

AN APPRAISAL OF THE MECHANISM OF ACTION OF *SHIRODHARA*

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**Abstract:**

*Shirodhara* is an important therapeutic measure in Ayurvedic system of medicine, which has got worldwide popularity because of its simple administration and efficacy in variety of life style disorders. *Shirodhara* is a purifying and rejuvenating therapy designed to eliminate toxins and mental exhaustion as well as relieve stress and any ill effects on the central nervous system. *Shirodhara* is a unique form of ancient therapy of pouring oil on the forehead from a specific height and for a specific period continuously and rhythmically allowing the oil to run through the scalp and into the hair. This is a subtype of *Murdha taila* which means keeping the medicated oil on the head region. The types of *Murdha taila* other than *Shirodhara* are *Shiro Abhyanga*, *Pichu* and *Shiro Basti*. In this article we are trying to analyse the various mechanism of action of this Panchakarma technique and search the scientific explanation for its therapeutic utility.

**Key Words:** *Shirodhara*, *Murdha taila*, *Panchakarma*.

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**Introduction:**

*Shirodhara* is an Ayurvedic method of treatment in which herbal oil, medicated milk or decoction is poured gently and steadily over forehead in a continuous stream at a particular point from a definite height.

It is mainly indicated in insomnia, stress, anxiety, depression, hair loss, fatigue, and functional as well as organic disorders. Some questions regarding *Shirodhara* commonly arise in mind which perplex the contemporary aspirant of Ayurveda such as – What is the scientific reason behind using different material (such as medicated ghrita, medicated milk, decoction, etc.) for *Shirodhara*? What is the rational thought behind this mode of administration of drug? How *Shirodhara* is different in action from other method of drug administration such as *Shiropicchu*, *Shiroabhyanga*, and *Shirotarpan*?

Ayurveda is a “Life Science” but yet scientific approach is wanting. Although with the help of intense researches in Ayurveda in past few decades a stupendous knowledge come in light but still a long way is to be covered for unanimously endorsement of Ayurveda as “Life Science”.

Considering the above questions in mind and in attempt to

search out the probable answer of these questions, we put forward a hypothesis regarding the mechanism of *Shirodhara* incorporating scientific facts and knowledge obtained from previous research works.

**Hypothesis for Probable mode of Action of *Shirodhara*:**

We know that any substance situated at certain height possess Potential Energy ( P.E. = mgh), and this energy is converted into Kinetic Energy when the substance fall from that certain height according to “Law of Conservation of Energy”<sup>1,2,3</sup>. Thus it can be concluded that-

$$P.E. = K.E \quad \text{i.e.} \quad mgh = \frac{1}{2} mv^2$$

Now Potential Energy of substance depends upon two things-

- (1) Mass of substance
- (2) Height of the substance

If height remains constant P.E. depends upon mass of substance or mass  $\propto$  energy i.e. more the mass of a substance more will be the energy possessed by the substance.

$$\text{Now } m = m_0 / \sqrt{1 - c^2 / v^2}$$

Where m= mass of substance,  $m_0$ = specific mass of substance, velocity = velocity of substance, c= velocity of light.

It is clear from above discussion that –

$m \propto m_0$  energy i.e. more the specific mass of a substance more will be its energy.

On the other hand, we know that when a moving substance collides with a resting substance it generates acceleration i.e. momentum,

$$P (\text{momentum}) = MV$$

So more will be the mass more will be the energy and more will be the momentum generated.

It is clear from above discussion that when anything pour upon forehead from a certain height due to change in the form of energy it generates momentum and that momentum may cause change in voltage and stimulate nerve impulse generation or accentuate the nerve impulse conduction. The magnitude of momentum is the ultimate factor which decide the voltage difference for nerve impulse generation and conduction if its magnitude is small the energy is absorbed by the skull only. This may be the probable reason why drug is given for 45 min- 1 hour in *Shirodhara*. It is known from the knowledge of modern physiology that there is continuous electrical activity in brain that generates electromagnetic waves and recorded with the help of Encephalogram (EEG)<sup>4</sup>. The intensities of brain waves on the surface of the scalp ranges from 0 to 200 microvolt's and their frequency ranges from once every few second to 50 or more per second. The character of these waves highly depends on the degree of the activity of cerebral cortex.

