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SOOTHING ANXIOUS MINDS OF DENTAL PATIENTS BY RELAXING THEIR OLFACTORY-AUDITORY SENSES - AN ADJUNCTIVE CLINICAL TRIAL

Clinical Research

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ABSTRACT

Introduction: Even after various advances in dentistry, anxiety is touching heights. Fear of unknown during dental treatment are the reason behind some escaped appointments which results into poor oral hygiene.
Aim: To realize and soothe worrisome of patients during dental treatment using various interventions.
Materials and Methodology: An adjunctive clinical study was conducted in two dental clinics of Jaipur in which Modified Dental Anxiety Survey questionnaire was used followed by recording vital signs (BP, respiratory rate, and pulse). A total 123 dental patients were allocated in two groups of music and aromatherapy for intervention to help diminish anxious minds amid the dental treatment.
Results: Significant results were appreciated in aroma group in mean score of diastolic blood pressure. With the confidence level of 97.9% and p-value 0.021 of DSP, aroma had helped in decreasing it.
Conclusion: Genuine to say that aromatherapy can help diminish the anxiety amid dental treatment.

KEYWORDS

MDAS, Anxiety, Music therapy, and Aromatherapy.

Introduction

Looking at the present era, where trend of mediation and yoga are more popular than a morning/evening walk in a garden, new generation of 21st century is more into anxiety-free lifestyle without spending a dime of their mind when compared to old people.

Dental anxiety or phobia, the word of utmost importance which negatively supports the poor oral hygiene and helps to add in the prevalence of it. People despite knowing about various advances in the dentistry, prefer to live through some small pains to avoid dental appointments.

Dental anxiety is prevalent worldwide and not limited to a population or country. Depending on the population and the measurement technique, 2.5-20% people endure high dental anxiety. [1]

Researchers often use the words anxiety and phobia to mean the same thing, but they are different. Those with dental anxiety will have a sense of uneasiness when it's time for their appointments. They'll have exaggerated fears. Dental phobia is a more serious condition. It's an intense fear in which people are afraid of a specific activity. People with dental phobia aren't merely anxious. They are terrified or panic stricken. [2]

Development of dental anxiety or phobia is usually associated with a traumatic experience about dental treatment. Several studies support the hypothesis that pain or fear of pain is a primary source of anxiety, as well as a major obstacle to seeking dental care. [3]

According to many studies dental injection is considered as the most frightful question followed by the dental drill. But, it is not only about the children, adults also need to be taken care of.

Since 1960s, numerous studies have demonstrated the value of various techniques in the treatment of pain. [4] Some non – invasive approaches that can be helpful like:

1. For patients who are screened as highly anxious, it would be worthwhile to ask them if they have considered seeing a mental health professional, such as a psychologist or psychiatrist. [5]
2. Basic changes to the waiting area can be comforting. Such as having the room temperature as per patients' requirement. A decent combination of soft and adoring colours that may please patients while in the waiting room.
3. Soothing of senses is also helpful like providing great music in the background or relaxing their anxious mind with the help of some pleasing fragrances. Many studies have also supported promising effects of visual therapy in the dental clinic as well.

Gue'tin et al (2011) [4] showed the value of music intervention in the management of chronic pain. **Venkataramana M et al (2016)** [6] appreciated the fragrance of lavender oil which was adjusted with the help of candle warmer in the dental clinic. Anxiety level was assessed by using modified dental anxiety scale (MDAS) [7] questionnaire. In the results, lavender oil was found to be very effective amid dental treatment.

The aim of this study is to test the hypothesis the effect of non – invasive methods like music therapy or aromatherapy on the anxious minds of dental patients and comparing the efficacy of the two respectively.

Materials and Methodology

It was an adjunctive clinical trial where two groups were included namely, music therapy and aroma therapy to reduce the anxious minds of the patients amid their dental treatment. A pilot study was conducted to estimate the feasibility of the groups and to calculate the sample size for the main study in one private dental clinic of Jaipur at the last week of April 2017. The ethical approval for conducting the pilot and the main study was obtained from Research Review Board, MVGU, Jaipur. Written consent was taken from all the participants.

