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ORIGINAL ARTICLE

Effects of yoga on quality of life, fatigue, and dynamic balance in individuals with schizophrenia: a single blind randomized controlled trial

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Purpose: Physical exercising is a reliable method to improve clinical symptoms, the quality of life and depressive symptoms in people with schizophrenia. The aim of this study is to examine the effect of yoga on the quality of life, fatigue and dynamic balance in people with schizophrenia.
Methods: Thirty-two outpatient individuals aged 18-65 years, diagnosed with schizophrenia by psychiatrist were included in the study. The individuals were randomly divided into two groups: yoga and control groups. Yoga was applied to the yoga group two times a week for a total of 12 weeks by a physiotherapist trained and experienced in yoga. The individuals were evaluated by researcher who does not know which group the participants are from at beginning and the end of 12 weeks. The fatigue severity was evaluated with the Fatigue Severity Scale, the quality of life was evaluated with the World Health Organization Quality of Life Scale-BREF Turkish version, balance and functional mobility were evaluated with the Timed up and Go Test.
Results: The mean ages of yoga and control groups were as 38.11±12.46 and 41.53±11.44 years respectively. As result of statistical analysis, there was a difference in the physical health parameter of the quality of life between the groups before and after treatment ($p<0.05$). When the groups were compared within themselves, a significant positive change was observed in the yoga group in terms of balance values ($p<0.05$).
Conclusion: It was determined that yoga improved dynamic balance in people with schizophrenia, and increased their physical health, which is a sub-parameter of life quality.
Keywords: Balance, Fatigue, Quality of life, Schizophrenia, Yoga.

Şizofrenili bireylerde yoganın yaşam kalitesi, yorgunluk ve dinamik dengeye etkileri: tek kör randomize kontrollü çalışma

Amaç: Fiziksel egzersiz, şizofrenili bireylerde klinik semptomları, yaşam kalitesini ve depresif semptomları iyileştirmek için güvenilir bir yöntemidir. Bu çalışmanın amacı şizofrenili bireylerde yoganın yaşam kalitesi, yorgunluk ve dinamik denge üzerindeki etkisini incelemektir.
Yöntem: Psikiyatrist tarafından şizofreni tanısı alan,18-65 yaş aralığında 32 poliklinik hastası çalışmaya dahil edildi. Bireyler yoga ve kontrol grupları olmak üzere rastgele iki gruba ayrıldı. Yoga grubuna, yoga konusunda eğitimli ve deneyimli bir fizyoterapist tarafından toplam 12 hafta boyunca haftada 2 kez yoga uygulandı. Bireyler 12 haftanın başında ve sonunda grupların dağılımını bilmeyen araştırmacı tarafından değerlendirildi. Yorgunluk şiddeti, Yorgunluk Şiddeti Ölçeği; yaşam kalitesi, Dünya Sağlık Örgütü Yaşam Kalitesi Ölçeği-BREF Türkçe versiyonu; denge ve fonksiyonel hareketlilik Zamanlı Kalk ve Yürü Testi ile değerlendirildi.
Bulgular: Yoga ve kontrol grubunun yaş ortalaması sırasıyla 38,1±12,5 ve 41,5±11,4 yıldı. İstatistiksel analizler sonucunda tedavi öncesi ve sonrası gruplar arasında yaşam kalitesi fiziksel sağlık parametrelerinde bir fark vardı ($p<0,05$). Gruplar kendi içlerinde karşılaştırıldığında, yoga grubunda dengede anlamlı bir pozitif değişiklik gözlendi ($p<0,05$).
Sonuç: Yoganın şizofrenili bireylerde, dinamik dengeyi geliştirdiği ve yaşam kalitesinin alt parametresi olan fiziksel sağlığın arttırdığı ortaya koyuldu.
Anahtar kelimeler: Denge, Yorgunluk, Yaşam kalitesi, Şizofreni, Yoga.

