

THE ORAL-SYSTEMIC INTERFACE IN SEVERE MENTAL ILLNESS: A COMPARATIVE ANALYSIS OF DIETARY PRO-OXIDANT PATTERNS AND BIO-CLINICAL INTERSECTIONS IN PATIENTS WITH SCHIZOPHRENIA

Ecaterina Burlui^{1,2}, G. Dascalescu^{1,2*}, A. Ciobica^{1,2,3,4}, V. Burlui^{2,3}, Diana Gheban²,
B. V. Stefanescu⁵, Daniela Tomita²

1. Alexandru Ioan Cuza” University of Iasi, Romania
2. “Ioan Haulica” Institute, Apollonia University, Iasi, Romania
3. Academy of Romanian Scientists, Bucharest, Romania
4. “Olga Necrasov” Center, Romanian Academy, Iasi, Romania
5. Grigore T. Popa University of Medicine and Pharmacy of Iasi, Romania

*Corresponding author. E-mail: gabidascalescu2001@gmail.com

THE ORAL-SYSTEMIC INTERFACE IN SEVERE MENTAL ILLNESS: A COMPARATIVE ANALYSIS OF DIETARY PRO-OXIDANT PATTERNS AND BIO-CLINICAL INTERSECTIONS IN PATIENTS WITH SCHIZOPHRENIA (Abstract): This study aims to investigate the nutritional pathways and lifestyle behaviors that bridge psychiatric symptomatology and oral pathological outcomes, specifically focusing on the role of dietary-induced oxidative stress in patients with schizophrenia compared to a healthy control group. **Materials and methods:** A comparative cross-sectional analysis was conducted on 40 participants (20 patients with schizophrenia and 20 demographically matched controls). Nutritional habits, antioxidant intake and pro-inflammatory food frequencies were assessed using validated questionnaires. Data were statistically analyzed to identify significant divergences in consumption patterns. **Results:** Patients with schizophrenia showed a significantly lower intake of dietary fiber compared to controls (1.65 ± 1.51 vs. 2.80 ± 1.92 , $p = 0.041$). Significant increases were observed in the consumption of fried foods ($p = 0.029$) and processed items ($p = 0.048$). Although antioxidant and fruit intake followed a downward trend, they did not reach the significance threshold, contributing to a documented pro-oxidant dietary environment. **Conclusions:** The results confirm a compromised “gut-brain-mouth” axis in schizophrenia. The dietary-induced pro-oxidant environment serves as a systemic driver for oral degradation, necessitating integrated psychiatric and dental management. **Keywords:** SCHIZOPHRENIA, ORAL HEALTH, OXIDATIVE STRESS, NUTRITIONAL PSYCHIATRY, DIETARY PATTERNS.

INTRODUCTION

Schizophrenia remains one of the most challenging conditions in modern psychiatry, not only due to its debilitating cognitive and emotional symptoms but also because of the significant somatic burden in

imposes patients.

Beyond the neurological manifestations, recent research has shifted the focus toward the “whole-body” impact of the disorder, highlighting a state of chronic, low-grade systemic inflammation (1). One of the most

critical yet frequently overlooked components of this physical decline is oral health, which acts as a bio-indicator for the overall psychological status of the patient (2).

The relationship between severe mental illness and dental pathology is multifaceted. Historically, poor oral outcomes in these patients were attributed solely to suboptimal hygiene or the side effects of antipsychotic medication, such as xerostomia (3). However, contemporary perspectives, including the “gut-brain axis” theory, suggest that the pathobiological intersections are much deeper. The nutritional status of patients with schizophrenia often reveals a profound imbalance, characterized by preference for high-caloric, nutrient-poor diets (4). This dietary pattern does not merely contribute to metabolic syndrome but also fuels a pro-oxidant environment that accelerates tissue destruction in the oral cavity.

The oral microenvironment is highly sensitive to the body’s antioxidant defense mechanisms. When dietary intake of polyphenols and vitamins is replaced by refined sugars and saturated fats, the resulting oxidative stress triggers an inflammatory cascade in the periodontal tissues (5). Therefore, understanding the dietary choices of these patients is not just a matter of nutritional counseling, but a necessity for preventing irreversible dental damage.

