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Investigating the Potential Positive Impact of Nutritional Interventions in the Management of Schizophrenia, Schizoaffective Disorder, and Other Psychotic Disorders: An Approach to Health Education

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Abstract

Introduction: Combined lifestyle and dietary interventions present a promising strategy for addressing weight management in individuals with schizophrenia and related disorders, potentially mitigating the adverse effects of antipsychotic medications.

Objective: The aim of the present study is to investigate the potential positive impact of nutritional interventions in the management of schizophrenia, schizoaffective disorder, and other psychotic disorders using a health educational approach.

Design: Mini narrative review.

Materials and Methods: The material of the present study was exclusively Internet-based. The method included a comprehensive electronic literature search for studies published between 1999 and 2024 in the databases PubMed and Google Scholar, conducted from 10 August 2024 to 10 October 2024.

Results and Discussion: The review of the literature revealed that lifestyle modifications, primarily dietary changes and physical activity, can significantly improve physical parameters, brain-derived neurotrophic factor (BDNF) levels, quality of life (QoL), and psychological outcomes. While some studies demonstrated the efficacy of structured programs in enhancing weight stability, others noted mixed health outcomes, indicating that educational efforts alone may not produce immediate changes in body mass index (BMI). Findings underscore the importance of interdisciplinary strategies that integrate physical health into psychiatric care to effectively manage the multifaceted physical health challenges faced by these individuals.

Conclusions: The findings suggest that interdisciplinary lifestyle interventions can play a crucial role in improving health metrics among individuals with psychiatric disorders, advocating for sustained engagement in nutritional and physical activity interventions to enhance both physical and psychological well-being.

Key words: Nutrition; Interventions; Schizophrenia; Schizoaffective Disorder; Psychotic Disorders; Health Education

Abbreviations: BDNF: Brain Derived Neurotrophic Factor; QOL: Quality of Life; BMI: Body Mass Index; GABA: Gamma-Amino Butyric Acid; SFW: Solutions for Wellness

Introduction

Schizophrenia

Schizophrenia is a thought disorder affecting 0.4% to 1.2% of the population, characterized by positive symptoms like delusions and hallucinations, and negative symptoms such as flat affect and social withdrawal. The disorder impacts relationships, work, and self-care, and may involve inappropriate emotions, cognitive impairments, and motor activity issues. Diagnosis requires excluding other conditions, with onset typically between late adolescence and the mid-30s. Research shows gender differences, with women often having a later onset and better outcomes, while hospital studies indicate higher rates in men [1-3]. Schizophrenia's pathophysiology involves complex molecular and neural circuit changes, but the precise relationship between these changes and underlying dysfunctions remains unclear. Central to this pathology are neurotransmitter abnormalities, particularly involving dopamine, serotonin, glutamate, and gamma-aminobutyric acid (GABA).

The initial link between dopamine and schizophrenia arose from the effectiveness of D2 receptor blockers in treating psychotic symptoms. Four key dopamine pathways have been identified: mesolimbic, mesocortical, tuberoinfundibular, and nigrostriatal, each contributing differently to schizophrenia's symptoms. Excessive dopamine in the mesolimbic pathway correlates with positive symptoms, while reduced dopamine in the mesocortical pathway relates to negative symptoms and cognitive deficits. Furthermore, recent advances reveal that dysregulated dopaminergic activity impacts how patients assign salience to environmental stimuli, potentially leading to delusions. The delayed clinical response to antipsychotic treatment also suggests that the antipsychotic effects may involve secondary neurochemical mechanisms. Exploring the interactions between dopamine, glutamate, and GABA is crucial, as alterations in these networks point toward novel therapeutic avenues beyond the traditional dopamine hypothesis [4-10].

