



## THERAPEUTIC EFFICACY AND MECHANISM OF ACTION OF AYURVEDIC SHIRODHARA: AN EVIDENCE BASED REVIEW

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*Received on* 08/01/2016

*Accepted on* 10/01/2016

*Published on* 05/02/2017

### ABSTRACT

Shirodhara is a form of Ayurvedic snehana procedure, wherein involves gently pouring liquids over the forehead. This procedure can be a poorvakarma (preoperative procedure) to main panchakarma or pradhan karma (Main procedure) depending upon the condition of the patient. Shirodhara is mainly indicated for neurobehavioral and psychosomatic disorders. Recent investigations report that, Shirodhara is effective in management of condition like pediatric attention deficit hyperactivity disorder, Cerebellar ataxia, Essential hypertension, Psychological symptoms of Menopause, Premature ejaculation, generalized anxiety disorder and Insomnia. The exact mechanism of its mode of action is not known till date. But, Preliminary reports suggest that, this procedure has a demonstrable anxiolytic effect evidenced by decrease in Plasma noradrenaline and urinary serotonin excretion, significant decrease in rate of breathing, reduction in diastolic blood pressure and heart rate with lowered sympathetic tone.

Key word: Shirodhara, Ayurveda, Psychosomatic disorders

## INTRODUCTION

The word *shirodhara* is derived from Sanskrit language *shiro* (head) + *dhara* (to flow). *Shirodhara* is a form of independent *snehana* procedure, wherein involves gently pouring liquids over the forehead. The selection of the drug and duration depends upon various factors including characteristics of disease, chronicity, involvement of *dosha*, patient's prakriti and environmental condition. There are various specialized forms of *shirodhara* such as *Tailadhara*, *Ksheeradhara*, *Takradhara*, *Jaladhara* and *Kwathadhara*. Though classically this procedure is not described under the *panchakarma*, but it incorporated under *snehana* karma by the *ayurvedic* scholars. This procedure can be a *poorvakarma* to main *panchakarma* or *pradhan karma* depending upon the condition of the patient. *Shirodhara* is classically advised for many diseases like insomnia, attention deficit hyperactivity disorder, anxiety disorders, phobia, depression, essential hypertension and other psychosomatic disorders. The present paper presents the evidence based approach of the classical *Ayurvedic* procedure "*shirodhara*". Apart from this article provides an insight into the probable mode of action of *shirodhara*.

## MATERIAL AND METHODS

PUBMED, MEDLINE, GOOGLE SCHOLAR and DHARA databases were searched for studies published with key words "*Shirodhara*," "*Ayurveda*," etc. clinical trials published in peer reviewed journals were only included in the review. Research articles in English language were only considered. Other languages were approved when there was an English abstract containing data essential for extraction. Articles were selected based on their relevance to the topic.

## INDICATIONS OF SHIRODHARA

- Conditions involving aggravated *vata dosha*

- Attention deficit hyperactivity disorder
- *Apasmar* (Epilepsy)
- Anxiety disorders
- Mental exhaustion
- Irritability
- Hypertension
- Insomnia
- Phobia, depression and other neurobehavioral disorders

## CONTRAINDICATIONS OF SHIRODHARA

- Inflamed skin on the forehead
- Drugs or Alcohol Intoxication
- Pyrexia

## PROCEDURE OF SHIRODHARA:

The process of *shirodhara* is divided into 03 important steps:-

Step 1 – *Purva karma* (Preoperative procedures)

Step 2 – *Pradhan karma* (Main procedure)

Step 3 - *Pachat Karma* (Post operative procedure)

## PURVA KARMA

Before starting *Shirodhara*, Physician should explain about whole procedure to the patient and take his/her consent for the same. The patient is made to lie down on *Shirodhara* table with his palms facing up. A rolled towel or a small pillow should be placed under the head so that head rests in a comfortable position. Precaution should be taken not be hyper flex or hyperextend the neck. Massage is done over head with prescribed medicated oils. Sometimes the whole body massage should be done regarding the patient condition. The medicated oil should be warmed and then should be taken out from hot water bath and temperature should be tested with a digital thermometer. It is then poured into the *shirodhara patra* (Vessel) that is positioned over the patient's head and adjusted to the appropriate height. Classically, *dhara patra* is made up of

copper metal. It is a wide mouthed and curved vessel pot having a hole in central bottom. Through the hole a cloth thread is pushed to allow the oil to flow continuously in the form of stream. The pot is hanged four inch above the forehead of the patient with the help of chain.

