

INTRODUCTION AND PURPOSE

Our aim is to explore and utilize **one particular property of BMS**, the one that the **symptom decreases during meals**. This property is mentioned in literature, but never reached the attention it deserves. It is not universally accepted, nor it is included in any of existing definitions of BMS.

Large number of studies claim that „it is very difficult and challenging to diagnose burning mouth syndrome” (BMS) (1,2). The general opinion is that BMS is the „diagnosis of exclusion” (2). One purpose of this study is to prove different. Another purpose is **to assess the effect of chewing on the alleviation of burning pain**. Clinicians encounter this effect among their patients (3). However, there are no estimates of the extent of this property in BMS population. Additionally, as complex approaches to treatment did not bring us closer to success rate superior to placebo, we postulate **that pain alleviation on chewing might represent important means for BMS management**.

Should this effect, presumably unique for BMS, be present in most of (or perhaps even all) patients complaining of oral mucosal burning in absence of clinical signs of disease, it would represent **robust tool for diagnosis and management of BMS**. We performed this study in order to determine this effect's extent, as well as to find out whether it is primarily effect of mastication or gustatory stimulation.

MATERIALS AND METHODS

In **100 newly diagnosed consecutive patients** (M:16, F:84, 33-88 Years old), seen due to spontaneous oral burning, with normal oral mucosa at sites of pain, we have measured the time of onset of improvement and of complete (or maximum) remission of symptoms (recorded by 0-10 Numerical Pain Rating Scale) after the start of **a) chewing a piece of paraffin wax and b) dissolving a piece of candy in the mouth**. We then measured the time to symptom return, following the stopping of the respective stimulation. All procedures were repeated one more time in order to assess repeatability.

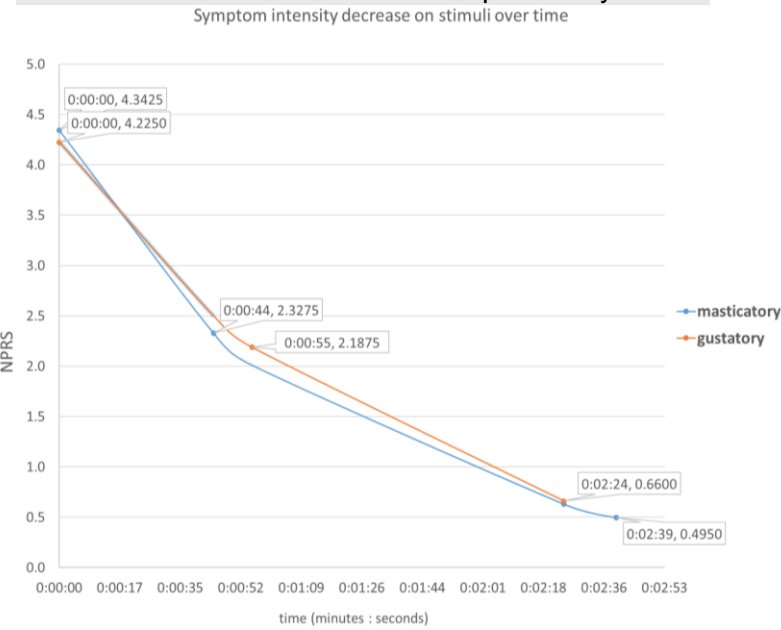


Figure 3. Mean values of oral burning intensity over time. The left panel shows decrease during chewing (blue line) / dissolving a candy (red line). The right panel shows return of symptoms following cessation of stimulation (X-axis: time; Y-axis: pain intensity recorded by NPRS).

