Clinical Evaluation of Chandana (Santalum album, Linn.) in the Generalized Anxiety Disorder (GAD) with Special Reference to Aromatherapy

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In view of the increasing incidence of anxiety day by day, and no satisfactory and safe solution provided by the main-stream medicine the need was felt to find out safer anxiolytic alternatives from the natural forms of medicines. Therefore, the present study was designed to evaluate clinical efficacy of Chandana (sandalwood) oil in the generalized anxiety disorder through aroma inhalation. The objective of this study was to revive the ancient holistic Ayurvedic and Unani (Greek) concepts of Aromatherapy; those are not practiced now by the physicians of these systems.

The reason for selecting Chandana as the test drug was because the history reveals in Indian tradition it is used for achieving the peace of mind. Interestingly, Ayurveda says there is a central node of nerves on the forehead (sthapani marma) between the eyebrows, and the Sandalwood paste application at this spot serves to tranquilize the individual.

The reason for selecting generalized anxiety disorder (GAD) as the ailment for the study, was that it is the commonest type among the nine types of anxiety. It causes clinically significant distress or impairment in social, occupational and other important areas of functioning.

According to Ayurveda, the Sandalwood is claimed to be medhavardhaka, smrutivardhaka, buddhivardhaka, surabhi, santāpa-santipradam, saumanasyajanana, hrudya, ahlādakāraka, pittashāmaka, tṛṣṇāhar, pipāsahara, dāhāśamaka etc. It relieves unmada, angamarda, arochak, shira-shoola, shwas, shirovibhram and pittaja shriahshoola. The Kalpa (formulations) containing Candana are claimed to improve brain functions and intelligence (medhya, medhavardhaka, smrutivardhaka, buddhivardhaka) and useful in different psychiatric disorders (manasroga, mastishka roga, sīrroga).

There are claims in Unani medicine, that the Sandal Safaid (Sandalwood) is musakkin (soothing, sedating), mubarrit (cooling), mufarreh (exhilarant, pleasure promoting, mood uplifting); useful in the ḍūʾī diṁāgh (weak function of the brain) and relieves ḍūʾī qūwwatī ḥāfīzah (amnesia); useful in ṣūdāʾi-ḥār (hot-type headache) or ṣūdāʾ safrāwī (bilious headache)
and *khafqān-i-hār* (palpitation due to heat); is *muqawwi qalb* (cardiotonic) and relieves *du’fī qalb* (heart’s weakness).

The modern aromatherapy also claims that the Sandalwood is calming, relaxing, soothing, anti-stress, exhilarant, euphoric, anti-depressant, sensual stimulant, cooling, sedative, tonic, strengthening effects; and it is useful in the stress, anxiety, nervousness, fear, depression, insomnia, tension, grieving, heartburn improving concentration, building-up self esteem and confidence etc.

As the previous studies have not generated any satisfactory evidences for the anxiolytic effects of Chandana; therefore the present study was designed on the basis of specific scientific criterion for the evaluation of anti-anxiety effects and the essential oil of Chandana was selected as the test drug for the study.

The test drug i.e. Sandalwood essential oil, was procured from the genuine source, through the scientists of Fragrance & Flavour Development Centre (FFDC), Kannauj, U.P., India.

Standardization of the essential oil of Chandana was made to ensure its identity, purity and quality. The authentication of the oil was done through the Holistic Health Care & Research Organization, Pune, India with arrangements of Gas Chromatography made by the Aromatics International Inc. U.S.A.

Controlled, randomized, single-blind, prospective, parallel designed, clinical trial was conducted, as per G.C.P. guidelines, on the individuals (100 completed patients) suffering from generalized anxiety disorder (GAD), those were diagnosed through the DSM-IV-TR diagnostic criteria (Hollander and Simeon, 2003). The permission of the Institutional Ethics Committee (IEC) was taken prior to the initiation of the clinical trial.