#### PRADHAN KARMA

After proper *snehan* (massage) on head, patient should be asked to lie on the supine position on the *shirodhara* table and keep the head on the extra projection of the table. Both the eyes of the patient are covered with cotton, gauge piece. This procedure is done to prevent the falling of medicated oil in the eyes. The fluid is then poured in *dhara patra* and the fluid is allowed to flow through the wick of cotton that is pushed down through the hole of the *shirodhara patra*. The movement of oil in the entire forehead is regarded beneficial. However various oscillatory procedures can be adopted as per the condition of disease and patient. The usual duration of *shirodhara* lasts for about 30-45 minutes. *Jaladhara* or *takradhara* can be given for more time as per the clinical judgment.

#### PASCHAT KARMA

After completion of *pradhan karma*, head of the patient should be cleaned thoroughly. Patient should be asked to take rest for few minutes on the *shirodhara* table. Advise the patient to take hot water bath after half an hour and not to get direct exposure of sunlight immediately.

#### CHANGES DURING SHIRODHARA PROCEDURE

The mechanism of action of *Shirodhara* is fully not understood yet. There are only a few research papers depicting the same. Uebaba et al (2008)

evaluated the effect of *Shirodhara* treatment on physiologic, biochemical, immunologic, and psychometric parameters. This trial was randomized, controlled protocol involving a novel approach using a robotic system. It was observed that Plasma noradrenaline and urinary serotonin excretion decreased significantly more after *Shirodhara* treatment than in the control. Apart from this, Plasma levels of thyrotropin-releasing hormone, dopamine, and natural killer (NK) cell activity were different between control and *Shirodhara* treatment.<sup>1</sup> This shows that *shirodhara* procedure has an anxiolytic effect.

In a similar investigation, Dhuri et al (2013) evaluated the psychological and physiological effects of *Shirodhara* in healthy volunteers by monitoring the rating of mood and levels of stress, electrocardiogram (ECG), electroencephalogram (EEG), and selected biochemical markers of stress. 16 healthy human volunteer participated in the trial and were subjected to *Shirodhara* followed by *Abhyanga* (whole body massage). It was observed that there was a significant improvement in mood scores and the level of stress ( $P < 0.001$ ). Apart from this, significant decrease in rate of breathing and reduction in diastolic blood pressure along with reduction in heart rate was observed. The relaxed alert state, after *Shirodhara*, was co-related with an increase in alfa rhythm in EEG.<sup>2</sup> Apart from this, the subject's feelings during *shirodhara* showed deep restfulness with less anxiety - as if the subjects were between the sleep and awake states. Study show that *Shirodhara* induce bradycardia and the relative suppression of LF/HF power spectrum density, which indicates lowered sympathetic tone. Expired gas analysis shows a decreased tidal volume and CO<sub>2</sub> excretion. The EEG shows the

slowing of the  $\alpha$  wave, an increase in  $\alpha$  and  $\theta$  activity and an increase in right-left coherence. Physiological changes during *shirodhara* are found to be similar to those of meditation, including  $\alpha$ -wave dominance in the frontal area and a decrease in heart rate and CO<sub>2</sub> excretion. These findings indicate a change in the function of the frontal lobe, limbic system, brain stem, and autonomic nervous system after *shirodhara*.<sup>3</sup>

### RECENT EVIDENCES ABOUT EFFICACY OF SHIRODHARA

*Shirodhara* is classically indicated in various neurobehavioral, psychosomatic disorders. Some of the research studies depicting the effectiveness of the procedure are as follows:-

#### Attention deficit hyperactive disorder

Attention deficit hyperactivity disorder (ADHD) is the most common neurodevelopmental disorder in childhood. It is found to be occurring in approximately 5.29% of children worldwide.<sup>4</sup> The core symptoms of ADHD include inattention, impulsivity and hyperactivity. On the basis of the core symptoms ADHD can be classified into 03 subtypes i.e. predominantly inattentive type, the predominantly hyperactive-impulsive type and the combined type.

