



Correlation Study Between Recurrent Oral Ulcers and PHQ-9 Emotional Symptom Inventory in Candidates Preparing for Postgraduate Entrance Examinations

Mengyao Wang

Qiqihar Medical University, Qiqihar, Heilongjiang, 161000, China

2083396399@qq.com

Abstract. Purpose: This study aims to explore the correlation between recurrent oral ulcers and the PHQ-9 emotional symptom inventory in candidates preparing for postgraduate entrance examinations. The findings provide a reference basis for the prevention and treatment of recurrent oral ulcers in this population.

Methods: A random sampling method was employed to conduct a questionnaire survey among 398 candidates preparing for postgraduate entrance examinations. The survey included demographic information, history of recurrent oral ulcers, duration of exam preparation, and the PHQ-9 emotional symptom inventory. The PHQ-9 inventory comprises nine items, each scored from 0 to 3, with a total score ranging from 0 to 27. A higher score indicates more severe emotional symptoms.

Results: The survey revealed that out of 212 individuals with recurrent oral ulcers, 106 were in the process of exam preparation with an average preparation time of 1.31 years. The average scores for PHQ-9 items ranged from 1.49 to 2.91, and the total score was 23.9. Among 186 individuals without recurrent oral ulcers, 46 were in the process of exam preparation with an average preparation time of 1.13 years. The average scores for PHQ-9 items ranged from 1.30 to 3.0, and the total score was 23.78. The proportion of candidates preparing for postgraduate entrance examinations was higher in the RAU group compared to the non-RAU group (50% vs. 24.7%, $P < 0.05$). In addition, the average scores for PHQ3 (difficulty falling asleep, always awake, or sleeping too much and drowsiness), PHQ4 (feeling tired and bored), PHQ6 (feeling dissatisfied with oneself, feeling like a failure, or dishonoring one's family), and PHQ9 (having thoughts of dying or trying to hurt oneself) were higher in the ROU group compared to the non-ROU group. Therefore, there is a certain correlation between recurrent oral ulcer and PHQ-9 emotional symptom scale in the postgraduate entrance examination.

Keywords: Recurrent Oral Ulcers, PHQ-9, Emotional Symptoms, Postgraduate Entrance Examination Candidates, data analysis platform.

1 Introduction

The etiology of recurrent oral ulcers is mainly focused on immune factors, genetic factors, systemic disease factors, mental and psychological factors, environmental factors and so on [1-4]. In recent years, the pathogenesis caused by psychological factors has attracted more and more clinical attention. Many scholars have studied it [5] [6]. All of them suggest that recurrent aphthous ulcer has emotional disorders and other characteristics. With the gradual improvement of people's living standards in modern society and the continuous progress of medical models, society pays more and more attention to diseases caused by psychological factors, including oral ulcers [7].

With the high incidence of depression in recent years, the screening of depression is very important. According to the "work Plan for exploring characteristic Services for the Prevention and treatment of Depression" issued by the National Health Commission, it is clearly proposed that high schools and colleges and universities should include depression screening in students' physical examination. Depression screening scale (PHQ-9) is one of the international universal depression scale, which belongs to self-rating scale, which can effectively screen individuals with depression [8]. Foreign Williams and other studies believe that compared with other depression screening tools, PHQ-9 has the same sensitivity and even higher specificity, and there are no restrictions on age, sex and race [9]. In addition, foreign Lowe and other studies believe that PHQ-9 can be used not only as a screening tool for depression with high sensitivity and specificity, but also as a clinical diagnostic tool, which has important use value in primary medical units [10].

In today's society, the postgraduate entrance examination has become an important way for many young people to pursue higher education. However, the stress and anxiety in the process of taking the postgraduate entrance examination may have a negative impact on the physical and mental health of candidates. Recurrent oral ulcer is a common oral disease, and its pathogenesis is not completely clear. In recent years, studies have shown that psychological factors are related to the pathogenesis of recurrent oral ulcer. Therefore, the purpose of this study is to explore the correlation between recurrent oral ulcer and PHQ-9 emotional symptom scale.

2 Data and Methods

A total of 206 college students filled in the form from January 2023 to October 2023, 7 invalid questionnaires were removed (exclusion criteria), and 199 valid questionnaires were selected (inclusion criteria: voluntary cooperation in filling out the contents of the scale; no other systematic diseases and mental disorders; college students across the country), the statistical data is expanded, and the valid data is 398. Among them, 212 patients with RAU (66 boys and 146 girls) were selected as the study group, and 186 patients without RAU (64 boys and 122 girls) served as the control group. There was no significant difference in sex, age, major and other general data between the two groups ($P > 0.05$).

SPSS is used for data analysis, measurement data are expressed by mean \pm standard deviation (mean \pm SD), and counting data are expressed by frequency (n) and percentage (%). T-test was used to compare the measurement data between the two groups, and chi-square test was used to compare the counting data. $P < 0.05$ indicates that the difference is statistically significant.

