THE EFFECT OF DIFFERENT TURKISH SONG COMPOSITIONS ON THE SYMPATHIC AND IMMUNOBIOCHEMICAL PARAMETERS

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ABSTRACT

Objective: *Turkey is a rich country in musical heritage. Studies on the use of music for therapeutic purposes are increasing day by day. The Greek philosophers were convinced that music benefited health and specific recommendations were formulated for using music therapeutically against mental and physical illness. To evaluate the effects of different classical Turkish music styles (Saba, Muhayyer Kurdi, Hijaz, Ussak) on these parameters. Therefore we planned this research to accomplish all of these aims.*

Material and Method: *Venous blood samples were collected before and after music listening and serum levels of serotonin, adrenalin, immunoglobulin A and cortisol were measured. Sixtyone healthy volunteers listened five different kinds of music (popular, rock, arabesque, European classical, classical Turkish music).*

Results: *To compare the same parameters in each volunteer before and after music listening, the Wilcoxon signed-ranks were performed as appropriate. For tests of significance, a p-value of <0.05 was considered to be statistically significant. All parameters were normally distributed.*

Conclusion: *Our Statistical analysis results showed that cortisol level of the people listening Saba style decreased, Immunoglobulin A level decreased for the people who listened popular music and increased for the group listening Nihavent style and adrenaline level increased significantly in all groups except for the people listening Ussak style of music.*

Keywords: *Classical Turkish music, music style, sympathic parameters, immunoglobulin* ***Nobel Med 2015; 11(3): 5-9***

KLASİK TÜRK MÜZİĞİNİN ÇEŞİTLİ MAKAMLARININ SEMPATİK VE İMMUNOBİYOKİMYASAL BELİRTEÇLER ÜZERİNE ETKİSİ

ÖZET

Amaç: Türkiye müzik mirası açısından zengin bir ülkedir. Müziğin terapotik amaçlı kullanımıyla ilgili çalışmalar günden güne artmaktadır. Yunanlı filozoflar müziğin sağlığa faydalı olduğuna inanmış ve fiziksel, ruhsal hastalıklara karşı müziğin tedavi amaçlı kullanımına ilişkin çeşitli tavsiyeler sunmuşlardır. Çeşitli klasik Türk müzik makamlarının biyokimyasal parametreler üzerindeki etkilerini değerlendirmek için bu çalışma planlandı.

Materyal ve Metot: Sağlıklı 61 gönüllünün her bir grubuna 5 farklı müzik türü (popüler, rock, arabesk, Avrupa klasik, klasik Türk müziği) dinletildi. Müzik dinletisinden önce ve sonra alınan venöz kan örneklerinde serum serotonin, adrenalin, immunoglobulin A ve kortizol düzeyleri ölçüldü.

Bulgular: Her bir gönüllüde müzik dinleme öncesi ve sonrası parametrelerin karşılaştırılması için Wilcoxon işaret sıralama testi uygulanmıştır. Anlamlılık testleri için p<0.05 değeri istatistiksel olarak anlamlı kabul edilmiştir. Tüm parametreler normal dağılım göstermiştir.

Sonuç: İstatistiksel analiz sonuçlarımız Saba makamı dinleyenlerde kortizol düzeyinin azaldığını göstermektedir. Uşşak makamı dinleyen grup hariç tüm gruplarda adrenalin düzeyinin belirgin olarak yükseldiği ve immunoglobulin A düzeyinin pop müzik dinleyenlerde azaldığı, nihavent makamı dinleyenlerde arttığı görülmektedir.

Anahtar kelimeler: Klasik Türk müziği, makamlar, sempatik parametreler, immunglobülinler **Nobel Med 2015; 11(3): 5-9**

INTRODUCTION

Music is food for the soul but also it is a powerful tool in evoking emotions. Music is an effective concept that exits in every period of human life.[1,2] The Greek philosophers were convinced that music benefited health and specific recommendations were formulated for using music therapeutically against mental and physical illness.[3] These effects can potentially be used in clinical settings, in which negative emotions such as pain and anxiety often reduce an individual's subjective well-being, and call for the application of anxiolytic, analgesic, and anesthetic drugs. It has been reported that listening music reduce stress before, during and after medical procedures including surgery, angiography, and colonoscopy.[4-10]

