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Stress Reducing Effect of a New Appliance on Dental Implant Patients

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Abstract

Aim: FM5 SENSORY system provides a new therapy modality which reveals synergistic effects on the level of stress. This innovative system combines music, aromatherapy and LED system by its own software program, and consist of a helmet and a main machine. By using this system, the aim of this study is to evaluate the levels of stress of the patients who would undergo dental implant surgery.

Methods: This study included 66 of patients with no systemic disease (33 females, 33 males; mean age: 37.4±1.5 years). Evaluation of the stress levels of patients were performed by measuring the concentration of urinary cortisol. The treatment with helmet and the program of main machine were applied to all patients for 30 minutes. Before and after the treatment, twenty-four hours urine were collected from each participant. For the analyzes of cortisol levels, Urine BETA Cross Laps® (CTX-I) ELISA kit was utilized and they were presented as pg/ml. Obtained data were analyzed statistically performing paired samples test of SPSS program with a significance level of 0.05

Results: A statistically significant difference for cortisol levels was displayed before and after treatment (p:0.03). A significant decrease in cortisol level was founded after helmet treatment in participants. Mean value of cortisol levels before and after the treatment were as follows: 43567±3456 pg/ml and 39454±1432 pg/ml, indicating that the helmet treatment helps to reduce cortisol levels in these patients.

Conclusion: FM5 SENSORY system can be a treatment modality to reduce the stress level and useful for patients who have increased levels of stress in dental appointments.

Keywords: Stress level; Cortisol; FM5 SENSORY

Introdution

Stress is defined as being in a situation which exceeds the coping or adaptive resources of a group or an individual [1]. Stress is common in everyday life and has many causes which are composed of pain, disease, medications, fear of the unknown, unpleasant events, external or internal conflicts, environmental and cultural issues [2-4]. The treatment of dental implant is also an unexpected and unknown situation for patients and can cause stress. In a stressful action, the parasympathetic nervous system is suppressed, and the sympathetic nervous system is activated to produce energy and stand out against the reason which makes stress. By the activation of the sympathetic nervous system, human body reveals changes, like high levels of blood pressure, increased heart rate, muscle stiffness, sweating, depression of immune response and decreased gastro-intestinal activity and is affected from endocrine system [5]. Adrenal cortex produce steroid type hormones and cortisol is one of them. This hormone helps to activate anti-inflammatory and anti-stress responses [6]. Pineal gland secretes a hormone called 'melatonin' and one of the main functions of this hormone is to synchronize our bodies with the darkness and daylight for the rhythm of qualified sleep [6]. Like melatonin, cortisol secretion has a relationship with light. While cool light resources induce the production of cortisol, warm light resources help to produce melatonin [5-6]. Although it is generally considered as pseudoscience, the therapy of colors has not been explained totally and several studies revealed results about the effects of colors on the human body. It has been mentioned that colors have both emotional and physiological effects, and these can cause changes on the system of the body [5]. In a study, stress and anxiety have been showed to be affected by the colors. The authors have reported that yellow and red lights cause to have significantly higher anxiety scores than green and blue lights [7]. In another study by Jacobs and Hustmeyr, the galvanic skin response was found to be higher in red light than in blue light. It was also reported that red light reveals a negative effect on stress-related responses [8].

Dental treatment of stressful individuals is a challenging factor for both patients and dental practitioners. Therefore, clinicians are in the seek of treatment modalities to reduce the stress levels of patients before or during the dental appointment for a qualified dental treatment. This plays an important role especially for the dental treatments which can cause more stress produce than the others, such as the dental implant placement. Therefore, for helping patients relax and decreasing stress levels, an appliance (FM5 SENSORY) has been innovated. This system includes a helmet and a main machine. The function of a helmet is to measure the level of stress, and the main machine maintains control with its software program. The appliance presents different treatment types, and it is possible to set parameters (intensity, duration and light intensity) according to the status of the patient. Program has a synergistic effect with the combination of photonic beams from LED system, acoustic Wİ Fi for musical frequency listening, and inhalation aromatherapy. Working modes of the system are pulsed or continuous with various light wavelengths. It does not require the continuous presence of the operator during the treatment and is also a non-invasive method [9]. It stimulates the functions of five senses and promotes active neuronal interconnections. By increasing the production of endorphins and blocking the negative effects of the cortisol, it helps to generate synergistic and synesthetic conditions. For the sense of sight, LED-generated light beams are generated at safe frequencies for the retina and helps relaxation. Designed binaural music is used to stimulate the sense of hearing and helps to produce useful endorphins to reduce stress level. Aromatherapy with oil inhalation stimulates the sense of smell and provides therapeutic efficacy. The aim of this study is to evaluate the levels of stress of the patients who would undergo dental implant surgery by assessing the 24 hours concentration of urinary cortisol.

Methods

Study sample

The present study was conducted with the guidance of the Helsinki Declaration of 1975. Participants who attended the study was given detailed formal information about the procedures and were provided written informed consent form. Power analysis was performed using G*Power (v3.1.7) to determine sample size for a minimum 80% power with an alpha error probability of 5%; this revealed a sample size of at least 25 participants. It was decided to benefit from a larger sample size, as reaching the number of samples used in the study was easy. Therefore, sample size was increased to 33 per group.

