



Review Article

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EFFECT OF SHIRODHARA IN THE MANAGEMENT OF NEUROPSYCHIATRIC DISORDERS: A REVIEW

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ABSTRACT

Background: There is an increased prevalence of neurodevelopmental and neurobehavioral disorders and other psychological issues. These all are considerably increasing in the paediatric age group in the present era. Children are the nation's future and tomorrow's citizens; it is a big concern for a paediatrician. All neuropsychiatric disorders are considered under the broad term *unmada* in Ayurveda. As per the pathophysiology of *unmada*, *manas* or *chitta* is affected. For this *samprapti vighatana*, there is a need for calming therapies like *Shirodhara*. *Shirodhara* also has many effects on *sareerika* and *manasika doshas*. To search and re-evaluate the possible mode of action of *Shirodhara* in different neurodevelopmental, neurobehavioral, and other psychotic disorders and also find the effectiveness of *Shirodhara* in neuropsychiatric disorders.

Keywords: *Shirodhara*, neuropsychiatric disorders, Ayurveda

INTRODUCTION

Neuropsychiatric disorders are the leading cause of disabilities in child and adult populations. Among these, neurobehavioral and neurodevelopmental disorders like ADHD, autism etc., are more prevalent in the childhood age group. In the paediatric age group, neuropsychiatric disorders may arise due to autoimmune causes followed by a streptococcal infection. The core symptoms include obsessive-compulsive disorders and worsening of tics, and other symptoms include ADHD symptoms, anxiety, enuresis, mood lability, choreiform movements etc.¹

All these neuropsychiatric disorders can be correlated as *unmada* in Ayurveda while considering the etiopathology in Ayurveda in the cause of *unmada* there is mentioned *dushti of manovaha srotas*. Also, there is *Manovibrama*, *budhivibrama*, *smritivibrama*, *sheelavibrama*, *chestavibrama*, and *acharavibrama* are present in all these disorders. Mind or higher consciousness is affected in all these conditions and vitiation of *dhee* (reason-based decision-making capacity and rational thoughts), *dhriti* (retaining power of the mind), and *smriti* (memory). This results in abnormal conduct and behaviour.² while considering the fundamental aspect of psychological issues through Ayurvedic science, the imbalance of *Vata dosha* is responsible for anxiety, fear, hyperactivity and mental instability. An imbalance of *Pitta dosha* can contribute to anger, irritability, insomnia, loss of attention etc. Imbalance of *Kapha dosha* leads to lethargy and depression. These symptoms are also found in neuropsychiatric disorders; hence, it is evident that an imbalance of three *dosha* leads to psychiatric disorders.³ Correction of this *dosha* imbalance or *manovaha srotas dushti* leads to mental calmness and reduced symptoms of neuropsychiatric disorders. For this tranquillising effect, the best treatment method is *Shirodhara*. Pouring any liquid or medicated liquid (milk, oil etc.)

over the forehead by a specific technique is known as *Shirodhara*. In this process, the liquid is poured over the forehead of patients in the form of a regular stream from a particular height, in a fixed fashion in the form of oscillatory movements for 30-45 minutes daily for two weeks.

This review is in a narrative format and consists of all publications relevant to "*Shirodhara*" that the authors identified through a systematic search of major computerised medical databases; no statistical pooling of results or evaluation of the quality of the studies was performed due to the widely different methods employed by each study.

Subject-related articles are searched from different databases PubMed 5, Google scholar 32, Journal of *Ayurveda* and integrative medicine 3, Journal of *Ayurveda* and integrated medical sciences 2. After identifying repeated articles, the final list of articles reviewed was 27.