Despite the clear clinical links, there is a scarcity of integrated data that correlate specific food frequency patterns in psychiatric patients with their systemic inflammatory risk. This study, conducted in the Iasi region, provides a foundation for a more holistic approach in both dental and psychiatric clinical practice. By examining these intersections, we aim to demonstrate that oral health management must become a

core component of the integrative treatment of schizophrenia.

MATERIALS AND METHODS

This comprehensive, cross-sectional study was conducted between December 2024 and January 2025 in Iasi, Romania. The research focused on evaluating the nutritional architecture and lifestyle factors of patients with severe mental illness in relation to their potential impact on oral health. The study population consisted of two distinct cohorts: a clinical group (n=20) comprising patients diagnosed with schizophrenia according to the DSM-V criteria and a healthy control group (n=20) recruited from the general population with no history of psychiatric or significant systematic disorders.

Inclusion criteria for the clinical group were: a confirmed diagnosis of schizophrenia, age over 18 years and the cognitive ability to provide informed consent and complete the assessment tools. Exclusion criteria included the presence of acute medical emergencies, pregnancy or current participation in intensive nutritional intervention programs. The control group was age-matched to ensure demographic comparability across the 18-60 age range.

The study was conducted in accordance with the Declaration of Helsinki. All participants were informed about the nature of the research, the confidentiality of the data and their right to withdraw at any time. Written informed consent was obtained from each participant or, where applicable, their legal guardians.

A comprehensive digital survey was employed to gather data on demographics, clinical history and dietary habits. The nutritional assessment was based on a modified Food Frequency Questionnaire (FFQ),

The oral-systemic interface in severe mental illness: a comparative analysis of dietary pro-oxidant patterns and bio-clinical intersections in patients with schizophrenia

specifically designed to capture the “pathobiological intersections” between dietary intake and systemic inflammation. Participants reported their consumption frequency for various food groups over the previous month using a Likert-type scale ranging from “Never” to “Daily”.

The survey focused on three specific dietary domains:

1. Protective factors: Frequency of intake for fresh fruits, vegetables, dietary fibers and antioxidant-rich foods (e.g, berries, nuts, leafy greens).
2. Pro-inflammatory and cariogenic factors: Consumption of refined sugars (candies, pastries), carbonated beverages, fast food and deep-fried items.
3. Lifestyle and comorbid factors: Prevalence of smoking, alcohol consumption and the use of dietary supplements or probiotics.

Quantitative data derived from the frequency scales were converted into numerical values to facilitate comparative analysis. Frequency scores were assigned based on consumption regularly (e.g, Daily = 7; 2-3 times/week = 2.5; weekly = 1; Never = 0). Descriptive statistics, including means and percentages distributions were calculated for each dietary variable. The signifi-

cance of differences between the schizophrenia group and the control group was evaluated using independent t-test or Mann-Whitney U test, depending on the data distribution. A *p-value* less than 0.05 was considered statistically significant. All analyses were performed using Microsoft Excel, ensuring a rigorous interpretation of the nutritional gaps identified.

RESULTS

The study cohort consisted of 40 participants, equally divided between patients with schizophrenia (n = 20) and healthy controls (n = 20). The demographic analysis showed that the psychiatric group was predominantly composed of individuals in the 31-60 age range (85%), with a higher prevalence of unemployment (90%), reflecting the social burden of the disease. In contrast, the control group was more diversely distributed across age groups and employment statuses.

Specifically, the intake of dietary fiber was significantly lower in patients compared to controls (1.65 ± 1.51 vs. 2.80 ± 1.92, p = 0.041), representing a 41% reduction. Similarly, consumption of fresh fruits, vegetables and antioxidant-rich foods showed a marked downward trend in the psychiatric cohort, although these did not reach statistical significance (tab. I).

