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STUDY OF THE LEVEL OF ORAL HYGIENE IN PATIENTS WITH PERI-IMPLANTITIS

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The study was devoted to researching of the level of oral hygiene in patients with peri-implantitis. 67 patients with peri-implantitis aged between 25 and 55 years took part in the research. All patients underwent a comprehensive examination of the main disease and dental status according to a single scheme. The dental examination was carried out in a dental office. The study clearly indicates that patients with peri-implantitis exhibit significantly higher levels of plaque and tooth calculus, evidenced by a 29 % higher Silness-Loe index, a 32 % greater Stallard index score, compared to the general population and 15 % greater tooth calculus intensity. Further research is warranted to delve deeper into the underlying mechanisms of peri-implantitis, explore potential risk factors, and develop targeted interventions. By enhancing our understanding and management of peri-implantitis, we can significantly improve the dental health outcomes and overall quality of life of affected patients.

Key words: oral hygiene, oral health, implants, inflammatory disease, adult patients.

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ВИВЧЕННЯ РІВНЮ ГІГІЄНИ ПОРОЖНИНИ РОТА У ПАЦІЄНТІВ З ПЕРЕІМПЛАНТИТОМ

Дослідження було присвячено вивченню рівня гігієни порожнини рота у пацієнтів з періімплантитом. У дослідженні взяли участь 67 пацієнтів з періімплантитом у віці від 25 до 55 років. Всім пацієнтам було проведено комплексне обстеження основного захворювання та стоматологічного статусу за єдиною схемою. Стоматологічне обстеження проводилося в умовах стоматологічного кабінету. Дослідження чітко вказує на те, що пацієнти з періімплантитом мають значно вищий рівень зубного нальоту та зубного каменю, про що свідчить на 29 % вищий індекс Silness-Loe, на 32 % вищий показник індексу Stallard порівняно із загальною популяцією та на 15 % вища інтенсивність зубного каменю. Необхідні подальші дослідження для глибшого вивчення механізмів виникнення періімплантиту, вивчення потенційних факторів ризику та розробки цілеспрямованих втручань. Поглиблюючи наше розуміння та лікування періімплантиту, ми можемо значно покращити результати стоматологічного здоров'я та загальну якість життя пацієнтів, які страждають на нього.

Ключові слова: гігієна порожнини рота, здоров'я порожнини рота, імплантати, запальні захворювання, дорослі пацієнти.

The work is a fragment of the research project "Improving the prediction of the occurrence and course of dental caries and periodontal disease, schemes for their prevention and treatment", state registration No. 0121U114672.

Peri-implantitis presents a significant challenge in the field of implant dentistry, marked by inflammatory responses in the tissues encircling dental implants, which consequently leads to a gradual degradation of the bone support structure [13]. This ailment not only jeopardizes the durability of dental implants but also complicates the maintenance of overall oral health in individuals suffering from it [9]. The genesis of peri-implantitis is complex and involves multiple factors, among which bacterial infection stands out as a critical element [1, 7].

It has been recognized that the principal reasons for the failure of dental implants are attributable to both infectious and non-infectious elements. Infectious agents comprise microorganisms that may infiltrate the implant site either during the surgical procedure or as a result of inadequate oral hygiene practices [14].

Emphasizing patient responsibility in maintaining oral cleanliness, coupled with routine dental appointments for professional cleaning and assessment of the implants, has been shown to diminish the likelihood of peri-implantitis development [10]. Research indicates that regular, professionally conducted oral hygiene can effectively lower the risk of this condition [11].

In more recent developments within this domain, there has been the introduction of predictive risk assessment models aimed at forecasting the occurrence of peri-implantitis [10]. These predictive tools are pivotal in the early identification and subsequent intervention, potentially enhancing the treatment outcomes for patients with dental implants [10]. Furthermore, the advent of novel therapeutic solutions, such as the application of postbiotic gels, has opened new paths for the treatment of peri-implant mucositis, an initial stage leading to peri-implantitis [5].

This study aims to explore different risk factors associated with peri-implantitis, with the goal of enhancing our understanding and discussion about how to manage this condition effectively.

The purpose of the study was to perform comprehensive examination of the level of oral hygiene in patients with peri-implantitis.

Materials and methods. To achieve the research objective, 67 patients with peri-implantitis aged between 25 and 55 years were surveyed. Dental examination was conducted in the dental office at the Department of Epidemiology and Prevention of Major Dental Diseases, Pediatric Dentistry and Orthodontics of the SE "The Institute of stomatology and maxilla-facial surgery National academy of medical sciences of Ukraine" (SE "ISMFS NAMS").

All patients underwent a comprehensive examination of their main disease and dental status using a unified scheme.