A study was conducted to determine *Shirodhara's* psychological and physiological effects on healthy volunteers. Rating of mood and stress levels, electrocardiogram (ECG), electroencephalogram (EEG), and selected biochemical stress markers were assessed pre-and post-*Shirodhara*. Sixteen healthy human volunteers were registered for the trial. Significant improvements in mood scores and the level of stress ($P < 0.001$) were observed after the treatment. A substantial decrease in breathing, a reduction in diastolic blood pressure, and a reduction in heart rate accompanied these changes. The relaxed alert state after *Shirodhara* was correlated with an increase in alpha rhythm in EEG.⁴

Another study was conducted with the objective of clinical efficacy evaluation of *Shirodhara* with water and *Shirodhara*

with water and *Ashwagandha* (*Withania somnifera*) extract orally in managing headaches and associated anxiety and depression. Forty cases of primary headache were randomly divided into two groups of 20 each and treated for 15 days. It was observed that the patients of group B treated with water *Shirodhara* and *Ashwagandha* (*Withania somnifera*) extract (500 mg once a day) showed significant improvement, whereas the group A treated with only *Shirodhara* with water also showed similar improvement.⁵

Thirty patients of stress-induced chronic insomnia (*Anidra*) were studied to evaluate the role of a compound herbal Ghrita. In a dose of 20 gm twice daily for six weeks, a compound herbal ghrita-based formulation containing *Jatamansi* (*Nardostachys Jatamansi*), *Shankhapushpi* (*Convolvulus pluricaulis*), *Ashwagandha* (*Withania somnifera*), and *Tagar* (*Valeriana jatamansi*) has significantly improved sleeplessness (86.54%), distress (89.28%), and sleep time (94.29%). Another set of patients experienced significantly significant improvement from sleeplessness (61.29%), distress (63.64%), sleep time, sleep quality, and freshness after waking (100% each) after using *Dashamula kwatha Shirodhara* for 30 minutes each morning for 21 days. Based on Hamilton's Anxiety Rating Scale, Hamilton's Depression Rating Scale, Brief Psychiatry Rating Scale, and *Manasabhav pariksha* on *Ayurvedic* criteria, relief in mental health have been seen in both groups.⁶

A study was conducted to evaluate *Shirodhara's* effect on generalised anxiety disorder. This study consisted of *Shirodhara* with *ksheera bala taila* as an intervention for 13 generalised anxiety disorder patients, and observations were done for six weeks. Response to *Shirodhara* noted through the changes in the Hamilton Anxiety Scale. Further evaluated pre-post significant changes in the Hamilton Anxiety Scale were observed. The difference between the baseline and second follow-up was 8.54 ± 2.11 . Statistically, this change was significant ($p < 0.001$). Between baseline and first follow-up, a reduction in HAM-A score was observed (8.85 ± 1.72), which was also substantial statistically ($p < 0.001$). However, an increase in the HAM-A score was observed between the first and second follow-up intervals, but it was not statistically significant ($p = 0.104$). The observed changes in HMA -A score indicate considerable improvement by this intervention (*Shirodhara*).⁷

A clinical study evaluated the mental concentration-enhancing effects of an *Ayurveda* drug and *panchakarma* in children. In this study, a randomised placebo control study was done, *Ayurveda* compound *Kalyana leha* and *Shirodhara* procedure in managing poor mental concentration in children. There were 3 study groups, A with *Kalyana leha* showed highly significant improvement in IQ level reaction time on Wechsler Intelligence Scale For Children (WISC) scale, group B as a placebo group had non-significant improvement in all parameters, whereas group C with *Shirodhara* procedure was also significant in all parameters. Intergroup comparison for change in IQ level has shown significant improvement in group A over group B and C ($p < 0.01$ and $p < 0.05$), respectively. Group C also substantially improved over group B. Both groups A and C considerably improved over group B ($p < 0.05$). This study has proven that mental concentration can be enhanced effectively with *Ayurveda* drugs and procedures like *Shirodhara*, which improves mental concentration, through which academic performance has also improved.⁸

A case study was conducted to find the effect of *Shirodhara* on biological markers of stress. A 35-year-old female patient was taken to the hospital with sleep issues, memory problems, and mood swings like anger. The Profile of Mood Score (POMS) questionnaire, Serum Cortisol (Sr. Cortisol), and