TABLE I.
Comparative analysis of protective dietary factors

| Nutritional Factor | Control Mean (± SD) | Schizophrenia Mean (± SD) | p-value |
|---------------------------|----------------------------|----------------------------------|----------------|
| Fruits and Vegetables | 2.65 (± 2.00) | 1.67 (± 1.42) | 0.083 |
| Antioxidant-rich Foods | 2.27 (± 1.77) | 1.42 (± 1.47) | 0.107 |
| Dietary Fiber | 2.80 (± 1.92) | 1.65 (± 1.51) | 0.041* |

*Note: Scores calculated on a scale of 0 (Never) to 7 (Daily); SD = Standard Deviation; * indicates statistical significance (p < 0.05 based on Independent T-test).*

The nutritional gap is visually represented in the comparison of protective factors (fig. 1).

Consumption of fried foods and saturated fats was nearly double in patients with schizophrenia (2.45 ± 1.75) compared to control group (1.47 ± 0.80 , $p = 0.029$). This pro-inflammatory trend was also evident in

the consumption of refined sugars and carbonated beverages (fig. 2).

Processed food consumption was also significantly higher in the psychiatric group (1.25 ± 1.28 vs. 0.50 ± 1.03 , $p = 0.048$), while the increased intake of refined sugars (2.35 vs. 1.82) contributes to the overall cariogenic potential (tab. II).

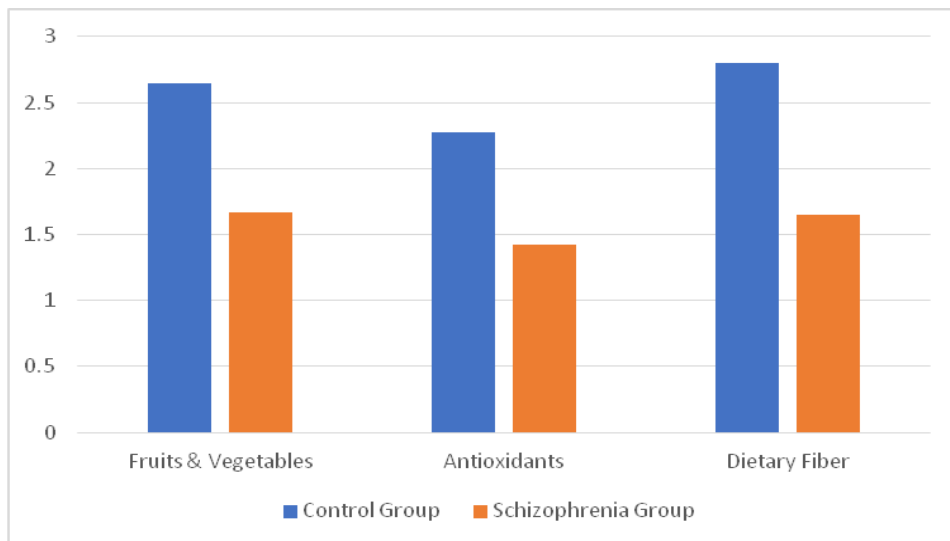


Fig. 1. Protective factors

TABLE II.
Pro-inflammatory and cariogenic risk profile

| Risk Factor | Control Mean (\pm SD) | Schizophrenia Mean (\pm SD) | <i>p</i> -value |
|--------------------------------|--------------------------|--------------------------------|-----------------|
| Fried Foods and Saturated Fats | 1.47 (\pm 0.80) | 2.45 (\pm 1.75) | 0.029* |
| Refined Sugars (Sweets) | 1.82 (\pm 1.55) | 2.35 (\pm 1.28) | 0.249 |
| Carbonated Beverages | 1.27 (\pm 1.01) | 1.95 (\pm 1.91) | 0.170 |
| Processed Foods | 0.50 (\pm 1.03) | 1.25 (\pm 1.28) | 0.048* |

Note: SD = Standard Deviation; * indicates statistical significance ($p < 0.05$ based on Independent T-test).

The escalation of pro-inflammatory dietary choices in the psychiatric group is evident (fig. 2).

Lifestyle variables further compounded these risks. Although smoking frequency was high across both groups, alcohol consumption frequency was more than double

in the schizophrenia group (0.90 vs. 0.42).

The cumulative data indicate that patients with schizophrenia live in a “pro-oxidant nutritional environment”, which, in the absence of adequate antioxidant defense, serves as a primary driver for oral tissue degradation.