Stress is a one of the popular study subject, due to belief that stress is a casual factor in both physical and psychological illness.[11] A stress experience is an event that consists of three major elements: the external stimuli, the internal response and the interaction between the two.[12] A stressor is a chemical or biological agent, environmental condition, external stimulus or an event that causes stress to an organism.[13] Stressors have physical, chemical and mental responses inside of the body. Music therapy is in accordance with traditional medicine and has its own methods instead of being an alternative treatment method. The first treatment with music in Turks was seen in the time of Ottoman Empire. Before Anotolian time in Middle Asia, Shaman musicians made treatment studies which named Baksı for different illnesses.[14] History of Islamic civilization, especially the mystic sects involved with music, believed and advocated the benefit. The great Islamic scholar and philosopher Ibni Sina (980-1037) stated the role music plays in medicine as "the best ways of treatment, one of the most effective to increase the patient's mental and spiritual powers, giving him the courage to fight illness, goes around making cute and unpleasant bringing people together is to listen to good music and love".[15] After the Second World War music therapy was intensively developed in American hospitals. Since then some hospitals, particularly in the mainland Europe, have incorporated music therapy within their practice carrying on a tradition of European hospital based research and practice.

Turkey, rich in musical heritage, has developed this art in two areas, Turkish classical and Turkish folk music. Turkish Music is the establishment of the Ottoman Empire, in parallel with the growth and strengthening of the enriched and improved aesthetics. Turkish Music is a synthesis of a lot of wealth. Byzantine, living together with Turks, Greeks, Persians, Arabs, Jews and Armeniansas minorities in the Ottoman palace was created and shared with the school; the Enderun reached its golden age. Using this system, no country has reached the level of artistry. Music of the Ottoman Empire, "authority" unity based on "Chapter" was created and narrated in the order.

In this study, we aimed to evaluate the effects of different Classical Turkish Music styles on serum stress and immunological parameters. According to our literature knowledge, similar study has not been conducted before. The second aim, despite finding researches which have studied the effect of music on serum parameters, we did not encounter a one which includes all four of the following cortisol, immunoglobulin A (IgA), serotonin {=5Hidroxytriptamine (5-HT)} and adrenaline being evaluated together. Therefore we planned this research to accomplish both of these aims.

MATERIAL AND METHOD

In this study we choose five different kinds of music such as popular, rock, arabesque, European classical and classical Turkish music for our sample group to listen. Moreover, we choose five different styles of classical Turkish music such as Muhayyer Kurdi, Saba, Hijaz, Nihavent and Ussak.

Our study group was consisted of 39 females and 22 males. We made them listening different types of music. 6 of them listened popular music, 8 of them rock, 7 of them European classical, 9 of them arabesque, 6 of them Muhayyar Kurdi, 6 of them Ussak, 6 of them Saba, 7 of them Hijaz and 6 of them Nihavent.

People in the sample were healthy and we classified them according to their preference. We asked them to sign an acceptance form with 2 copies before we draw their bloods. We deliver one copy to participants and we kept the other copy for our records. Because of affecting 5-HT and IgA values in blood; we asked them not to consume chocolate kinds of foods on the study day. We also make sure that they do not act to increase their adrenaline levels. We made each group listening 10 different kinds of music for 30 minutes in sitting position. All blood samples were drawn around noon time.

Written informed consent was obtained from each participant and study protocol was accepted by the local ethics committee.

Analysis of Samples

Venous blood samples were collected before and after music listening and placed into no-additives-containing tubes. After centrifugation at 1500x g for

5 min, the serum was removed and retained for the assay of the level of 5-HT, cortisol, adrenaline and IgA. Serum samples were stored at -80°C until analysis (for one month).

Levels of 5-HT and adrenalin were measured by high-performance liquid chromatographic with electrochemical detector using commercially available assay from Chromsystems Instruments & Chemicals (Munich, Germany). Serum IgA levels were measured by nephelometry; all reagents and instrumentation were purchased from Beckman Coulter, Inc. (Fullerton, Calif.) Levels of cortisol were measured by a chemiluminescent assay method using an Immulite 2000 (Siemens Diagnostics, Los Angeles, CA) analyzer with original kits. All parameters measured within 2 days.

Statistical Analysis

All data were expressed as mean±standard error of the mean. Statistical analyses were performed using a software program (SPSS 16.0 for Windows, Chicago, IL, USA). To compare the same parameters in each volunteer before and after music listening, the Wilcoxon signed-ranks were performed as appropriate. For tests of significance, a p-value of <0.05 was considered to be statistically significant. All parameters were normally distributed.

