



Case Report

Impact of *Shirodhara* on biological markers of stress: A case studySujata Rajan ^{a, *}, Manoj K. Shamkuwar ^b, Ankur Kumar Tanwar ^a^a Dept of Kriya Sharir, Ayurvedic & Unani Tibbia College & Hospital, Govt of Delhi, India^b Dept of Panchkarma, Ayurvedic & Unani Tibbia College & Hospital, Govt of Delhi, India

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ABSTRACT

The unforgiving pace and complexity of modern life has greatly challenged our ability to live healthier and fully in the present moment. Industrialization, globalization, and competition in each sector lead to emotional stress and strain in life which is dangerous at the physical and mental levels. As per the classics of Ayurveda, *chinta* (stress) and *atichintan* (overthinking) are the causes of *Rasavaha srotodushti* which lead to many diseases. *Shirodhara* is an important healing technique of Ayurveda that has neuro-immuno-physio-psychological effects on the human body. Several studies have been carried out to evaluate the efficacy of *Shirodhara* in many diseases. A 35-year-old female patient with sleep deprivation, loss of concentration, and irritable mood symptoms was admitted to the hospital. She was assessed on the basis of the Profile Of Mood Score (POMS) questionnaire, Serum Cortisol (Sr. Cortisol), Dehydroepiandrosterone (DHEA). The patient was treated by *Shirodhara* with sesame oil for 14 days continuously. Results were assessed by biomarkers of stress and by POMS score. At the end of *Shirodhara*, there was significant improvement found in presenting complaints as well as on the POMS Score and Stress biomarkers. During or after the treatment, no adverse events were observed.

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1. Introduction

The human being has to face various challenges in day to day life because of a different kind of occupational, environmental, and social conditions. Such frustration and worry lead to stress which adversely affects our physical, social, mental, and spiritual health too.

In the face of a transforming world, the maintenance of life is critically dependent on keeping our inner environment constant called “homeostasis” and which threatens the homeostasis termed as stress [1]. Prolonged or inadequate response to stressors can impair the growth and development of the human body resulting in endocrine, metabolic, autoimmune, and psychological disorders [2]. Both psychologically and biologically, men and women tend to respond differently to stress [3]. But upon stress, women had greater subjective and behavioral emotional arousal [4], some conditions, such as depression and anxiety, are more prevalent in women [5]. We are dealing not only with physical challenges but

with emotional stressors too. Financial pressure, the demands of the workplace, hectic schedules – all of these can contribute to increasing our stress levels. All kinds of worries can trigger body flight and fight response. Stress is a profound risk factor for almost all non –communicable diseases, including cardiovascular diseases, cancer, diabetes, neurological disease.

There is a close connection between our body and our mind [6]. Charaka defined *Chinta* (stress)-*atichintan* (overthinking) are the causative factors of the vitiation of *Rasavaha Srotas*-a body channel [7] that may cause many diseases in the human body. *Chinta* aggravates *Vata* [8], the vitiated *Vata* adversely affects the heart and destabilize the *buddhi* and *smriti* [9] According to Ayurveda physiology, *Tridosha* (functional units of the body) regulates the normal physiology of the human body; they maintain or destroy the body by equilibrium or disequilibrium [10].

Shirodhara is a unique non-invasive technique of Ayurveda. Its non-invasive approach has been shown good or even better for the treatment of insomnia, anxiety, stress, headache, hypertension [11]. *Shiro* means head and *dhara* means dripping. *Shirodhara* is the procedure in which oil or any liquid dripping on the forehead in a steady stream or flow for 36 min to 1 h 12 min [12]. Total treatment duration in terms of days is not specified in classical texts, based on various practices in India *Shirodhara* is done for 3, 7, 14, or 28 days

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[11,13]. Many studies showed that *Shirodhara* significantly decreased levels of state of anxiety [14,15]. Studies published by Japanese researchers showed plasma levels of noradrenaline decreased significantly in the *Shirodhara* treatment [16]. *Shirodhara* may also be useful for restraining the disruption of *manasbhava* and anxiety disorder [17].

