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Sleep, Anxiety and Neurotrophic Factors in Whirling Dervishes

Semazenlerde Uyku, Anksiyete ve Nörotrofik Faktörler

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ÖZET

Amaç: Sema; bünyesinde hem meditasyonu hem de egzersiz eylemlerini barındıran dini bir ibadettir. Çeşitli ibadet türlerinin stres ve anksiyete üzerinde olumlu etkilerinin bulunması sema ibadetini gerçekleştiren semazenlerin de; stres düzeylerinin düşük, uyku kalitelerinin yüksek ve nörotrofik faktörlerinin optimal düzeyde olacağı yönünde bir hipotezi düşündürmektedir.
Gereç ve Yöntem: İlgili çalışmada semanın strese karşı koruyucu etkisi araştırıldı. Çalışmaya 17 semazen ve 16 gönüllü olmak üzere toplamda 33 yetişkin erkek dahil edildi. Çalışmaya dahil edilen tüm bireylerin; nörotropik faktörleri (VEGF, BDNF, GDNF), PNX-20 verileri, anksiyete düzeyleri (BECK Anksiyete Ölçeği) ve uyku kaliteleri (Richard- Campbel Uyku Ölçeği) incelendi.
Bulgular: Semanın; VEGF, BDNF, GDNF ve Phoenixin-20 ve anksiyete değerlerini düşürdüğü, uyku kalitesini ise arttırdığı tespit edildi.
Sonuç: Stres yönetimi için birçok alternatif meditasyon uygulaması popüler olarak kullanılmaktadır. Sema, daha az bilinen bir meditasyon uygulamasıdır. Sonuçlarımız, Sema'nın stres yönetiminde etkili bir araç olabileceğini ortaya koydu.

Anahtar Kelimeler: Sema, semazen, nörotrofik faktörler, phoenixin-20, uyku, anksiyete

ABSTRACT

Background: The Mevlevi Sema ceremony is a Sufi ritual that includes meditation, exercise actions, and religious symbols. Sema is also a method of meditation. There are few whirling dervishes in the world. Positive effects of worship on stress and anxiety leads to a hypothesis that whirling dervishes have low-stress levels, high sleep quality, and optimal neurotrophic factors.
Aim: Our aim in the present study is to determine the effect of stress levels of whirling dervishes on neurotrophic factors.
Materials And Methods: In this research, possible protective effect of Sema against stress was investigated. A total of 33 adult men comprising, 17 whirling dervishes, and 16 healthy volunteers were recruited. Neurotropic factors (VEGF, BDNF, GDNF), PNX-20, anxiety levels (BECK Anxiety Scale), and sleep quality (Richard-Campbel Sleep Scale) data were obtained from the participants.
Results: It was found that whirling dervishes have lower VEGF, BDNF, GDNF, Phoenixin levels, anxiety scores, and better sleep quality.
Conclusion: Many alternative meditation practices have being popularly utilised for stress management. Sema is a less-known type of meditation practice. Our results, revealed that Sema may be an effective tool in stress management.

Key words: Sema, whirling dervishes, neurotrophic factors, phoenixin-20, sleep, anxiety

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INTRODUCTION

Key features of all matter in the universe include rotations, spins (whirling) and transformation. No entity in the universe exists that does not spin or transform into a different from. The Planets, Earth, Moon, and even atoms, the smallest units of matter, keep a system of regular whirling. Whirling dervishes are consciously involved in this universal pattern with their very movement of turn, Sema. Sema ceremony represents the transformation and introversion experienced by human beings in their spiritual meditation journey. With this whirling movement, they illustrate that the only valid return on Earth can be towards God. Mawlana Celaleddin Rumi, a Sufi and a great philosopher who lived in the 13th century, performed Sema and recommended it to his students. Sema is a type of meditation that not only includes physical aspects but also psychological ones. A person who conducts the Sema ceremony is called a whirling dervish. There are few whirling dervishes in the world. Whirling dervishes perform a special spinning action called 'a wheel' for about two hours by rotating their left foot, while their right hands ponting up and left hands down. They dress, their unique clothes for the ceremony, perform wheels in an area called 'the square' accompanied by music. During this action, whirling dervishes expend a great deal of physical energy not to mention great amounts of effort required to ensure balance and coordination. Many neurobiological structures work in collaboration to provide physical and mental coordination (1). Neurobiological effects of Sema on the brains of whirling dervishes remain unknown.