Dehydroepiandrosterone were used to evaluate the patient (DHEA). *Taila dhara* was given constantly, sesame oil treatment for 14 days. Then, the outcomes were assessed using the POMS score and stress biomarkers. In addition to improvements in the patient's presenting complaints and in the POMS Score (which showed a noticeable improvement in the positive domain of the POMS Score and decreased the negative domain value in the POMS Score), the patient experienced significant relief after the procedure (*Shirodhara*). During or after the treatment, no adverse events were observed.⁹

A clinical study was conducted on 20 cases to evaluate the efficacy of *Shirodhara* with *Ashwagandha taila* (*Withania somnifera* processed in *tila taila*) in managing stress-induced insomnia. The efficacy was assessed based on characteristics of sleeplessness, sleep awake schedule, sleep quality, sleep time, feeling after awakening and associated symptoms. The study reveals that *Shirodhara* has a significant role in relieving and maintaining mental calmness. The effect of therapy was also evaluated on the DASS scale. The overall result shows the effectiveness of *Shirodhara* on *manovaha srotas*¹⁰.

A case-control study was conducted on children with ADHD. Forty-eight children aged 6 to 15 from various grades (classes), schools and socio-economic strata were selected. Selected children were randomly divided into groups, A, B, C, and D, of 12 children each and were administered with *Vallarai khiritha*, *Vallarai khiritha* and *Shirodhara*, placebo, placebo and *Shirodhara*, respectively. Pre-assessment screening of ADHD children was done according to the criteria. Doses were according to the child's body weight (200 mg/kg/day) in 2 divided doses for three months. After three months of treatment, post-assessment was done, and the effect of the therapy was assessed based on the improvement of clinical symptoms. By statistical analysis of the result obtained on the core symptom, inattention showed statistically significant improvement in three groups, A, B and D ($p < 0.001$). All three groups, A, B and D, showed a significant advantage over group C on comparing the inter-group differences ($p < 0.01$; $p < 0.001$ and $p < 0.001$), respectively. This study indicates the synergistic effects of *Shirodhara* with the study drug.¹¹

A study was conducted on 60 clinically diagnosed patients of *Chittodvega* to evaluate and compare the efficacy of *Shankhapushpi Panak* and *Shirodhara* with *Mansyadi Kwatha* and Tab Sertraline (generally used in the management of *Chittodvega* w.s.r. to Generalise Anxiety Disorder). Patients were randomly divided into two groups. In Group 1, 30 patients received *Shirodhara* with *Mansyadi Kwatha* for 21 days for 48 minutes each morning and *Shankhapushpi Panak* in the dose of 15 ml twice daily with equal amounts of water after meals. For 30 days, 30 Patients in Group 2 received Tab Sertraline 50 mg daily at bedtime. The Hamilton Anxiety Rating Scale, *Chittodvega*, and DSM-IV signs and symptoms of GAD were used to evaluate the treatment's effects. According to the assessment, clinical symptoms have improved in both groups, and the HMA rating has changed. The mean HAM-A Scale score for Group 1 was 44.46 before therapy, but it fell to 15.86 after treatment. *Ayurveda* drug with *Shirodhara* produced an equivalent effect as that of the standard drug sertraline.¹²

A pilot study was conducted to evaluate the efficacy of *Ashwagandha Siddha Taila dhara* in managing *Avasada* (depression). For this study, ten patients fulfilling the diagnostic criteria of *Avasada* (depression) were selected. The efficacy of *Taila dhara* was evaluated based on improvement in subjective signs and symptoms of *Avasada* and a decrease in the HDRS (Hamilton Depression Rating Scale) score. On assessment, it is

showed that *Ashwagandha Siddha Taila dhara* has a statistically highly significant ($P < 0.0001$) effect on *Dukhatva*, *Atmano Ashaktataa*, *Apraharsha* and in terms of HDRS, it showed statistically highly significant results in insomnia: middle of the night ($p = 0.0005$) insomnia: early hours of the morning improvement ($p = 0.0005$). This study proved that *Shirodhara* is very effective in managing *Avasada* (depression); in another way, it indicates excellent stress relieving and calming effect of *Shirodhara*, or the action of *Shirodhara* on *manovaha srotas*.¹³

