

## **SECTION: MEDICINE**

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### **ASSESSMENT OF ORAL HYGIENE STATUS IN PATIENTS WITH OBESITY ASSOCIATED WITH PERIODONTAL TISSUE PATHOLOGY AND DENTOFACIAL ANOMALIES**

**Magdalena Zalwert-Zajac**

Ph.D. in Medical Sciences, Founder and Chief physician  
of the Orthodontics and Implantology centre «OrtoDent»,  
Wroclaw, Poland

<https://orcid.org/0009-0002-6880-4833>

**Bandrivsky Yurii**

Doctor of Medical Sciences, Professor  
of the Department of Pediatric Dentistry,  
I. Horbachevsky Ternopil National Medical University  
Ternopil, Ukraine

<https://orcid.org/0000-0002-4103-3664>

**Abstract.** Obesity is regarded as a systemic risk factor for the development of inflammatory and dystrophic-inflammatory diseases of periodontal tissues, and it also complicates the course of orthodontic pathology. The quality of individual oral hygiene determines the severity of these conditions, making its assessment clinically significant. The aim of our study was to evaluate the features of oral hygiene status using the OHI-S index in patients with obesity in combination with periodontal tissue diseases and dentoalveolar abnormalities. A total of 516 patients were examined and stratified into clinical groups according to the presence of obesity, periodontal pathology, and dentoalveolar abnormalities. Oral hygiene status was assessed using the OHI-S index (Greene & Vermillion, 1969). The study revealed that in the control group (healthy patients), the OHI-S index corresponded to a satisfactory hygiene level ( $1.38 \pm 0.08$ ). Patients with obesity in combination with periodontal pathology and dentoalveolar abnormalities demonstrated the highest scores –  $2.68 \pm 0.12$  and  $2.94 \pm 0.13$ , respectively – exceeding control values by more than twofold,  $p < 0.01$ . Patients with obesity but without concomitant dental pathology showed an intermediate hygiene level –  $2.00 \pm 0.09$ , significantly worse than that of the control group,  $p < 0.05$ . Thus, obesity in conjunction with periodontal diseases and dentoalveolar abnormalities is associated with a significant deterioration of oral hygiene status. A detailed analysis confirms that the comorbidity of these conditions creates critically unfavorable circumstances for maintaining an adequate level of individual oral hygiene.

**Keywords:** obesity, periodontal tissue diseases, dentoalveolar abnormalities, oral hygiene, OHI-S.

**Introduction.** Obesity is a global medical and social challenge that affects multiple aspects of both systemic and oral health. It has been demonstrated that obese patients are at an increased risk of developing inflammatory and dystrophic-inflammatory periodontal diseases due to systemic inflammation, dyslipidemia, and metabolic disturbances [1, 2]. Furthermore, obesity may aggravate the course of dentoalveolar abnormalities, intensifying occlusal dysfunction and worsening oral hygiene status [3].

Among objective indicators of individual oral hygiene, the OHI-S index is the most widely used, allowing quantitative evaluation of dental plaque and calculus (Greene & Vermillion, 1969). Previous studies have shown that individuals with periodontal pathology and excess body weight present significantly higher OHI-S scores compared to patients without these risk factors [4, 5].

Therefore, assessing oral hygiene status in obese patients with concomitant periodontal diseases and dentoalveolar abnormalities is relevant for both preventive and therapeutic dentistry.

**Aim.** To determine the characteristics of oral hygiene status using the OHI-S index in patients with obesity in combination with periodontal tissue diseases and dentoalveolar abnormalities.

**Materials and Methods.** The study was conducted at the Department of Pediatric Dentistry, I. Horbachevsky Ternopil National Medical University, Ministry of Health of Ukraine, in accordance with the ethical principles of the Declaration of Helsinki [6]. Informed consent was obtained from all participants. A total of 516 individuals aged 18-45 years were examined and stratified into five clinical groups depending on the presence of obesity, inflammatory or dystrophic-inflammatory periodontal diseases, and dentoalveolar abnormalities. Two sub-cohorts were formed: the first included patients with inflammatory periodontal lesions, and the second included those with dystrophic-inflammatory lesions.