The oral-systemic interface in severe mental illness: a comparative analysis of dietary pro-oxidant patterns and bio-clinical intersections in patients with schizophrenia

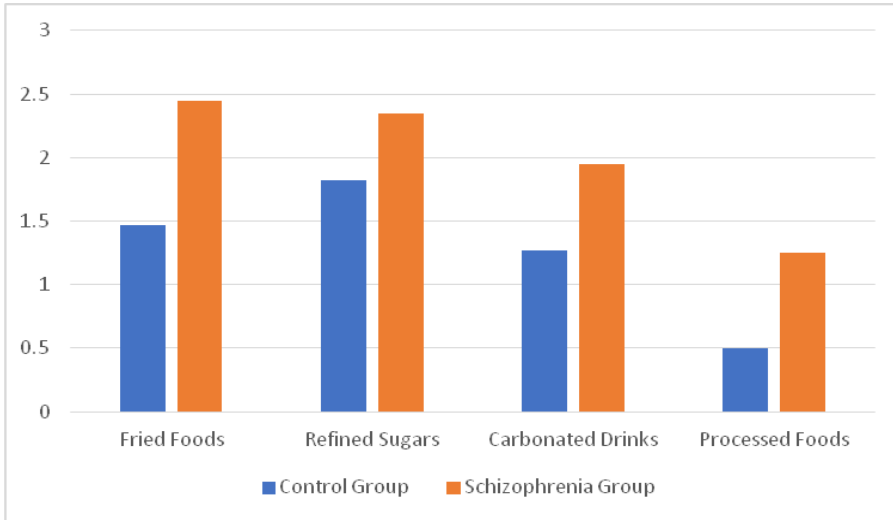


Fig. 2. Risk Factors

DISCUSSION

The nutritional architecture of patients with schizophrenia in the Iasi region reveals a significant systemic vulnerability. Our results demonstrate a profound “nutritional gap” characterized by a critical deficit in antioxidants and fiber ($p = 0.041$), coupled with a nearly twofold increase in the consumption of pro-inflammatory foods like fried fats ($p = 0.029$) and refined sugars (tabs. I, II). This dietary shift does not merely represent a lifestyle preference but serves as a primary driver for oral-systemic degradation.

The significant reduction in antioxidant intake observed in our cohort is a key finding that aligns with current models of “Nutritional Psychiatry”. Previous work by our group has extensively examined the intersection of molecular markers and clinical outcomes, emphasizing that the gap between laboratory findings and patient care can only be bridged through an oxidative stress-centered approach (6). This is particularly relevant in oral medi-

cine, as periodontal tissues are highly sensitive to the balance between reactive oxygen species (ROS) and antioxidant defenses. When protective factors are absent, as seen in our data, the oral mucosa becomes vulnerable to the same inflammatory cascades observed in other chronic conditions. For instance, the therapeutic potential of natural polyphenolic extracts has been documented in mitigating oxidative damage in gastrointestinal models (7), suggesting that the systematic absence of such compounds in the diet of psychiatric patients directly impairs their capacity to resolve periodontal inflammation.

Furthermore, the high prevalence of fried food and saturated fat consumption in the schizophrenia group (+0.98 difference, $p = 0.029$) points toward a systemic pro-inflammatory status. Research conducted by our team in related medical fields highlights that chronic systemic stressors often manifest through significant structural and functional changes in

organ systems, such as increased tissue stiffness in extrahepatic cholestasis (8) or the development of small bowel malignancies (9). While these studies involve different anatomical sites, they establish a critical principle of “tissue vulnerability” under chronic stress. In the context of dental medicine, this suggests that the oral environment in schizophrenia is not an isolated compartment but part of a wider pathobiological intersection where systemic inflammation, driven by poor nutrition, accelerates the breakdown of tooth-supporting structures.

This metabolic complexity is further highlighted when managing high-risk clinical populations. Our experience with complex chronic conditions, such as HCV cirrhosis in elderly patients (10), has taught us that therapeutic safety and efficacy are inextricably linked to the patient’s underlying systemic resilience. Similarly, the dental management of a patient with schizophrenia cannot succeed through local hygiene alone. The high intake of carbonated beverages and refined sugars found in our study mirrors findings from international cohorts, where psychiatric patients are reported to have significantly higher rates of decayed, missing and filled teeth (DMFT) due to dietary cariogenicity (11, 12).