After analysing the results of the pilot study, both the groups were considered in the main study, music, and aroma therapy. Sample size was estimated by using statistical analysis. With the confidence interval of 95%, sample size for the main study was computed to be 123 with 60 and 63 patients for music and aroma group respectively.

Sampling method to cover the sample size was convenience method and independent variables like age, gender was tried to retain in 50-50

ratio for the proper analysis. Statistical analysis was done by using MATLAB software *version 2016a*, U.S.

The anxiety level was assessed by filling of Modified Dental Anxiety Scale (MDAS)[7] questionnaire by every one of the participants previously, then after the fact the dental treatment. To give a base to the appropriate response of these survey, vital signs – blood pressure, Pulse rate, and respiratory rate were additionally checked by using blood pressure monitor *(Mark of Fitness. MF 46. Blood Pressure monitor. Indonesia)* and stethoscope *(Microtone Deluxe Stethoscope. MSI. New Delhi)*. During the dental treatment, soothing music – with an alternative of headphones and the fragrance of lavender aroma with the help of an aroma electric diffuser was given to every patient.

The main study was conducted in two private dental clinics of Jaipur where both adults and children aged between 11 – 65 years where included to analyse and compare the impact of every intervention on them and those who gave their consent.

Similarly, those who did not give their written consent or with systemic disease, or newbies to dental treatment were excluded from the study.

Except on Sundays, the main study was carried out in the evening time at two private dental clinics of Jaipur by the investigator. The explanation behind choosing private dental clinics rather than government dental hospitals was that in private clinic patients come with requests of personal attention with less pain so the endeavours from the opposite side to acknowledge the intervention was positive. The duration of the study was April to July 2017.

Results

Sample size for each group was calculated based on the result of the pilot study. Out of 123 participants, 60 were of music therapy group and 63 were of aromatherapy. And of these, 57 were females and 66 males (Table 1) and they were further categorized into youngsters (13 - 17 years) and adults for the appropriate statistical analysis between every variable. Statistical analysis was done using MATLAB software *version 2016a*, U.S.

Overall effect of aroma on anxiety level of patients –
Mean score of systolic blood pressure was 2.980, which says that with the confidence level of 89.6% and p-value 0.105, it can be estimated that aroma had helped the patient amid the treatment in lowering the systolic blood pressure score which was high before the treatment. (Table 2 – 3 – 4)

Although, significant results were also appreciated in aroma group in mean score of diastolic blood pressure and respiratory rate. With the confidence level of 97.9% and 99.9% and p-value 0.021 and 0.001 for diastolic blood pressure and respiratory rate respectively, aroma had helped in decreasing the blood pressure and respiratory rate. (Table 2 – 3 – 4)

In terms of male-female and adult-children ratio:

- the highest effect was seen in systolic blood pressure of children

A change of 5.700 in mean score of systolic blood pressure in children was observed when compared with the baseline data and can be marked as a significant result with the confidence level of 96.1% and p-value 0.039.

In the present study, Modified Dental Anxiety Score (MDAS) questionnaire was used to quantify the anxiety level of patients. In terms of scores, aroma therapy has proven effective. With the confidence level of 93.8%, patients' anxiety score was decreased after their respective dental treatment and they would prefer aromatic environment again if they get any dental appointments in future.

Music Intervention Characteristics
On the other hand, effect of music can also be considered in a positive way, however it did not improve over aroma. Only two values were found significant in music group discussed below:

- A change of 2.917 in the mean anxiety score of females was established and considered significant with the p-value of 0.014.
- A reduction in the male anxiety score was noted with a difference of mean score by 1.765 when compared to the baseline data.

Discussion

Even after various advances in the field of dentistry, level of dental anxiety is touching heights. Tension or fear of unknown during dental treatment are the reason behind some escaped appointments, which, obviously, results into poor oral hygiene and toothache increasing procrastinator nature of patients towards dental treatment.

This study had an approach towards diminishing anxiety level of patients including adults as well as children by means of giving them non – invasive interventions like music and aromatherapy amid their respective treatment.

