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Exercise for the Treatment of Schizophrenia: a Current Review and Recommendations

Körperliche Aktivität in der Behandlung der Schizophrenie: ein aktuelles Review und Empfehlungen

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Summary

- › **Schizophrenia** ranges among the most debilitating psychiatric diseases. Physical activity is recommended as an add-on therapy to improve acute symptoms (especially negative symptoms and cognitive deficits) and to prevent the onset of the disease. But individuals with schizophrenia usually engage in less physical activity than the general population.
- › **This sedentary lifestyle** is one of the reasons that lead to more somatic comorbidities and increased mortality in this cohort. In this narrative review we provide an overview of evidence for the beneficial effects of physical exercise on the central nervous system and symptom severity in individuals with schizophrenia.
- › **We discuss the findings** in the context of their implementation in current treatment guidelines: The guidelines only provide general advice and no concrete statements regarding type, duration and intensity of exercise therapies, as the existing studies varied in their methodology. Future studies should therefore explore the possibility to transfer existing detailed recommendations for the general population on patients with schizophrenia to reduce sedentary behavior.

Zusammenfassung

- › **Die Schizophrenie** zählt zu den schwerwiegendsten psychiatrischen Erkrankungen. Körperliche Aktivität und Sport können hierbei als add-on Therapien sowohl akute Symptome (vor allem Negativ-Symptome und kognitive Defizite) verbessern als auch in der Prävention der Erkrankung unterstützend wirken. Trotzdem bewegen sich Erkrankte im Vergleich zur Normalbevölkerung deutlich weniger.
- › **Diese Bewegungsarmut** ist einer der Gründe für die erhöhte Rate an somatischen Komorbiditäten und der erhöhten Gesamtsterblichkeit in dieser Kohorte. In diesem narrativen Review geben wir einen Überblick über die Erkenntnisse zu den positiven Auswirkungen von sportlicher Bewegung auf das zentrale Nervensystem und die Symptomschwere in Patienten mit einer Schizophrenie.
- › **Wir diskutieren die Ergebnisse** im Kontext der aktuellen Behandlungsleitlinien: Diese geben nur allgemeine Hinweise und keine konkreten Empfehlungen hinsichtlich Art, Umfang und Intensität der empfohlenen Bewegung. Dies ist in den sehr heterogenen Methoden der bisherigen Studien begründet. In zukünftigen Studien sollte daher die Möglichkeit evaluiert werden, die existierenden detaillierten Empfehlungen für die Normalbevölkerung auf Patienten mit einer Schizophrenie auszudehnen, um der Bewegungsarmut entgegenzuwirken.

KEY WORDS:

Aerobic, Add-on therapy, Resistance Training, Prevention

SCHLÜSSELWÖRTER:

Aerobic, Zusatztherapie, Widerstandstraining, Prävention



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Introduction

Schizophrenia ranges among the most debilitating psychiatric diseases and affects large patient cohorts (median lifetime morbid risk for schizophrenia: 7.2/1,000 persons) (16). For the treatment of positive symptoms (e.g. hallucinations), antipsychotics with mainly antidopaminergic mechanisms have been proven effective in therapeutic regimes. There is an

ongoing search for improving negative symptoms and cognitive deficits, as these domains are more difficult to address with antipsychotic medication. One of this possible add-on treatments is physical activity. Prior studies identified a two-way relationship between the amount of physical activity and symptoms of schizophrenia (4, 8, 11).

In this narrative review with a selective literature search in the pubmed databank we aimed at providing a summary of current findings concerning the amount of physical activity in patients with schizophrenia, neurobiological effects of exercise in this cohort, the effects of physical activity on schizophrenia symptoms and their prevention. We discuss the findings in the context of current national recommendation guidelines.

Physical Activity and Comorbidities in Patients with Schizophrenia

Healthy individuals are advised to engage in at least 150 minutes of moderate aerobic exercise or 75 minutes of vigorous intensity per week to maintain their cardiorespiratory and muscular fitness, and flexibility (10). A meta-analysis with 35 studies and 3453 individuals with schizophrenia (mean age 40.0 years; 64.0% male) displayed that the amount of moderate and vigorous physical activity was significantly reduced in patients compared to healthy controls (24). This led to reduced cardiorespiratory fitness and to more sedentary behaviour in patients with schizophrenia. Combined with other lifestyle factors and somatic comorbidities, the sedentary behaviour resulted in premature mortality in this cohort. Physical activity was identified as an independent and modifiable risk factor for this observed premature mortality (28).

Somatic comorbidities that might be associated with the sedentary lifestyle include adipositas, diabetes mellitus, metabolic syndrome and coronary heart disease. The prevalences for metabolic syndrome in patients with schizophrenia is 33.4% (95%CI: 30.8% -36.0%, N = 93 studies) (29), for diabetes type II 11.5% (95% CI: 9.8 -13.5%, N = 57 studies) (27) and for cardiovascular diseases 11.8% (95% CI: 7.1 -11.0%, N = 57 studies) (3). Multiple factors have been identified that contribute to the development of comorbidities and metabolic syndrome in patients with schizophrenia: Pharmacological treatment with antipsychotics for itself can lead to an inactive lifestyle (19) and increase the risk for metabolic syndrome (17). Also common psychiatric comorbidities, e.g. substance use disorders (13), can further aggravate the link between schizophrenia and sedentary lifestyle.

In summary, patients with schizophrenia engage in less physical activity compared to healthy individuals, the sedentary lifestyle is associated with various somatic comorbidities and taken together, leads to an increased all-cause mortality.