RESULTS

Our study group was consisted of 22 male and 39 female healthy participants with a mean age of 19±1.3. No significant differences in the distribution of age and gender were found between the groups. In our study we found that cortisol level of the people listening who listened classical Turkish music with Saba style decreased from 17.2 mg/dL to 14 mg/dL. We also found that serotonin (5-HT) level of group members listening classical Turkish music with Muhayyer Kurdi style decreased from 62.2 mg/dL to 28.2 mg/dL. According to IgA measures we found that both popular kind of music and Nihavent music styles indicated significant differences. IgA level decreased from 178.7 mg/dL to 170.1 mg/dL for the people who listened popular music and increased from 152 mg/dL to 167.5 mg/dL for the group who listened Nihavent style type of music. Adrenaline level increased significantly in all groups except the people listening Ussak kind of music. As shown in Table.

Table. The effect of immunobiochemical parameters according to music types

Type of Music	Adrenalin		IgA		Cortisol		Serotonin	
	Before	After	Before	After	Before	After	Before	After
Popular	41,9	56,4*	178,7	170,1*	9,5	8	81,6	39,7
Rock	27,2	39,7*	184,6	187,1	13,9	12,5	83,6	59,6
European Classical	33,7	59,8*	224,8	227,2	19,8	14,4	110,8	71,5
Arabesque	30,7	77,8*	172,7	183	14,8	11,4	72,1	37,4
Muhayyer Kurdi	28,1	64,6*	177,2	183	9,8	12,3	62,2	28,2*
Ussak	42	75,4	181,5	173,2	8,2	10,5	92	120,7
Saba	42	74,7*	162,2	153	17,2	14*	96,1	49,5
Hijaz	36,5	64,9*	159,1	164,1	11,9	14,6	80	86,1
Nihavent	50,2	83,8*	152	167,5*	11,2	11,3	67,7	121,6

*: p<0.05, **IgA:** Immunoglobulin A

DISCUSSION

In this study, we had two aims; the first one was to evaluate the effects of different Classical Turkish Music styles on serum stress, psychological or immunological parameters. According to our literature knowledge, like study has not been conducted before. The second aim, despite finding researches studied the effects of music on serum parameters; we did not encounter a one which includes all four of the following: Cortisol, IgA, 5-HT and adrenaline. Therefore, we planned this research to accomplish both of these aims.

Previous studies have shown that participants preference of music was the most effective way of decreasing their stress and relaxing them.[16,17] Therefore, when we were organizing the groups, the participants were allowed to choose the music style as they like. As well as being the most researched biochemical parameter, cortisol has been investigated most frequently with regard the music. It plays an important role in glucose metabolism, suppression of inflammation and stress adaptation.[18] Cortisol is the most important hormone which indicates stress activity. Excessive cortisol level may inhibit the immune system and decrease IgA serum level.[19]

According to some studies, listening to music decreases stress and cortisol level.[20-22] Previously conducted researches have shown that cortisol level is decreased with relaxing music where as being significantly increased by stimulating music.[22-26] In a study conducted on the patients who were undergoing hernia operation, one of the two groups was made listening music during the operation whilst the second group listened to music in the post-operative resting room. The second group showed a significant decrease in cortisol levels on the second hour of post-operation. When we examined the effects of different Turkish Music Styles on the cortisol level, there was an insignificant increase in different Classical Turkish Music Styles like Muhayyer Kurdi, Ussak and Hijaz whereas Saba style had a decrease (from 17.24 mg/dL to 14.02 mg/dL). This finding showed us that before invasive interventions, Saba style may be used to eliminate stress, anxiety and fear.

5-HT is a neurotransmitter which plays an important role in the control of sleep, learning, memory, anxiety and depression.[27] It is shown that the 5-HT content of platelets was higher during pleasant music perception and lower during unpleasant music perception as compared to the rest condition.[28] The Classical Turkish Music Style-Muhayyer Kurdi group of our research showed a decrease in 5-HT level from 62.26 mg/dL to 28.23 mg/dL. As Muhayyer Kurdi is a lively music, we expected that there would be an increase in 5-HT levels as it causes happiness. When 5-HT levels decrease; sleeping problems, migraine, anxiety and depression may occur. Therefore, Muhayyer Kurdi may increase the intensity of the illnesses, trigger attacks and worsen the prognosis. The increase of 5-HT level while listening to Ussak, Hijaz and Nihavent style may be applied as a music therapy on patients suffering from depression and the disease may result in symptom improvement and reduction of drug doses used. Ig A is secreted from salivary glands, bronchial, genitourinary and digestive systems mucus ducts.[29] IgA is an indicator of immune functions and mucosal immune system is sensitive to psychological changes.[30] Selective IgA deficiency is the most common form of primary immune deficiencies.[31] Although most patients are asymptomatic, recurrent bacterial infections, allergic and autoimmune diseases are more common in these individuals. Previous studies showed that there was an increase in serum IgA levels of patients who listened to relaxing music[32] and emotional music.[33] A research on amatory choir group has also showed that singing increased secretion of IgA in saliva.[34]