A study was conducted using a healing robot for the scientific study of *Shirodhara* on sixteen healthy adult females (ages 21–56, 33 ± 9 years). *Shirodhara's* treatment session was 20 minutes. The same subjects participated as a control group. Subjects used for assessment are blood pressure intermittent blood pressure, electrocardiogram, impedance cardiography and respiratory chest movement also assessed. The psychological changes were assessed by psychometric studies using the State-Trait-Anxiety Inventory (STAI) before and after *Shirodhara* and ASC questionnaires just after *Shirodhara*. The assessment found that the heart rate and CO₂ consumption decreased during *Shirodhara* compared to the control group; no change was observed in the control group. The STAI scores of 12 healthy female individuals who underwent *Shirodhara* for anxiety reduction were compared to those of 12 additional women who underwent facial relaxation with algae packs. As the subject's anxiety level was measured before and after *Shirodhara*, it was discovered that it had dramatically decreased ($p < 0.05$) when compared to the control group (the participants who received the algae pack) ($p < 0.005$).

Shirodhara's anxiolytic effects were also noted in 57 subjects, 10 of whom received repeated *Shirodhara* treatments four times per week while experiencing a high level of anxiety (>40). Following *Shirodhara*, the POMS score alterations were evaluated. And the outcome showed that tension and anxiety significantly decreased (Wilcoxon signed rank test, $p < 0.05$). During *Shirodhara*, an EEG assessment also showed an increase in slow α and θ or $Fm\theta$ waves. *Shirodhara* induced a rise in right-left EEG coherence. These results indicated restful alertness in which the frontal lobe, limbic system, and medulla oblongata were activated. All over, *Shirodhara* induced an altered state of consciousness in some subjects and reduced anxiety. From this study, it is evident that continuous *Shirodhara* treatment reduced the tension and anxiety of study subjects.¹⁴

A study was conducted to demonstrate the clinical efficacy of *Manasamitra Vataka* and *Shirodhara* over Clonazepam in preserving slow-wave sleep and promoting sleep quality in patients of Generalized Anxiety Disorder (GAD) with comorbid generalised social phobia. For this study, 72 patients with insomnia with generalised anxiety disorders were selected. They were randomised (blocked randomisation) into three groups. In group I, there was 24 patients received the tablet *Manasamitra Vataka* (100 mg, twice daily, for 30 days); in group II also, there were 24 patients received *Shirodhara* with *Brahmi tailam* (oil-based extract of *Bacopa monnieri*) during the morning hours for the first seven days along with *Manasamitra Vataka*. In group 3 there were 24 patients received the tablet Clonazepam (0.25 mg in the morning and 0.50 mg at night) for 30 days. Medications were administered in the morning and 1 hour before the habitual sleep time. The results were assessed, and it was found that *Ayurvedic* assessment effectively managed sleep disorders and generalised anxiety disorders with comorbid generalised social phobia compared to Clonazepam. *Shirodhara* also plays a vital role in maintaining mental calmness and reducing generalised anxiety disorder.¹⁵

A randomised placebo-controlled study was conducted to evaluate the role of an *Ayurveda* compound (*Manas niyamak yoga*) and *Shirodhara* in managing ADHD in children. For this trial, children aged 6-15 years were selected, and therapy was given for three months. In four groups of 10 children, group A was given the *Ayurvedic* compound *Manas Niyamak Yoga*; group B was given the *Ayurveda* compound along with *Shirodhara* (*ksheera dhara*); group C children was given a placebo; group D children were given a placebo with *Shirodhara*. The efficacy of therapy was assessed based on improvement in attention span reaction time, motor ability and DSM-IV criteria. IQ level. The result showed statistically significant improvement in the symptoms in three groups, A, B, and D. While comparing intergroup; the response was more significant in the group where *Shirodhara* and drugs were involved. This is again indicating the tranquilising effect of *Shirodhara*.¹⁶

