in which 80.5% were women; Bagis *et al.*<sup>14</sup> in Turkey, 70.4%, and Guzman *et al.*<sup>15</sup> in Chile, 70.2%; all conducted in clinical samples. Epidemiological and clinical findings show that women are at greater risk of developing chronic pain and some evidence suggests they may experience more severe clinical pain due to hormonal, genetic and psychosocial mechanisms<sup>16</sup>.

All patients with neuropathic symptoms were women, higher prevalence in females was expected taking into account the findings of previous studies. Torrance *et al.*<sup>17</sup> estimated the prevalence of NP in three cities in the UK, using the LANSS scale, they found a prevalence of 6% in females and 3% in males; Karibe *et al.*<sup>18</sup> found a proportion of 2:1 between men and women in the orofacial region in a study conducted in California.

Female gender is a factor associated with NP; however, prospective studies are needed to determine whether it

is a risk factor<sup>19</sup>. The mean age (36.7) was lower than in other studies, such as those by Karibe *et al.*<sup>18</sup> and Tomoyasu *et al.*<sup>20</sup>, which reported a mean of 54.3 and 65 years respectively in patients with NP.

A higher prevalence of orofacial neuropathic symptoms (20.2%) was found in this study in comparison to previous studies. Karibe *et al.*<sup>18</sup> found 11% of patients with NP, and Suárez *et al.*<sup>21</sup> found, 13.1% in a study on OFP in two health centers in the United States. These differences may be due to the different methodologies used in the studies where the diagnostic method and causes of OFP considered were different, which makes comparisons difficult.

Pedullà *et al.*<sup>22</sup> think that TMD and NP can be related. Using imaging methods, they found that in patients with TMD and NP, the distance between the articular disc and the mandibular nerve was lower than in patients with TMD without NP. This suggests that when the disc moves medially in opening mandibular movements can directly damage the mandibular nerve, which may account for a greater frequency of NP in patients with TMD.

Regarding the questionnaire, questions with a greater proportion of positive answers in patients with neuropathic symptoms were 1 (itching, tingling or pricking) and 4 (sudden appearance, in bursts of pain), with 88.2% and 82.3% respectively. These symptoms are consistent with those found in trigeminal neuralgia<sup>23,24</sup>, the most frequent diagnosis for the unilateral episodic NP<sup>24</sup>.

The assessments for allodynia and hyperalgesia were positive in 82.3%. This intense response to a nociceptive stimulus is related to central sensitization mechanisms, within which we find the phenomenon of "wind up". In the wind-up process, wide dynamic range neurons undergo recurrent depolarization, resulting from a low intensity discharge that is continuous in time, producing an increase in the number of depolarizations when glutamate passes through ionotropic AMPA channels.

Because the discharge is continuous, magnesium ion of NMDA receptors is released, producing a larger flow of

excitatory amino acid glutamate. Nociceptive receptive field increases and neurons that are not involved in pain transmission start responding to these stimuli; increasing the response to an suprathreshold input stimulus; and increasing the incoming sub-threshold stimuli, initiating the action of potential discharge<sup>25</sup>, which is manifested as symptoms of NP (sudden bursts of pain, allodynia and radiating pain in the affected dermatome).

Regarding the location of pain in patients with symptoms of NP, this coincided mainly with areas innervated by branches of the trigeminal nerve (V2 and V3). In contrast, in patients with nociceptive pain, it was often located in the TMJ area.

The area with the highest prevalence of neuropathic mechanisms (mandibular sector) was similar to that found by Tomoyasu *et al.*<sup>20</sup>, in which the mandibular sector was the most affected (47.8%), followed by the face (41.8%). These areas may match those found in TMD. These symptoms caused the patient's referral because they can be confused and/or consistent with TMD.

NP and TMD have different etiologies, and are expected to be qualitatively different. However, it may be difficult to find differences in the characteristics of the pains<sup>26</sup>. The LANSS scale can be a tool for a diagnostic approach that general dental practitioners can use in cases when there is no apparent cause of OFP, preventing unnecessary referrals.

In the orofacial area, the specialists in TMD and OFP are the ones in charge of establishing the appropriate treatment options, evaluating the use of a multidisciplinary approach depending on the etiology.

Within the limitations of the study, the measuring instrument is not specific for OFP, and does not include the mucous membranes in the questionnaire. It may

create response bias, since there are painful events in these structures, for example, two cases within the sample, previously diagnosed with burning mouth syndrome, which gave a negative result on the scale.

Other limitations are the lack of previous studies with the same methodology or where the same diagnostic approach method is used for OFP.

There are more instruments to measure NP, as the DN4<sup>27</sup> questionnaire, which are not consistent with each other<sup>28</sup>, and difficult to compare.

For future studies it would be advisable to establish diagnoses of TMD and NP in advance, since there may be associations, and since there are risk factors already identified for NP (diabetes mellitus, herpes zoster virus and previous surgeries<sup>20</sup>).

It is also necessary to evaluate the intensity and the period of evolution of pain, which can influence the development of symptoms. Descriptive population studies are also required to establish the prevalence of orofacial NP to assess the need for prevention policies.

## CONCLUSION.

The prevalence of symptoms of neuropathic pain is 20% in patients referred for painful TMD. Dentists should consider assessing the presence of neuropathic symptoms to provide proper treatment.

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## Prevalencia de síntomas neuropáticos en pacientes derivados por trastorno temporomandibular en un hospital chileno, 2014-2015.

**Resumen:** Objetivo: Determinar la prevalencia de síntomas neuropáticos orofaciales en pacientes derivados

por trastorno temporomandibular doloroso al Hospital Base Valdivia en 2014 y 2015. Material y métodos: Se desarrolló un estudio observacional incluyendo pacientes derivados por trastorno temporomandibular doloroso por odontólogos generales de atención primaria en salud, al



servicio dental del Hospital, durante octubre del 2014, marzo y abril del 2015. Un examinador les aplicó la escala de dolor LANSS. Se midieron las variables edad, sexo y localización del dolor. Resultados: De los 84 pacientes encuestados, el 88.1% fueron mujeres, edad promedio de 38.2 años. La mediana del puntaje obtenido en la escala fue de 3.0 [0-8.75]. Un 20.2% presentó síntomas de dolor neuropático, todos mujeres, promedio de edad de 36.7 años. El dermatoma de la rama mandibular del nervio

trigémico del lado derecho fue la zona dolorosa más frecuente en pacientes con síntomas de dolor neuropático. Conclusión: La prevalencia de síntomas de dolor neuropático es de un 20% en pacientes derivados por trastornos temporomandibulares dolorosos. Odontólogos deben considerar evaluar la presencia de síntomas neuropáticos para brindar un manejo adecuado.

**Palabras clave:** *Trastornos Temporomandibulares, Dolor Facial, Dolor Neuropático, Escala LANSS.*

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