Stress is a pressure people experience when they cannot cope with mental and emotional feelings they encounter in daily life. Likewise, anxiety is a state of psychological deterioration as a result of inability to cope with stress experienced (2). Anxiety may be seen in different levels depending on the severity and course of stress. Stress and anxiety negatively affect both psychological and physiological well being. High levels of stress may have many adverse effects on overall health, such as depression, anxiety disorder, sleep disorder, deterioration in neuroplasticity, deterioration in neurogenesis, functional disorders in nerve cells, cardiovascular disorders, deterioration in memory and brain functions, decrease in the immune response, functional disorders in the gastrointestinal system, etc. Increasing difficulty of daily life has raised the incidence of anxiety disorder (2). Much scientific research is still being carried out today to reduce negative effects of stress and anxiety disorder.

Sleep is an action performed for the human body to rest and prepare for the coming day by processing information received by brain during the past day. While sleeping, we cannot respond instantly to all stimuli. However, this does not mean there is no response generated to stimulus recevied during sleep. Environmental factors and triggers continue to be processed by brain during sleep (3). Circadian rhythm is the clinical pattern of daily biological actions in human body. Sleep-wake state is one of the basic actions that play a role in forming and regulating the circadian rhythm (4). The higher the current sleep quality, the better the circadian rhythm (5). Research has emphasized that it is essential to increase sleep quality to protect and improve the human body's psychological and physiological health (6). Sleep quality can be affected by many conditions and factors. Stress and anxiety disorder are among those (7). It is thought that meditation positively affects both psychological and physical health (8).

Neurotrophic factors are endogenous soluble proteins responsible for ensuring survival, growth, morphological plasticity, and synthesis. Neurotrophic factors are classified as Classical Neutrophins (NGF, BDNF, NT-3, NT-4), Neuroprotective (EGF, IGF-1, FGF, HGF, EPO, VEGF, CNTF, TNF), and Glial Derived Neurotrophic Factor Ligands (GDNF, NRTN, ARTN, PSPN). VEGF (Vascular endothelial growth factor) is a neuroprotector and neurogenic factor used as a marker in the diagnosis of depression and Alzheimer's disease. BDNF is involved in neuroplasticity and neurogenesis, takes part in the development, survival and functioning of the nervous system (9,10). It contributes to the maintenance of functions of hippocampus and prefrontal. It is also responsible for ensuring balance and balance coordination (9). Elevations in BDNF may cause epilepsy (9,10). GDNF is essential in the healthy development, protection, and survival of nerve cells (11). GDNF also plays a decisive role in the regeneration and differentiation of spermatogonial stem cells (11). Phoenixin-20 (PNX-20) is a bioactive peptide with hormone-like effects in vertebrates. PNX-20 has been found to be associated with various conditions such as anxiety and obesity. PNX-20 has effects such as inhibiting pain , producing itching, inducing anxiety , and protecting memory. PNX-20 also acts as a reproductive peptide (12).

Anxiety disorder is one of the biggest problems in modern life. It affects human health in many ways, almost like a chain traffic accident. Anxiety disorder negatively affects sleep quality. As a result of the disruption of circadian rhythm, functioning of the brain is impaired. Consequently, alterations occur in the levels of neurotrophic factors. This causes balance and coordination problems, memory problems, and various complex ailments such as Alzheimer's and Parkinson's. As we mentioned above, stress is a complex problem that has multifaceted effects and threatens the organism, which makes it very important to cope with. Much research have been carried out to determine and develop methods to prevent the complicated effects of stress and anxiety. It is well-known that chi, meditation, prayer, worship, and regular exercise have positive effects on stress and anxiety (13-18).

Sema is a religious worship that involves both meditation and physical exercise. We hypothesized that whiriling dervishes who constantly practice Sema would have lower stress levels, better sleep quality, and optimal neurotrophic factor levels.

MATERIALS AND METHODS

1.Ethics Approval

This research was approved by Necmettin Erbakan University Local Ethics Committee of Non-Pharmaceutical and Biomedical Research. Ethics committee approval number was 2022/3840. All participants have given written informed consent prior to participation. World Medical Association (WMA) HELSINKI Statement and World Psychiatric Association HAWAII Statement of Good Clinical Practices were complied with.