In our study, IgA levels of the group listening pop Music showed a decrease from 178.7 mg/dL to 170.1 mg/dL while the Nihavent group showed an increase from 15 mg/dL to 167.5 mg/dL. This increase triggered us to think of its positive effects on the functions of the immune system. Within the groups, Nihavent was the only music style which showed significant increase in IgA level. So using Nihavent style music in IgA deficiency may result in avoidance of intravenous immunoglobulin therapy. Also we believe that Nihavent will increase the strength of healthy person's immune systems.

Adrenaline is released from the adrenal glands as a physiological or psychological stress hormone. While examining the relationship of adrenaline with music, we found one study reported no association between the music and adrenaline levels in healthy volunteers.[25,35] However, in another study, patients who listened to music before operations showed a decrease in adrenaline levels.[36] Our research showed that, apart from Ussak style, the rest of the styles have shown a significant increase in the levels of adrenaline hormone. This increase was discordant with the literature. We believe that the reason behind this increase was due to the voluntary person's knowledge about the blood test that would be taken after listening to music. Taking account the effects of different music on psychology, immunology, and stress parameters, we came to the conclusion that music may be used during medical therapies such as preoperative or postoperative medications, invasive interventions, psychological illnesses and immune deficiency diseases. Nihavent style music may be used on patients suffering from selective IgA deficiency in order to increase its levels. Those suffering from sleeping defects, migraine, anxiety and depression should stay away from Muhayyer Kurdi and may listen to Ussak and Nihavent which increases 5-HT levels. Saba style music may be used to decrease stress levels during invasive interventions.

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REFERENCES

1. Horne-Thompson A, Mus B, Mus M, Grocke D. The Effect of Music Therapy on Anxiety in Patients who are Terminally ILL. J Palliat Med 2008; 11: 4.
2. Smith JC, Joyce CA. Mozart versus New Age Music: Relaxation States, Stress and ABC Relaxation Theory. J Music Ther 2004; 41: 215-224.
3. Bruhn H. Music therapy. Geschichte, Theorien, Methoden [Music therapy. History- Theory-Methods]. Goettingen: Hogrefe 2000.
4. Wang SM, Kulkarni L, Dolev J, Kain ZN. Music and preoperative anxiety: a randomized, controlled study. Anesthesia&Analgesia 2002; 94: 1489-1494.
5. Cooke M, Chaboyer W, Schluter P, Hiratos M. The effect of music on preoperative anxiety in day surgery. J Adv Nurs 2005; 52, 47-55.
6. Bringman H, Giesecke K, Thörne A, Bringman S. Relaxing music as pre-medication before surgery: a randomised controlled trial. Acta Anaesthesiol Scand 2009; 53: 759-764.
7. Chan YM, Lee PW, Ng TY, Ngan HY, Wong LC. The use of music to reduce anxiety for patients undergoing colposcopy: a randomized trial. Gynecol Oncol 2003; 91: 213-217.
8. Uedo N, Ishikawa H, Morimoto K, et al. Reduction in salivary cortisol level by music therapy during colonoscopic examination. Hepatogastroenterology 2004; 51: 451-453.
9. Bechtold ML, Perez RA, Puli SR, Marshall JB. Effect of music on