Patients with inflammatory periodontal diseases: Group I (n=49) – obesity without concomitant dental pathology; Group II (n=57) – inflammatory periodontal disease with obesity; Group III (n=53) – dentoalveolar abnormalities with obesity without periodontal lesions; Group IV (n=55) – dentoalveolar abnormalities and inflammatory periodontal disease with obesity; Group V (n=45, control) – systemically and dentally healthy individuals.

Patients with dystrophic-inflammatory periodontal diseases: Group I (n=49) – obesity without concomitant dental pathology; Group II (n=58) – dystrophic-inflammatory periodontal disease with obesity; Group III (n=53) – dentoalveolar abnormalities with obesity without periodontal lesions; Group IV (n=52) – dentoalveolar abnormalities and dystrophic-inflammatory periodontal disease with obesity; Group V (n=45, control) – systemically and dentally healthy individuals.

Periodontal pathology was classified according to Danilevsky's system modified by Mashchenko, while the degree of obesity was determined using WHO criteria [7, 8]. Patients with dentoalveolar abnormalities were examined using a standardized protocol including assessment of postural status, craniofacial structures, soft tissues,

intraoral dental arch and occlusion analysis in three planes, and evaluation of additional oral structures. Oral hygiene was assessed with the OHI-S index (Greene & Vermillion, 1969), which accounts for plaque and calculus on the buccal surfaces of teeth 11, 16, 26, 31 and the lingual surfaces of 36 and 46 [9]. For visualization, Schiller–Pisarev solution was used to enhance objectivity. Data were analyzed using Student's t-test, with  $p < 0.05$  considered statistically significant.

Results and discussion. Analysis of the OHI-S index values (Fig. 1) demonstrated that only in representatives of Group V, who had no concomitant somatic or dental diseases, the level of individual oral hygiene was assessed as satisfactory. The mean index value in this group was  $1.38 \pm 0.08$  points, which significantly differed from the corresponding parameters of the other study groups,  $p - p_3 < 0.05$ .

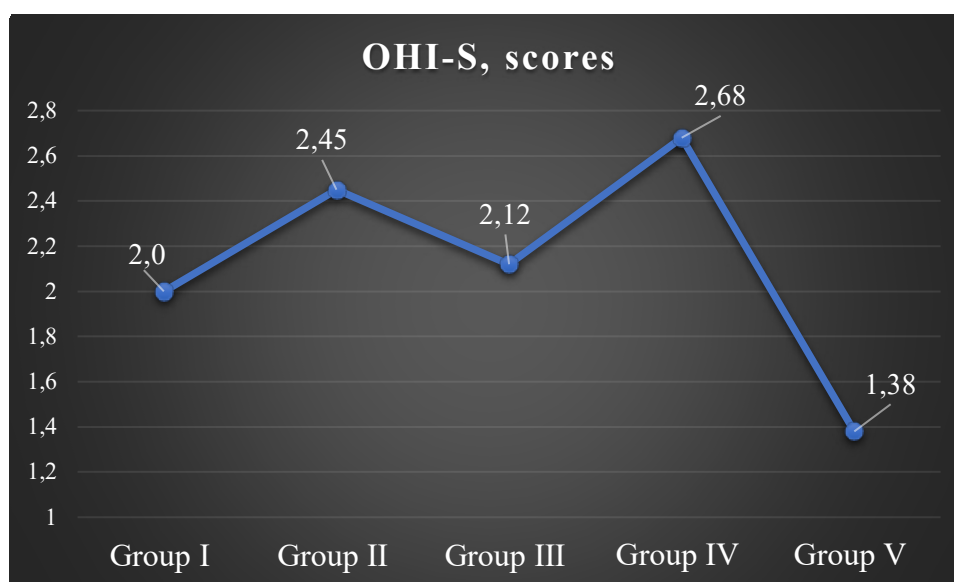


Figure 1. Assessment of oral hygiene status in patients with obesity in the presence of inflammatory periodontal tissue diseases and dentoalveolar abnormalities

At the same time, the maximum OHI-S index values were recorded in patients with obesity and comorbid dental pathology (Group IV) –  $2.68 \pm 0.12$  points,  $p, p_2 < 0.01$ . It was noteworthy that the OHI-S values in individuals of Group IV exceeded the corresponding ones: 1.3 times higher in Group I (obesity) and Group III (dentoalveolar abnormalities + obesity), but did not significantly differ from those in patients with inflammatory periodontal tissue diseases against the background of obesity (Group II),  $p_1 > 0.05$ .