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Schizophrenia is one of the important mental disorders that is encountered at the rate of approximately 1% in all societies, causes deteriorations in the mental, social, professional, and economic fields in patients unless it is treated, and may cause a serious loss of ability.[1] Although psychosocial approaches have been intensively used in the recent ten years in the treatment of schizophrenia, the basis of schizophrenia treatment consists of antipsychotic drug treatment. Among today's unfulfilled needs regarding schizophrenia are negative symptoms, other side effects of drugs, affective disorder symptoms, comorbid disorders, alcohol-substance abuse, in-community labelling, psychosocial and economic needs, integrated evidence-based interventions to increase the quality of life, and non-institutional care.[2] Physical therapy interventions (yoga, aerobic exercises, strength exercises, relaxation training, basic body awareness exercises, or a combination of these) are used in the multidisciplinary management of schizophrenia. It is stated that the interventions in question significantly reduce the psychiatric symptoms, potentially improve the mental and physical quality of life and reduce metabolic risk and weight.[3,4]

Exercise is known to improve mental health through neurotrophic factors such as Brain-derived neurotrophic factor (BDNF), Glial-derived Neurotrophic Factor (GDNF) and Insulin-like growth factor (IGF-1), which have important roles in neurogenesis, angiogenesis, and plasticity.[5] In addition to BDNF, GDNF and IGF-1, exercise increases the release of endothelial growth factor Vascular Endothelial Growth Factor (VEGF). VEGF provides endothelial cell production and angiogenesis and has a neurotrophic, neuroprotective and neurogenic effect.[6] Exercise also increases the release of many transmitters such as seratonin, dopamine, acetylcholine, and norepinephrine. Exercise increases cerebral blood flow in many cortical and subcortical areas.[7]

It was shown that physical exercising provides benefit in disorders such as depression, anxiety, and schizophrenia when applied in addition to the treatment.[8,9] It is also valuable for people with schizophrenia spectrum disorder since clinical symptoms have a positive effect on the quality of life and consciousness. Considering the physiological and psychological effects of exercising in areas such as mood, dopaminergic system, and sleep, it may be considered that it can be beneficial in the treatment of psychiatric problems. Physical exercising is a reliable treatment to improve clinical symptoms, the quality of life and depressive symptoms in people with schizophrenia.[10] Yoga is a very old technique that has originated from India. Yoga develops the physiological, psychological, and mental potential of individuals. Yoga is the integration of physical exercises with meditation and breathing exercises. It includes prohibitions (yamas), suggestions (niyamas), postures (asanas), controlled breathing (pranayama), withdrawal of the senses (pratyahara), concentration (darana), and meditation (dhayana).[11,12]

With an increasing popularity in Western countries in recent years, yoga has become an alternative method of coping with stress. Despite its popularity, the physiological effects of doing yoga regularly are not known much.[13] Yoga asanas have positive effects on tension, insomnia, depression, posture, muscle spasm, and bone mineral density (BMD) among individuals with their balance, stretching, relaxation, strengthening components.[14]

Incomprehensive studies conducted, it is suggested that exercising may create an antidepressant effect both in hospitalized and ambulant patients, but exercising alone is not sufficient for especially diagnosed mental disorders (depression, schizophrenia, etc.) without the pharmacological treatment, and further studies are required for the relation between the prevention of mental disorders and exercising.[15] The hypothesis of this study has the effect of yoga on fatigue, quality of life and dynamic balance in individuals with schizophrenia. In line with this objective, it was aimed in this study to examine the effect of yoga as an alternative approach on fatigue, the quality of life, and dynamic balance in people with schizophrenia.