This study depended on control of cerebrum waves which may initiate positive outcomes and help in decreasing anxiety. The pattern of these cerebrum waves varies in:

1. Alpha waves – relaxing and creativity inducing
2. Beta waves – the focus and logic
3. Delta waves – healing and deep sleep

Speaking of music, it is an effective way to unwind stress of any kind. Many studies indicate that music around 60 beats per minute can cause the brain to synchronize with the beat causing alpha brainwaves (frequencies from 8 – 14 hertz or cycles per second). This alpha brainwave is what is present when we are relaxed and conscious. [3]

In this study, soothing music was chosen in accordance with some scientific studies showing it can diminish anxiety levels, lower heart rate, and decrease blood pressure. Research demonstrates that strong beats have a tendency to invigorate brainwaves while slower rhythms create a quiet and meditative state. As music influences brain waves, it changes the body's reactions. A slower heart rate enacts the relaxation response. And this relaxation process benefits the entire body.

Speaking of aroma, it is believed that fragrance of essential oils has the powerful effects to influence emotional states in human beings. It started back in Chinese and Egyptian cultures. Rene-Maurice Gattefosse, [8] a French chemist coined the term '*Aromatherapie'* in the 1920s and experimented with essential oils for wound healing during World War I.

In aromatherapy, lavender oil was used, as it is considered to be the best essential oil in alleviating emotional and mental distress in patients, its two main components, linalool and linalyl acetate [9] are rapidly absorbed and cause central nervous system depression.

Fragrance of lavender oil has been demonstrated to decrease scores and increase Theta 1 (3.5 – 5.5 Hz) and alpha (8 – 13 Hz) brain wave activity and decrease Beta 1 (13.5 – 20 Hz) which is associated with relaxation. [9]

On inhalation of aroma, volatile molecules of the oil reach the lungs and rapidly diffuse into the blood, causing brain activation via systemic circulation. However, these molecules also bind to olfactory receptors, creating an electrophysiological response which reaches the brain. Neocortex activation is expected to occur by this response, which influences perception of odours and reaches the limbic system regions including amygdale and hypothalamus, the areas where levels of hormone and emotions are controlled. [10]

Lavender oil is also suggested to modulate GABAergic neurotransmission, especially on $GABA_A$ receptors, and enhance inhibitory tone of the nervous system Cholinergic system is suggested to play a role in lavender analgesic, antianxiety, anti-depression, and anticonvulsant effects of lavender. [11]

The result of this study favours fragrance based treatment over music-therapy in mitigating anxiety of dental patients. Despite the fact that, considering statistical analysis of the study with the confidence level of 95%, 100% results are not significant, but on individual level with various independent variables like males, females, adults, and children, aromatherapy has turned out to be better.

One reason of this result can also be due to peoples' apathy towards music, in other words, it is referred as musical anhedonia. Approximate 24% participants, in this study, had no interest in listening to music. A scientific study conducted in 2014 [12], revealed that while those exhibiting musical anhedonia do not have a problem

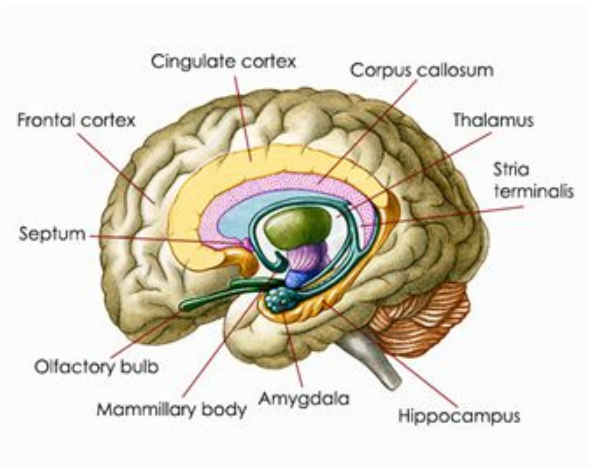
comprehending music, they simply fail to experience any material form of positive emotional response from listening to it.

Many other studies have also supported aromatherapy and especially the fragrance of lavender oil like,

Itai et al. (2000) and Md. Zabirunnisa et al (2014) [13,14] compared and analysed the effect of lavender aroma with the control arm. Usage of fragrance of lavender oil is helpful to reduce mean anxiety scores.