Schizoaffective Disorder

Schizoaffective disorder is often misdiagnosed, with debates about its criteria and some advocating for its removal from the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). Originally a subtype of schizophrenia, it lacks conclusive evidence for unique etiology. Research indicates high comorbidity with depression and identifies various risk factors, including genetics and trauma. The disorder's evolving diagnostic criteria hinder epidemiological studies, but estimates suggest it occurs in 0.3% of the population, primarily in women and individuals aged 25-35. Schizoaffective disorder accounts for 10-30% of inpatient psychosis admissions. The pathophysiology of schizoaffective disorder is not fully understood, but neurotransmitter irregularities (dopamine, norepinephrine, serotonin) likely play a role. Structural brain changes, particularly in the right lentiform nucleus, left temporal gyrus, and right precuneus, are associated with both schizophrenia and schizoaffective disorder. Additionally, individuals with schizoaffective disorder often show reduced hippocampal volumes and distinct shape alterations in the medial and lateral thalamic areas compared to controls [1,2,11-15].

Other Psychotic Disorders

Psychosis is characterized by a disconnection from reality and affects approximately 1.5 to 3.5% of individuals diagnosed with a psychotic disorder. However, many more may experience psychotic symptoms in their lifetime. It is linked to various psychiatric, neurodevelopmental, and medical conditions and is a key feature of schizophrenia. Often co-occurring with mood disorders and substance use, psychosis presents significant challenges for patients and families. Its distressing nature makes it a central concern for healthcare providers in treatment planning [1,2,16,17].

Differentiating between psychoses associated with a primary psychotic disorder and psychotic disorders associated with other medical or neurologic conditions involves several factors. Key indicators include age of onset, with primary psychotic disorders typically manifesting in late teens to early thirties, while psychotic disorders associated with other medical or neurologic conditions appears after 40. Onset patterns differ; primary psychotic disorder often starts subtly, whereas psychotic disorder associated with other medical or neurologic conditions is acute. A family history of primary psychotic disorders is more common. Presentation is influenced by life stressors for primary psychotic disorders, while psychotic disorders associated with other medical or neurologic conditions often occur in healthcare settings. Additionally, primary psychotic disorders are linked to auditory hallucinations, unlike the visual or tactile hallucinations seen in psychotic disorders associated with other medical or neurologic conditions [1,2,18].

Psychotic disorders are characterized by a complex interplay of multiple pathophysiological factors. While the dopamine hypothesis highlights dopamine dysregulation as central, other neurotransmitter imbalances-such as serotonin, glutamate, and GABA-also contribute. Additionally, neuroinflammation and dysfunction of glial cells (microglia, astrocytes, and oligodendrocytes) play pivotal roles. The hypothalamic-pituitary-adrenal axis, gut microbiome, oxidative stress, and mitochondrial dysfunction further complicate the neurochemical landscape. These interconnected factors elucidate the intricate mechanisms underlying psychosis, emphasizing that multiple systems contribute to the disorder's manifestation [1,2,19-22].

Weight gain associated with antipsychotic medications is a notable concern in the management of schizophrenia, contributing to an elevated risk of morbidity and mortality. Mechanisms for obesity in schizophrenia, schizoaffective disorder, and other psychotic disorders include a complex interplay of pharmacological and psychosocial factors. Antipsychotics, especially atypical ones, can influence metabolic pathways by altering neurotransmitter systems, including serotonin and histamine, leading to increased appetite and changes in fat metabolism. Furthermore, these medications can diminish physical activity due to sedation, compounding weight gain. Additionally, individuals with schizophrenia, schizoaffective disorder, and other psychotic disorders may face socioeconomic challenges that hinder access to nutritious food and exercise, further exacerbating the risk of obesity. Psychosocial factors, such as stress and stigma, may also contribute to unhealthy eating behaviours [1,2,23-25].

Objective

Nutritional interventions refer to targeted strategies and actions designed to improve an individual's or population's

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dietary practices and nutritional status. These interventions can take various forms, including changes in diet, supplementation, education, and policy initiatives aimed at enhancing nutrient intake, addressing deficiencies, and promoting overall health. They are often implemented in clinical settings, community programs, or public health campaigns to prevent or manage health conditions, such as obesity, malnutrition, diabetes, and cardiovascular diseases. The goal of nutritional interventions is to support better health outcomes and improve quality of life through optimized nutrition [26].