METHODS

Study design and participants

Individuals diagnosed with Schizophrenia by a psychiatrist who applied to Kırıkkale

Yüksek İhtisas Hospital, Community Mental Health Centre, aged 18-65 years were included in the study. The G*Power program (version 3.0.10 Universität Düsseldorf, Düsseldorf, Germany) was used for power analysis. In the power analysis according to the reference study, when 26 individuals were included in the study (13 individuals to each group) the statistical significance of alpha was found to be 5% and the confidence interval was taken as 95%, the power (1-β) of the study was found to be 80%.[16] Physical health sub-parameter of quality of life was selected as the primary outcome. Accordingly, 38 people schizophrenia were evaluated, 6 patient did not meet the inclusion criteria (4 patients weren't meeting inclusion criteria and 2 patients were not volunteers). 32 people with schizophrenia were included in the study (Figure 1). The criteria for inclusion in the study were determined as being diagnosed with schizophrenia, being able to come to the institution independently, having no communication difficulties and problems, volunteering to participate in the study. Those who had cardiac diseases, cardiac arrhythmia, cardiovascular diseases, malignancy, receiving chemotherapy, and radiotherapy causing malignity, with any neurological or orthopaedic disorder that may disrupt balance (Basilar artery insufficiency, cervical advanced stenosis, etc.), mental disorder that would not allow understanding the exercise to be done, and pregnant ones were not included in the study. Block randomization was done by a computer-generated random number list prepared by an investigator with no clinical involvement in the trial. Thirty two individuals who were included in the study were randomly divided into 2 groups. While one group received yoga group, another group was identified to be the control group. The age, height, weight, Body Mass Index (BMI), gender, and duration of the disease of the individuals included in the study were recorded with the evaluation form prepared. All assessments were performed by trained physiotherapist who were blind to a subjects' allocation and were not involved in the yoga. The fatigue severity of the individuals was evaluated with the Fatigue Severity Scale (FSS)[17], the quality of life was evaluated with the World Health Organization Quality of Life Scale-BREF Turkish version (WHOQOL-BREF-TR)[18], and balance and functional mobility were evaluated with the Timed up and Go (TUG) Test[19].

The yoga program was applied to the yoga group 2 times a week for a total of 12 weeks by a physiotherapist trained and experienced in yoga. One session lasted for approximately 45 minutes. Breathing exercises, warm-up exercises, lying, sitting and standing yoga postures and relaxation were applied during the sessions, while no application was performed to the control group. Asanas were selected based on the patients' need and ability. Yoga postures used in the program included ardha kati chakrasana, tadasana, padahastasana, paschimottanasana, vakrasana, salabhasana, trikonoasana, vrikshasana, virabhadrasana, surya namaskar and ended with relaxation in shavasana. The program was adjusted according to the condition of the individuals for 12 weeks. The individuals were evaluated by a researcher who does not know which group the participants are from researchers at the beginning and end of 12 weeks.

Ethical approval

All procedures performed were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All individuals included in the study were given detailed information about the purpose and methodology of the study and their consent was obtained for participation in the study. Voluntary forms were signed by all participants. Also, individuals were given information about how personal information is kept confidential.

This study was approved by the Kırıkkale University Clinical Research Ethics committee. (Decision Number: 23/05)

Evaluation methods

The FSS is a scale of which validity and reliability are proved. The FSS is shown as the best example among single-dimension scales. The individual expresses to what extent he/she is of the same opinion with each item by choosing a number from 1 to 7. 1 means disagreeing completely, while 7 means agreeing completely. The score range of the scale that consists of 9 questions in total is 9-63. A score of 36 or higher means severe fatigue.[17]

WHOQOL-BREF-TR is a form that consists of 27 questions in total prepared in order to assess the quality of life of individuals. The