A case study was conducted to evaluate the effect of *Shirodhara* in managing *chittodvegajanya anindra*, insomnia due to generalised anxiety disorder. For this study, a 19-year female patient with clinical symptoms such as *anindra*, *krodha*, *shoka*, *bhaya*, and *daurbalya* was taken. The patient was treated with *Shirodhara* with *Dashamula Kshira Kwatha*, *Pratimarsha Nasya* with *Ksheerabala Taila* and certain *Ayurveda* internal medicines (*Saraswatrishtha*, *Ashwagandharishtha*, *Brahma Rasayana*, *Avipattikar Churna*) for 14 days and in follow up *medhya* drugs were also administered. And found marked relief in clinical symptoms such as *krodha* and *bahaya*, and the patient got good sleep and weight gain. Because of the calming effect of *Shirodhara*, it reduced anxiety and gave a significant improvement in clinical symptoms.¹⁷

A clinical study was conducted to evaluate the feasibility and pilot efficacy testing of integrated yoga and *Shirodhara* on adults with anxiety disorders. The study was conducted for two weeks of intervention, and clinical symptoms were assessed using HAM-A, State and Trait Anxiety Inventory, Brief Psychiatric Rating Scale and sleep quality (sleep rating questionnaire), and cognition (Stroop test and digit letter substitution test) using standard validated tools. Clinical symptoms, cognitive functions and sleep quality of adults with anxiety disorders. A total of 30 subjects with generalised anxiety disorders participated in the trial. They were divided into two groups at random: (1) a lifestyle programme based on yoga (YT; $n = 15$), and (2) YT with *Ayurveda* (YA; $n = 15$). Subjects in the YA group underwent *Shirodhara* as an intervention in the morning for 40 minutes each day for seven days in addition to the daily schedule of the YT programme. Except in emergencies, both groups received standard medical care and stayed on stable medication throughout the study. While assessing the result, it was obtained that two groups showed significant improvement in clinical symptoms, cognition and sleep quality. Intergroup comparison it is shown the YA group showed more improvement; from this, it is clear that along with yoga, *Shirodhara* help to enhance executive memory and sleep quality.¹⁸

DISCUSSION

Present review documents that *Shirodhara* is significantly effective in the management of psychological disorders along with neurobehavioral disorders of children like ADHD. The probable mode of action of *Shirodhara* can be explained considering the following facts when a constant stream of liquid is poured over the forehead from a fixed height, it results in pressure on the skin over the forehead. This pressure stimulates the Pacinian receptors or the mechanoreceptors on the skin, which in turn leads to mechanical deformation of the receptors, which results in the change in the membrane potential of the receptor,

and a receptor potential is generated. The receptor potential then leads to the generation of the action potential, which is then passed to the cerebral cortex via the brain stem or the RAS. In this way, the information from outside reaches the cerebral cortex finally. The pressure input from the skin over the head region is conveyed by the ophthalmic branch of the trigeminal nerve to the reticulospinal neurons via a di-synaptic pathway¹⁹. When sensory information reaches the cerebral cortex, only a tiny fraction of that information causes an immediate motor response. Much of the remainder is stored for future control of motor activities and use in the thinking processes.²⁰ Repeated stimulus input leads to the consolidation of the information, which needs 5 to 10 to minutes for minimal consolidation and 1 hour or more for more vital consolidation.²¹ This fact is consistent with the duration of *Shirodhara* of 30-45 minutes practised daily. To achieve the permanent effect of *Shirodhara*, there must be a change in response characteristics of different neuronal pathways, and to attain this, activation of the second messenger pathway is needed, which might be attained through the process of *Shirodhara*²².