3 Results

The average score and standard deviation of each question in the observation group were calculated. The average preparation time of the observation group was 1.30 years. The average score range of PHQ- 9 was 1.49-2.91, and the total score was 23.9. Among the 186 people in the control group, 46 were in the state of preparing for the examination, and the average preparation time was 1.13 years. The average score of PHQ- 9 scale of psychological test was 1.30-3.0. the total score was 23.78. See Table 1 for details.

Table 1. Standard deviation blocks for PHQ1-9.

	Average score of observation group	Standard deviation of observation group	Average score of the control group	Standard deviation of control group
PHQ1	2.91	0.29	2.91	0.29
PHQ2	2.75	0.43	2.78	0.42
PHQ3	2.68	0.47	2.61	0.49
PHQ4	2.79	0.41	2.74	0.44
PHQ5	2.83	0.38	2.91	0.29
PHQ6	2.79	0.41	2.70	0.46
PHQ7	2.77	0.42	2.83	0.38
PHQ8	2.89	0.31	3.00	0.00
PHQ9	1.49	0.50	1.36	0.46

A higher proportion of people with recurrent oral ulcers are preparing for graduate students (50% vs 24.7% $P < 0.05$). In addition, the average scores of PHQ3 (having difficulty falling asleep, always awake, or sleeping too much), PHQ4 (always feeling tired and bored), PHQ6 (being dissatisfied with yourself, feeling like a failure, or embarrassing your family) and PHQ9 (having the idea of dying, or how to hurt yourself) were higher than those who did not have recurrent oral ulcers. See Figure 1 and Table 2 for details.

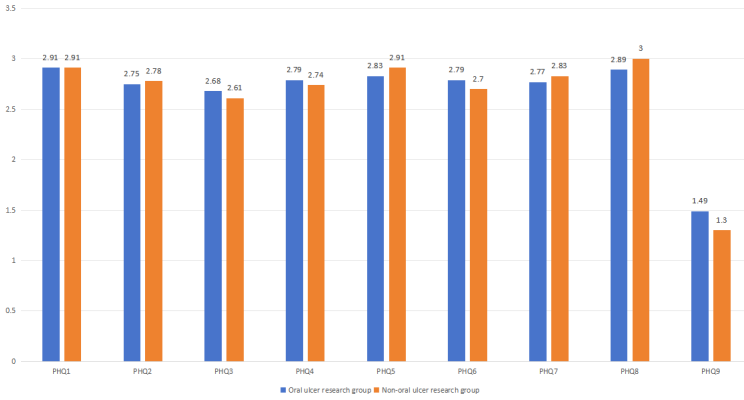


Fig. 1. Score situation of PHQ1-9 in two groups

Table 2. t value, degree of freedom, P value of PHQ1-9

	T value	Degree of freedom	P value
PHQ1	0.00	396	1.0
PHQ2	-0.51	396	0.610
PHQ3	1.04	396	0.299
PHQ4	0.82	396	0.413
PHQ5	-1.54	396	0.124
PHQ6	1.45	396	0.148
PHQ7	-1.04	396	0.299
PHQ8	-2.58	396	0.010
PHQ9	2.75	396	0.006

P < 0.05 has statistical significance.

4 Discussion

ROU is a common oral mucosal inflammatory disease, which is characterized by recurrent, self-limited and painful ulcers, with an incidence of about 20%, mainly in adolescents and young people. The cause of the disease is not clear, and may be related to genetic, immune, microbial, nutritional, psychological and other factors. In this study, we found that there was a significant correlation between recurrent oral ulcer and PHQ-9 emotional symptom scale. Specifically, negative emotions such as depressive symptoms and anxiety symptoms may increase the risk of recurrent oral ulcers. This may be related to the decline of immune system function caused by negative emotion and the change of local oral microenvironment. In addition to negative emotions, psychological factors are also associated with recurrent oral ulcers. For example, the pressure of taking the postgraduate entrance examination may increase the psychological burden of candidates, which in turn increases the risk of oral ulcers. In addition, personality characteristics, life events and other psychological factors may also have an impact on the

occurrence of oral ulcer. The data show that the higher the stress level of the postgraduate entrance examination, the higher the examinee's PHQ-9 score, which indicates that the stress of the postgraduate entrance examination may be an important factor leading to depressive symptoms. At the same time, it also implies that the pressure of the postgraduate entrance examination may have an impact on the occurrence of oral ulcers. Future studies can further explore the role of psychological intervention in relieving the pressure of the postgraduate entrance examination and preventing recurrent oral ulcers. At the same time, it also implies that the pressure of the postgraduate entrance examination may have an impact on the occurrence of oral ulcers. The results provide an effective basis for exploring psychological intervention measures to relieve the pressure of the postgraduate entrance examination and prevent recurrent oral ulcers. On this basis, more targeted programs and more accurate psychological intervention measures for the prevention of recurrent oral ulcers for the postgraduate entrance examination can be worked out. The PHQ- 9 scale was used to evaluate the emotional symptoms of the examinees. The scale has high reliability and validity. In addition, we also use the double-blind method for data collection and analysis to reduce errors and deviations. These measures help to improve the reliability and stability of the research results. The results of our study are mainly applicable to patients with recurrent oral ulcers in the postgraduate entrance examination. However, because recurrent oral ulcer is a common oral disease, and its pathogenesis may be related to psychological factors, our findings may also have some implications for patients with recurrent oral ulcer in other populations.