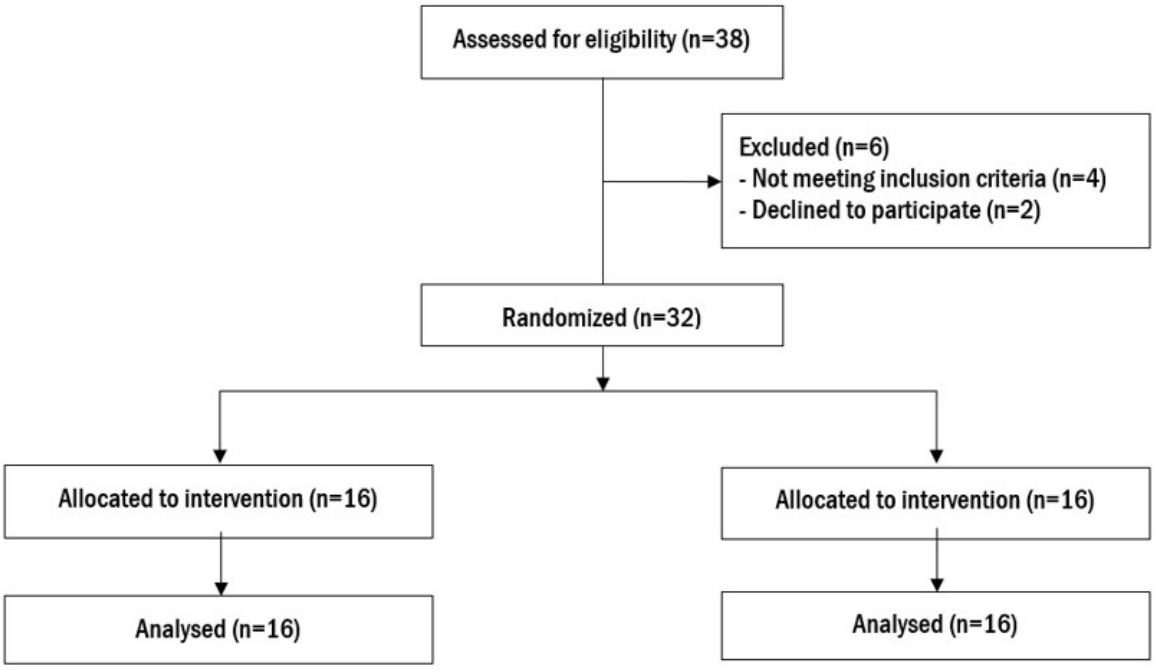

Figure 1. Flow chart of the study.

results are evaluated in 5 main areas. These are physical health, mental field, environmental field, social field, and national field. The quality of life is assessed in direct proportion to the increase in the field scores.[18] Each field scores are calculated between 4-20. The higher the score, the better the quality of life. The TUG test is an objective, reliable, and simple criterion for assessing the balance and functional mobility. It can be used in order to assess the risk of falling. An individual is asked to stand up from a chair, walk 3 m, turn around, walk back to the chair and sit down, and the score is calculated by measuring in how many seconds the test is completed. The use of walking aids is allowed during the test.[19]

Statistical analysis

The data were analysed using SPSS 23 packaged software. The fitness of the variables to normal distribution was examined using visual (histogram and possibility graphs) and analytic methods (the Kolmogorov-Smirnov/Shapiro-Wilk tests). The Mann-Whitney U test was used in the comparison of independent group differences and in the dependent group comparisons Wilcoxon Matched Pairs Test was used. Descriptive statistics were presented by using the median and minimum-maximum values for the variables that were not normally distributed. We used to a Bonferroni correction. Because of the significance level was accepted as $p<0.017$ in all applied analyses.

RESULTS

While the yoga group included 16 patients in total, 10 of them being female and 6 males with the mean age of 38.1±12.5 years, the control group included 16 patients in total, 11 of them being female and 5 being male with the mean age of 41.5±11.4 years.

The BMI mean of the yoga group was 29.23±6.93 kg/m^2, while that of the control group was 29.96±6.22 kg/m^2. Eight individuals in each of the yoga and control groups smoked, while 2 individuals frequently drank alcohol in the yoga group. The duration of the disease was 15.52±16.09 years on mean in the yoga group and 15.0±13.65 years in the control group. There was no difference between the groups in terms of age, gender, BMI, and the duration of the disease ($p>0.05$) (Table 1). There was no difference between the groups' baseline and post-training sub-fields of WHOQOL-BREF-TR

(p>0.05), except physical health sub-field (p<0.05) When the sub-fields values of WHOQOL-BREF-TR of the groups after 12 weeks were examined, there was no change in both groups in all sub-fields (p>0.05) (Table 2).

