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THE AROMAS AND THE MIND

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Abstract

This paper aims to introduce the role that aromas (odors) could play in managing the psychological challenges and improving the mental health of human beings, given the direct link between our olfactory system and the brain, with a direct impact on cognitive-emotional states.

Mental disorders are often multi-symptomatic which irrecoverably bear on the individual's quality of life. Although there are conventional intervention protocols available, whereby psychology attempts to provide adequate symptom control, there certainly still are many unanswered questions here.

Over the past decades, the use of aromas as an adjuvant in clinical psychology proved to be effective in relieving symptoms, particularly in depression, anxiety, distress, fatigue, insomnia, but also in improving memory and attention.

More and more research studies conclude that the use of aromas in psychological practice could be a key element in improving symptom control of various mental disorders and life quality.

Keywords: *aromas, mind, mental disorder*

Motto:

"There is virtually no people, known to anthropology – however remote, isolated or primitive – in which some form of doctoring with plants was not practiced." (Griggs, 1997)

"History showed us that plants and essential oils had been used for thousand of years to promote health and wellbeing.
Aromatic treatment (Psycho-aromatherapy) is a continuation of this tradition of old, providing us a natural and effective method to enhance our state of mind and to treat our emotional and mental troubles." (Tisserand, 2004).

*Applied to the skin these essences regulate the activity of the capillaries and restore vitality to the tissues... "...**But of the greatest interest is the effect of fragrance on the psychic and mental state of the individual.***
Powers of perception become clearer and more acute... The use of odiferous matter induces a true sentimental and mental liberation ...essential oils liberate us of

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that emotion which perturbs us, but leave unaltered the other faculties." (Maury, 1961).

A report published by the World Health Organization (WHO, 2022), in June 8th, 2022, shows that, *"In 2019, 1 in every 8 people, or 970 million people around the world were living with a mental disorder, with anxiety and depressive disorders the most common (1). In 2020, the number of people living with anxiety and depressive disorders rose significantly because of the COVID-19 pandemic. Initial estimates show a 26% and 28% increase respectively for anxiety and major depressive disorders in just one year."*

Another report published by the World Health Organization (WHO, 2023), in June 23rd, 2023, points out that approximately 280 million people in the world have depression and more than 700,000 people die due to suicide every year, suicide being the fourth leading cause of death in 15–29-year-olds.

These are just two of the many reports that draw attention to the process of degradation of the mental health of the world's population and prompt us to put mental health at the forefront of our efforts, both at the level of public health and at that of personal health. Finding simple and effective ways to manage emotional and psychological wellbeing becomes a pressing task for each of us.

Plant aromas have always been used to alter mood (especially in the form of perfumes), the direct link between our olfactory system and the brain being scientifically attested long ago and fully proven in recent years through complex clinical studies. A mere search on the *PubMed* platform (specialized in medical and biomedical sciences), attests to a number of over 12,300 research studies on the effects of essential oils on human beings, only in the latest 5 years (PubMed, 2023).

One of the questions to which science is still searching for simple and certain answers is whether one could capitalize on the power of olfactory stimulation to cope with emotions and manage the mental challenges of the times we live in. And if so, to what extent? How much can the aromas of essential oils extracted from plants help us cope with various psychological challenges, manage our emotions, or improve our mental health?

It is a known fact that aromas are perceived via olfactory receptors in the nose, which detect aromatic molecules and convert them into electrical signals, which are further transmitted to the brain via the olfactory nerve, where they are processed in various regions of the brain, including the olfactory bulb and olfactory cortex.

While olfactory signals are processed at the level of the olfactory cortex, our brain identifies chemicals in flavors and associates them with certain experiences or memories. Nevertheless, aromas can also cause physiological reactions, such as salivation or insulin secretion. These reactions are triggered by the neurotransmitters and the hormones that are released in the brain following processing of olfactory signals. Thus, the scents of essential oils can influence the level of *serotonin, dopamine, endorphins, oxytocin*, *etc.* through the intermediary of the effects generated on the central nervous system.

This finding cleared the way for an impressive number of clinical studies analyzing the effect of essential oils aromas on human mind, and modern research on the psychotherapeutic effects of essential oils began in 1923, with smell-test experiments conducted by Italian physicians Giovanni Gatti and Renato Cayola,

whose results were published in an article titled "*The Action of Essences on the Nervous System"* (Damian & Damian, 1995).