Individuals with schizophrenia, schizoaffective disorder, and other psychotic disorders exhibit a higher prevalence of overweight and obesity compared to the general population [1,2,23-25]. Therefore, it is reasonable to make the hypothesis that nutritional interventions tailored for this patient population could yield beneficial effects in reducing body weight and, consequently, improving their overall health. The aim of the present study is to investigate the potential positive impact of nutritional interventions in the management of schizophrenia, schizoaffective disorder, and other psychotic disorders using a health educational approach. This review seeks to address gaps in the existing literature within the field and to enhance the overall level of knowledge. By focusing on the unique dietary needs of this population, it highlights a crucial yet often overlooked aspect of their health management. The importance of this review lies in its potential to inform healthcare professionals and policymakers about effective dietary strategies that may mitigate obesity and promote overall well-being in these individuals. By integrating nutrition with mental health care, it strives to improve health outcomes and enhance quality of life, fostering holistic approaches to treatment in clinical practice.

Materials and Methods

Design

A mini narrative review was performed based on a synthesis of previously published literature. The material of the present study was exclusively Internet-based. A comprehensive electronic literature search in the databases PubMed and Google Scholar was performed (from 10 August 2024 to 10 October 2024) using the following terms/key words: “nutritional interventions “ OR “nutritional programs” AND “schizophrenia” AND “schizoaffective disorder” AND “other psychotic disorders”. In addition, a search in the reference lists was carried out.

Criteria for inclusion of studies were:

- Literature written in English
- Literature published from from 1999 to 2024 (25 years)
- Studies that involved original research
- Studies that had keywords in the title and/or abstract

Criteria for exclusion of studies were:

- Reviews
- Conference papers
- Book chapters
- Books
- Short surveys
- Articles and documents written in languages other than English

Selection of Studies

All obtained references from the search were organized and duplicates were excluded. The titles and abstracts were screened for content and relevance to the topic with focus on the inclusion criteria. The integral text of selected titles was read and the reference list of selected articles was consulted in order to find out other relevant publications. Additionally, studies which failed to adequately describe the potential positive impact of nutritional interventions in the management of schizophrenia, schizoaffective disorder, and other psychotic disorders were excluded.

Data Extraction and Analysis

The essential data from each published study were extracted and synthesized. The results are presented in a brief narrative form. Eight (8) research articles were obtained and analyzed.

Results

A study by Aquila & Emanuel [27] investigated the impact of dietary changes on patients receiving novel antipsychotics. They conducted a retrospective analysis involving 32 patients diagnosed with DSM-IV schizophrenia or schizoaffective disorders, all residing in an adult care facility. Prior to the intervention, 71% experienced significant weight gain due to traditional antipsychotics. The intervention included switching to atypical drugs, implementing a low-calorie monitored diet, and providing nutritional education. After 12 and 18 months, weight gain was reported in only 30% of the participants, in contrast to the baseline. This suggests that dietary management may be a better predictor of weight stability compared to medication choice.

In a more expansive study, Porsdal et al. [28] analyzed the effectiveness of a three-month educational program, “Solutions for Wellness” (SfW), across 49 psychiatric clinics. A total of 373 patients were assessed, of which 314 participated in the SfW group (54% had schizophrenia). At baseline, patients presented with a mean age of 41 years and a Body Mass Index (BMI) of 31.4. While the program didn’t significantly enhance subjective well-

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being, it showed a notable association with maintaining weight stability and waist circumference within the intervention group.

Kuo et al. [29] focused on the relationship between weight reduction and serum brain-derived neurotrophic factor (BDNF) among 33 obese, non-diabetic patients with chronic schizophrenia. Over 10 weeks, participants engaged in a lifestyle modification program that included psychosocial treatment and exercise. Blood biochemistry and serum BDNF levels were evaluated. Post-intervention, patients displayed significant reductions in body weight. The increase in serum BDNF levels post-program correlated positively with reductions in weight and body mass index, indicating potential biological outcomes from lifestyle interventions.

CAPiCOR, a randomized clinical trial by Masa-Font et al. [30], assessed the effectiveness of an educational intervention focusing on diet and physical activity among 332 patients diagnosed with severe mental disorders in Barcelona. This intervention yielded a significant increase in physical activity (average weekly METs increased by 266.05 in the intervention group). However, the intervention did not significantly decrease BMI or waist circumference at three months, revealing mixed outcomes concerning physical health parameters.