A similar study aimed at assessing oral hygiene status was conducted among patients with dystrophic-inflammatory periodontal tissue diseases in the presence or absence of dentoalveolar abnormalities against the background of obesity.

Analysis of oral hygiene index values (OHI-S) demonstrated (Fig. 2) that in somatically and dentally healthy individuals (Group V) hygiene status was assessed as satisfactory –  $1.38 \pm 0.08$  points,  $p - p_3 < 0.01$ .

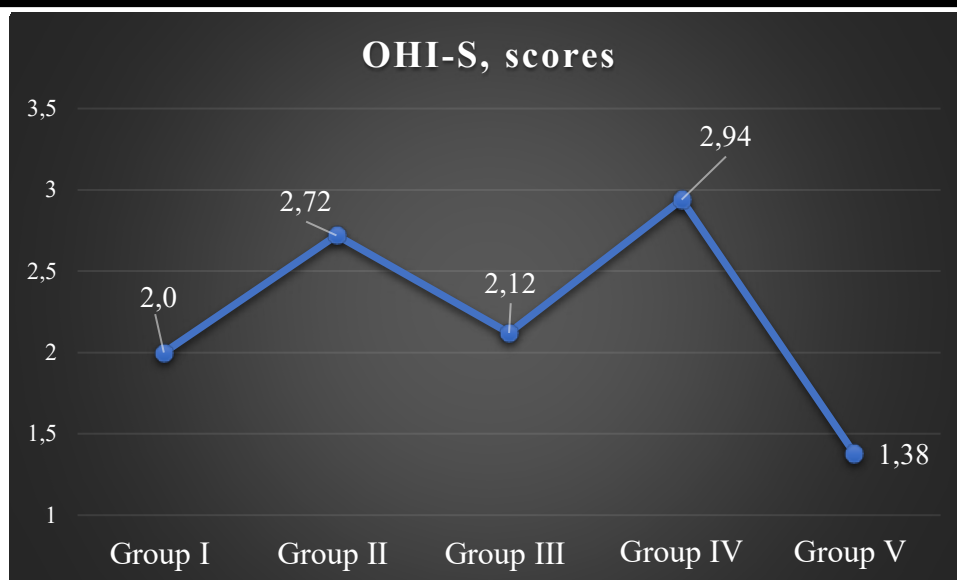


Figure 2. Assessment of oral hygiene status in patients with obesity in the presence of dystrophic–inflammatory periodontal tissue diseases and dentoalveolar abnormalities

An unsatisfactory oral hygiene status was revealed in patients of Group I (obesity without dental diseases) and Group III (dentoalveolar abnormalities + obesity), where OHI-S index values were  $2.00 \pm 0.09$  and  $2.12 \pm 0.10$  points, respectively,  $p > 0.05$ ;  $p_1 < 0.01$ . The highest OHI-S values were observed in patients of Group IV (dystrophic–inflammatory periodontal tissue diseases + dentoalveolar abnormalities + obesity) –  $2.94 \pm 0.13$  points, which exceeded the corresponding values of Group I by 1.5 times,  $p < 0.01$ ; Group III by 1.4 times,  $p_2 < 0.01$ ; and Group V by 2.1 times,  $p_3 < 0.01$ , although they did not significantly differ from the data in individuals with dystrophic–inflammatory periodontal tissue diseases against the background of obesity (Group II),  $p_1 > 0.05$ .

The obtained data confirm that obesity is a significant risk factor for the deterioration of oral hygiene status, especially when combined with periodontal pathology and dentoalveolar abnormalities. Similar results were presented in study [10], which demonstrated an association of obesity with increased colonization by periodontopathogens.

Elevated OHI-S index values in patients with comorbid dental pathology can be explained both by metabolic disorders and by reduced motivation to maintain oral hygiene, which is consistent with the conclusions of [11].