2. Case report

A 35 years old female admitted to the inpatient department of A and U Tibbia College and Hospital, New Delhi in November 2019 with complaints of disturbance in sleep, fatigue, weakness, loss of concentration, and irritable behavior as per chronological order shown in Table 1. The history revealed that she was healthy and socially active, had a happy family life. Owing to infertility and later the health issues of her adopted child, her emotional burden reached high at the same time that she also suffered from the problems in her professional life. The patient didn't take advice from any medical consultants for the same before consulting at this hospital since she had not been diagnosed with any mental illness. She had no known allergies. Before ongoing the examination and procedure, the informed written consent was obtained from the patient.

2.1. Diagnosis

The criteria manifestations for severe stress must be present almost every day for the diagnosis. The diagnosis was made based on the Profile of Mood Score (POMS) questionnaire [18]. Sr. Cortisol, and DHEA markers by the CLIA method. The cause aggravating the symptoms suggested *Vata Dosha* predominance in the patient.

2.2. Clinical findings

2.2.1. General examination and personal history

The patient's general health was fine. In vital signs, no deviation was observed. The patient had a sedentary lifestyle having a BMI of 26.588. There is no history of substance use. The patient did not sleep soundly. There was no major illness in the family. The blood parameters like CBC, Blood Sugar, and Sr Cholesterol were within the normal limit. The appetite was decreased however the bowel and urine frequency was normal.

2.2.2. Therapeutic focus and assessment

Stress is one of the causes of *Vatprakopa* [19]. Sesame oil is having the property of *Ushna*, *Vataghna*, *tvachya*, *medha*, and *agni-vardhaka* [20]. Taking into account its property, the sesame oil was intended for *Shirodhara*. The analysis of sesame oil was done before the use for therapeutic purposes. The weight of the sesame oil was 0.8748 gm/ml at 40 °C. Microbial contamination was minimal against the normal range of 10×10^3 micro-organism/gm, the

Table 1
Chronological orders of complaints and events.

S.No	Complaints/Events	Duration/Date
01.	Loss of sleep/disturbed sleep	3.5 year
02.	Loss of concentration	2 year
03.	Irritable behaviors/mood swings	2 year
04.	Weakness	1 year
05.	Fatigue	1 year
06.	Sr. Cortisol, DHEA increased, POMS Score 49	23.11.2019
07.	Started <i>Shirodhara</i> procedure	24.11.2019
08.	Feeling of happiness at the end of therapy Sr. Cortisol, DHEA decreased	07.12.2019

fungal count was absent. There were no specific pathogens found in the sesame oil used in the study. No heavy metals were found. Clinical and biochemical evaluations were conducted before and after *Shirodhara*.

The *Shirodhara* was planned in the following manner.

2.2.3. Purvakarma (Pre-operative)

The Patient was examined and ensured indications for *Shirodhara* as the patient had a headache, disturbed sleep, and a stressed state.

2.2.4. Preparation of the patient

The patient was asked to complete her natural urges like bowel and bladder evacuation, then head and neck-shoulder massage was given. A thick cord prepared of cotton and tied around the head just above eyebrows and ears to prevent the oil come down to the eyes. The eyes were covered with cotton pads. The ears were closed with cotton buds. The patient was asked to lie down on *Droni* (massage table) in the supine position. A rolled towel was placed beneath the neck.

2.2.5. Preparation of drug

The oil was warmed at a temperature of $39.0 \text{ }^\circ\text{C} \pm 0.2 \text{ }^\circ\text{C}$ on induction and maintained throughout the procedure (the temperature was confirmed from the patient as it is *sukhoshna*).

2.2.6. Pradhan Karma (Operative)

Poured Lukewarm oil into dripping apparatus i.e. *Dharapatra* made up of Bronze having *Varti* inserted into the nozzle. *Varti* (cotton thread) should hang down so that the tip of the *Varti* (cotton thread) from forehead was maintained at the level 8 cm (4 *angula*) and the height of *Dharapatra* was 20 cm above the forehead of the patient.

The oil then allowed to flow through *Varti* on the forehead and a continuous stream of oil was maintained. The vessel oscillated during the procedure so that oil dripping was all over the forehead. The scalp was massaged intermittently.