Research by Hjorth et al. [31] underscored the intersection of quality of life (QoL) and physical health in patients with schizophrenia over a 30-month period. They included 190 patients and measured various outcomes, noting that higher BMI was significantly correlated with lower QoL. Newly diagnosed patients displayed a decline in physical health, whereas long-term patients improved in several metabolic risk factors, suggesting that chronic intervention positively impacts long-term health metrics.

An additional longitudinal study by Juel et al. [32] involved 64 patients with concurrent psychiatric disorders and substance use over a 24-month health-promotion programme. They reported significant improvements in QoL, particularly in the psychological and environmental domains, correlating positively with the quantity of interventions attended. This illustrates the potential of structured lifestyle improvement programs in enhancing the health metrics and QoL of patients facing dual challenges of mental health issues and substance addiction.

Osborn et al. [33] explored a primary care intervention aimed at reducing cardiovascular risk factors among 327 participants with severe mental illness. Although the mean cholesterol concentration showed no significant difference between the intervention and control groups after 12 months, the study highlighted the intervention's potential cost-effectiveness and lower psychiatric admission rates, emphasizing the need for ongoing cardiovascular risk management.

The "Meals, Mindfulness, & Moving Forward" program, detailed by Usher et al. [34], involved a feasibility study with 33 young individuals with a history of psychotic episodes. The primary aim was adherence to a lifestyle intervention over six weeks. Results indicated high adherence rates (88%) alongside significant improvements in positive psychotic symptoms, supporting the viability of integrating mindfulness and nutritional education in early psychosis management.

Discussion

Synthesis of the Studies

Key findings across these studies underscore the relevance of lifestyle intervention in managing the physical health of individuals with severe mental disorders (Figure 1). Combined lifestyle and dietary interventions demonstrate a promising approach to address weight management in individuals with schizophrenia and related disorders. Individual studies reveal improvements in physical parameters, BDNF levels, quality of life, and psychological outcomes, suggesting these strategies can potentially mitigate the adverse effects of antipsychotic medications. Aquila & Emanuel [27] found that dietary management may be a stronger predictor of weight stability than the choice of antipsychotic medication, as evidenced by a reduction in the percentage of participants experiencing weight gain post-intervention. Porsdal et al. [28] reported that while subjective well-being did not significantly improve, maintaining weight stability was achieved, emphasizing the importance of educational programs for this population. Kuo et al. [29] demonstrated a significant correlation between weight reduction and increased serum brain-derived neurotrophic factor (BDNF) levels, suggesting that lifestyle interventions have potential biological benefits.

Conversely, Masa-Font et al. [30] identified mixed health outcomes despite increased physical activity levels, indicating that educational efforts alone may not translate to immediate changes in BMI or waist circumference. Juel et al. [32] highlighted that structured programs can enhance QoL, especially in psychological and environmental domains, suggesting that both mental and physical health interventions yield synergistic benefits. Finally, Usher et al. [34] affirmed the feasibility and efficacy of nutritional and mindfulness interventions in early psychosis, noting high adherence rates and improved psychotic symptoms. Collectively, these findings emphasize the multifaceted approach required for effective management of the physical health challenges faced by individuals with psychiatric disorders, advocating for ongoing interdisciplinary strategies in clinical practice.

Across the aforementioned studies, a common theme emerges concerning the exploration of lifestyle modifications-primarily dietary changes and physical activity-as mechanisms to mitigate the adverse physical health outcomes associated with psychiatric conditions, notably schizophrenia and severe mental disorders. Each study undertakes an intervention that combines educational components with behavioural modifications aimed at improving weight management and overall health metrics.

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Moreover, many of these studies utilize longitudinal designs to assess the outcomes over extended periods, either by observing changes in weight, body mass index (BMI), or quality of life (QoL) parameters, thereby providing robust temporal data on the efficacy of the interventions. Furthermore, populations affected by similar psychotropic medication-induced metabolic side effects are often targeted in these studies, as well as a shared emphasis on the necessity of integrating physical health considerations into psychiatric care [27-34].

