

# Potential of the Japanese Version of PainDETECT questionnaire for Patients with Chronic Orofacial Pain and Psychiatric Comorbidities: A preliminary study

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## Research article

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# Abstract

**Background** Various questionnaires have been introduced and validated as methods for screening of neuropathic pain, but none have been established for the orofacial region. Although chronic pain and depression are likely to comorbid, few studies have examined the relationship between chronic pain in the orofacial region and depression. Therefore, we evaluated the potential of the Japanese Version of PainDETECT as an assessment tool for neuropathic pain associated with burning mouth syndrome (BMS) and persistent idiopathic facial pain (PIFP). We also evaluated the depression scale such as Beck's Depression Inventory (BDI: a subjective index) and Hamilton Depression Rating Scale (HDRS: an objective index) with BMS or PIFP. **Methods** We administered the Japanese version of the PainDETECT questionnaire to the patients with BMS (29 patients) and PIFP (17 patients). We performed BDI and HDRS with BMS or PIFP. We also evaluated the correlation between the PainDETECT final score and BDI or HDRS. The questionnaire was also used to evaluate post-extraction pain which is a typical nociceptive pain (EXT 16 patients). All subjects underwent a psychiatric evaluation by a trained psychiatrist. **Results** Although PainDETECT final score was significantly higher in the BMS [median: 10] compared with the PIFP [6] ( $p=0.016$ ) and EXT [5] ( $p=0.005$ ), both BMS and PIFP did not reach the cutoff value. HDRS was significantly higher in the BMS [7] than the PIFP [3.5] ( $p=0.04$ ). There were no significant differences between the BMS [14] and PIFP [9] in BDI. There was little correlation between the PainDETECT final score and BDI or HDRS. **Conclusion** We could not say that the Japanese version of the PainDETECT questionnaire have sufficient potential as a pain assessment tool for patients with BMS and PIFP. Although there was little correlation between depression and PainDETECT final score for patients with BMS or PIFP, BMS was comorbid with depression objectively than PIFP.

## Background

Various types of chronic orofacial pain of unknown origin exist. The pathologies associated with these conditions, which include burning mouth syndrome (BMS) and persistent idiopathic facial pain (PIFP), remain unclear. Recently, it was hypothesized that these conditions may actually represent neuropathic pain. Although they may be caused by peripheral sensitization, central sensitization, or impaired upper central nervous control function [1], pathophysiological diversity was observed, as we previously reported [2].

Various questionnaires [3–5] have been introduced and validated as methods for screening for diagnosis of neuropathic pain. These questionnaires offer excellent usability, do not require special examination, and are low-cost. Furthermore, they are considered as accurate and cost-effective means of diagnosing neuropathic pain [6]. PainDETECT, one such questionnaire, was originally developed in Germany as a screening tool for neuropathic pain in patients with chronic lower back pain, and its reliability and validity have been examined [7]. Furthermore, the reliability and validity of the Japanese version of the PainDETECT has also been proved [8]. In recent years, some practitioners have used the PainDETECT to diagnose neuropathic pain in patients with BMS; [9, 10] however, we were unable to locate any reports of the Japanese version of the PainDETECT used with patients with PIFP. Furthermore, there were no reports

of the Japanese version of the PainDETECT used with patients with post-extraction pain as control group (typical nociceptive pain) to assess the validity for assessment tool for using PainDETECT as an orofacial region.

Chronic pain represented by neuropathic pain can be comorbid with mental illness such as depression and can also affect various aspects of patients' daily lifestyles, such as housework and employment, which immensely lowers patients' quality of life [11].

Although chronic pain and depression are likely to comorbid, few studies have examined the relationship between chronic pain in the orofacial region and depression.

In this study, although the number of cases are limited, we evaluated the potential of the Japanese version of the PainDETECT questionnaire as a pain assessment tool for patients with BMS and PIFP. We also performed depression rating scale to the patients with BMS and PIFP and also evaluated the correlation between the PainDETECT final score and depression rating scale.

## **Methods**

### **Ethical guidelines**

This study was approved by the Ethical Committee of the School of Dentistry, Aichi Gakuin University and the Ethics Review Committee of Nagoya University Graduate School of Medicine (Approval No. 372: Aichi Gakuin University, Approval No. 2004 – 0234: Nagoya University). This study was performed with sufficient consideration of the protection of personal information. We have followed the Helsinki Declaration and have followed the guidelines in this investigation.