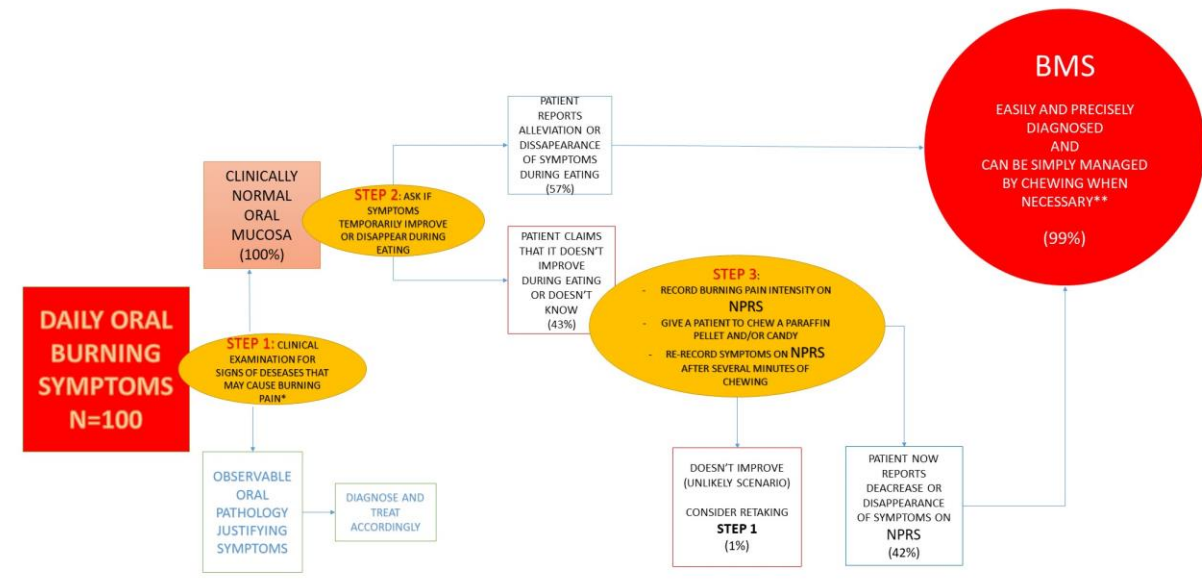


Figure 6. Proposal of the protocol for approaching patients complaining of spontaneous chronic oral burning sensations.

RESULTS

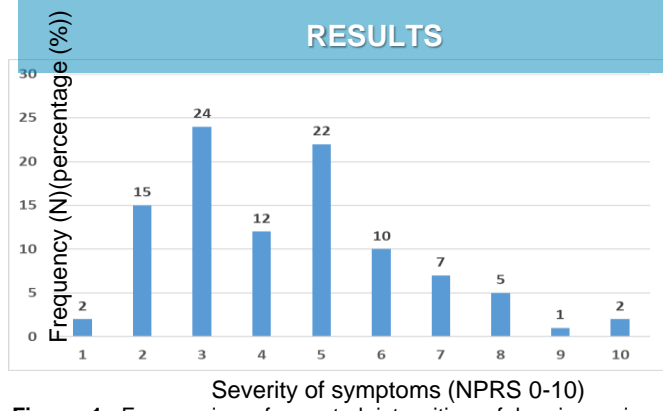


Figure 1. Frequencies of reported intensities of burning pain symptoms before the experiment (x-axis: reported "Numerical Pain Rating Scale" values; y-axis: frequency of patients (and %) per each NPRS value).

Distribution of frequencies of pre-measurement symptom severity, according to "numerical pain rating scale" (NPRS) is shown in figure 1.

Patients' awareness that eating or chewing alleviates symptom severity is shown in figure 2. A total of 43% of patients were not aware or denied that symptoms get improved during eating or chewing.

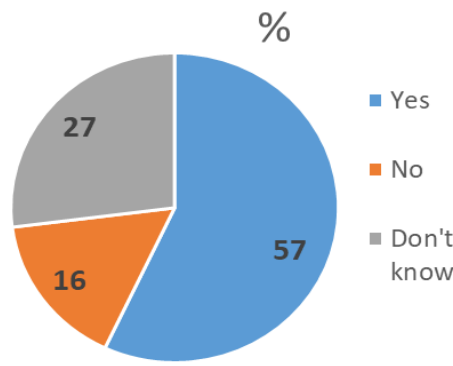


Figure 2. Percentages of patients' responses to question: "Does your oral burning sensation temporarily decrease or disappears while you are eating?"

During the experiment with masticatory and gustatory stimuli, **all but one subject (99%) had marked improvement**, of which **82 (82%) had temporary complete relief from at least one of the stimuli**. **Temporary complete relief observed during paraffin chewing was recorded in 75 (75%) subjects, and for candy in 72 (72%) subjects**. Overall for both stimuli, the improvement starts after 49.5±50 seconds while the maximum effect is reached after 151±117 seconds. The return of symptoms after the end of the stimulus begins after 59±73 seconds, and the complete return to the initial symptom level after 171±159 seconds (Figures 3 and 4).