The epitome of the study says, sense of smell is linked with orbital prefrontal region of the brain. And the pathway of registering an aroma is, it enters the nose and coordinated to the highest point of the nasal depression to the Olfactory cleft where the Olfactory nerves are found and the combination of activated nerves travel to the brain registering smells that humans can detect. These cells are renewed every 30 to 60 days and are the only cranial nerve, Olfactory (2nd cranial nerve) that can regenerate. [15]

Females have performed better with aromatherapy than males on the ground that females have a more developed orbital prefrontal region of the brain. [15]



The Limbic System

Looking at the present scenario, the aftereffects of the study shows that utilizing music and fragrance based treatment in lowering nervousness in dental patients may bring out positive outcomes. The result of this study shed light on various other possibilities that more than one intervention can be utilized effectively to drop down the anxiety level of dental patients. Nonetheless, patients who experienced aromatic treatment when compared with music treatment encountered a better change in their anxiety level.

At the last, being a public health dentist, it is our obligation to help the population out there to cope up with the pain and everything malicious that can influence. Giving couple of intervention during the dental treatment is good but it is also needed to know that having good ambience of the clinic with the correct combination of colour in the waiting room is necessary. In addition, awareness of meditation and yoga is a decent step too. Because an increase in theta and alpha wave activities, which is associated with relaxation, can also be noted in people who practice meditation on daily basis.

Conclusion

The aim of the study was to diminish the anxiety of patients amid the dental treatment via giving some non – invasive interventions like music and aromatherapy. A quantitative approach was adapted to target the goal. Some insights can be highlighted below:

1. Genuine to say that aromatherapy can diminish the stress and anxiety a patient experience with the fear of unknown at the time of their dental treatment.
2. Music is likewise not behind but rather not at all like aroma, music cannot be valued by 100% populations as an occupied mind can avoid music yet unfit to maintain a measurable distance from aroma.

Limitations

Although this research was carefully formulated, but the limitations of the study are as mentioned:

1. The study had two interventions which was executed in two groups with the sample size of 123, it could have included more mediation like visual therapy or combination of groups with more sample size for the generalized effect.
2. In independent variables, socioeconomic status would have been included for the more precise results as patients with lower SES might be coming for the dental treatment with pre-set mind for pain.

CONFLICT OF INTEREST

There was no conflict of interest.

Acknowledgement

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Tables (cited in text)

Table 1: Independent Variables In The Study

Independent Variables	N (%)
Total Dental Patients	123 (100%)
Male	66 (53.65%)
Female	57 (46.34%)
Adults	72 (58.53%)
Children	51 (41.46%)

Table 2: Mean Values Depicting Difference Between Pre- And Post-Treatment

		Before and After Difference in…			
		Systolic	Diastolic	Score	RR
Aroma	Mean	2.980	2.380	0.900	-1.240
Music	Mean	-1.760	-2.820	1.260	0.480
Music - Female	Mean	0.833	-3.833	2.917	0.583
Music - Male	Mean	-4.154	-1.885	-0.269	0.385
Aroma - Female	Mean	2.917	2.792	0.958	-1.250
Aroma - Male	Mean	3.039	2.000	0.846	-1.231
Music - Child	Mean	0.938	-4.000	0.188	1.375
Music - Adult	Mean	-3.029	-2.265	1.765	0.059
Aroma - Child	Mean	5.700	1.900	1.100	-1.500
Aroma - Adult	Mean	1.167	2.700	0.767	-1.067

Table 3: Exhibition of p-values [Rejecting Null Hypothesis – Mean Equal to Zero] Using One Sample t-test

	Systolic	Diastolic	Score	RR
Aroma	0.105	0.021	0.062	0.001
Music	0.343	0.112	0.071	0.270
Music - Female	0.790	0.164	0.014	0.245
Music - Male	0.052	0.423	0.718	0.589
Aroma - Female	0.353	0.093	0.226	0.003
Aroma - Male	0.151	0.125	0.156	0.033
Music - Child	0.772	0.246	0.840	0.127
Music - Adult	0.187	0.281	0.060	0.904
Aroma - Child	0.039	0.156	0.180	0.018
Aroma - Adult	0.637	0.071	0.206	0.013