The following indices were used to assess the state of oral hygiene [3]:

– the prevalence of tooth calculus was divided into low (0–50 %), moderate (51–80 %) and high (81–100 %) with the intensity of calculus formation within six sextants of 0–1.5, 1.6–2, 5 and more units, respectively;

– the level of oral hygiene was assessed using the Silness-Loe and Stallard oral hygiene indices.

The results were processed by variational statistical methods of analysis using the Microsoft Office Excel 2016 software. Statistical processing of the experimental study results was carried out by the methods of variation analysis using the Student's test. The difference was considered statistically significant at $p < 0.01$ [2].

Results of the study and their discussion. To enhance the efficacy of preventive strategies for peri-implantitis management, our research undertook a comprehensive analysis of oral hygiene indexes in patients diagnosed with peri-implantitis. This involved comparing the oral hygiene levels of these patients against the normative values prevalent within the Ukrainian demographic. The objective was to discern distinct deviations and trends that are indicative of peri-implantitis.

The level of oral hygiene in the studied patients aged 25–55 years with peri-implantitis is presented in table 1.

Table 1

The level of oral hygiene in the examined 25–55 years old patients with peri-implantitis, M±m

Groups	Indices	Silness-Loe, points	Stallard, points	Tooth calculus
25–55 years old, n=67		2.19±0.18 $p < 0.001$	2.37±0.21 $p < 0.001$	2.17±0.16 $p < 0.01$
Average in Ukraine, 30–50 years old, n=200		1.55±0.14	1.62±0.15	1.85±0.13

Note. p – indicator of the probability of differences in clinical indices of patients with average indicators in Ukraine.

In this research, we meticulously evaluated the state of oral hygiene in patients diagnosed with peri-implantitis, focusing on individuals aged between 25 and 55 years. Our assessment was structured around three primary oral hygiene indices: the Silness-Loe index, the Stallard index, and the intensity of tooth calculus. These indices were carefully chosen to offer a comprehensive view of the oral hygiene status in these patients.

Upon examining the Silness-Loe index, which primarily measures plaque accumulation, it's observed that the mean value for the 25–55 year-old peri-implantitis group (n=67) is 2.19±0.18. This figure is markedly higher than the average Silness-Loe index value of 1.55±0.14 recorded for the general Ukrainian population within the 30–50 years age bracket (n=200). This translates to the peri-implantitis group having a 29 % higher Silness-Loe score compared to the average population.

Such a pronounced increase in the Silness-Loe index among the peri-implantitis patients suggests a substantial disparity in plaque control and oral hygiene practices between the two groups. Several factors could contribute to this divergence. Patients with peri-implantitis may exhibit poorer oral hygiene habits, potentially due to a lack of awareness or complacency in maintaining oral cleanliness. Additionally, the presence of implants and the associated peri-implantitis condition itself might make oral hygiene more challenging, leading to increased plaque accumulation. It's also possible that the inflammatory processes

inherent in peri-implantitis could exacerbate plaque formation, creating a vicious cycle where poor oral hygiene and disease progression feed into each other.

Furthermore, this elevated Silness-Loe score in the peri-implantitis group warrants attention in the context of preventive and therapeutic strategies. It underscores the need for enhanced oral hygiene education and more rigorous plaque control measures in patients with or at risk of peri-implantitis. Tailored oral hygiene instructions, regular professional cleanings, and possibly the use of specialized oral care products could be essential components in managing the oral health of these patients. This approach not only addresses the immediate concern of plaque accumulation but also plays a critical role in the long-term management and prevention of peri-implantitis.

In the studied group of 25–55 year-old patients with peri-implantitis ($n=67$), the Stallard index was recorded as 2.37 ± 0.21 , significantly higher than the average index of 1.62 ± 0.15 found in the general Ukrainian population within the 30–50 years age range ($n=200$). The statistical significance of this difference, indicated by a p-value of less than 0.001, reveals a 32 % higher Stallard score in the peri-implantitis group. This increase primarily reflects a greater area of dental plaque. The prominence of a larger plaque area in peri-implantitis patients can be attributed to several potential factors. These may include challenges in maintaining effective oral hygiene around implants, the structural complexities of implants that might hinder plaque removal, or possibly a lack of awareness or compliance with recommended oral hygiene practices specific to implant care. This insight into the connection between peri-implantitis and plaque area, as highlighted by the Stallard index, underscores the need for strict plaque control in these patients.

In conclusion, the data analysis clearly illustrates a significant difference in the oral hygiene levels, as measured by the Silness-Loe index, between the peri-implantitis patients and the average population. This finding is instrumental in understanding the dynamics of oral health in peri-implantitis and forms a basis for formulating targeted preventive and therapeutic interventions. Regular assessment of plaque area using the Stallard index could be a valuable approach in early detection and ongoing monitoring of peri-implantitis.