This study explored the potential relationship between recurrent oral ulcer and PHQ-9 emotional symptom scale in people taking postgraduate entrance examination. Research data show that the prevalence of recurrent oral ulcers is higher among graduate students preparing for exams, and this part of the population is also more likely to suffer from emotional symptoms such as anxiety and depression. More interestingly, the total score of PHQ- 9 was significantly higher in patients with recurrent oral ulcers, suggesting that emotional symptoms may have an impact on the occurrence of recurrent oral ulcers. Our results coincide with some previous studies. For example, [6], The two articles "the influence of psychosocial factors on recurrent oral ulcer" and "the analysis of psychological related factors in patients with recurrent oral ulcer" emphasize the relationship between psychological factors and oral ulcer. It is especially pointed out that learning pressure and interpersonal relationship and other factors have a significant impact on the incidence of oral ulcer in senior high school students. Another article entitled "A study of psychological factors in the etiology of 150 cases of recurrent aphthous ulcer" also clearly pointed out that the pathogenesis of recurrent aphthous ulcer is closely related to psychological factors.

Although there are some similarities between this study and the Clinical study of Oral ulcer caused by Psychological factors in Senior High School students, there are still significant differences between them. First of all, there are differences in the main focus of the study: this study mainly discusses the relationship between recurrent oral ulcer and emotional symptoms in the postgraduate entrance examination. Secondly, the evaluation methods are different: in this study, PHQ- 9 scale was used to evaluate the emotional symptoms, while the reference literature used different evaluation methods.

Therefore, although both of them are related to the relationship between psychological factors and oral ulcer, the specific concerns and methods are different.

In addition, the results of this study indicate that there is a certain correlation between recurrent oral ulcers and emotional symptoms in candidates preparing for postgraduate entrance examinations, which provides a new idea and direction for using artificial intelligence technology to assist in the diagnosis and treatment of recurrent oral ulcers. According to previous studies [10], computer vision, natural language processing, machine learning and other technologies can be used to achieve automatic detection, analysis and evaluation of oral ulcers, as well as intelligent recognition, monitoring and intervention of the emotional state of candidates preparing for postgraduate entrance examinations, thus improving the prevention and treatment effect of oral ulcers, reducing the emotional pressure and burden of candidates preparing for postgraduate entrance examinations. In addition, the conclusion suggests that people preparing for the examination can use the PHQ- 9 scale to detect their mental health status and actively take psychological intervention measures to reduce the occurrence of recurrent oral ulcers, which is of great significance for them to maintain oral health during the post-graduate entrance examination. At the same time, cloud computing, big data, data mining and other technologies are used to build a data analysis platform based on oral ulcers, reveal the rules and characteristics of oral ulcers, and provide data support and guidance for scientific research and clinical practice of oral ulcers, as shown in Figure 2.

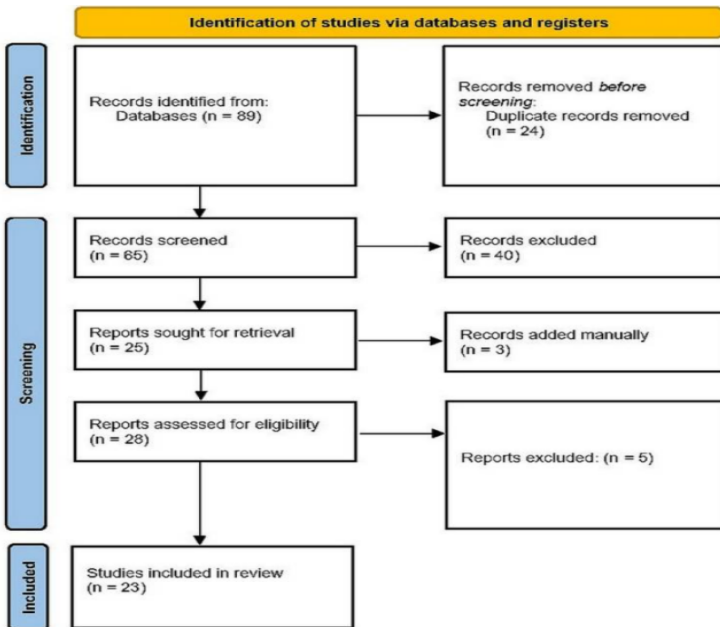


Fig. 2. PRISMA flowchart showing the systematic selection of articles

5 Conclusion

To sum up, the results of this study further confirmed the correlation between psychological factors and recurrent oral ulcers, and suggested that we should pay attention to the incidence of recurrent oral ulcers in different populations. and use appropriate evaluation methods to evaluate and treat the emotional symptoms of patients. However, the sample size of this study is small, and there may be some sampling errors. In the future, larger sample size, more objective data collection methods and longer follow-up time can be used to improve the quality and effectiveness of the study.

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