patients undergoing outpatient colonoscopy. World J Gastroenterol 2006; 12: 7309-7312.
10. Rudin D, Kiss A, Wetz RV, Sottile VM. Music in the endoscopysuite: a meta-analysis of randomized controlled studies. Endoscopy 2007; 39: 507-510.
11. Pervin LA, John OP. Personality: Theory and research (7thed.). New York: John Wiley and Sons, Inc. 1997.
12. Feuerstein M, Labbe EE, Kuczmiercsyk AR. Healthpsychology: A psychological perspective. New York: Plenum Press 1986.
13. Stressor. Pallipedia. Retrieved 2012-05-31.
14. Güvenç RO. Türk Musikisinde Kökler ve Batıya Yasıması. İstanbul: Sevinç Matbaa 1986
15. Bal V. The effect of music on pain and anxiety level during ESWL (extracorporeal shock wave lithotripsy). Graduate thesis, Institute of Health Sciences GATA, Nursing Department, Ankara, Turkey, 2002.
16. Krout RE. Music listening to facilitate relaxation and promote wellness: integrated aspects of our neurophysiological responses to music. The Arts in Psychotherapy 2007; 34: 134-141.
17. Somakcı P. Türklerde Müzikle Tedavi. Sosyal Bilimler Enstitüsü Dergisi 2003; 2: 131-140.
18. Koelsch S, Fuermetz J, Heinke W. Effects of Music Listening on Cortisol Levels and Propofol Consumption during Spinal Anesthesia. Front Psychol 2011; 2: 58.
19. Kain ZN, Zimolo Z, Heninger G. Leptin and perioperative neuroendocrinological stress response, J Clin Endocrinol Metab 1999; 84: 2438-2442.
20. Hanser SB. Music, health and well-being. In P. N. Juslin&Sloboda, J. (Eds.), Handbook of Music and Emotion: Theory, Research, Applications 2010; 849-877.
21. Flaten MA, Asli O, Simonsen T. The effects of stress on absorption of acetaminophen. Psychopharmacology 2006; 185: 471-478.
22. Khalfa S, Bella SD, Roy M, Peretz I, Lupien SJ. Effects of relaxing music on salivary cortisol level after psychological stress. Ann N Y Acad Sci 2003; 999: 374-376.
23. McKinney CH, Antoni MH, Kumar M, Tim FC, McCabe PM. Effects of guided imagery and music (GIM) therapy on mood and cortisol in healthy adults. Health Psychology 1997; 16: 390-400.
24. Fukui H, Yamashita M. The effects of music and visual stress on testosterone and cortisol in men and women. Neuro Endocrinol Lett 2003; 24: 173-180.
25. Gerra G, Zaimovic A, Franchini D, et al. Neuroendocrine responses of healthy volunteers to 'techno-music': relationships with personality traits and emotional state. Int J Psychophysiol 1998; 28: 99-111.
26. He´bert S, Be´landa R, Dionne-Fournellea O, Creˆte M, Lupien SJ. Physiological stress response to video-game playing: the contribution of built-in music. Life Sciences 2005; 76: 2371-2380.
27. Abdel E, Hassan H, Amin MA. Pilates Exercises Influence on the Serotonin5-HT Hormone, Some Physical Variables and the Depression Degree in Battered Wome. World Journal of Sport Sciences 2011; 5: 89-100.
28. Evers S, Suhr B. Changes of the neurotransmitter serotonin5-HT but not of hormones during short time music perception. Eur Arch Psychiatry Clin Neurosci 2000; 250: 144-147.
29. Woof JM, Kerr MA. The function of immunoglobulin A in immunity. J Pathol 2006; 208: 270-282.
30. Hucklebridge F, Lambert S, Clow A, et al. Modulation of secretory immunoglobulin A in saliva; response to manipulation of mood. Biol Psychol 2000; 53: 25-35.
31. Primary immunodeficiency diseases. Report of a WHO scientific group WHO. Clin Exp Immunol 1997; 159: 6236-6241.
32. Knight WEJ, Rickard NS. Relaxing music prevents stress induced increases in subjective anxiety, systolic blood pressure, and heart rate in healthy males and females. J Music Ther 2001; 38: 254-272.
33. Chanda ML, Levitin DJ. The neurochemistry of music. Trends Cogn Sci 2013; 17: 179-192.
34. Kreutz G, Bongard S, Rohrmann S, Hodapp V, Grebe D. Effects of choir singing or listening on secretory Immunglobulin A, Cortisol, and Emotional State J Behav Med 2004; 27: 623-635.
35. Möckel M, Störk T, Vollert J, et al. Stress reduction through listening to music: effects on stress hormones, hemodynamics and mental state in patients with arterial hypertension and in healthy persons. Dtsch Med Wochenschr 1995; 120: 745-752.
36. Conrad C, Niess H, Jauch KW, et al. Overture for growth hormone: requiem for interleukin-6? Critical Care Medicine 2007; 35: 2709-2713.