Neurobiological Effects of Exercise in Patients with Schizophrenia

The neurobiological effects of exercise on the central nervous system are diverse and include modifications in synaptic plasticity, neurotrophins, glial cells, blood volume, growth factors, inflammation, DNA-polymorphisms and metabolic parameters (15, 30). Only some of these aspects were explicitly studied in patients with schizophrenia. A meta-analysis with 737 participants provided evidence for an exercise-induced volumetric retention in the left hippocampus. This effect was not displayed in the small cohort of schizophrenia patients and more research is needed to provide enough data for valid statements in this cohort (9). Regular ergometer training can have positive effects on white matter integrity (inhibition of the left hemisphere) in patients with schizophrenia (26). Aerobic exercise can increase Brain derived neurotrophic factor (BDNF) in patients with schizophrenia and might improve cognitive capacities (6).

In conclusion, exercise has various beneficial effects on the central nervous system, but explicit findings of these effects in the cohort of schizophrenia patients are limited to date. Still, the available results also point to beneficial neurobiological effects in this cohort and the implementation of exercise as add-on therapy becomes increasingly important.

Exercise for Improving Symptoms in Patients with Schizophrenia

Prior studies suggested beneficial effects of physical activity on both symptom severity and on quality of life in patients with schizophrenia. Severity and presence of psychotic symptoms were inversely correlated with physical activity levels (25). Besides the beneficial effects on psychotic symptoms, physical activity also improved cardiorespiratory fitness, cognition and quality of life in people with schizophrenia (8). Even though most studies examined aerobic exercise (8), also other forms of physical activity were proven effective, e.g. Yoga (1) or combined forms of physical activity (4). Also resistance training seems to have possible positive effects, but for this intervention more studies are needed to further elucidate the relationship (11).

Another aspect of exercise and especially team sports covers psychosocial consequences in patients with schizophrenia (and in general, patients with severe mental illness). A systematic review identified several additional effects of sports (23): the participation can provide a "normal" environment and interactions with other people that are not associated with the specific disease. It can furthermore provide a sense of meaning and achievement. Other psychosocial benefits include a reduction in social isolation.

Exercise for the Prevention of Psychotic Disorders

A current review summarized prospective studies regarding the preventive effects of exercise on the onset of psychotic syndromes. Four studies met the inclusion criteria with a total of 30,025 participants at the baseline assessments in the studies (2, 12, 14, 20, 22).

Age at baseline ranged from 9 to 18 years. Two studies stated proportion of women at baseline (49% and 52 %) (12, 14). The follow-up period ranged from 4 to 32 years. Diagnostic assessment was made using data from national registers and physical activity was assessed with self-reported questionnaires (12, 14, 20, 22). Two studies investigated covariates in their analyses (e.g. Gender, age, body mass index (BMI), birth weight, socioeconomic status) (14, 22). Crude analyses of the included studies revealed that physical activity may be prospectively associated with a decreased risk of incident psychosis. But in the subsequent analyses with possible covariates, the significant results could not be replicated. The authors concluded that there may be possible causal relationship between physical activity and the onset of psychotic disorders, but future studies have to further explore the possible influence of covariates.

Discussion

Physical activity has various beneficial effects on the central nervous system and is recommended for both healthy individuals and for patients with schizophrenia (9, 15). In healthy individuals, it can maintain the cardiorespiratory and muscular fitness (10) and it might help to prevent the onset

of psychotic symptoms (2). In patients with schizophrenia, physical activity as add-on therapy reduces disease-specific symptoms and increases quality of life and cardiorespiratory fitness (25).

Despite these findings, only general, but no specific recommendations regarding physical activity are included in German language treatment guidelines for schizophrenia. National treatment guidelines in Germany included general recommendations that individuals with schizophrenia should be offered exercise therapy (especially aerobic exercise) as part of a multimodal treatment concept (5). The Austrian guidelines recommend exercise as part of the possible treatment options in cases of weight gain during antipsychotic treatment (19). The Swiss guidelines added a statement that exercise and exercise therapy can improve physical fitness and psychiatric symptoms (21). Also non-German guidelines, e.g. the NICE guidelines, restrict their recommendations to general advice („People with psychosis or schizophrenia, especially those taking antipsychotics, should be offered a combined healthy eating and physical activity programme by their mental healthcare provider“) (18). Reasons for these rather general recommendations include the wide range of exercise interventions in the existing literature, which makes it difficult to generalize the findings and to draft concrete guidelines. Moreover, not only the type of exercise varied across prior studies, also the duration and intensity were not homogenized.

These rather general recommendations seem insufficient for the cohort of schizophrenia patients, because multiple aggravating factors contribute to the sedentary lifestyle as displayed above (e.g. medication, comorbidities). Prior literature also investigated possible motivating factors and barriers towards exercise and found that major barriers include low mood/stress, but also lack of support (7). Especially for these patients, very specific guidelines with concrete specifications seem inevitable.

Conclusion

Beneficial effects of add-on exercise on both cardiorespiratory fitness and on symptoms of schizophrenia are well-established. Methodological variations regarding type, duration and intensity of investigated exercise therapies contribute to the displayed vagueness of recommendations in the current German language national treatment guidelines (Germany, Austria, Switzerland). It would seem useful to transfer the existing recommendations for healthy individuals of the ACSM (10) on individuals with schizophrenia and to focus on these parameters in future studies. ■

Conflict of Interest

Prof. A. Hasan is editor of the WFSBP guidelines schizophrenia and the WFSBP guidelines of how to develop guidelines and co-editor of the German S3-guideline schizophrenia.

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