### Probable Effect of Pressure and Temperature in Procedure of *Shirodhara*

*Shirodhara* produce a constant pressure and vibration which is amplified by hollow sinus present in frontal bone. The vibration is then transmitted inwards through the fluid medium of cerebrospinal fluid (CSF). This vibration along with little temperature may activate the functions of thalamus and the basal fore brain which then brings the amount of serotonin and catecholamine to the normal stage. Pressure also has an effect on impulse conduction. If prolonged pressure is applied to a nerve, impulse conduction is interrupted and part of body relaxes. In the procedure of *Shirodhara* pro-

longed and continuous pressure due to trickling of medicated liquid over forehead causes tranquility of mind and reduces stress by modulating the nerve progression/stimulation<sup>5</sup>. When nerve endings of autonomic nervous system are stimulated, they produce chemical substances like Acetylcholine which exists in the tissues in an inactive form and is activated by a nerve impulse vibration produced due to constant pouring of *Kshiradhara* over forehead which may stimulate nerve endings and in turn Acetylcholine may be liberated. Small doses of Acetylcholine cause fall of blood pressure leading to decreased activity of central nervous system resulting in tranquility of mind<sup>6</sup>. It is to be noted that larger doses of Acetylcholine like substances activate central nervous system, thereby resulting in increased activity of body and mind. During the process the patient concentrates on *Dhara Dravya* which is falling on his head, which increases the intensity of  $\alpha$ -brain waves and decreases the brain cortisone and adrenaline level. This factor is also contributory in anti-stress effect of *Shirodhara*. Probably *Shirodhara* normalizes the two important neurotransmitters Serotonin and Norepinephrine, which regulates a wide variety of neuropsychological processes along with sleep.

Serotonin (5-hydroxytryptamine, 5-HT) is a neurotransmitter in the brain that has an enormous influence over many brain functions. It is synthesized, from the amino acid L-tryptophan, in brain neurons and stored in vesicles. Serotonin is found in three main areas of the body: the intestinal wall; large constricted blood vessels; and the central nervous system.

Of the chemical neurotransmitter substances, serotonin is perhaps the most implicated in the treatment of various disorders, including anxiety, depression, obsessive-compulsive disorder, schizophrenia, stroke, obesity, pain, hypertension, vascular disorders, migraine, and nausea<sup>7,8</sup>.

Stress is one of the biggest factors determining the amount of serotonin in the brain. Lack of sleep, inadequate exercise, anxiety and a hectic schedule are all factors that can greatly contribute to stress and severely lower the level of serotonin, resulting in feelings of fatigue, down moods that can turn into depression, insomnia, loss of appetite and many other

related issues<sup>9</sup>. *Shirodhara* bring a calming effect because after completion of procedure patient feel relax and sleepy. So it may say that one of the mechanisms of action of *Shirodhara* is by raising the level of Serotonin.

#### Probable Mode of Action of *Shirodhara*:

- 1. Tranquilizing effect :** Continuous pouring of *taila* on fore-head for a specific period has Tranquilizing effect and induces Sleep. According to Modern science local applications as ointment may pass through the Stratum corneum into blood vessel and produces desirable effects by reaching the target organ. The continuous pouring of oil in relaxed and comfortable position has an additional effect which can be compared to the cradling of Mother to a child. This function act as a sedative and soothing effect for the Brain and produces Sleep. Medicated oil poured on fore-head may be absorbed , producing Tranquilizing effect by reaching the Brain cortex .The chemical constituent of medicated oil may act as a Neuro transmitter as deficiency of certain Neurotransmitter can be checked hypothetically if oil percolate in to Brain cortex as explained by Johnson while treating the patient of Angina by Nitroglycerine<sup>10</sup>.
- 2. Effect on Autonomic Nervous System:** *Shirodhara* may also have **Alpha** Adrenergic blocking effect and can thus block certain actions of adrenaline and nor adrenaline. *Shirodhara* may also act on the adrenergic neuron probably produce their effects by modifying the synthesis storage and uptake mechanisms of noradrenaline.
- 3. Effect on Endocrine system:** The effect of *Shirodhara* on hormone secretion can also be postulated considering the effect on hypothalamus as hypothalamus is the main controller of endocrine secretions. The hypothalamic Neurons which secrete the regulatory hormones are themselves under the control of specialized monoaminergic, neurotransmitter neurons which arise in the mid brain. These latter release Dopamine, Nor adrenaline and Serotonin. In turn, these mid brain nuclei are under the control of visceral brain and are responsive to stress and emotional disturbances.

- 4. Regulation of emotional and behavioural patterns:** Together with the limbic system with the hypothalamus regulates the feeling of rage, aggression, pain and pleasure and behavioural patterns of sexual arousal. Ultimately it can be postulated that *Shirodhara* may be having some effect on hypothalamus resulting in decrease of most of the psychic and somatic disorders.

**Conclusion:** From the above discussion it can be concluded that *Shirodhara* works on the law of Energy Conservation. It modulates the secretions of various neurotransmitters and hormone by adjusting the intensities of electromagnetic waves of brain.

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