The human individuals of same socio-economic status, irrespective of sex and religion, between the age group of 25 to 40 years, suffering from *mild to moderate Generalized Anxiety Disorder (GAD)* were included in the clinical trial. Informed Consent Form was given to each individual. They were divided by random sampling, according to lottery method, into two groups, i.e. Test and Control, comprising of 50 individuals in each group.
The patients of Test group were administered two drops (0.1 ml.) Sandalwood oil with one ml. of distilled water, through nebulizer for 5 minutes, twice a day, as well as Placebo (starch) capsule of 500 mg. orally B.D.; while of the patients of Control group were given only Placebo (starch) capsule of 500 mg. orally, B.D.

Total duration of study was two months. However, the follow-up was done for a period of another one month (at every 15 days) to assess the relapse cases. Follow ups were carried out on each fifteenth days for two months, and after the completion further at one month.

The assessment of the effects of Sandalwood oil aroma inhalation on the G.A.D. in the individuals was made on each fifteen days for two months, by the Hamilton Rating Scale for Anxiety (HAM-A). The Daśavidha Parikṣa was also performed, in which the parameters observed were viz. Prakṛti, Vikṛti, Sāra, Saṃāhanana, Pramāṇa, Satmya, Satvā, Ahāra Śakti, Vyayama Śakti and Vaya. The results were analyzed statistically by the One-way Analysis of Variance (ANOVA) – Dunnett Multiple Comparisons Test.

Present study reveals that the patients included in the study, suffering from G.A.D., were from vata-pitta, vata and pitta prakṛuti. No patient was belonging to the kapha prakṛuti. It is proved from this study that the persons of vata and pitta prakṛuti are more prone to suffer from G.A.D.; and kapha persons being cool-minded have least tendency of the G.A.D.

As far as the sāra is concerned, it was observed that the patients included in the study were belonging to all types of sāra, i.e. rasa, rakta, mamsa, medha, asthi, majja and shukra. Therefore, no correlation was found regarding association of any type of Sāra with the G.A.D.

It was also observed that in satwa parikshan, the patients were from either rājasa or tāmasa type of psychological constitution. No person was belonging to the satwa type.

The analysis of overall G.A.D. revealed that in control group, there were no significant (p>0.05) mean differences found at different stages of the treatment phase, as compared to the mean score of the pre-treatment phase. While in the test group, at each stage of the treatment phase, the mean differences (as reduction) in overall G.A.D. scores were found highly.
significant (p<0.01), as compared to the pre-treatment mean scores. Therefore it becomes clear that the test drug, Sandalwood essential oil suppressed the severity of the G.A.D. significantly.

When we analyzed the 14 individual groups of symptoms of the G.A.D., viz. anxious mood, tension, fears, insomnia, intellectual symptoms, depressed mood, somatic-muscular symptoms, somatic-sensory symptoms, CVS symptoms, respiratory symptoms, G.I.T. symptoms, genitor-urinary symptoms, autonomic symptoms, behaviour at interview; the same pattern of responses in the control and test groups was found as in the analysis of the overall response of the G.A.D., and the severity of all symptoms was found suppressed by the test drug.

The actions of Chandana like medhavardhaka, smrutivardhaka, buddhivardhaka in Ayurveda as well as Unani claims regarding usefulness of Sandal in ḍu’tī dimāgh (weak function of the brain) and ḍu’tī quwwati ḥāfizah (amnesia); become evident in the form of very significant improvement in the components of intellectual symptoms (like difficulty in concentration and poor memory etc.).

Actions of Chandana like surabhi (aromatic), santāpa-śantipradam (calms down mental irritability); saumanasyajanana (soothing effect on manas (mind) and body) in Ayurveda; as well action of Sandal described in Unani as musakkin (soothing, sedating), mubarrid (cooling) are evident and proved; as there is very significant relief in the component symptoms of anxious mood (including worries, anticipation of the worst, fearful anticipation, irritability etc.); as well component symptoms of tension (including feelings of tension, fatigability, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax etc.). The above actions of chandana could also be responsible for very significant relief in the component symptoms of insomnia (including difficulty in falling asleep, broken sleep, unsatisfying sleep and fatigue on waking, dreams, nightmares, night terrors etc.) as well as component symptoms of behavior at interview (including fidgeting, restlessness of pacing, tremor of hands, furrowed brow, strained face, sighing or rapid respiration, facial pallor, swallowing etc.).
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The chandana is used in Ayurveda for relief of angamarda, and this action is evident as very significant relief in components of **somatic (muscular)** symptoms (including pains and aches, twitchings, stiffness, myoclonic jerks, grinding of teeth, unsteady voice, increased muscular tone etc.).