Since the stimulus reaches the RAS first, stimulated RAS generates L-block waves or the alert response is generated, and continuous practice of this process for 15 days may result in some long-lasting effects. The process or the mode of action here is similar to that of neurofeedback or the EEG bio-feedback technique, in which individuals are provided with honest time feedback about their brainwave activity and taught to use that information to modulate certain aspects of their mind. Regular or continuous pressure input generates a constant impulse to the CNS, thereby continuously stimulating the CNS. Practising this procedure regularly for 15 days may lead to prolonged, lasting stimulation of the CNS. The mechanism is comparable to CNS stimulant medications advised for neuropsychiatric disorders. An animal study found that the response evoked by head or tail stimulation was three or four times larger than that of mind-body stimulation¹⁹. Thus, it may be interpreted that the same response is true with the man. This point explains why *dhara* on the forehead is more effective for mental disorders. Regarding the *Shirodhara's* deed, there are some opposing viewpoints.

According to the yoga school of thought, ten primary *Chetana kendras* (sites of consciousness) or *Nadichakras* are distributed throughout our bodies. These chakras are interconnected and support one another in their work. *Shirodhara* helps the stimulation of two chakras, the *Agya chakra* (located between the two eyebrows) and the *Bhramarayuha chakra* (located at the upper forehead region), which in turn produces the desired result. As per the *Ayurvedic* view, the site where the *dhara* stimulates is the place of *sthapani marma* and *marma* in *Ayurveda* is supposed to be a junction of veins, arteries, nerves, joints /sutures and bones. *Sthapani marma* is situated between the eyebrows. It controls the 6th *chakra* (*Agya*) and *Prana Vayu*. The tissues or structures involved in the formation of *sthapani marma* are

- Supraorbital and facial artery
- Anterior facial vein superior sagittal sinus
- Drainage to submandibular lymph glands
- Supraorbital nerve
- Frontal bone

Additionally, *sthapani marma* has anatomical features like the cavernous plexus, optic chiasma, and thalamus. These anatomical features have close ties to the limbic system, which is controlled by neighbouring regions like the pituitary gland and the hypothalamus, and when they are continuously stimulated, they cause certain emotional modifications that influence rational thoughts and behavioral changes. Warm water or a medicinal liquid is poured while performing *Shirodhara*, stimulating the tactile and thermoreceptive systems. When a thermoreceptor is activated, particular neurons in the thalamus and cortex are also activated, which affects higher mental activities. The continuous pouring of a medicinal liquid will cause blood vessels to dilate, increasing blood flow to the brain and overall blood circulation, which will benefit both the body and the mind.

Additionally, the constant pouring pressure will aid in maintaining good mental health. In *Shirodhara*, trigeminal nerves are continuously tactilely stimulated on the skin or hair follicles (first branch). These impulses travel from the central nucleus of the brain to the thalamus and then to the brain's limbic system or somatosensory cortex. And the stimulus helps to attain relief from anxiety. Additionally, it promotes mental clarity and appropriate psychological elements.¹⁴

Another view explains that *Tarpaka Kapha*, which is found in the *siras* and responsible for nourishing the sense organs, are nothing more than the cerebrospinal fluid, endolymph perilymph in the internal ear, and aqueous and vitreous humours in the eye. A vibrating effect occurs in the fluid medium during *Shirodhara*, and this vibration is transferred to the brain via *Tarpaka Kapha*. Brain wave synchronisation is made more accessible by *dhara*, and these vibrations may be enhanced by a hollow sinus in the frontal lobe and conveyed to the rest of the brain and sense organs. *Shirodhara's* vibrating effects may improve a person's emotional and psychological well-being. (There are many studies regarding brain wave vibration and psychological symptoms, oxidative stress, which show that there is simple healing of the body and mind. And also, there is reduced oxidative stress and improved emotional state).²³

Shirodhara may also have a soothing effect on the hyperactive limbic system caused by stress. *Shirodhara* facilitates inhibitory presynaptic action of GABA and reduces noradrenaline levels, which are found high in an anxious state of mind. It, in turn, helps to attain mental calmness.²⁴ Also, the constant stream of *Shirodhara* increases the intensity of alpha brain waves and decreases the brain cortisone and adrenalin level. Emotional and behavioural control is done by the limbic system along with the hypothalamus; it is postulated that *Shirodhara* may have some effect on the limbic system and hypothalamus, which also helps in psychic and somatic disorders.²⁵

CONCLUSION

Present evidence reveals that *Shirodhara* can be a safe and effective treatment for neuropsychiatric and neurobehavioral disorders. It is easy to administer and is cost-effective as well.