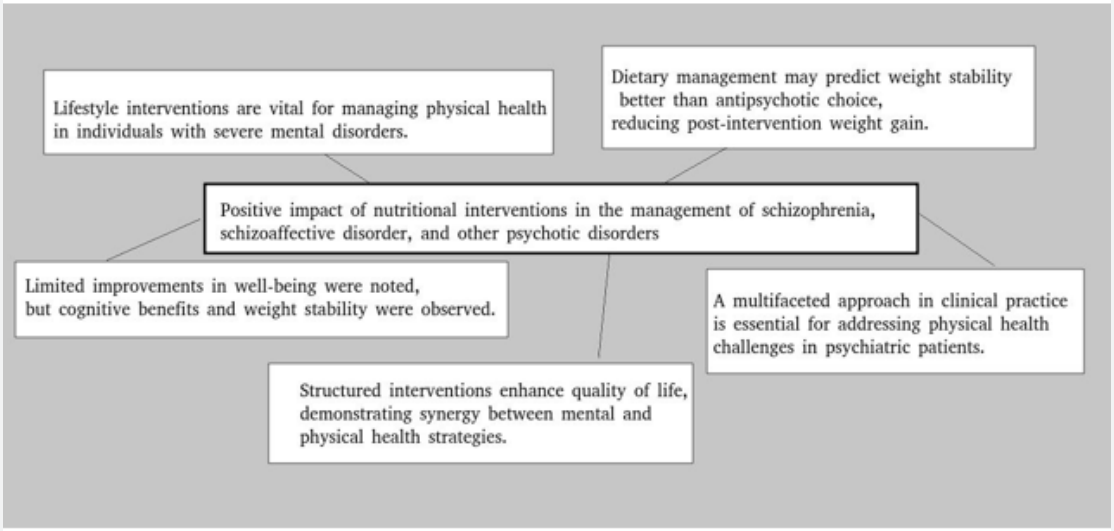

Figure 1: The positive impact of nutritional interventions in the management of schizophrenia, schizoaffective disorder, and other psychotic disorders according to the literature.

While the studies align on the overarching theme of lifestyle intervention, they exhibit notable methodological differences. For example, Aquila & Emanuel [27] conducted a retrospective analysis with a smaller sample size (32 patients), whereas Porsdal et al. [28] expanded the scope to a multi-clinic prospective analysis involving 373 participants, enhancing the generalizability of findings. The nature of the interventions varies significantly as well; Kuo et al. [29] focused on a lifestyle modification program that emphasized both psychosocial treatment and exercise, whereas the CAPiCOR trial by Masa-Font et al. [30] primarily emphasized education on diet and physical activity without observing substantial reductions in BMI at three months. Additionally, the populations studied have different co-morbidities, with some studies addressing individuals with concurrent substance use disorders, while others focus exclusively on schizophrenia. The duration of interventions also varies, ranging from six weeks in Usher et al. [34] to 30 months in Hjorth et al. [32], affecting the follow-up and potential long-term benefits recorded in each study.

Strengths of the Studies

The studies highlighted present several strengths: they indicate a robust examination of how dietary modifications, physical activity, and mental health outcomes interact, particularly in patients with severe mental disorders. Collectively, these studies offer compelling evidence for the multifaceted benefits of lifestyle interventions in the realm of mental health. They underscore the potential to enhance both physical health and quality of life, advocating for broader acceptance and implementation of such strategies in clinical settings, ultimately paving the way for more effective and patient-centered care. The studies highlighted provide significant insights into the intersection of dietary modifications, physical activity, and mental health outcomes in patients with severe mental disorders. Aquila & Emanuel's [27] research demonstrates the effectiveness of dietary management over medication choice in stabilizing weight among antipsychotic users. Similarly, Porsdal et al. [28] showed that educational interventions like the "Solutions for Wellness" program could yield positive impacts on weight stability, even if subjective well-being did not improve significantly.

Kuo et al. [29] further contributed to this body of knowledge by linking weight reduction to increased levels of BDNF, underlining the biological benefits of lifestyle changes. Masa-Font et al. [30] emphasized the importance of physical activity, revealing a marked improvement in activity levels, which is crucial for comprehensive health supervision. Hjorth et al. [31] and Juel et al. [32] accentuated the correlation between physical health and quality of life, affirming that structured interventions can yield lasting benefits in health metrics. Finally, Usher et al. [34] illustrated the successful integration of mindfulness and nutritional education in addressing early psychosis, supporting

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the adoption of holistic approaches in mental health treatment. Together, these studies highlight the multifaceted benefits of lifestyle interventions, highlighting their potential to enhance physical health and quality of life in mental health patients.