The oil was collected which drained from the head and the same was made warm again and used for *dhara*. The stream was maintained continuously and the temperature was maintained constant throughout the procedure. *Shirodhara* was done for 45/min for 14 days regularly. The time for the procedure was 9 am–10 am.

2.2.7. Paschat Karma (Post-operative)

The cord and earplugs were removed properly. The oil from the head soaked, and *Rasnadi churna* was applied over a scalp (*Talam*). The patient was advised to have a bath after half an hour with the hot water and to take the rest. The patient was advised to take a light diet.

2.2.8. Therapeutic intervention

No internal medication was given during this period.

2.2.9. Patient assessment

POMS score was calculated as a subjective parameter before the treatment; the second assessment was done on the 7th day and the final one after the 14th day of treatment. Sr. cortisol, DHEA were done prior to the treatment and the final one after 14th day of treatment. The blood was collected in 8.30 AM on empty stomach.

3. Results

Serum Cortisol and DHEA levels were 14.52 ug/dL and 36.50 ng/dL at the baseline, which decreased to 09.45 ug/dL and 21.50 ng/dL after *Shirodhara* respectively. The POMS scale assessment showed

that Total Mood Disturbance (TMD) at the base level was 49 which turned to -21 after the *Shirodhara* therapy. Positive subscales domains VIG (Vigour) and ERA (Esteem related effect) showed a marked increase in score and a decreased level of negative subscales after *Shirodhara*.

The systolic blood pressure (SBP) and diastolic blood pressure (DBP) after *Shirodhara* markedly reduced from mean score of 122.85 mm of Hg–112.14 mm of Hg and 78 mm of Hg–73.85 mm of Hg respectively. Systolic and diastolic Blood pressure both decrease significantly at P-value <0.001 after the *Shirodhara*.

3.1. Effect of *Shirodhara* on POMS scale (Table 2)

3.1.1. Clinical outcome

Based on the assessment authors opine that there was a satisfactory response and many of the symptoms were reduced after even the 7th day of *Shirodhara*. There was an improvement in many of the domains in the POMS scoring scale. There was a marked improvement in TEN (tension)/ANG(Anger)/FAT(Fatigue)/DEP(Depression)/CON(Confusion) domain, which are negative subscales. All these domains showed a marked decrease in score. Positive subscales domain VIG (Vigour) and ERA (Esteem Related Affect), both showed a marked increase in score after *Shirodhara*.

After the 14th day of *Shirodhara*, the final assessment was done and found that in the domain of mood there was a significant decrease in tension and anxiety. The mental state, mood, and sleep of the patient were better. The level of Sr. Cortisol just after *Shirodhara* was decreased significantly. DHEA level showed a significantly decreased after the *Shirodhara*. No significant impact was observed on the pulse rate of the patient. Overall she felt better and her sleeping pattern got a little better towards the end of the day.

The patient was having *ashraddha* (disinclination for food), *aruchi* (anorexia), *aasyavairasya* (bad taste in the mouth), *hrilas* (nausea), *Gaurav* (heaviness), *tandra* (tandra), *angamard* (boadyache), *agnimandya* (loss od appetite), *akaalvali* (premature wrinkles), *akaalpalitya* (premature greying of hairs), *hritpida* (pain in chest), *shabd-ahsahishnuta* (intolerance for sound), *shosha* (dryness of mouth), *rukshata* (dryness of body) which are the symptoms of *rasvahsroto dusti* out of which all the symptoms except *akaalvali*, *akaalpalitya* were recovered after the course of *Shirodhara*

4. Discussion

A present case report of a woman who is working and having an adopted child suffering from cerebral palsy (CP) provides an overview of the clinical evidence for Hypothalamic –Pituitary-adrenocortical (HPA) axis axis and glucocorticoid dysfunction and the impact of *Shirodhara* thereon. According to Ayurveda *Rasvah*

Table 2
Details on POMS scoring.