Protocol

The total sample size of the present study was 66 (33 males, 33 females) with the mean age of 37.4±1.5 years. All the participants had to meet the following inclusion criteria: having indication of dental implant therapy, absence of pregnancy, absence of spontaneous pain, being over 18 years of age, a good general health based on medical history, absence of dentofacial deformity, absence of trauma, absence of neurological and psychiatrically disorders. Before dental implant surgery, all patients were treated with FM5 SENSORY helmet for 30 minutes by wearing it. Before and after this treatment, twenty-four hours urine were collected from each participant, as stress levels of the patients were evaluated according to urinary cortisol concentration. Urine BETA Cross Laps® (CTX-I) ELISA kit was used for analyzes and levels of cortisol were presented as pg/ml. Obtained data from the patients were analyzed statistically performing paired samples-t test of SPSS program with a significance level of 0.05.

Results

Study results showed that there was a statistically significant difference in urinary cortisol levels of the patients between before and after the helmet treatment (p:0.03). After treatment, cortisol levels in urine samples were lower than the baseline results before applying treatment. This significant result showed that applied treatment modality decreased the cortisol level in urine which means this therapy can be used in reducing stress level. Mean value of the cortisol level in twenty-four hours urine samples before and after the treatment were 33331±6212 (SD) pg/ml and 30513±1758 (SD)pg/ml (Table 1).

Table 1: Cortisol concentration in urine collected for 24 hours before and after treatment (SD: Standard deviation, p:0.03).

Patient number	Before treatment (pg/ml)	After treatment (pg/ml)
1	33456	29897
2	34324	31874
3	34654	31256
4	36754	32456
5	32657	28965
6	31453	30143
7	34236	30124
8	32476	29065
9	30231	27689
10	31583	28756

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11	29546	26547
12	32465	28654
13	33426	28097
14	36524	32567
15	33245	28976
16	31278	27809
17	30584	27658
18	29587	26578
19	29654	26752
20	34269	30864
21	29463	27654
22	30530	26798
23	34724	30673
24	29045	25764
25	30326	27098
26	31287	27654
27	32407	30569
28	30325	27645
29	31278	27083
30	29765	26987
31	33487	28756
32	32486	28954
33	30342	26578
34	29458	26790
35	33685	27895
36	35743	30764
37	36524	32654
38	33486	28950
39	31269	27658
40	31497	26784
41	29045	26745
42	31276	27856
43	30476	26795
44	32476	28956
45	32457	29865
46	33476	28967
47	31256	26789
48	32467	29078
49	31987	27890
50	29076	25876
51	30316	27845
52	32487	28976
53	31276	27658
54	35245	32476
55	29045	26897
56	31267	27645
57	30126	26574

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58	32467	27856
59	31254	26798
60	30124	25678
61	29045	27653
62	30156	27347
63	31276	27685
64	32346	28976
65	31265	27089
66	29065	26578
Mean	**33331±6212 (SD)**	**30513±1758 (SD)**

Discussion

The main finding of the present study was that the cortisol levels in twenty-four hours urine samples have decreased after FM5 SENSORY treatment. Statistically significant difference was detected the cortisol levels of patients before and after the treatment, directly correlated with stress levels of the patients. Based on this difference it can be concluded from the present study that FM5 SENSORY treatment may be an option to reduce the stress level before stress related treatments, such as dental implant placement. Many patients are faced with stress of dental treatment from mild to intense degrees [10-12]. This kind of stress doesn't contain only fear of pain but also related with emotional responses, such as crying, fear, delay of treatment, rejection [13,14]. The demand for decreasing the stress levels of patients is necessary for a better quality of dental treatment. In this study, applying this different treatment modality was concluded to affect stress levels of patients and may be an option for this aim.

Colors and hues have been found to affect emotion and stress levels [15]. Lighting has also been shown to be related with stress. In the study influence of color was found to play a key role in stress levels and related emotions. The authors declared that pale colors caused relaxation on patients more than vivid colors. Furthermore, short-wavelength colors were found to have an effect on heart rate. By affecting emotional state, short-wavelength colors decreased the heart rate and influenced the stress level of the patients [16]. In a recent study which evaluated heart rate, emotion and performance, color lighting was used to treat patients who had behavioral disorders. The authors have declared that emotional states have been affected from color lighting and pink light decreased the aggressiveness level. Another conclusion of this study was that color light can be used successfully to treat stressful patients [17].

Stress is associated with central nervous system and has a main relationship with a psychological reaction to external stimuli [18]. Metabolic control has shown to be influenced from stress levels of the patients [19]. FM5 SENSORY treatment has achieved to decrease stress levels of the patients by combining three factors: music, aromatherapy, and photonic beams. This system promotes the activation of the metabolism and works according to the principles of bio-modulation. It activates neuronal interconnections and stimulates the functions of the five senses by maintaining a communication between mind and body. After the treatment, the level of endorphins increases, and this helps to reduce the stress level of the patient. This treatment modality can also be used for peri-oral diseases and cosmetic treatments, such as photo-rejuvenation and photo-bio-modulation. In this study, it was used for relaxation and the aim of de-stress synaestetics. Limitations of the present study were using only urine cortisol levels for the detection of stress and small sample size. Also, the influence of gender hasn't been evaluated in this study. Therefore, blood samples may be used for the evaluation of cortisol levels, but it should be taken into consideration that the method of taking blood is an invasive research method and can be painful for patients. Another recommendation is to use a larger sample size to get more clear results of the mentioned treatment system.

Conclusion

It has been concluded from this study that cortisol levels of selected patient groups have decreased after this novel treatment and it is possible to reduce stress level by applying this modality. Therefore, FM5 SENSORY system can be a treatment modality to reduce the stress level and is useful for patients who have increased levels of stress in dental appointments.

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