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ASSOCIATION OF PERIPHERAL NEUROPATHY WITH SYMPTOMS OF BURNING MOUTH SYNDROME IN TYPE II DIABETIC PATIENTS

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ABSTRACT

Objective: The purpose of this study was to investigate whether or not there is a connection between experiencing symptoms similar to burning mouth syndrome and having diabetic peripheral neuropathy.

Study Design: Cross-sectional study

Place and Duration: Department of Oral Pathology, Baqai Medical University, Karachi/ Sardar Begum Dental College and Hospital, Rehman College of Dentistry, Peshawar KPK, Pakistan from May 2022-April-2023.

Methods: Total 215 patients of both genders with type-II DM were presented. We asked patients to fill out a detailed medical history questionnaire that included their age, gender, height, weight, occupation, method of therapy, HbA1c, diabetic status, if they had DPN, and whether they had any BMS symptoms. SPSS 23.0 was used to analyze all data.

Results: Out of the total, 125 patients (58.1%) displayed symptoms similar to BMS, while 90 patients (41.9%) did not. Age, treatment regimen, time since diagnosis, Hb1AC, diabetic status, DPN of hands and feet, and form of peripheral neuropathy were found to be statistically significantly related to the occurrence of BMS. Binary logistic regression study identified diabetes status, peripheral neuropathy of the hands, and peripheral neuropathy of the feet as three independent predictors of BMS.

Conclusion: The results of this study indicate that type II diabetic individuals are more likely to experience BMS-like symptoms if their diabetes is not well-controlled and if they have diabetic peripheral neuropathy (DPN) in their hands and feet.

Keywords: DPN, BMS, Type-II DM, Symptoms

INTRODUCTION

Diabetic neuropathy (DN) affects several parts of the nerve system, creating a complicated picture of symptoms and indicators that differ from one organ to another. The most frequent kind of neuropathy, peripheral neuropathy, may impact almost half of all people with diabetes mellitus (DM) at some point in their lives, according to new recommendations [1].

In Western nations, peripheral neuropathy (PN) is the most common cause of lower limb amputation [2,3,4]. It is one of the primary microvascular consequences of both type 1 and type 2 diabetes mellitus (T1DM and T2DM). PN is more common than nephropathy and retinopathy.

Although both type 1 and type 2 diabetes are associated with peripheral neuropathy, the lifetime prevalence of the two is different. Research has shown that diabetic peripheral neuropathy (DPN) is not always noticeable when a patient is first diagnosed with the condition. In fact, it may not show up until at least 10 years into the disease's course and may impact as many as 34% of patients beyond 25 years [5,6]. However, in other cases, DPN may already be present when a patient is diagnosed with type 2 diabetes; in such cases, the prevalence increases as the patient ages and the duration of diabetes continues to progress [2,7,8].

Another symptom that some writers have seen in pre-diabetic patients is neuropathic pain or sensory neuropathy. Nobody knows for sure how common pre-diabetic neuropathy is, but it appears to fall somewhere in the middle of the spectrum between people with normal blood sugar levels and those with obvious diabetes [9]. By 2045, the predicted global prevalence of diabetes among persons aged 20–79 would have increased from 10% (500 million people) to 11–12% (nearly 700 million) [10]. From these numbers, it follows that DN will likewise likely see a rise in prevalence over the next years. In light of this, it is the duty of the physician to make an early diagnosis of neuropathy and to provide the patient with the best course of treatment to alleviate symptoms, stop the worsening of the condition, or both.

It is not yet known why type II diabetes is so strongly associated with symptoms similar to those of BMS. While only 7% of the general population has BMS-like symptoms, a research conducted in 2000 evaluated the incidence of these symptoms in type 2 diabetics and found that 18% of patients with DM type II did [15]. Notably, 42% of their sample had DPN, although they failed to find any link between DPN and BMS [15]. Maybe this was because they didn't use standardised testing procedures and had a small sample size. We think this is an important subject to explore further since there may be a shared origin between DPN and BMS, two tiny nerve neuropathies [16]. Our study's objectives were twofold: first, to determine whether there is a relationship between BMS-like symptoms and demographic variables such as age, sex, duration since diagnosis, disease control, treatment regimen, and DM type II DPN; and second, to create a predictive model for BMS-like symptoms in this population using logistic regression analysis and the aforementioned parameters.

MATERIALS AND METHODS

This Cross-sectional study was conducted at the Department of Oral Pathology, Baqai Medical University, Karachi/ Sardar Begum Dental College and hospital, Rehman College of Dentistry KPK Pakistan, and comprised 215 patients. All patients had DM type II and were over the age of 40. They also had normal results for a standard blood complete picture test. Patients with symptoms of burning mouth syndrome prior to diagnosis of diabetes.

Age, sex, duration since diagnosis, medications, additional medicine use, smoking history, and alcohol intake were inquired of willing parties. Changes in taste, dryness, puffiness, and oral mucosa burning or discomfort were also enquired about. The research participants required to fulfil International Headache Society-3 (beta) BMS criteria. To assess glycemic control, researchers examined HbA1C levels, which should be between 4% and 8%. After recording this data on pre-prepared proformas, one observer performed a complete oral assessment. Oral cavity examinations checked for candidiasis, geographic tongue, ulceration, leukoplakia/erythroplakia, and lichen planus. A 5.07 10 g monofilament (Semmes-Weinstein monofilament®) on the soles of the feet, toes, and fingers permitted the DPN investigation. We ran the monofilament perpendicular to the skin across our hands and feet until we saw a bend. Our notes included the patient's verbal responses on contact.