For the management of ADHD, behavioral therapy as well as medications is advised. Medications indicated for ADHD include CNS stimulants (Methylphenidate, amphetamine and their derivatives) and antidepressants. Though, these drugs are effective in reducing inattention, hyperactivity and impulsivity in 70-80% children, but however no improvement is observed in academic achievement or social skills. Moreover, adverse effects like abdominal discomfort,

loss of appetite, weight loss etc is common.<sup>5</sup> *Shirodhara* is a non invasive procedure which has shown satisfactory results in reducing the core symptoms of ADHD. Singhal et al (2010) conducted investigation to evaluate the increase in attention span in 43 ADHD-affected children treated with different *ayurvedic* approaches. In their study, selected children of both sexes in the age-group of 6–16 years were divided into three groups. In group A, 17 patients received syrup *Ayurvedic* compound I (*Bacopa monnieri* Linn – 42.86%, *Withania somnifera* Linn – 28.57%, *valerian walichi* DC – 28.57%); in group B, 14 patients were treated with syrup *Ayurvedic* compound I + *Shirodhara* with milk; and in group C, 12 patients received placebo syrup. The dose of the drug was 1.0 ml/kg body weight and the duration of treatment was 3 months. It was observed that Group B showed highly significant ( $P < .001$ ) improvement in total reaction time, while in group C the change was statistically nonsignificant  $P > 0.10$ . Further, it was observed that the drug and *Shirodhara* were both effective in improving the reaction time of ADHD-affected children, but the drug combined with *Shirodhara* was superior to the drug used alone.<sup>6</sup>

#### Cognitive development

In a recent investigation, Yadav et al (2013) evaluated the effect of *ayurvedic* non invasive procedures (*Mantra* chanting and *Shirodhara*) in cognitive development of children. Weschler's Intelligence scale in children (WISC), Draw-a-man test and Vernier chronoscope were the assessment criteria adopted for the study. *Shirodhara* was done by pouring simple cow milk over the forehead of patient in the form of regular stream from a specific height of 8 cm in a fixed form of oscillatory movements, i.e. to and fro movement up to 30-45 minutes daily for 2 weeks. It was

observed that both the therapies showed statistically significant result in almost all the spheres of memory and attention.<sup>7</sup>

### **Cerebellar ataxia**

Cerebellar ataxia is a complex motor disturbance, which presents with symptoms of an inability to coordinate balance, gait, extremity and eye movements.<sup>8</sup> *Sriranjini et al (2009)* conducted a clinical trial on ten patients diagnosed with progressive cerebellar ataxia. The patients were treated over a period of one month. Treatment consisted of *Shirobasti* (therapeutic retention of medicament over the scalp) in male patients and *Shirodhara* (pouring of a steady stream of medicament on the forehead) in female patients with *Dhanvantaram tailam* (medicated oil) for 45 minutes daily, followed by *Abhyanga* (methodical massage) with *Dhanvantaram tailam* and *Bhashpa sweda* (steam bath), for 14 days. Apart from this, patients were also administered with *Maharasnadi kashayam* 15ml thrice daily, *Dhanvantaram* capsules 101 two capsules thrice daily, and *Ashwagandha* tablet 500 mg one tablet thrice daily, orally for one month. It was observed at the end of the trail, that there was subjective improvement in walking as well as statistically significant improvement in the overall and anteroposterior balance indices of dynamic stability. Moreover all patients tolerated the treatment well without any adverse events. These results show that, *ayurvedic* treatment with *shirodhara* and internal medication improves balance in patient with progressive degenerative cerebellar ataxia.<sup>9</sup>

### **Essential hypertension**

Essential hypertension is a major modifiable risk factor for cardiovascular disease. *Kundu et al (2010)* evaluated the efficacy of *Shirodhara* and *Sarpagandha Vati* in management of essential

hypertension. A total 47 patients were selected for study, out of which 40 patients (20 in each group) completed the course of treatment. Study subjects were randomly allotted into two groups, with one group being treated with *Shirodhara* and the other with *Sarpagandha Vati*. Specialized Ayurvedic rating scales like *Manasa Pariksha Bhava* as well as the Hamilton Anxiety Rating Scale were adopted to assess the effect of therapy. The effects of treatment on the chief complaints and the associated complaints were also evaluated. It was that, although both *Sarpagandha Vati* and *Shirodhara* helped in reducing systolic and diastolic pressures in patients with essential hypertension, the effect of *Shirodhara* was more marked.<sup>10</sup>