No difference was observed in the TUG values between the two groups before and after the treatment (p>0.05). When the groups were compared within themselves before and after the treatment, a significant positive change was observed in the yoga group (p<0.05) (Table 3). No difference was observed in the severity of fatigue between and within the groups before and after the treatment (p>0.05) (Table 3).

Table 1. Socio-demographic characteristics of the Yoga Group (n=16) and the Control Group (n=16).

	Yoga Group	Control Group	
	Mean±SD	Mean±SD	p
Age (years)	38.11±12.46	41.53±11.44	0.405
Body Mass Index (kg/m^2)	29.23±6.93	29.96±6.22	
Duration of Schizophrenia	15.52±16.09	15.0±13.65	0.664
Smoking history (n (%))	8 (50)	8 (50)	
Alcohol history (n (%))	2 (12.5)	- (0)	

p>0.05.

Table 2. Comparison of the quality-of-life values of individuals before and after Yoga.

		Before Yoga	After Yoga			
		Mean±SD	Mean±SD	p_1	p_2	p_3
QoLph	Yoga Group	27.35±3.60	26.76±3.38	0.036α	0.011*α	0.581β
	Control Group	24.20±4.34	22.66±4.33			0.068β
QoLp	Yoga Group	21.67±5.74	19.76±5.68	0.363α	0.910α	0.283β
	Control Group	19.53±7.06	19.66±7.19			0.715β
QoLeh	Yoga Group	26.35±4.28	25.64±4.04	0.471α	0.635α	0.653β
	Control Group	24.86±7.56	24.40±9.00			0.715β
QoLsr	Yoga Group	8.76±2.90	7.88±2.93	0.595α	0.970α	0.623β
	Control Group	8.26±2.86	8.00±2.95			0.655β
QoLgh	Yoga Group	30.0±4.63	29.47±4.07	0.820α	0.448α	0.574β
	Control Group	28.66±8.03	27.6±7.88			0.197β

α: Mann Whitney U test; β: Wilcoxon signed rank test, p<0.017, p_1: Differences between yoga and control groups before yoga, p_2: Differences between yoga and control groups after yoga, p_3: The difference between the two measurements, QoLph: Physical health quality of life, QoLp: Psychological quality of life, QoLeh: Environmental health quality of life, QoLsr: Social relationships quality of life, QoLgh National area (general health) quality of life.

Table 3. Comparison of Time up and go test and Fatigue Severity Scale scores of individuals before and after yoga.

		Before Yoga	After Yoga			
		Mean±SD	Mean±SD	p_1	p_2	p_3
Time up and go test	Yoga Group	8.80±2.11	8.10±1.84	0.509α	0.168α	0.003*β
	Control Group	9.67±3.19	9.53±3.24			0.273β
Fatigue Severity Scale	Yoga Group	25.41±12.28	29.94±15.37	0.179α	0.865α	0.212β
	Control Group	32.86±16.28	31.33±15.06			0.461β

α: Mann Whitney U test; β: Wilcoxon signed rank test, p<0.017, p_1: Differences between Yoga and Control groups before Yoga, p_2: Differences between yoga and control groups after yoga, p_3: The difference between the two measurements.

DISCUSSION

In our single-blind study in which yoga was applied to people with schizophrenia, it was observed that yoga increased physical health, which is a sub-parameter of life quality and improved dynamic balance by affecting spiritual and mental well-being positively. Studies carried out have shown that exercises performed on individuals increase the usability of oxygen in the brain by increasing the metabolism of neurotransmitters such as acetylcholine, norepinephrine, and serotonin.[20] It is also known that exercising increases physical and mental excitability by improving the processes related to attention. Cognitive functions deteriorate in individuals with depression and anxiety. The increase in the psychological well-being after exercising may also correct the cognitive functions. The benefits and necessity of exercising are absolute to increase the psychosocial functionalities and life quality especially of people with schizophrenia, which is a complex disorder during which people have difficulties in the process of thinking and which causes hallucinations, feelings, irregular thoughts and extraordinary speeches or behaviours.[21]