Our findings on the deficit of fruits and vegetables are consistent with studies by Vetrani *et al.* (13) and Dipasquale *et al.* (4), which identified that patients with severe mental illness often consume diet types that are high in energy but low in essential micronutrients. This nutritional pattern has been linked to increased levels of C-reactive protein (CRP) and other pro-inflammatory cytokines (14). In the oral

cavity, this systemic inflammation is exacerbated by psychological stress, which has been shown to induce oxidative DNA damage in salivary glands (15).

Moreover, the “gut-brain-mouth” axis suggested by our data is supported by recent research into the oral microbiome. Studies by Comparelli *et al.* (16) and Gurbuz *et al.* (17) have demonstrated that the dietary habits of schizophrenic patients alter the oral microbial ecosystem, favoring the growth of periodontal pathogens. When combined with the high frequency of smoking observed in our study, this creates a “synergistic insult” to the oral tissues. The lack of dietary fiber found in our patients ($p = 0.041$) further complicates this, as fiber is known to modulate systemic inflammation through the production of short-chain fatty acids (18), which play a role in maintaining the integrity of both the gut and the oral mucosal barriers (19, 20).

Ultimately, the nutritional gap identified in this study advocates for a multidisciplinary clinical shift. Dental professionals must move beyond the “drilling and filling” paradigm and recognize the psychiatric patient’s dietary status as a primary clinical marker. Integrating antioxidant monitoring and nutritional counseling into the standard psychiatric protocol is essential to mitigate the systemic and oral complications of the disease.

However, certain limitations of the present study must be acknowledged, such as the relatively small sample size and the reliance on self-reported dietary data, which may be subject to recall bias. Furthermore, while the identified nutritional patterns strongly suggest a pro-oxidant state, longitudinal studies incorporating

The oral-systemic interface in severe mental illness: a comparative analysis of dietary pro-oxidant patterns and bio-clinical intersections in patients with schizophrenia

direct biochemical markers of oxidative stress are required to establish a definitive causal link between specific dietary deficits and the progression of periodontal destruction in this population.

CONCLUSIONS

The results of this study confirm a profound nutritional imbalance in patients with schizophrenia, characterized by a statistically significant deficit in dietary fiber ($p = 0.041$) and a marked escalation in the consumption of pro-inflammatory foods, such as fried fats ($p = 0.029$) and processed products ($p = 0.048$). This “nutritional gap” creates a systemic pro-oxidant environment that directly com-

promises oral mucosal integrity and periodontal health. Our findings suggest that the oral cavity acts as a clinical mirror for the metabolic disturbances associated with severe mental illness. Consequently, managing these patients requires a multidisciplinary shift that integrates nutritional counseling and antioxidant monitoring into standard psychiatric and dental care to mitigate the systemic drivers of oral degradation.

CONFLICT OF INTEREST AND FUNDING

The authors declare that there is no conflict of interest and they received no specific funding regarding this scientific research.

REFERENCES

1. Fillman SG, Cloonan N, Miller LC, Weickert CS. Markers of inflammation in the prefrontal cortex of individuals with schizophrenia. *Molecular psychiatry* 2013; 18(2): 133 / doi: 10.1038/mp.2012.199.
2. Kisely S, Baghaie H, Laloo R, Siskind D, Johnson NW. A systematic review and meta-analysis of the association between poor oral health and severe mental illness. *Psychosomatic medicine* 2015; 77(1): 83-92 / doi: 10.1097/PSY.000000000000135.
3. Turner M, Jahangiri L, Ship JA. Hyposalivation, xerostomia and the complete denture: a systematic review. *Journal of the American Dental Association (1939)* 2008; 139(2): 146-150 / doi: 10.14219/jada.archive.2008.0129.
4. Dipasquale S, Pariante CM, Dazzan P, Aguglia E, McGuire P, Mondelli V. The dietary pattern of patients with schizophrenia: a systematic review. *Journal of psychiatric research* 2013; 47(2): 197-207 / doi: 10.1016/j.jpsychires.2012.10.005
5. Remigante A, Morabito R. Cellular and Molecular Mechanisms in Oxidative Stress-Related Diseases 2.0/3.0. *International journal of molecular sciences* 2023; 24(21): 16018 / doi: 10.3390/ijms242116018
6. Balmus IM, Ilie OD, Ciobica A, et al. Irritable Bowel Syndrome between Molecular Approach and Clinical Expertise-Searching for Gap Fillers in the Oxidative Stress Way of Thinking. *Medicina (Kaunas, Lithuania)* 2020; 56(1): 38 / doi: 10.3390/medicina56010038.
7. Cojocariu R, Ciobica A, Balmus IM, et al. Antioxidant Capacity and Behavioral Relevance of a Polyphenolic Extract of *Chrysanthellum americanum* in a Rat Model of Irritable Bowel Syndrome. *Oxidative medicine and cellular longevity* 2019; 3492767 / doi: 10.1155/2019/3492767
8. Trifan A, Sfarti C, Cojocariu C, et al. Increased liver stiffness in extrahepatic cholestasis caused by choledocholithiasis. *Hepatitis monthly* 2011; 11(5): 372-375.