### **Psychological symptoms of Menopause**

Women experience a range of symptom during the menopausal transition. These include pshychological symptoms (irritability, lack of concentration, mood swings, depressive mood etc.) vasomotor symptoms (hot flushes, palpitation, sweating etc.) and somatic symptoms (sleep disorders, vaginal dryness, pain during sexual intercourse, lethargy, arthralgia and Myalgia etc). Hormonal replacement treatment (HRT) is found to be effective in reducing mild depression and other psychological symptoms associated with menopausal transition. *Santwani et al (2010)* conducted a clinical trial to evaluate the efficacy of *Shirodhara* and *Saraswatarishta* as compared to hormone replacement therapy (HRT) in the management of menopausal syndrome, along with the assessment of *Manasika Bhavas*. The subjects were randomly divided into three groups i.e. Group A, Group B and Group C. Total 48 patients were selected for the study, out of which 43 patients completed the study. Group A patients were treated with

conjugated estrogens 0.625 mg once daily for 45 days. Group B was treated with *Saraswatarishta* 20 ml mixed with water and taken before meals twice a day for duration of 45 days and in Group C *Shirodhara* with *Bala Taila* was administered, 30 min per sitting for 45 days. Specialized *Ayurvedic* rating scales like *Manasa Pariksha Bhavas* as well as the Hamilton Anxiety Rating Scale, Hamilton Depression Rating scale, and Menopause Rating Scale were adopted to assess the effect of therapy. It was observed that Patients undergoing *Shirodhara* had better relief of the disturbances of *Manasa Bhavas* and psychic symptoms of menopause as compared to the other two groups.<sup>11</sup>

#### **Premature ejaculation**

Premature is a common sexual dysfunction among men. In a human trial, 60 subjects with premature ejaculation were selected for the study. They were randomized into 03 groups. Group A patients received Psychological counseling with placebo medication whereas Group B patients received Psychological counseling with Rasayan yoga. Group C patients were administered with *shirodhara* along with psychological counseling and Rasayan yoga. Statistically highly significant results were observed in all three groups. The improvement in Group C (*Shirodhara* + Psychological counseling + Rasayan yoga) was better compared to Group B (Psychological counseling + Rasayan yoga) with regards to Intra-vaginal ejaculatory latency time, voluntary control over ejaculation, patient satisfaction, performance anxiety and number of penile thrusts.<sup>12</sup>

#### **Generalized anxiety disorder**

In a recently conducted trial, 72 patients with generalized anxiety disorder with co morbid social phobia meeting DSM IV TR criteria were enrolled and randomly

divided into three treatment groups i.e Group I, Group II and Group III. Group 1 (n=24) patients received *Manasamitra Vataka* tablets at a dose of 100 mg twice daily orally for 30 days. Group II, in addition to *Manasamitra Vataka* (100 mg twice daily orally for 30 days), underwent *Shirodhara* (therapy involving dripping of medicated oil - Brahmi oil over the forehead) treatment for the first 7 days. Group III (n=24) patients received clonazepam 0.75 mg daily in divided dose for 30 days. The assessment of the study was done using the Hamilton Anxiety Rating Scale, Beck Anxiety Inventory, Beck Depression Inventory, Epworth Sleepiness Scale (ESS), World Health Organization Quality of Life BREF, and Clinical Global Impression scales (Improvement and Efficacy). It was observed that Patients from all the three groups showed significant reduction in clinical parameters evaluated. However, improvement in Epworth Sleepiness Scale (ESS) was observed only in Group II. The treatment outcome was comparable between the three groups. This study shows that combined therapy of *Manasamitra vataka* and *shirodhara* is effective in management of generalized anxiety disorders. *Shirodhara* reduces the daytime sleepiness associated with GAD with co morbid generalized social phobia.<sup>13</sup>