Limitations of the Studies

The limitations of the studies discussed are manifold, substantially impacting the generalizability and interpretability of their findings. Aquila & Emanuel's [27] retrospective analysis, while providing valuable insights, employed a small sample size of only 32 patients, which may limit the robustness of the conclusions regarding dietary management's predictive capabilities. Porsdal et al. [28] faced similar challenges with a significant dropout rate (59 patients) and lack of improvement in subjective well-being, raising concerns about the program's overall efficacy and applicability to broader populations. Kuo et al. [29] reported positive correlations between lifestyle intervention and increased serum BDNF levels; however, the short duration of 10 weeks and the small participant pool of 33 limit the findings' long-term relevance. Masa-Font et al. [30] demonstrated mixed results with no significant reduction in BMI despite increased physical activity, suggesting a need for more comprehensive intervention designs. In Hjorth et al. [31], the reliance on correlational data to infer causation between BMI and quality of life may oversimplify a complex interplay of factors.

Juel et al. [32] reported significant improvements in quality of life but did not control for potential confounding variables impacting these outcomes over the two-year study period. Osborn et al. [33] acknowledged the lack of notable changes in cholesterol levels, questioning the effectiveness of their intervention while still highlighting its cost-effectiveness, which may not fully capture the clinical significance. Lastly, Usher et al. [34] indicated high adherence rates; however, the limited sample size and feasibility focus render the findings less applicable to wider populations, particularly in diverse clinical settings. Collectively, these studies underscore the necessity for larger, well-controlled trials with more comprehensive outcome measurements to elucidate the efficacy of lifestyle interventions among diverse populations with mental health disorders.

Future Directions

Research into dietary management and lifestyle interventions reveals a complex relationship with health outcomes in individuals with schizophrenia, schizoaffective disorder, and other psychotic disorders. Future studies should prioritize longitudinal research to understand the long-term effects of dietary changes on both physical and mental health. There's a need to develop integrated intervention models that combine dietary education, physical activity, psychosocial support, and mindfulness to evaluate their combined impact on quality of life and mental health. Investigating the biological mechanisms behind lifestyle changes could provide insights into how they affect neurotrophic factors and biomarkers linked to improved mental health. Individualized interventions considering demographic factors may enhance their effectiveness, while cost-effectiveness analyses could highlight the potential benefits of lifestyle approaches over traditional treatments. Additionally, incorporating mindfulness practices into interventions warrants exploration, as it could improve mental health outcomes. Engaging families and communities is essential for developing strategies that support lifestyle changes. Utilizing technology, like mobile health applications, can help implement these interventions effectively. Comparative effectiveness research on various dietary and exercise approaches is necessary, alongside examining socioeconomic factors that affect adherence, to ensure equitable access to mental health interventions. These future research directions aim to optimize nutritional and lifestyle factors in treating severe mental illness [27-34].

Conclusions

In summary, the studies reviewed highlight the significant potential of dietary and lifestyle interventions in managing the physical health challenges faced by individuals with schizophrenia, schizoaffective disorder, and other psychotic disorders. Given the concerning weight gain associated with antipsychotic medications, it is critical to explore alternative strategies that can contribute to better health outcomes, including nutritional education, physical activity, and psychosocial support. The evidence suggests that these interventions not only aid in weight management but also show promise in improving biomarkers like brain-derived neurotrophic factor (BDNF) and enhancing overall quality of life. While the findings indicate benefits derived from structured lifestyle programs, variability in methodologies and outcomes points to the need for more comprehensive, standardized research efforts in this domain. Future studies should focus on long-term implications of these interventions, considering the biological mechanisms at play and aiming for individualized approaches that account for the diverse needs of this patient population. Ultimately, cultivating a more holistic treatment framework that integrates lifestyle modifications into the mental health care paradigm could lead to improved physical and mental well-being for people grappling with serious psychiatric illnesses.

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