9. Trifan A, Singeap AM, Cojocariu C, Sfarti C, Stanciu C. Small bowel tumors in patients undergoing capsule endoscopy: a single center experience. *JGLD* 2010; 19(1): 21-25.
10. Trifan A, Stanciu C, Gheorghe L, et al. Efficacy and safety of paritaprevir / ritonavir, ombitasvir, and dasabuvir with ribavirin for the treatment of HCV genotype 1b compensated cirrhosis in patients aged 70 years or older. *Medicine* 2017; 96(50): e9271 / doi: 10.1097/MD.0000000000009271.
11. Yang M, Chen P, He MX, et al. Poor oral health in patients with schizophrenia: A systematic review and meta-analysis. *Schizophrenia research* 2018; 201: 3-9 / doi: 10.1016/j.schres.2018.04.031.
12. Aghasizadeh Sherbaf R, Kaposvári GM, Nagy K, Álmos ZP, Baráth Z, Matusovits D. Oral Health Status and Factors Related to Oral Health in Patients with Schizophrenia: A Matched Case-Control Observational Study. *J Clin Med* 2024; 13(6):1584 / doi:10.3390/jcm13061584.
13. Vetrani C, DE Simone G, Saia V, et al. Diet quality in patients with treatment-resistant schizophrenia: time for improving nutritional recommendations. *Minerva endocrinology* 2025; 50(4): 377-386 / doi: 10.23736/S2724-6507.24.04158-7.
14. Marder SR, Essock, SM, Miller AL, et al. Physical health monitoring of patients with schizophrenia. *The American journal of psychiatry* 2004; 161(8): 1334-1349 / doi: 10.1176/appi.ajp.161.8.1334.
15. Irie M, Asami S, Nagata S, Miyata M, Kasai H. Relationships between perceived workload, stress and oxidative DNA damage. *International archives of occupational and environmental health* 2001; 74(2): 153-157 / doi: 10.1007/s004200000209.
16. Comparelli A, Stampatore L, Costacurta M, Pompili M. Schizophrenia and Dental Health: A Systematic Review. *The Journal of nervous and mental disease* 2021; 209(9): 684-690 / doi:10.1097/NMD.0000000000001371.
17. Gurbuz O, Alatas G, Kurt E, Dogan F, Issever H. Periodontal health and treatment needs among hospitalized chronic psychiatric patients in Istanbul, Turkey. *Community dental health* 2011; 28(1): 69-74.
18. Mörkl S, Wagner-Skacel J, Lahousen T, et al. The Role of Nutrition and the Gut-Brain Axis in Psychiatry: A Review of the Literature. *Neuropsychobiology* 2018; 1-9 / doi:10.1159/000492834.
19. Mobley CC. Nutrition and dental caries. *Dental clinics of North America* 2003; 47(2): 319-336 / doi: 10.1016/s0011-8532(02)00102-7.
20. Meyer JM, Stahl SM. The metabolic syndrome and schizophrenia. *Acta psychiatrica Scandinavica* 2009; 119(1): 4-14 / doi: 10.1111/j.1600-0447.2008.01317.x
- 21.