2.Setting

The research was carried out on volunteer adult males. Whirling dervishes were selected among members of Konya Turkish Sufi Music Ensemble.Controls were adult male volunteers conveniencely sampled. The study was carried out in the city of Konya between 10.06.2022 and 30.06.2022.

3.Participants

A total of 33 adult men, including 17 whirling dervishes and 16 volunteers, were included in the study. Participant's ages were between 18-60 years. Excluding criteria included having acute or chronic diseases or taking regular medications. Whirling dervishes in the study were regular performers of Sema biweekly (Saturday-Sunday).

4.Data Collection and Analysis

VEGF, BDNF, GDNF, PNX-20 levels of all participants were evaluated by ELISA method from blood samples. Blood, samples were taken at a fixed time interval. All participants were on an empty stomach when blood collection was performed. Samples were drawn from the participants' left forearm antecubital vein. Blood samples were kept at room temperature for 20 minutes. Blood samples that were hemolyzed during the waiting period were excluded. Samples were centrifuged at 1000 rpm for 15 minutes and plasma serum was obtained.

Stress and anxiety levels of the participants were examined by the BECK Anxiety Scale (19). Sleep quality of the participants was evaluated using the Richard-Campbell Sleep Scale (20).

BECK Anxiety Scale: is a reliable scale that evaluates physical and emotional symptoms with 21 questions. The participants were asked to identify and mark the answers (values between 0-3) that they think most appropriate. Interpretation was as follows; 0 indicates no anxiety, 1 indicates mild anxiety, 2 indicates moderate anxiety, and 3 indicate a high level of anxiety.

Richard-Campbel Sleep Scale: is a scale that includes questions about depth of night sleep, noise level in the sleeping environment, frequency of awakening in the night, and its duration. There are 6 questions in total on this scale. While filling the scale from 0 to 100, a respondent should mark the value that best meets his current sleep state. A value of 0 indicates very poor sleep quality, while a value of 100 indicates highest quality of sleep.

5.Statistical Analysis

Mean and standard deviations of numerical variables were given. Frequency and percentage values for nominal variables were shown as descriptive statistics. The Chi-square test was used in the analysis of nominal variables. Analysis of numerical variables were performed using independent T-test and Pearson correlation analyses. All statistical analyzes were done using Jamovi 2.3.2 and R 4.5.1. software. $p<0.05$ was considered significant.

Table 1. Demographic and biochemical data

	Control Group (n=16)	Whirling Dervishes Group (n=17)	P
Age	35.63± 11.41	38.59± 10.75	0.448
Education			0.18
Primary	*0(0 %)*	*1(6 %)*	
Elementary	*0(0 %)*	*1(6 %)*	
High School	*6(38 %)*	*4(24 %)*	
University	*7(44 %)*	*11(65 %)*	
Post graduate	*3(19 %)*	*0(0 %)*	
Smoking	15(94 %)	13(76 %)	0.17
Regular exercising	9(56 %)	11(65 %)	0.62
BECK Anxiety Scale Total	7.88± 3.20	2.53± 1.66	< .001
Richard-Campbel Sleep Scale Total	380.00± 105.45	559.41± 69.59	< .001
VEGF	2332.35± 1304.76	1172.33± 730.67	0.007
BDNF	3.09± 2.80	0.75± 1.34	0.009
GDNF	7.21± 5.61	3.18± 2.87	0.024
Phoenixin-20 (PNX-20)	553.97± 445.30	243.07± 188.36	0.024