Schizophrenia causes psychological difficulties (with positive and/or negative symptoms) as well as cognitive disabilities (attention, memory, executive functions, and social cognition).[22] The fact that individuals with chronic psychiatry diseases are guided towards physical activity and exercises is

important for them to feel good and keep the amount of energy balanced.[23] Physical activity is important for long-term health, and it is affected by the lifestyle of the individual.[22] The variables that can affect the physical activity state of individuals were classified as “demographic”, “biological”, “psychologic”, “perceptional”, “emotional”, “behavioral”, “social” and “cultural” variables, and “physical environment” variables. They may have different effects in each patient group.[22] Regular physical activity and exercising are in line with the improvement of well-being, physical health, being satisfied with life and conceptual functions.[24] As a result of the study carried out by Kavak et al. on 70 people with schizophrenia, it was emphasized that the relaxation exercises and musical therapy applied to chronic people with schizophrenia could be used as complementary treatment methods supporting the drug therapy.[25] As a result of the study carried out by Atılgan et al., it was considered that the yoga-based exercising program could be applied to healthy individuals in order to protect the general health and flexibility.[26] It was observed that hatha yoga training increases static balance in healthy young adults.[27] Besides, there is preliminary evidence to suggest that yoga-based interventions may help in improving neurocognition and social cognition in patients with schizophrenia, and also lead to better physical fitness and postural stability which are very important to improve overall health in this chronic condition.[28] Ikai et al. investigated the effects of yoga therapy on postural stability and body flexibility in patients with schizophrenia in their eight-week single-blind RCT study. The results confirmed the beneficial effects of yoga therapy on postural stability in patients with schizophrenia. However, the therapeutic effects appeared temporary, which warrants more.[29]As a result of our study, the TUG values of the group receiving yoga were found to be low when compared to the control group. It was found out that yoga improved dynamic balances in people with schizophrenia. We believe that studies that examine parameters such as respiration and balance of yoga in people with schizophrenia are required.

Yoga therapy is a potential treatment option for improving quality of life, cognitive symptoms, and negative symptoms in schizophrenia.[30] Kavak and Ekinci stated that the 6-week yoga they applied to people with schizophrenia increased the functional level of people with schizophrenia.[31] As a result of the yoga applied to 28 people with schizophrenia, Paikkatt and Singh found out that it positively affected the functionality of the patients by increasing their personal hygiene and daily activities.[32] Behere et al. determined that an increase occurred in the social functionality level of people with schizophrenia as a result of the yoga.[33] In their studies, Gangadhar and Varambally, reported that the yoga applied to people with schizophrenia reduced depressive symptoms for 2 weeks and reported that the adaptation of the patients increased. Furthermore, they emphasized that yoga should be used as a complementary treatment for reducing and treating the symptoms in people

with schizophrenia.[34] As a result of their compilation, Vancompfort et al. determined that the yoga applied to people with schizophrenia increased the quality of life related to health, increased positive symptoms and improved the general psychopathology.[35] Duraiswamy et al. reported that an increase occurred in all sub-parameters of the WHOQOL-BREF and functions related to social life and work in people with schizophrenia after the 4-week yoga practice.[15] As a result of our study, it was found out that the 12-week yoga practice applied to people with schizophrenia had positive effects on the physical health parameter of the quality of life and dynamic balances of individuals. Although it could not be shown statistically that yoga influenced the fatigue severity in people with schizophrenia, we clinically observed that people with schizophrenia were more active, energetic, and outgoing during the therapy.

Limitations

The limitation of our study is the absence of a no comparison group with intervention.