Tooth calculus, or dental tartar, is a significant indicator as it directly contributes to the progression of oral diseases, including peri-implantitis. For the group of 25–55 year-old patients with peri-implantitis, the mean value for tooth calculus intensity was measured at 2.17 ± 0.16 . This is notably higher than the average value of 1.85 ± 0.13 observed in the general Ukrainian population within the age range of 30–50 years ($n=200$). This translates to the peri-implantitis group having approximately a 15 % higher tooth calculus intensity compared to the average population. This elevated level of tooth calculus in the patients with peri-implantitis can be indicative of several underlying issues. It suggests that these patients may have more difficulty in maintaining oral hygiene, leading to the accumulation of tartar. The presence of dental implants and the associated peri-implantitis might further complicate effective tartar control, as implants can create niches that are more challenging to clean. Additionally, the biological and chemical environment influenced by peri-implantitis might be more conducive to the calcification of dental plaque, thus leading to increased tartar formation.

The significance of higher tooth calculus intensity in peri-implantitis patients cannot be understated. It emphasizes the need for enhanced oral hygiene practices, more frequent professional cleanings, and possibly the adoption of specific dental care techniques or products aimed at reducing tartar buildup. Regular dental check-ups become even more crucial for these patients, as dental professionals can help in the early detection and removal of tartar, thereby mitigating its potential impact on peri-implantitis.

In summary, the comparative analysis of tooth calculus intensity reveals a significant increase in the peri-implantitis group compared to the average population. This finding highlights the necessity for more rigorous and targeted oral hygiene measures in patients with peri-implantitis, focusing particularly on tartar control as a critical factor in managing and preventing the progression of the condition.

Our study highlights a significant correlation between poor oral hygiene and the development of peri-implantitis, as evidenced by higher Silness-Loe and Stallard index scores in patients with peri-implantitis compared to the general population. This finding aligns with the broader consensus in dental research that emphasizes the critical role of oral hygiene in preventing peri-implant diseases. For instance, Darby [7] and Mombelli et al. [11] have underscored the importance of maintaining oral hygiene to prevent peri-implantitis, a perspective that is reinforced by the current study's findings. Recent studies have expanded our understanding of peri-implantitis, offering new perspectives that complement the findings of Abu Hussien et al. [4] observed that thicker palatal mucosa around implants is associated with deeper pockets and higher severity of peri-implantitis. This suggests that tissue characteristics, in addition to oral hygiene, play a role in the development and progression of peri-implantitis. The findings [6] suggest that advancements in non-surgical treatments, such as the use of postbiotics, could be beneficial in managing

early stages of peri-implant diseases. This is particularly relevant for patients identified in the current study with high plaque and calculus levels, as early intervention might prevent the progression to peri-implantitis. The relationship between systemic diseases and periodontal health [8] provides a broader context for understanding peri-implantitis. Given that peri-implantitis shares many etiological factors with periodontal diseases, systemic health conditions could also be influential in the development and progression of peri-implantitis. This aspect represents an important area for future research. While the current study focuses on the assessment of oral hygiene levels, understanding the effectiveness of various treatment modalities is crucial for comprehensive peri-implantitis management [14]. The epidemiological study by Mombelli et al. [12] provides a broader perspective on the prevalence and incidence of peri-implantitis. Understanding the epidemiological context is essential for assessing the public health impact of peri-implantitis. Our study contributes to understanding of the relationship between oral hygiene and peri-implantitis. It underscores the need for rigorous oral hygiene to prevent peri-implant diseases. However, future research should also consider tissue characteristics, systemic health factors, and the efficacy of various treatment modalities. By integrating these aspects, we can develop a more holistic approach to managing peri-implantitis, ultimately improving dental health outcomes and patient well-being.

Conclusions

1. The study clearly indicates that patients with peri-implantitis exhibit significantly higher levels of plaque and tooth calculus, evidenced by a 29 % higher Silness-Loe index, a 32 % greater Stallard index score, compared to the general population and 15 % greater tooth calculus intensity.
2. The marked differences in oral hygiene indices between peri-implantitis patients and the average population highlight the importance of regular monitoring for effective management of the condition. Frequent assessments using the Silness-Loe and Stallard indices can aid in early detection and timely intervention for peri-implantitis, thereby contributing to better long-term oral health outcomes.
3. Further research is warranted to delve deeper into the underlying mechanisms of peri-implantitis, explore potential risk factors, and develop targeted interventions. By enhancing our understanding and management of peri-implantitis, we can significantly improve the dental health outcomes and overall well-being of affected patients.

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