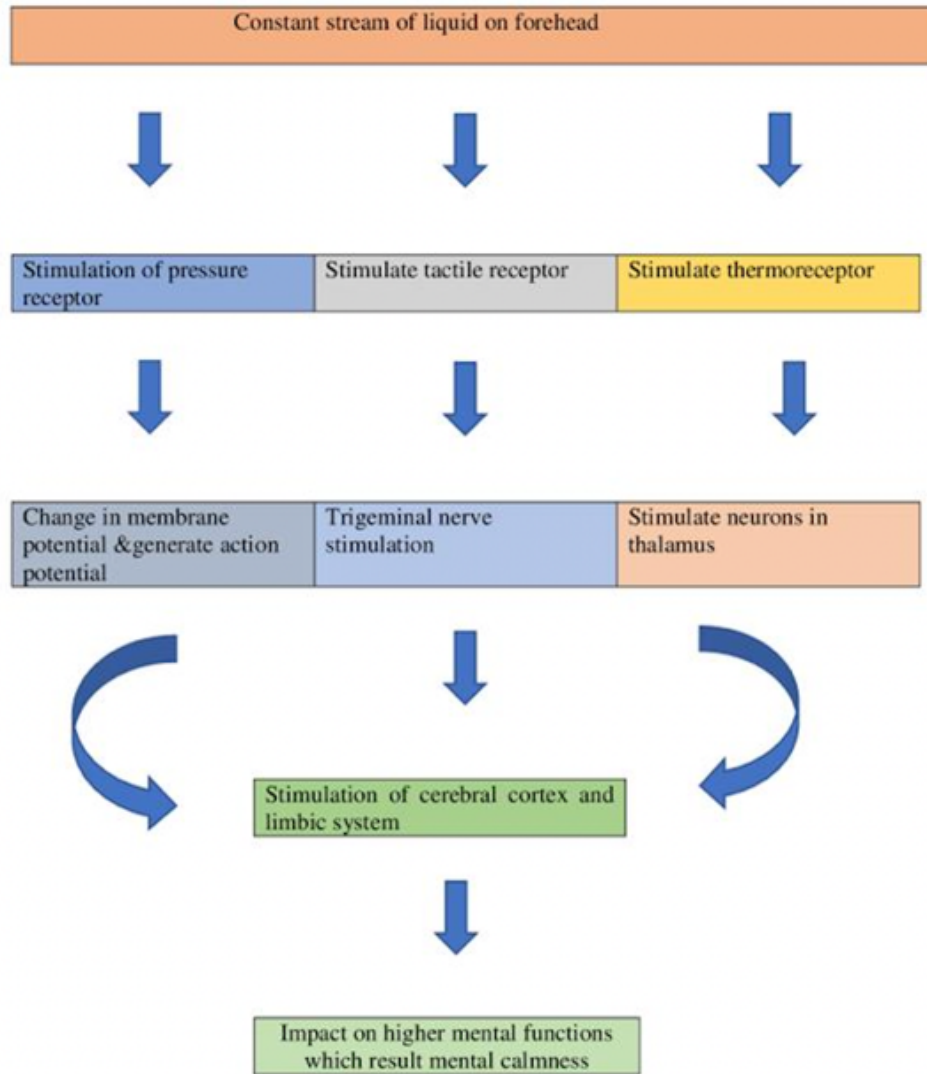


Figure 1: Mode of action of Shirodhara

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