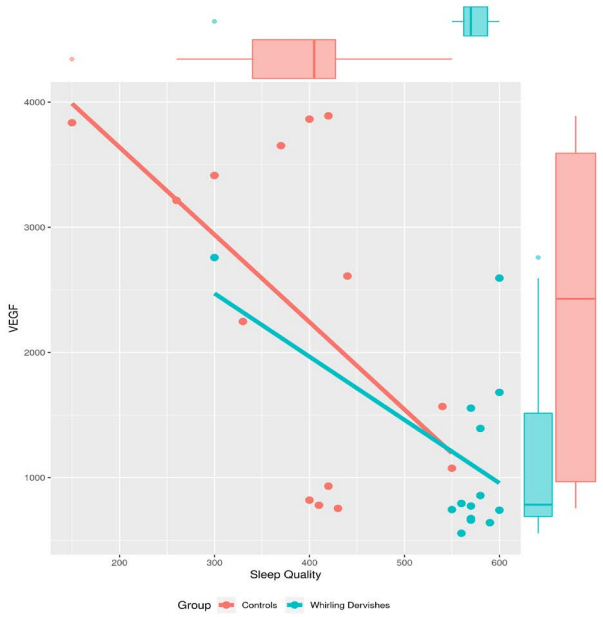

Figure 1. Scatter plot of VEGF and Sleep quality scores. Regression lines are drawn to indicate trends. Vertical boxplots denote VEGF values and horizontal boxplots are for Sleep Quality scores.

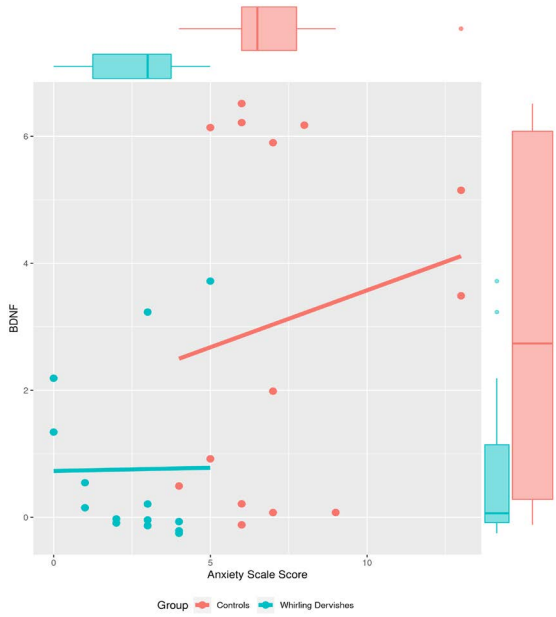

Figure 2. Scatter plot of BDNF and Anxiety scores. Regression lines are drawn to indicate trends. Vertical boxplots represent BDNF values and horizontal boxplots are for Anxiety scores.

RESULTS

Table 1 displays demographic and biochemical figures of the participants. Mean ages of the participants were not different (whirling dervish vs. control) (p= 0.448). Mean anxiety level of whirling dervishes was significantly lower (p<0.001) compared to the controls. Sleep quality of whirling dervishes was significantly higher (p<0.001) compared to that of the control group. VEGF, BDNF, GDNF, and PNX-20 were all significantly lower in whirling dervishes (p=0.007, p=0.009, p=0.024, and p=0.024, respectively.).

Neurotrophic factor levels were strongly correlated to each other (Table 2). We also found very strong correlations of Sleep Quality scores with neurotrophics factor levels. Correlations of anxiety scores with neurotrophic factor levels were mild. (Figure 1, Figure 2).

DISCUSSION

Modern life exposes people to a great deal of stress. The prevalence of stress in society has increased considerably with the effect of the COVID-19 pandemic in last years (21). For this reason, stress is seen as the endemic of our ages. When stress cannot be controlled, it causes severe disorders, such as cardiovascular diseases, tumoral pathologies, memory problems, sleep disorders, changes in neurotrophic factor levels, and disorders in neurogenesis and neuroplasticity (22-25).

Whirling dervishes are a very rare endemic study group. For this reason, the physiological effects of the sky remain

Table 2. Correlation of biochemical findings

	Richard-Campbel Sleep Scale Total (RCS)	BECK Anxiety Scale Total (BAS)	VEGF	BDNF	GDNF	Phoenixin-20 (PNX-20)
RCS TOTAL	—					
BAS TOTAL	-0.74***	—				
VEGF	-0.68***	0.41*	—			
BDNF	-0.69***	0.44*	0.97***	—		
GDNF	-0.65***	0.36	0.97***	0.99***	—	
PNX20	-0.60***	0.34	0.95***	0.98***	0.98***	—

Note. * p < .05, ** p < .01, *** p < .001

a mystery. Revealing the physiological effects of whirling is important at the point of suggesting the current form of meditation. The present research was carried out to reveal the physiological effects of Sema.