Table 4: Computation of Confidence Level Supporting Table – 3

	Systolic	Diastolic	Score	RR
Aroma	89.6%	97.9%	93.8%	99.9%
Music	65.7%	88.8%	92.9%	73.1%
Music - Female	21.0%	83.7%	98.6%	75.5%
Music - Male	94.8%	57.7%	28.2%	41.2%
Aroma - Female	64.7%	90.7%	77.4%	99.7%
Aroma - Male	84.9%	87.5%	84.4%	96.7%
Music - Child	22.8%	75.4%	16.0%	87.3%
Music - Adult	81.3%	71.9%	94.0%	9.7%
Aroma - Child	96.1%	84.4%	82.0%	98.2%
Aroma - Adult	36.4%	92.9%	79.4%	98.7%

Table 5: Exhibition of p-values for Two Sample t-test [Rejecting Null Hypothesis – Mean Values of the Groups are Equal]

	Systolic	Diastolic	Score	RR
Aroma and Music	0.069	0.011	0.666	0.002
Music - Male and Female	0.178	0.582	0.018	0.820
Music - Adult and Child	0.974	0.696	0.907	0.977
Aroma - Male and Female	0.319	0.647	0.287	0.155
Aroma - Adult and Child	0.221	0.699	0.733	0.529

Table 6: Computation of Confidence Level Supporting Table – 5

	Systolic	Diastolic	Score	RR
Aroma and Music	93.2%	98.9%	33.4%	99.8%
Music - Male and Female	82.2%	41.8%	98.2%	18.0%
Music - Adult and Child	2.7%	30.4%	9.3%	2.3%
Aroma - Male and Female	68.1%	35.3%	71.3%	84.5%
Aroma - Adult and Child	77.9%	30.1%	26.7%	47.1%

References

1. Masoud Saatchi et al. The Prevalence of Dental Anxiety and Fear in Patients Referred to Isfahan Dental School, Iran. Journal of Dental Research. 2015; 12(3);248 – 253.
2. www.colgate.com/en/us/oc/oral-health/basics/dental-visits/article/what-is-dental-anxiety-and-phobia
3. Lahmann C Et al. Brief Relaxation Versus Music Distraction in the Treatment of Dental Anxiety. Journal of the American Dental Association. 2008; 139(3):317 – 324.
4. Stephane Guetin at al. The Effects of Music Intervention in the Management of Chronic Pain: A Single-Blind, Randomized Controlled Trial. Clinical Journal of Pain. 2011;28(4):329 – 337.
5. Peltier B. Psychological Treatment of Fearful and Phobic Special Needs Patients. Special Care Dentistry. 2009; 29(1):51 – 57.
6. Venkataramana M, Pratap K, Padma M, Kalyan S, Redyy A, Sandhya P. Effect of aromatherapy on dental patient anxiety: A randomized controlled trial. Journal of Indian Association of Public Health Dentistry. 2016; 14: 131 – 134.
7. Acharya S, Sangam DK. Dental anxiety and its relationship with self-perceived health locus of control among Indian dental students. Oral Health and Preventive Dentistry. 2010; 8(1): 9 – 14.
8. http://www.amykreydin.com/aromatic-history-gattefosses-aromatherapie/
9. Siripornpanich V et al. The Effect of Lavender Oil inhalation on Emotional Stress, Autonomic Nervous System, and Brain Electrical Activity. Journal of the Medical Association of Thailand. 2012; 95 (4): 598 – 606.
10. Buck LB. Smell and taste: The chemical senses. Principles of Neural Science. 2000; 4:625–47.
11. Peir Hossein Koulivand et al. Lavender and the Nervous System. Evidence-based Complimentary, and Alternative Medicine. 2013; 681304:1 – 10.
12. http://www.huffingtonpost.in/entry/musical-anhedonia_us_586e717ce4b02b5f85875c21
13. Itai T, Amayasu H, Kuribayashi M, Kawamura N, Okada M, Momose A, et al. Psychological effects of aromatherapy on chronic hemodialysis patients. Psychiatry of Clinical Neuroscience. 2000; 54:393–7.
14. Md. Zabirunnisa et al. Dental Patient Anxiety: Possible Deal with Lavender Fragrance. Journal of Research in Pharmacy Practice. 2014; 3(3):100 – 103.
15. Ruben C. Gur et al. Sex Differences in Temporo-limbic and Frontal Brain Volumes of Healthy Adults. Cerebral Cortex. 2002; 12 (9): 998 – 1003.