The **ahlādakāraka** (creates pleasure and mood uplifting) action of Chandana in Ayurveda and claims regarding its usefulness in the arochaka; as well action of Sandal described in Unani as mufarreh (exhilarant, pleasure promoting, mood uplifting) are proved through very significant relief in the components of **depressed mood** (including loss of interest, lack of pleasure in hobbies, depression, early waking, diurnal swing etc.).

It seems that Ayurvedic actions like pittashāmaka (suppresses the vitiated pitta); trṣṇāhar, pipāsahara, dāhaśamaka (relieves thirst and excessive heat of the body) as well as claims regarding its usefulness in the unmade, shīra-shoola, shīroviṅhram and pītaja shriahshoola; and Unani claims regarding usefulness in ṣudā’i-ḥār (hot-type headache) or ṣudā’ safrāwī (bilious headache) are evident in the form of very significant relief in the component of **autonomic** symptoms (including dry mouth, flushing, pallor, tendency to sweat, giddiness, tension headache, raising of hair etc.).

The **hrudya** action of Chandana described in Ayurveda; and action of Sandal described in Unani literature as muqawwi qalb (cardiotonic) and claims regarding its usefulness in du’ti qalb (heart’s weakness) and khafqān-i-ḥār (palpitation due to heat); could have relieved the components of **cardiovascular** symptoms (including tachycardia, palpitations, pain in chest, throbbing of vessels, fainting feelings, sighing, dyspnea etc.). It is interesting to note that in some previous studies, reduction was found in the palpitation by the Sandalwood (Blumenthal, 1998, Block, 2003); and decreased heart rate by massage and inhalation with Sandalwood oil (Hongratanaworakit, 2001).

In Ayurveda there are frequent references regarding usefulness of Chandana in shwas, and this action is also reflected in this study as it is relieving the component of **respiratory** symptoms of the G.A.D. (including pressure or constriction in chest, choking feelings, sighing, dyspnea etc.).
In the present study, the route of administration of the Sandalwood oil was selected through inhalation, which is the safest route. Throughout the clinical study, the Sandalwood oil did not show any adverse effect.

As far as the probability of the action of Chandana is concerned, for that we can assume that, because of the actions of Chandana described in Ayurveda, Unani and Modern Aromatherapy earlier, it alleviates the individual components of the G.A.D. (manakshobh, cittodvega or inteshar-e-zahn). Due to Tikta rasa and sheeta virya, the Chandana acts as pittasamaka and has calming and soothing effect on agitated state of mind (saumanasyajanana). Because of laghu and ruksha guna it digests ama and has raktarasaprasadana effect; and thereby, acts on hrudyā (seat of manas) and control deranged functions of manas.

As we know that the inhalation is the safest mode of administration of drugs, and a drug like the essential oil of sandalwood used in the present study, that is showing significant effect in the generalized anxiety disorder, has a wider scope to be used in larger population as a safer remedy for the anxiety. Further, there is a scope for future studies to be designed for checking the efficacy of Sandalwood oil in other psychiatric disorders.

Limitation of the present study is that the effect of Sandalwood oil could be investigated on different neurotransmitters and many advanced biochemical parameters.

The present clinical study is proving the actions of Sandalwood described in classical Ayurvedic and Unani literature as well as in modern aromatherapy. Finally, we can say that the Sandalwood oil should be put forward for its clinical use, at a wider level, through aromatherapy, in a larger population, to be adopted as a novel and safer therapeutic agent for Generalized Anxiety Disorder (G.A.D.) and related psychiatric disorders etc.