### **Study Design and Patients**

As a target group, the subjects comprised 46 patients diagnosed with either BMS (n = 29) or PIFP (n = 17) who were treated at the Liaison Clinic, Department of Oral and Maxillofacial Surgery, Aichi Gakuin University Dental Hospital (coordinated with the Department of Psychiatry, Nagoya University Graduate School of Medicine) and who consented to participate in the study. The diagnostic criteria for BMS and PIFP were based on the International Classification of Headache Disorders 3rd edition [12] (Table I). As a control group, to assess the validity of PainDETECT as an orofacial region, the patients with post-extraction pain (typical nociceptive pain, the day after tooth extraction) (EXT 16 patients) were also participated in this study. We administered the Japanese version of the PainDETECT questionnaire to these subjects. A trained psychiatrist performed psychiatric evaluations on all subjects using the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) [13]. In order to make a psychiatric diagnosis based on DSM-5, we used the structured clinical interview. The psychiatrist and dentist are providing treatment in the same clinic, and the psychiatric and dental diagnosis were performed in the same place and on the same.

### **Outcome measures**

We additionally collected information related to age, sex, and duration period. The Japanese version of the PainDETECT questionnaire was used to individually evaluate burning, tingling, allodynia, electric shock-like pain, pain on cold/hot stimulation, numbness, and pain by pressure. These were evaluated on a six-point Likert scale (max = 5 points, min = 0 points) and the total scores (max = 35 points, min = 0 points) of these seven items were calculated. Total score was adjusted based on persistent pain with fluctuations ( $\pm 0$  if present), persistent pain with pain attacks ( $- 1$  if present), pain attacks without interceding pain ( $+ 1$  if present), pain attacks with interceding pain ( $+ 1$  if present), and radiating pain ( $+ 2$  if present) to calculate the final score (max = 38 points, min = 0 points). This was considered as the PainDETECT final score. Additionally, we evaluated pain intensity using an 11-step numerical rating scale (NRS), according to present, average, and maximum values. To evaluate depression in the 46 patients with BMS and PIFP, we used Beck's Depression Inventory (BDI: cutoff value  $\leq 10$ ) [14] as a subjective index and the Hamilton Depression (HDRS: cutoff value  $\leq 7$ ) [15], which uses semi-structured interviews by a trained psychiatrist, as a highly-precise, objective index.

## Statistical analysis

Data are expressed as median [Interquartile range: IQR] or number. All statistical analyses of recorded data were performed using the Excel statistical software package (Ekuseru-Toukei 2010; Social Survey Research Information Co., Ltd., Tokyo, Japan). The Kruskal–Wallis test and multiple comparisons using the Steel-Dwass were used for age, pain intensity, and PainDETECT final score. Mann–Whitney's U-test was used for duration, BDI total score, and HDRS total score. The Chi-Square Test of Independence was used for psychiatric diagnosis, pain course pattern, radiating pain, and the number of patients in each score range of PainDETECT final score. Spearman's rank-order correlation coefficient was used to investigate the correlation between PainDETECT final score and BDI total score or HDRS total score. The level of statistical significance was set at  $p < 0.05$ .

## Results

Demographic data are summarized in Table II. Age was significantly higher in the BMS ([median (IQR)] [65 (61–65)]) than in the PIFP [52 (43.5–61)] ( $p = 0.003$ ) and EXT [40 (30–43.5)] group ( $p < 0.001$ ). HDRS total score was significantly higher in the BMS [7 (3–12.75)] than in the PIFP [3.5 (2.75–7)] groups ( $p = 0.04$ ). There were no significant differences between each group in sex, examination period, BDI total score, and psychiatric diagnosis. Summaries of patient responses are presented in Table III. Pain course patterns and radiating pain are summarized in Table IV; there were no significant differences between each group. Scores of pain intensity by NRS and the PainDETECT final score are summarized in Table V. Using the Kruskal-Wallis test, PainDETECT final score was significantly different among the 3 groups. In multiple comparisons using the Steel-Dwass, PainDETECT final score was significantly higher in the BMS [10 (7–13)] than in the PIFP [6 (4–8)] ( $p = 0.016$ ) and EXT [5 (2–8)] ( $p = 0.005$ ) (Fig. 1). There were significant differences in the number of patients in each range of the PainDETECT final score (Table VI). ( $p \leq 0.033$ ). Spearman's correlations between the PainDETECT final score and BDI total score, or HDRS

total score are summarized in Table VII. There was little significant correlation between PainDETECT final score and BDI or HDRS scores in either group.

## Discussion

Although this study is a preliminary, ours is the first study to use the Japanese version of PainDETECT for BMS and PIFP, and to examine the association between depression and PainDETECT score. Our results indicated that 21 patients (72%) in the BMS group and 17 (100%) patients in the PIFP group had less than a 15% possibility of neuropathic pain elements. This result is similar to a prior report that found the PainDETECT questionnaire to be unsuitable as an assessment tool for BMS [9]. Relying solely on the PainDETECT final score may erroneously lead one to the conclusion that BMS and PIFP pain are not neuropathic but rather nociceptive in nature. This result may have occurred because the PainDETECT was not originally developed for assessing neuropathic pain in the orofacial region. If PainDETECT is to be used to assess the orofacial region, its current cutoff value is not ideal for pain screening.