It is crucial to reduce the current effects of stress to protect human health. Unfortunately, a system in which the effects of stress can be totaly prevented has not been developed today. However, various practices such as physical exercise, meditation, worship, and prayer can be beneficial (26,27). Regular exercise contributes to the regulation of blood pressure, prevents hypercholesterolemia, increases bone mineral density, reduces the risk of depression- anxiety -sleep disorders, and changes the levels of some neurochemicals (BDNF, GDNF, VEGF) in the blood (18,28). Regular exercise is one of the most effective practices found in reducing stress levels.

As it is known, Sema, involves physical activity. In our research, it was determined that the neurotrophic factors (VEGF, BDNF, GDNF) and Phoenixin-20 levels of regular whirling dervishes were significantly lower than the control group. The findings of the research were found to be compatible with the literature (29). In the light of relevant data; it has been understood that Sema reduces stress levels and has a protective effect on functions of the brain.

When reducing stress, it is very important to get rid of the thought cycle that provokes stress and detriments mental relaxation. Various meditative approaches are preferred in order to suppress the stress cycle. Yoga, which is a kind of meditation practice, reduces anxiety, contributes to the treatment of depression, and increases sleep quality (26,30-32). In addition, yoga practices contribute to protection of cardiovascular health, positively affect neurotransmitter release, improve autonomic nervous system activation, help maintain circadian rhythm under optimum conditions, positively affect neurogenesis, and protect memory and cognition systems (33,34). In our research; it was revealed that anxiety levels of whirling dervishes who regularly performed whirling were significantly lower than control group. It is thought that Sema will exert a positive impact on the treatment process of disorders like depression and anxiety. Yoga is undoubtedly an effective meditation method in coping with stress. However, its use is limited to some countries and cultures; and it is not among the most preferred meditation methods. Meditation practices may differ in each culture depending on the existing belief system. In some belief systems; prayers and acts of worship are also accepted as meditation practices.

When prayer and worship practices performed regularly; it has been reported that this reduces anxiety levels, prevents the formation of depression, positively affects neuroplasticity, improves social relations, expands white and gray matter areas in the brain, suppresses unnecessary activation of the autonomic nervous system, contributes to the regulation of circadian rhythm, protects cardiovascular system health and increases sleep quality (16,17,27,35-38).

Every religion has its own forms of meditation and worship. Sema is also a form of meditation -worship in Islam. Sema is a complex worship that requires focus, balance, and physical strength (1). Therefore, number of people who can perform Sema is very small. Due to this sparsity; scientific researches on whirling dervishes is also limited. Positive effects of worship and meditation practices on stress are remarkable. No previous research was found on stress levels of whirling dervishes.

Many researches have shown that meditation reduces stress, improves sleep quality, and contributes to regulation of circadian rhythm (8,26,33). In this research, it was determined that sleep quality of whirling dervishes who performed regular whirling was significantly higher than control group. It has been understood that these findings are compatible with literature. It has been revealed that whirling increases quality of sleep and thus contributes to maintenance of general health.

Sema, is a type of meditation practice that is less known compared to yoga, meditation and pray. Sema affects both physical and mental health positively. It is thought that Sema may be an effective practice in stress management.

Limitations

Our research is a cross-sectional study. In our study, the number of samples was low due to lack of voluntary whirling dervishes. The subjects were not undergone apriori psychiatric examinations. Data obtained from the study were evaluated by authors including no psychiatrists, hence there is a lack of psychiatric evaluation. Our findings represent short-term results. For future studies, it would be beneficial to increase number of samples and examine findings in a longer term.

CONCLUSION

Sema is a little-known type of meditation practice. Our research was carried out to investigate current mystery of Sema. It was found that whirling dervishes have lower VEGF, BDNF, GDNF, and Phoenixin levels, less anxiety, and better sleep quality. It was understood that Sema may be an effective method in stress management, and can have supportive effects on the treatment of various disorders such as high-stress anxiety disorder, depression, and future anxiety. Further research is needed to reveal physiological effects of Sema deeper.

Etik Kurul: Necmettin Erbakan University Local Ethics Committee of Non-Pharmaceutical and Biomedical Research. Ethics committee approval number was 2022/3840.

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