According to their research, applying certain essential oils extracted from certain plants can have sedative or stimulating effects, and can relieve anxiety and depression. Nonetheless, the identification of these psychotherapeutic, sedative or stimulating effects was not performed by the respective physicians by treating and monitoring people diagnosed with anxiety or depression, but by measuring pulse, cardiovascular and respiratory activity, before and after inhaling each essential oil aroma. The list of sedative essential oils recommended by the two physicians for anxiety relief includes neroli essential oil (which is obtained from orange blossoms), petitgrain essential oil (which is obtained from orange leaves), cedarwood essential oil, chamomile, melissa and valerian. The only antidepressant recommended was ylang-ylang essential oil (which they also cited, without providing an explanation, as an aphrodisiac).

In the 1970s, Paolo Rovesti (Rovesti, 1980), another Italian researcher, continued the investigations into the psychotherapeutic effects of aromas, which were begun by Giovanni Gatti and Renato Cayola, this time on real patients, diagnosed with depression and anxiety disorders. Unlike his predecessors, Paolo Rovesti indeed used aromatic therapy to treat the psychological conditions of his patients, inhalation being his administration method of choice and using essential oils in synergy, rather than as single scents. The studies conducted by Paolo Rovesti confirmed the conclusions of the research works performed by Giovanni Gatti and Renato Cayola on the antidepressant effects of ylang-ylang, to which he also added jasmine, orange[1] (Hongratanaworakit & Buchbauer, 2005), sandalwood, lemon[2] (Komiya, Takeuchi, & Harada, 2006) and lemongrass. As a matter of fact, numerous subsequent clinical studies confirmed the antidepressant effects of the ylang-ylang aroma[3] (Heuberger, Tapanee, & Buchbauer, 2006), as well as of the other essential

[1] In a small trial of twenty-four individuals (12 men, 12 women), the inhaled aroma of Sweet orange (Citrus sinensis) essential oil increased physiological arousal (sympathetic tone) and at the behavioral level, individuals who inhaled sweet orange rated themselves more alert then the control group. The researchers believe that this furnishes scientific proof that the inhalation of sweet orange may be of benefit for the relief of mild depression and stress in humans. The group was divided into two with one group inhaling sweet orange and the other group inhaling pure water vapor only.

[2] A combination of lemon, orange, and bergamot essential oils with cis-4-hexanol exhibits antidepressant and immune-enhancing activities. Twelve depressive patients experienced some relief from their depression after being treated with the citrus fragrance. Their hormone levels and immune function also improved during treatment.

[3] In a 2004 placebo controlled study, researchers set out to study the potential effects of inhalation of ylang ylang essential oil on the autonomic nervous system as well as the mental and emotional response, as well as to elucidate the potential mechanisms of action for these effects. Twenty-four health volunteers participated in the study. Two groups consisting of 12 individuals were formed. In the ylang ylang group, participants inhaled ylang ylang for 20 minutes. The individuals in the placebo group, inhaled a placebo substance for 20 minutes. Breathing rate, pulse rate, and skin temperature were taken in each session. A baseline session using placebo only for all individuals was performed prior to the ylang ylang session and placebo session. Each participant also shared their subjective mental and emotional response to what they experienced during their inhalation session. The study found that the inhalation of ylang ylang decreased pulse rate, decreased systolic blood pressure, and decreased physiological arousal (decrease of sympathetic tone). Interestingly, participants in the ylang ylang group rated themselves more alert and attentive. The researchers concluded that while ylang ylang decreases physiological arousal, subjectively it appears to make some individuals feel more alert and

oils mentioned, to which frankincense sage has been added over time[4] (Han, Hur, Buckle, Choi, & Lee, 2006).

Regarding the aromas with sedative effects, recommended in anxiety disorders, Paolo Rovesti confirmed the properties of petitgrain and neroli essential oils and added to the list the aromas of bergamot[5] (Rombolà, et al., 2017), lavender[6] (Sayorwan, et al., 2012), marjoram, cypress, rose, linden and violet leaves, his conclusions being confirmed by subsequent clinical studies, and so were other aromas of essential oils, like those of Roman chamomile[7] (Wilkinson, Aldridge, Salmon, Cain, & Wilson, 1999) and geranium[8] (Sabzghabaee, Shirdare, Ebadian, Aslani, & Ghannadi, 2011), (Fakari, Tabatabaeichehr, Kamali, Fakari, & Naseri, 2015).