Conclusion

We believe that psychiatric treatment alone is insufficient for people with schizophrenia, and physical therapy interventions (yoga, aerobic exercises, strength exercises, relaxation training, basic body awareness exercises, or a combination of these) should be applied together with psychiatric treatment. It was determined that yoga increased physical health, which is a sub-parameter of life quality in people with schizophrenia. Yoga could be a right choice for improving psychopathology resulting in better quality of life along with other pharmacological management and psychosocial interventions. It was also observed that the dynamic balances of the patients improved with the yoga techniques applied. Therefore, we believe that planned and continuous physical activity programs should be applied to psychiatry patients such as people with schizophrenia. Furthermore, such studies are required in the literature since the number of studies investigating parameters such as the respiration, balance, and fatigue of yoga in people with schizophrenia is insufficient. We believe that our study is valuable in that it is single blind and is among the limited number of studies that assess yoga in people with schizophrenia in terms of fatigue and dynamic balance.

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Conflicts of Interest: *None*

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REFERENCES

1. Cetin M. Research and Clinical Practice of Biological Psychiatry, Schizophrenia. 3rd edition. Istanbul: Kure Publishing Group; 2005.1-99.
2. Çetin M. Şizofreni tedavisi: geçmişi, bugünü ve geleceği. Bulletin of Clinical Psychopharmacology. 2015;25:95-99.
3. Vera-Garcia E, Mayoral-Cleries F, Vancampfort D, et al. A systematic review of the benefits of physical therapy within a multidisciplinary care approach for people with schizophrenia: An update. Psychiatry Res. 2015;229:828-839.
4. Broderick J, Crumlish N, Waugh A, Vancampfor D. Yoga versus non-standard care for schizophrenia. Cochrane Database Syst Rev. 2017;28:9
5. Kimhy D, Vakhrusheva J, Bartels MN, et al. The impact of aerobic exercise on brain-derived neurotrophic factor and neurocognition in individuals with schizophrenia: a single-blind, randomized clinical trial. Schizophr Bull. 2015;41:859-868.
6. Duman RS. Neurotrophic factors and regulation of mood: role of exercise, diet and metabolism, Neurobiol Aging. 2005;26:88-93.
7. Critchley HD, Corfield D, Chandler M, et al. Cerebral correlates of autonomic cardiovascular arousal: a functional neuroimaging investigation in humans. The J Physiol. 2000;523:259-270.
8. Wipfli BM, Rethorst CD, Landers DM. The anxiolytic effects of exercise: a meta-analysis of randomized trials and dose-response analysis. J Sport Exerc Psychol. 2008;30:392-410.