Scale	0 Day Score	7th Day Score	14th Day Score
TEN	15	09	01
ANG	13	06	01
FAT	05	08	05
DEP	12	08	00
CON	17	06	06
VIG	10	10	12
ERA	13	19	12
Total Mood Disturbance (TMD)	49	08	-21

Impact of *Shirodhara* on POMS Scale: The patient had stress. Their tension (TEN)/ANG(Anger)/FAT(Fatigue)/DEP(Depression)/CON(Confusion) decreased significantly after the sessions of *Shirodhara* for 14 days. Positive subscales domain VIG(Vigour) and ERA (Esteem related effect), both showed a marked increase in score after *Shirodhara*.

shrotodusti may cause many diseases. The affliction of the channels leads to vitiation of tissue element, vitiation of one lead to other and they vitiate *srotas* and *dhatu* [7]. Hence to prevent the body from the disease, it is necessary to avoid *Srotodushti*. As *chinta* (stress), *atichintan* (overthinking) are the causative factors of *Rasvahsrotodusti* hence treating the stress *Shirodhara*, which is an important healing technique of Ayurveda was intervened.

HPA axis is an important physiological stress pathway. The major part of the stress arbitrates by the Hypothalamic –Pituitary-adrenocortical axis [21]. The secretion of Glucocorticoids affects the HPA limb of the stress system [22]. Activation of HPA responsible for increased secretion of CRH, which stimulates the production of ACTH by the anterior pituitary gland. Further, ACTH acts on adrenal glands to release glucocorticoids [23]. Most GC have their role in stress and they also regulate cardiovascular, metabolic, immune, and behavioral processes [24]. DHEA as well as the cortisol produced in the cortex of the adrenal gland situated at the top of the kidney [25]. Serum levels of cortisol and DHEA both rise in response to physical and acute psychosocial stress [26,27]. In the present case, the level of Sr. Cortisol and DHEA were initially high. After the *Shirodhara* level of both the biomarkers of stress reduced, these results reflect the action of *Shirodhara* on HPA axis. Kishor et al. stated that their study provides evidence for the antidepressant and effective neuroendocrine modulatory influence of Ayurvedic intervention along with *Shirodhara* in patients of *Vishada* (Major Depressive Disorders). In their study cortisol level was decreased after the therapy [28]. *Shirodhara* has psycho-neuro-immunological effects such as a decrease in noradrenaline level, exhibiting of sympatholytic effect, activation of peripheral skin circulation, and increase level of natural killer cells [16]. Xu et al. speculated the mechanism in their study that the physiologic effect of *Shirodhara* by dripping sesame oil on the forehead may induce somato-autonomic reflex through thermo sensors or pressure sensor in the skin or hair follicles via the trigeminal cranial nerve. This procedure produced a relaxed state that results in the maintenance of psycho-physiological balance [29]. The patient’s sleep came to normal. A study has been conducted by Akiko et al. to evaluate the effect of sesame oil *Shirodhara* (SOS) against warm water *Shirodhara* (WWS) on improving sleep quality and quality of life (QOL). In their study, it was found that SOS is a safe potential therapy to improve sleep quality and QOL in persons with sleep disorders [30]. However, the *Shirodhara* reduced daytime sleepiness [31].

To use of such biomarkers may help to establish the efficacy of the *Shirodhara* therapy on stress-induced diseases. This case study having encouraging results and it can give hope of ray for treatment strategy for many psychosomatic disorders, It is clear that working woman having adopted a child with a disability triggers the stress, and to overcome such conditions, more research is warranted.

5. Conclusion

Shirodhara showed significant improvement in serum biomarkers of stress, which are reduced after *Shirodhara*. It provided significant relief in the grading of the POMS Score on the 07th and 14th day of *Shirodhara*. It showed marked improvement in the positive domain of the POMS score and decreased the negative domain value in the POMS Score. There was a significant reduction in systolic and diastolic blood pressure after *Shirodhara*. It showed appropriate responsiveness to the stress system. This therapy found effective treatment in the management of stress.

5.1. Patient perspective

The patient told a good and regular sleep pattern after 5 days of *Shirodhara*. The patient felt marked improvement in memory. The

patient felt sleepy and a feeling of happiness after the *Shirodhara*, especially.

6. Informed consent

Being a single case study, there is no requirement of an ethical approval committee. Written informed consent from the patient was obtained to publish details of the case.

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None.

Conflict of interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jaim.2021.01.008>.

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