The presence of dentoalveolar abnormalities in patients with obesity further complicates the process of mechanical oral hygiene, leading to the formation of persistent dental plaque and, consequently, progression of periodontal lesions. This coincides with data obtained in [12], which emphasize that orthodontic patients with excess body weight have poorer hygiene indicators and an increased risk of caries.

Thus, the combination of obesity, periodontal pathology, and dentoalveolar abnormalities creates unfavorable conditions for maintaining an adequate level of individual oral hygiene.

**Conclusion.** The results of the present study indicate that obesity in combination with periodontal tissue diseases and dentoalveolar abnormalities leads to a significant

deterioration in oral hygiene status. Patients with comorbid pathology demonstrate significantly higher OHI-S index values compared with healthy individuals, which confirms the need to develop individualized preventive programs and active hygiene education for this category of patients.

### References

1. Zhao, P., Xu, A., & Leung, W. K. (2022). Obesity, Bone Loss, and Periodontitis: The Interlink. *Biomolecules*, 12(7), 865. <https://doi.org/10.3390/biom12070865>
2. Chaffee, B. W., & Weston, S. J. (2010). Association between chronic periodontal disease and obesity: A systematic review and meta-analysis. *Journal of Periodontology*, 81(12), 1708–1724. <https://doi.org/10.1902/jop.2010.100321>
3. Verdecchia, A., Suárez-Fernández, C., Menéndez Díaz, I., Sanz, V. G., Spinaz, E., & Cobo, T. (2025). Obesity and Overweight Conditions in Children and Adolescents and Their Impact on Craniofacial Morphology: A Systematic Review. *Children (Basel, Switzerland)*, 12(3), 377. <https://doi.org/10.3390/children12030377>
4. Keller, A., Rohde, J. F., Raymond, K., & Heitmann, B. L. (2015). Association between periodontal disease and overweight and obesity: A systematic review. *Journal of Periodontology*, 86(6), 766–776. <https://doi.org/10.1902/jop.2015.140589>
5. Prpić, J., Kuis, D., Glazar, I., & Ribarić, S. P. (2013). Association of obesity with periodontitis, tooth loss and oral hygiene in non-smoking adults. *Central European journal of public health*, 21(4), 196–201. <https://doi.org/10.21101/cejph.a3829>
6. World Medical Association. (2013). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA*, 310(20), 2191–2194. <https://doi.org/10.1001/jama.2013.281053>
7. Danylevskyy, M.F., Borysenko, A.V., Antonenko, M.Yu., Sidelnikova, L.F., Nesyn, O.F., & Dikova, I.H. (2018). *Terapevtychna stomatolohiya [Therapeutic dentistry]* (Vol. 3, 624 p.). Kyiv: VSV «Medytsyna». [in Ukrainian]
8. World Health Organization. (2022). Obesity and overweight. Geneva: WHO.
9. Kutsevlyak, V. F., & Lakhtin, Yu. V. (2015). *Indeksna otsinka parodontal'noho statusu [Index assessment of periodontal status]* (2nd ed., rev. and enl.). Sumy: VVP «Mriya».
10. Suvan, J., D'Aiuto, F., Moles, D. R., Petrie, A., & Donos, N. (2011). Association between overweight/obesity and periodontitis in adults. A systematic review. *Obesity reviews : an official journal of the International Association for the Study of Obesity*, 12(5), e381–e404. <https://doi.org/10.1111/j.1467-789X.2010.00808.x>
11. Wilensky, A., Frank, N., Mizraji, G., Tzur, D., Goldstein, C., & Almozno, G. (2023). Periodontitis and Metabolic Syndrome: Statistical and Machine Learning Analytics of a Nationwide Study. *Bioengineering (Basel, Switzerland)*, 10(12), 1384. <https://doi.org/10.3390/bioengineering10121384>
12. Saloom, H. F., Boustan, R., Seehra, J., Papageorgiou, S. N., Carpenter, G. H., & Cobourne, M. T. (2021). The impact of obesity on orthodontic treatment outcome in adolescents: a prospective clinical cohort study. *European journal of orthodontics*, 43(2), 165–172. <https://doi.org/10.1093/ejo/cjaa032>