9. Holley J, Crone D, Tyson P, et al. The effects of physical activity on psychological wellbeing for those with schizophrenia: A systematic review. Br J Clin Psychol. 2011;50:84-105.
10. Dauwan M, Begemann MJ, Heringa SM, et al. Exercise improves clinical symptoms, quality of life, global functioning, and depression in schizophrenia: Asystematic review and meta-analysis. Schizophr Bull. 2016;42:588-99.
11. Rocha KKF., Ribeiro AM, Rocha KCF et al. Improvement in physiological and psychological parameters after 6 months of Yoga practice. Conscious Cogn. 2012;21:843-850.
12. Ross A, Ma S. The health benefits of Yoga and exercise: A review of comparison studies. J Altern Complem Med.2010;16:3-12.
13. Altuntuğ K, Ege E. Kanıta dayalı rehberleriyle tamamlayıcı ve destekleyici uygulamalar: Yoga. Ankara; Akademisyen Tıp Kitabevi; 2015.
14. Field T. Yoga clinical research review. Complement Ther Clin Pract.2011;17:23-27.
15. Durstine JL, Moore GE, Painter PL. American College of Sports Medicine. ACMS's exercise management for persons with chronic diseases and disabilities. Champaign, IL. Human Kinetics;2016.
16. Duraiswamy G, Thirthalli J, Nagendra HR, et al. Yoga therapy as an add-on treatment in the management of patients with schizophrenia–a randomized controlled trial. Acta Psychiatr Scand.2007: 226-232.
17. Armutlu K, Korkmaz NÇ, Keser İ, et al. The validity and reliability of the Fatigue Severity Scale in Turkish multiple sclerosis patients. Int J Rehabil Res.2007;30:81-85.
18. Eser SY, Fidaner H, Fidaner C, et al. Yaşam kalitesinin ölçülmesi, WHOQOL-100 ve WHOQOL-BREF. 3P Dergisi. 1999;7:5-13.
19. Lin MR, Hwang HF, Hu MH, et al. Psychometric comparisons of the Timed up and go, one-leg stand, functional reach, and Tinetti balance measures in community-dwelling older people. J Am Geriatr Soc. 2004;52:1343-1348.
20. Greenwood BN, Fleshner M. Exercise, stress resistance, and central serotonergic systems. Exerc Sport Sci Rev. 2011; 39:140-149.
21. Mammen G, Faulkner G. Physical activity and the prevention of depression: a systematic review of prospective studies. Am J Prev Med. 2013;45:649-657.
22. Farhat SL, Hochard C, Orens S, et al. Psychoeducationnal therapeutic group program for schizophrenic patients, based on nutritional balance and pleasure, using cognitive functions: A pilot study. Encephale. 2016;42:410-414.
23. Li Y, Cao XL, Zhong BL, et al. Smoking in male patients with schizophrenia in China: A meta-analysis. Drug Alcohol Depend. 2016;162:146-153.
24. Zschucke E, Gaudlitz K, Ströhle A. Exercise and physical activity in mental disorders: clinical and experimental evidence. J Prev Med Public Health. 2013;46:12-21.
25. Kavak F, Ünal S, Yılmaz E. Şizofreni hastalarında gevşeme egzersizi ve müzik terapinin psikolojik belirtiler ve depresyon düzeyine etkisi. Integr Tıp Derg 2015;3:116-117.
26. Atılgan E, Tarakcı D, Polat B, et al. Sağlıklı kadınlarda Yoga temelli egzersizlerin esneklik, yaşam kalitesi, fiziksel aktivite ve depresyon üzerine etkilerinin araştırılması. J Exerc Rehabil. 2015;2:41-46.
27. Baş Arslan U, Livanelioğlu A. Hatha Yoganın ve kalistenik egzersizlerin statik denge üzerindeki etkileri.J Sport Sci. 2003;14:83-91.
28. Govindaraj R,Varambally S, Rao NP, Venkatasubramanian G, Gangadhar BN. Does yoga have a role in schizophrenia management? Curr Psychiat Rep. 2020;22:78.
29. Ikai S, Uchida H, Suzuki T, et al. Effects of yoga therapy on postural stability in patients with schizophrenia-spectrum disorders: A single-blind randomized controlled trial. J Psychiatr Res 2013;47:1744-1750.
30. Dodell-Feder D, Gates A, Anthony D, et al. Yoga for schizophrenia: A review of efficacy and neurobiology. Curr Behav Neurosci Rep. 2017:4;209-220.
31. Kavak F, Ekinci M. The effect of yoga on functional recovery level in schizophrenic patients. Arch Psychiatr Nurs. 2016;30:761-767.
32. Paikkatt B, Singh AR. Efficacy of yoga therapy on subjective well-being and basic living skills of patients having chronic schiophrenia. Ind Psychiatry J. 2012;21:12-14.
33. Behere RV, Arasappa R, Jagannathan A, et al. Effect of yoga therapy on facial emotion recognition deficits, symptoms and functioning in patients with schizophrenia. Acta Psychiatr Scand.2011;123:147-153.
34. Gangadhar BN, Varambally S. Yoga as therapy in psychiatric disorders: past, present, and future. Biofeedback.2011;39:60-63.
35. Vancampfort D, Vansteelandt K, Scheewe T, et al. Yoga in schizophrenia: a systematic review of randomised controlled trials. Acta Psychiatr Scand. 2012:126:12-20.