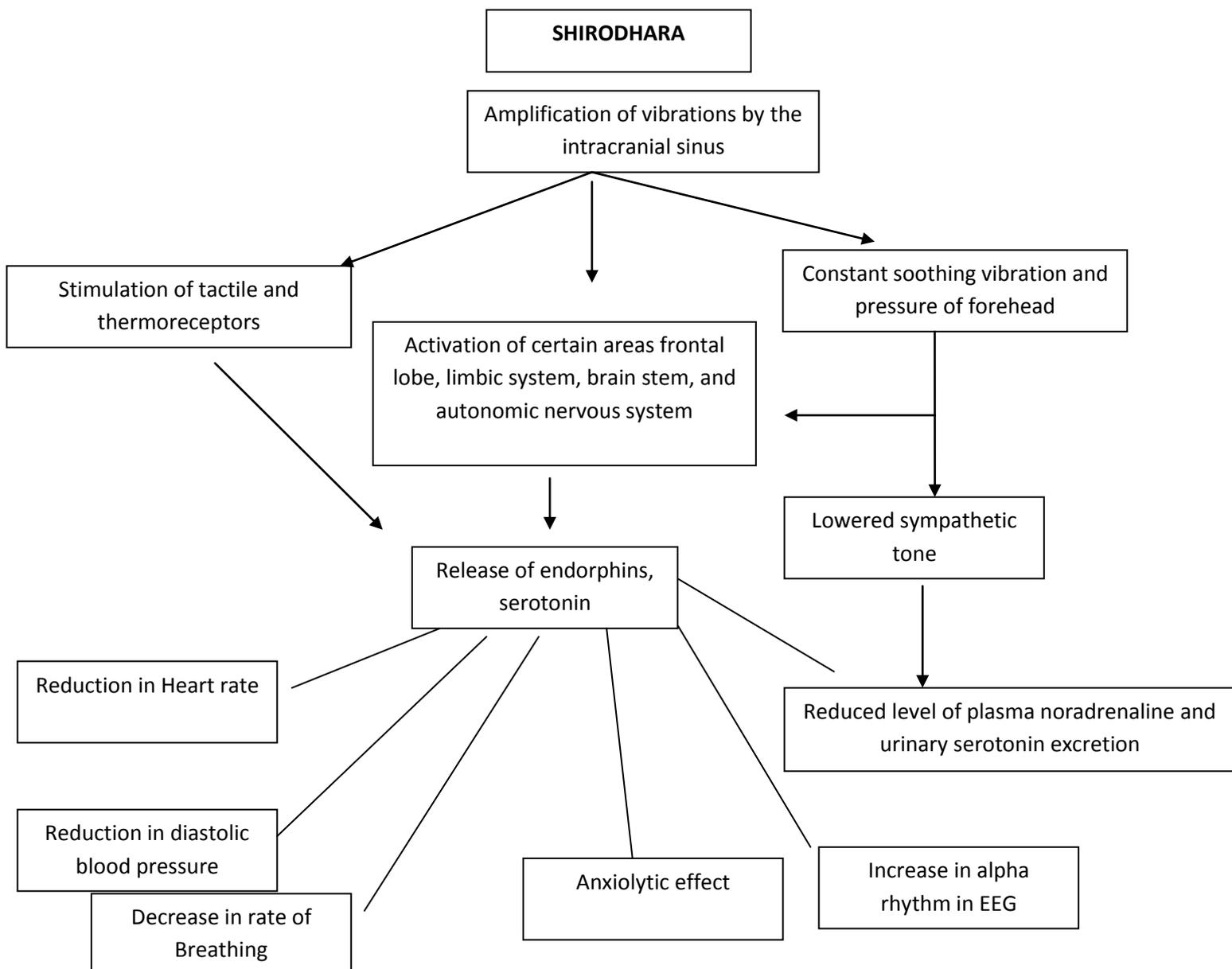
#### **Insomnia**

A study was conducted in 30 subjects with an objective to evaluate the efficacy of *Shirodhara* and Tab. *Insomrid* (proposed herbal formulation) in the management of Insomnia. These patients were randomly divided into three groups of 10 patients each i.e. Group I (Tab. *Isomrid*), Group II (*Shirodhara*), and Group III (Tab. *Isomrid* + *Shirodhara*). Statistically highly significant results were obtained in all the three groups. The

patients of Group III treated with Tab. Insomrid and *Shirodhara* with milk showed highly significant improvements. This shows that, *shirodhara* can be prescribed with oral medication for the effective management of Insomnia.<sup>14</sup> In another research study, it was observed that *shirodhara* with *Dashamoola kwatha* (half an hour daily in morning for 21 days) showed highly significant relief on Sleeplessness (61.29%), Distress (63.64%)

, Sleep Time, Sleep Quality and Freshness after Awakening (100% each) in patients of stress induced chronic Insomnia. Apart from this Relief in mental health symptoms was observed which was based on Hamilton's Anxiety Rating Scale, Hamilton's Depression Rating Scale, Brief Psychiatry Rating Scale and *Manasabhav pariksha* on *Ayurvedic* parameters.<sup>15</sup> Vansh et al (2008) evaluated the effect of

### PROBABLE MODE OF ACTION OF SHIRODHARA



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Source of support: Nil  
Conflict of interest: None Declared