For example, Prof. Dr. Ernst Wagner[9] and his team of specialists in pharmaceutical biology and biotechnology of the University of Munich, Germany,

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attentive. The researchers called this effect: harmonization. In their words "The effects of ylang ylang oil may be characterized by the concept of 'harmonization' rather than relaxation/sedation."

[4] A 2014 study published in Phytotherapy Research demonstrated that the inhalation of clary sage essential oil increased 5-HT plasma concentration significantly while plasma cortisol levels significantly decreased. The study included 22 menopausal women in their 50's. Two groups were formed: normal and depression tendency groups. Clary sage (Salvia sclarea) essential oil contained 63.58% linalyl acetate and 20.99% linalool. Other major components (< 3% each) included: b-caryophyllene, geraniol, nerol, geranyl acetate, neryl acetate, and a-terpineol. Both groups inhaled clary sage essential oil. 0.1 ml of clary sage essential oil was placed on a gauze and each participant would inhale through the nose for approximately 5 minutes. The researchers acknowledged that the study was small and that it lacked participants with severe depression, however, they believe the study supports the anti-depressant activity of clary sage essential oil and its potential value for individuals suffering with depression.

[5] A small pilot study using 57 individuals (50 women, 7 men), found that the diffusion of bergamot essential oil in a waiting room increased positive feelings and mood.

[6] Inhalation of lavender (scientific name not given) essential oil relieves anxiety and reduces cortisol levels in candidates for open-heart surgery.

[7] Massage with or without Roman chamomile (Chamaemelum nobile) essential oil reduces anxiety in cancer patients in a palliative care setting. Massage with Roman chamomile may increase quality of life. In a small study designed to test the effects of massage alone or aromatherapy massage using Roman chamomile essential oil on cancer patients in a palliative care setting. Eighty-seven patients completed the study. Each patient was allocated to one of two groups and received three full body massages over 3 consecutive weeks. The Roman chamomile group received massage with sweet almond oil and Roman chamomile oil (dilution not specified), the control group received massage with sweet almond oil only. Although both massage and massage with Roman chamomile proved effective at reducing anxiety and increasing relaxation. One significant difference that occurred post test: patients in the Roman chamomile group had significantly better quality of life, with greater improvement in their physical and psychological symptoms then patients in the almond oil only group.

[8] In a randomized clinical trial involving 100 women divided into two groups: 50 participants received two drops of 2% concentrated geranium essential oil to inhale and 50 participants received the equal amount as distilled water (placebo control group). The geranium oil was dropped onto similar odorless non-absorbent pieces of fabric attached to the participant's collar. Anxiety was reduced in both groups with a slightly higher reduction of anxiety with geranium.
Similar results with the upper ones were obtained from a randomized, triple-blind, placebo-controlled clinical trial involving 80 patients with acute myocardial infarction. Geranium essential oil inhalation reduced anxiety.

[9] Pharmaceutical Biotechnology - Faculty for Chemistry and Pharmacy - Prof DI Dr Ernst Wagner (uni-muenchen.de); Pharmaceutical Biotechnology - Faculty for Chemistry and Pharmacy - Publications Prof DI Dr Ernst Wagner (since 2000) (uni-muenchen.de)

centralizing the results of several research works, published a review of herbal flavors used as "*adaptogens",* which he defined as *"substances meant to put the body in a state of increased nonspecific resistance, so as to better cope with stress and to adapt to extraordinary challenges".* Thus, lavender oil, when taken in small amounts, proved to be a sedative, whereas in larger amounts, it becomes a stimulant.

The '90s came with an avalanche of research works and clinical trials that would analyze the specific psychological effects of essential oil aromas not only on human beings' emotional states, but also on the mental ones.

The Yale University researcher Frank Schab's paper (Schab, 1990), published in the July 1990 issue of the *Journal of Experimental Psychology: Learning, Memory and Cognition,* features the first firm scientific piece of evidence that aromas can help recall memories.

In his experiment, Frank Schab, who has since conducted psychological research at General Motors Research Laboratories in Warren, Michigan, demonstrated that students who were exposed to chocolate aroma while studying (doing a word exercise), and again during the next day's test, remembered their answers better than those who were not exposed to the chocolate aroma. Another experiment, with the same chocolate scent, involved 72 Yale University students who were asked to write an antonym for 40 common adjectives without being told they would have their memory tested on antonyms the following day. Some of the students were exposed to chocolate aroma during the antonym-finding exercise, and the others only during the memory (recall) examination test. The results of the study showed that students exposed to the chocolate aroma throughout the procedure (word match test and recall test) remembered a much higher percent of responses (21%) than the other participants, showing that the pleasant aroma inhaled during the studying process should be present. Dr. Frank Schab's research also reveals the fact that a student reading for different subject matters may also use a different flavor for each subject (Damian & Damian, 1995).