Sense loss occurs when a patient reports no sensation at five feet and hands.
Using a C-shaped 128-Hz tuning fork, vibration sensitivity was measured. After the tuning fork stopped vibrating, the examiner asked the patient to report it. The fork was placed on toe and finger bones. We studied hypoesthesia and anaesthesia with the Wartenberg pin wheel (Great Care®). Radiating sharp pins rolled the palmer and planter surfaces of the hands and feet. When uncomfortable, patients were instructed to say so. Podia Care® thermal tips measured temperature. The patient's eyes were closed when the flat heat tip was placed on their palmer and planter surfaces. To determine if it was chilly, we asked the patient. With the foot dorsiflexed, we tapped the Achilles tendon with the ptaller hammer to measure ankle responsiveness. Tendon extension causes calf muscle contraction, indicating a positive test. Not feeling vibration, having paresthesia, or not having an ankle response are all criteria for DPN diagnosis. Pre-drafted proformas incorporated these findings.

RESULTS

Majority patients 150 (69.8%) were females and 75 (30.2%) were males. Mean age of the patients was 60.16±13.25 years. Out of the total, 125 patients (58.1%) displayed symptoms similar to BMS, while 90 patients (41.9%) did not have any symptom.(Table 1)

Table-1: Data demographics of the enrolled cases

Variables	Frequency (215)	Percentage
Gender		
Male	150	69.8
Female	75	30.2
Mean age	60.16±13.25	
BMS like symptoms		
Yes	125	58.1
No	90	41.9

Age, treatment regimen, time since diagnosis, Hb1AC, diabetic status, DPN of hands and feet, and form of peripheral neuropathy were found to be statistically significantly ($p<0.002$) related to the occurrence of BMS. (Table 2)

Table-2: Symptom Distribution Similar to Burning Mouth Syndrome Based on Various Conditions

Variables	Patients with BMS like Symptoms (125)	Patients with out BMS like Symptoms (90)
HbA1c	8.1±2.14	6.9±11.19
Diabetes		
Controlled	25 (20%)	75 (83.3%)
Uncontrolled	100 (80%)	15 (16.7%)
DPN of hands		
Present	103 (82.4%)	6 (6.7%)
Absent	22 (17.6%)	84 (93.3%)
DPN of feet		
Present	95 (76%)	5 (5.6%)
Absent	30 (24%)	85 (94.4%)
Natural of PN		
Tingling	60 (48%)	7 (7.8%)
Numbness	10 (8%)	3 (3.3%)
Both	45 (36%)	9 (10%)
None	10 (8%)	71 (78.9%)

Binary logistic regression study identified diabetes status, peripheral neuropathy of the hands, and

peripheral neuropathy of the feet as three independent predictors of BMS.(Table 3)

Table-3: Burning mouth syndrome-like symptoms in diabetics: a logistic regression model.

Variables	Regression Coefficient (β)	OR (95% CI)	P value
Diabetic Status	2.119	7.87 (3.15 – 15.60)	<0.002
DPN of hands	1.578	6.57 (2.00 – 15.10)	0.002
DPN of feet	1.421	3.75 (1.40 – 11.52)	0.009

DISCUSSION

Among those with diabetes, DPN is a prevalent consequence. Extreme sensitivity to touch, numbness, tingling, acute pain, and peripheral nerve dysfunction are symptoms of this condition [13]. Dyslipidemia, cardiovascular disease, retinopathy, and long-term diabetes all enhance a patient's risk of developing DPN. Further variables that increase the likelihood of developing DPN include metabolic syndrome and obesity [14].

According to our findings, 58.1% of people with type II diabetes experience symptoms similar to BMS. It was also observed that afflicted people tended to be older and female. A previous research found a prevalence rate of 18%, whereas ours was substantially higher [15]. The small sample size and preponderance of men in the population might explain their low frequency. Consistent with previous research from both the general public and diabetic patients, our sample did consist primarily of women and had an older average age for BMS [16].

A research conducted in India found that among diabetes patients, 22% had tingling, 6% numbness, and 25% discomfort [17]. These data are highly congruent with our own; 48% of patients reported tingling, 8% reported numbness, and 36% reported both symptoms [17]. It is believed that these neuropathic symptoms arise from a mismatch between the rate of damage to nerve fibres and the rate of healing [18]. The prevalence of symptoms similar to BMS in diabetic individuals is not unexpected, given that BMS can be caused by either peripheral or central neuropathies [19]. Burning, tingling, numbness, discomfort, scorching, and itching are some of the common clinical characteristics between BMS and DPN [20].

Research shows that a significant portion of diabetes individuals have dry mouth, with a further 60% reporting bitter or metallic tastes and 35% reporting various changes to their taste buds [21]. While 9.4% of our patients reported just altered taste perception, 42.9% reported burning or tingling in addition to altered taste perception. The findings we obtained were derived on patients' self-reported subjective assessments of flavour. According to research, there are many internal and external elements that affect taste perception and sensitivity, which means that people's perceptions of flavour might differ greatly from one another [22]. This would clarify why other research' findings differ from ours.

Uncontrolled hyperglycemia is strongly associated with BMS-like symptoms, according to our model. Resolving oral symptoms, such as BMS, can be achieved by restoring glycemic control, according to previous research [23,24]. Additionally, we found that BMS was associated with DPN of the hands and feet in individuals with type II diabetes. This lends credence to our hypothesis that the causes of both illnesses are similar. One case report in a patient with type II diabetes shows a link between the two conditions, although there isn't much evidence to support this assertion [25]. Dependability on self-reporting was one of the main drawbacks of our research. Another issue was that we couldn't separate out postmenopausal women from the rest of the population, even though they're at a higher risk of developing BMS [26].

CONCLUSION

The results of this study indicate that type II diabetic individuals are more likely to experience BMS-like symptoms if their diabetes is not well-controlled and if they have diabetic peripheral neuropathy (DPN) in their hands and feet.

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