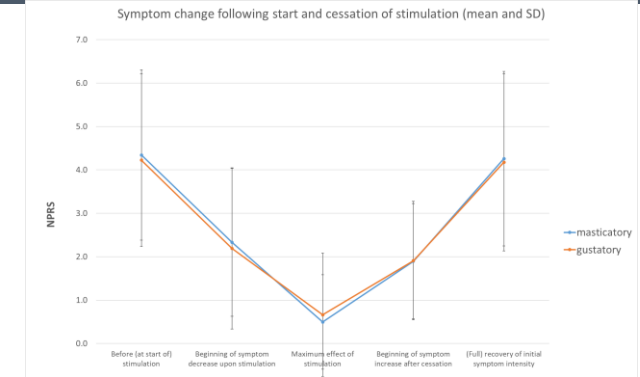


Figure 4. Oral burning symptoms at each of 5 measuring points (Mean+ /-SE)

Interestingly, only one subject had a complete absence of effect to the masticatory, three to the gustatory and one to both applied stimuli.

Improvement of symptoms, as measured by NPRS, was statistically significant (Wilcoxon Matched Pair test, p<0.01) (Figure 5 – left). Following cessation of stimulation, symptoms eventually returned to initial levels (before start of stimulation) (Figure 5 - right).

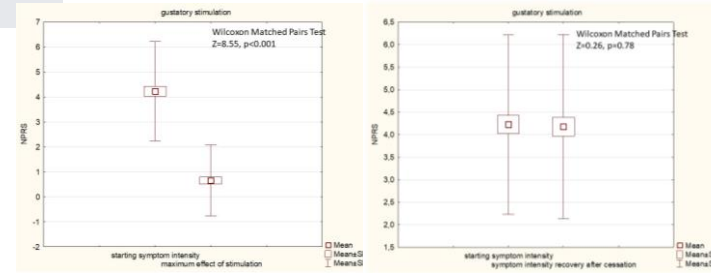


Figure 5. Measured by NPRS, symptoms significantly improved to stimulation (left). Following cessation of stimulation, symptoms returned to baseline values (right).

DISCUSSION AND CONCLUSION

Every but one consecutive patient felt marked improvement, most of them having complete response. This **reliable property** solves both major issues regarding BMS: its accurate and fast diagnosis and its management. **Figure 6** shows **our proposal for the protocol**, which utilizes this robust and repeatable feature of BMS.

Improvements in diagnosing BMS

This feature is so reliable and predictable, in as much as that BMS very probably represents homogeneous group of patients. Utilizing this feature, **true BMS patients gets diagnosed without any expenses and without the need of performing the usual "diagnosis of exclusion"**, which usually lists "necessary" tests unsupported by evidence, such as CBC, vitamin levels, Candida oral smears, dental materials patch tests, and other various falsely considered diagnostic procedures that are frequently suggested in literature (4). Simplicity of this approach is further sensible due to inherent reasonableness and non-invasiveness.

Improvement in management of BMS

As by far the most of patients feel less burning pain while eating, it would be sensible to regularly utilize this effect for temporary symptom management. Arguments for that are within facts that: **a) it is effective in virtually every BMS patient, more frequently than any other proposed treatment modality, albeit temporary; b) it is without any side effects, whereas other modalities nowadays prescribed do have side effects (e.g. medications acting on CNS); c) very low cost and d) doesn't require follow up**. Management is best achieved if chewing is coupled with sensible and realistic oral and written information about BMS. We still don't know what BMS really is, but it is equally important to embrace and inform patients about what we know that BMS is not. **This property of BMS deserves its regular application and the inclusion in its new definition.**

REFERENCES:

1. Dym H, Lin S, Thakkar J. Neuropathic Pain and Burning Mouth Syndrome: An Overview and Current Update. Dent Clin North Am. 2020 Apr;64(2):379-399.
2. Klasser GD, Epstein JB, Villines D. Diagnostic dilemma: the enigma of an oral burning sensation. J Can Dent Assoc. 2011;77:b146.
3. Jääskeläinen SK, Woda A. Burning mouth syndrome. Cephalalgia. 2017;37(7):627-647.
4. Moghadam-Kia S, Fazel N. A diagnostic and therapeutic approach to primary burning mouth syndrome. Clin Dermatol. 2017;35(5):453-460.

This work has been fully supported by Croatian Science Foundation under the project (IP-2019-04-6211).