Moreover, clinical research has endorsed the use of aromas, especially pleasant ones, to create a positive reinforcement behavioral modification (for example, Dr. Susan Schiffman's behavioral techniques, considering that pleasant aromas are not rejected, either physically or emotionally, and therefore they penetrate deeper into the psyche and memory.

It has been proven, likewise, that the olfactory response to aromatic stimuli, be it an essential oil or another aroma, can be used more effectively when accompanied by physical therapy (e.g., massage), by a learning practice and/or by a cognitive intellectual exercise, applied, needless to say, by means of standard psychotherapeutic procedures and behavioral modification techniques, involving learning, conditioned reflex and partial reinforcement reflex.

In a study conducted also in the '90s by the University of Cincinnati, psychologists William Dember and Joel Warm found that subjects who inhaled mint and lily-of-the-valley aromas while performing a boring computer task made 25% fewer errors than those who breathed unflavored air. Starting from this study, particularly research centers in Japan conducted extensive research studies on how essential oil aromas impact attention and concentration (Griffin, 1993).

Nonetheless, many research studies have started from the search for solutions to solve current challenges at the level of medical systems or care facilities, such as

minimizing preoperative anxiety, which is a common issue in hospitals (Wotman, et al., 2017).

Consequently, a study conducted in 2017 by the *Department of Otolaryngology–Head and Neck Surgery* and by the *Department of Healthcare Policy and Research, New York - the Presbyterian/Weill Cornell Medical College, New York, U.S.A.* on the efficacy of lavender aroma in reducing preoperative anxiety in ambulatory surgery patients undergoing procedures in general otorhinolaryngology *(The Efficacy of Lavender Aromatherapy in Reducing Preoperative Anxiety in Ambulatory Surgery Patients Undergoing Procedures in General Otolaryngology)* (WHO, Mental disorders, 2022) started exactly from the fact that, irrespective of the severity of surgery, patients can experience considerable apprehension (fear, anxiety, worry) because of the fear of surgery, anesthesia and of postoperative pain, shown to have a negative impact on patients.

Physicians determined that the presence of an intense state of preoperative anxiety generates an increased use of narcotics and anesthetics, a prolonged duration of hospitalization and of postoperative wounds healing, a diminished ability of the body to fight infections and, last but not least, a decrease in the ability to understand information about surgery.

Pharmacological therapies, such as sedatives and opioids, are often used to treat preoperative anxiety, however, these drugs have unwanted side effects, including fatigue, confusion and restlessness, and (Najafi, Taghadosi, Sharifi, Farrokhian, & Tagharrobi, 2014) can bear on the patient's ability to actively participate in postoperative care and may delay discharge (Kim, et al., 2011).

The eight-month study involved 100 patients, who were admitted to New York-Presbyterian/Weill Cornell Medical Center for outpatient surgery, and the conclusion was explicitly worded as a recommendation: Given *"the adverse effects of preoperative anxiety and the simplicity of aromatherapy, healthcare providers would need to consider using preoperative lavender aromatherapy in ambulatory surgery."*

CONCLUSION

Invariably, for anyone, the road to finding a solution to improve a cognitive-emotional disorder is extremely toilful, and it becomes itself a psychological challenge.

For the management of such a "human experience", the protocols of classical therapy are by no means sufficient. The confines of conventional, allopathic or psychological, treatments have to be admitted. Human beings need considerably more in order to reactivate that original "setting" that leads them to healing. And one of the ways, perhaps the smoothest, most pleasant and free from adverse effects, is to use aromas, and not empirically and intuitively, but scientifically.

As might be expected, one could argue that there are still not enough studies to entail the inclusion of aromas in the treatment protocol of serious mental disorders. However, the studies that already exist unequivocally highlight the extraordinary benefits that aromas bring in support of any form of psychological therapy.

Each person suffering from a cognitive-emotional disorder have their own "life story" that brought them to this point of suffering, where healing can only come through a holistic approach, centered on the patient and their particular needs, and aromas, psycho-aromatherapy, sustained aroma therapy, abundantly address these requirements.

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