Chronic pain can be classified from a variety of different angles. When classifying by pain factors, there are nociceptive pain, neuropathic pain, psychosocial pain and others. When the pain becomes chronic, the cause is seldom due to one of these three and in many cases, it is a complex mixed pain condition involving several causing factors [16]. In the present study, although both the BMS and PIFP lacked macroscopic organic changes, our results indicated a probability of nociceptive pain elements.

In terms of chronic pain and depression, although both BMS and PIFP have low scores, our results showed that values of the HDRS, which is an objective index of depression, were significantly higher in the BMS group than in the PIFP group. Meanwhile, no significant differences were seen between the two groups for BDI, which is a subjective index of depression. This suggested that BMS was comorbid with depression objectively, while PIFP was associated with milder depression than BMS, despite resulting from similar kinds of chronic pain. The present study revealed that BDI or HDRS was little correlated with PainDETECT. This demonstrates that depression based on BDI and HDRS score is not always severe just because the PainDETECT score is high. Our results may also demonstrate that the intensity of depression is not related to the diagnostic type of pain. In this study, the results for age, sex ratio and duration of BMS are almost the same as those of previous studies [9, 10]. However, comparison of the BMS and PIFP groups showed that ages were significantly higher among BMS patients. This strongly suggested that PIFP develops in younger age than other forms of chronic pain in the orofacial region.

There are several limitations to the present study. First, the sample size is relatively small. Second, the number of examples and age are not matched in each group. Although we will continue clinical research in this field in a larger sample size, we hope that the results of this study will help clarify the mechanism of pain in BMS and PIFP.

## Conclusions

We applied the Japanese version of the PainDETECT questionnaire to patients with BMS and PIFP. We could not say that the Japanese version of the PainDETECT questionnaire have sufficient potential as a pain assessment tool for patients with BMS and PIFP. As for depression, although both BMS and PIFP have low scores, BMS was comorbid with depression objectively than PIFP.

## List Of Abbreviations

burning mouth syndrome (BMS)

persistent idiopathic facial pain (PIFP)

Beck's Depression Inventory (BDI)

Hamilton Depression Rating Scale (HDRS)

Interquartile range (IQR)

## Declarations

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### Availability of data and materials

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

### Authors' contributions

AS, HK, TT<sup>2)</sup>, WN, MI and TM wrote this manuscript under supervision of KK, YN, NO<sup>2)</sup>, EU, TT<sup>6)</sup> and MO. AS, HK, TT<sup>2)</sup>, TM, EU, MI and NO<sup>5)</sup> designed the study. AS, WN, YK, SK and NO<sup>5)</sup> performed the investigation and analyzed the data. WN, YK, EU, MI, SK, YN, MO, TT<sup>6)</sup>, NO<sup>5)</sup>, KK, HK, TT<sup>2)</sup>, TM and NO<sup>2)</sup> made substantial contribution to the interruption of the data. NO<sup>2)</sup>, MO and KK was responsible for the study design, writing of the manuscript, analysis and interpretation of the data. All authors have read and approved the final manuscript.

## Competing interests

The authors declare that we have no competing interests.

## Consent for publication

Not applicable.

## Ethics approval and consent to participate

This study was approved by the Ethical Committee of the School of Dentistry, Aichi Gakuin University and the Ethics Review Committee of Nagoya University Graduate School of Medicine (Approval No. 372: Aichi Gakuin University, Approval No. 2004-0234: Nagoya University). Written informed consent was obtained from all the patients.

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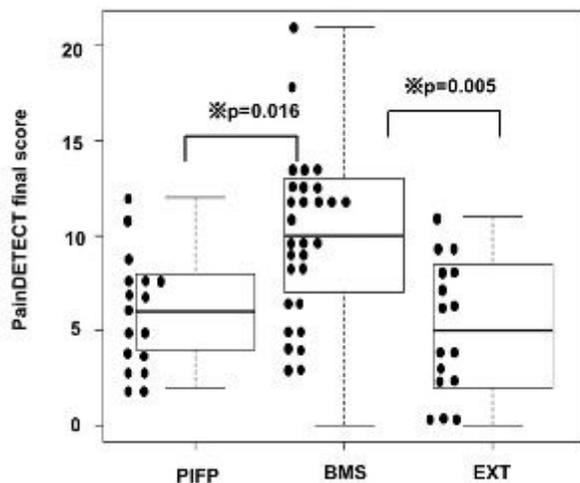
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## Tables

Due to technical limitations the tables are available as a download in the Supplementary Files.

## Figures



**Figure 1**

The patient distribution of PainDETECT final score in each group PainDETECT final score was significantly higher in the BMS [10 (7–13)] than in the PIFP [6 (4–8)] ( $p=0.016$ ) and EXT [5 (2–8)]

(p=0.005).

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Table7.jpg](#)
- [Table2.jpg](#)
- [Table3.jpg](#)
- [Table4.jpg](#)
- [Table5.jpg](#)
- [Table6.jpg](#)
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