

REVIEW ARTICLE

The Soothing Effects of *Shirodhara*: Alleviating Stress through an Ancient Ayurvedic Technique

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ABSTRACT

Introduction: *Shirodhara* therapy, an ancient Ayurvedic practice, is gaining recognition as a potential stress management tool. This therapy involves the gentle pouring of warm herbal oil or other soothing liquids onto the forehead, inducing deep relaxation. As stress-related disorders continue to rise, exploring effective and alternative approaches like *Shirodhara* is crucial.

Methods: This article reviews existing scientific literature and clinical studies to evaluate the effectiveness of *Shirodhara* therapy in stress reduction. Research papers, systematic reviews, and meta-analyses were examined to gather relevant data on the physiological and psychological effects of *Shirodhara* in stress management.

Results: The findings from the reviewed studies suggest that *Shirodhara* therapy exhibits a significant promise in alleviating stress and its associated symptoms. It has been shown to balance stress hormones, activate the body's relaxation response, and induce a profound sense of calmness. Moreover, *Shirodhara* has demonstrated positive outcomes in reducing anxiety levels, improving sleep quality, and lowering blood pressure.

Conclusion: *Shirodhara* therapy offers a holistic and natural alternative for stress management, with promising results seen in various studies. Its potential integration into mainstream practices is promising. However, further research is needed to understand mechanisms, optimize protocols, and assess long-term efficacy. This emerging field provides exciting opportunities to explore *Shirodhara*'s therapeutic potential in addressing stress-related disorders.

1. INTRODUCTION

In today's fast-paced world, stress has become an increasingly prevalent issue affecting individuals from all walks of life. Managing stress is crucial for maintaining overall well-being and preventing various physical and mental health problems.^[1] While there are numerous strategies available to combat stress, one ancient Ayurvedic practice, known as *Shirodhara*, has gained recognition for its profound calming effects on the mind and body.

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1.1. Understanding Stress

Stress is a natural response of the body to demands or pressures, both physical and psychological. When faced with stressful situations, the body releases stress hormones such as cortisol and adrenaline, triggering a "fight-or-flight" response. While this response is essential in certain situations, prolonged or chronic stress can have detrimental effects on health, leading to anxiety, depression, insomnia, and other ailments.^[2]

1.2. Prevalence of Stress

The prevalence of stress is a common concern in modern society, affecting individuals from diverse backgrounds and occupations.

While stress can serve as a motivator in moderation, excessive or chronic stress can have negative impacts on physical, mental, and emotional well-being.^[3] Factors such as cultural, social, economic, and environmental aspects can influence the prevalence of stress in different populations.

According to the American Institute of Stress, around 33% of people experience extreme stress, with significant impacts on both physical and mental health. In addition, a substantial number of individuals face difficulties with sleep due to stress, and stress levels appear to be increasing for many.^[4]

In a study conducted by the center of healing, it was found that 74% of Indians suffer from stress, while 88% experience anxiety.^[5] The study also revealed that stress levels varied, with 57% reporting mild stress, 11% moderate stress, 4% moderately severe stress, and 2% severe stress. The COVID-19 pandemic has contributed to the escalation of stress and anxiety levels. Therapists have observed a surge in individuals seeking therapy, with 68.6% reporting increased clients and therapy hours. In addition, 55% of therapists noted a rise in first-time therapy seekers since the start of the pandemic.^[6] Stress prevalence is a significant issue, affecting individuals worldwide. Understanding and addressing stress factors are crucial for maintaining overall well-being and promoting effective coping strategies.

1.3. Involvement of the Organ System

Stress has a wide-ranging impact on various organ systems within the body. It affects the cardiovascular system by causing an elevation in heart rate, stronger contractions of the heart muscle, dilation of blood vessels, and redirection of blood flow to larger muscles. The respiratory system collaborates with the cardiovascular system to supply oxygen to body cells and eliminate carbon dioxide waste. Under acute stress, the airways constrict, resulting in shortness of breath and rapid breathing. The endocrine system responds to stress by increasing the production of steroid hormones, including cortisol, which triggers the body's stress response. In the gastrointestinal tract, stress influences the speed of food passage through the bowels, digestion, and nutrient absorption in the intestines. The nervous system plays a crucial role in stress response as it activates the sympathetic nervous system, which, in turn, stimulates the adrenal glands. Once the acute stress crisis subsides, the parasympathetic nervous system aids in the body's recovery. Stress also impacts the musculoskeletal system by inducing muscle tension as a protective mechanism against potential pain and injury. In the reproductive system, chronic stress can have adverse effects on sexual desire, sperm production, and maturation, as well as pregnancy and menstruation.^[2]

1.4. Aim of the Article

This systematic review aims to explore the concept of stress, delve into the origins and techniques of *Shirodhara*, and present scientific evidence supporting its effectiveness in stress reduction.

2. MATERIALS AND METHODS

2.1. Search Strategy

A comprehensive search was conducted using online databases including Medline, PubMed, Embase, and Google Scholar. In addition, a manual search was carried out to ensure the completeness of the search results pertaining to studies related to *Shirodhara* on stress.

2.2. Selection Criteria

2.2.1. Inclusion criteria

This study focused on research specifically addressing the effects of *Shirodhara* interventions on stress and its influence on various bodily systems.

2.2.2. Exclusion criteria

Studies that did not involve *Shirodhara* were excluded from consideration.

In addition to the online databases, relevant literature was sourced from textbooks and newspaper articles to ensure a comprehensive approach.

2.2.3. Data extraction

Following an extensive search and the application of inclusion criteria, the process of data extraction was initiated. The authors systematically gathered relevant information. The finalized manuscripts were prepared by the authors, and thematic extraction was employed to extract pertinent details. Extracted information encompassed study objectives, employed methodologies, significant findings, and concluding remarks from various research endeavors.

2.2.4. Data synthesis

On completion of the data extraction process, a systematic data synthesis was performed. This involved categorizing the findings of the studies under pertinent and distinct headings

3. RESULTS

3.1. How *Shirodhara* Therapy Holds Relevance in Stress Management?

3.2. *Shirodhara*: The Ancient Therapy

Shirodhara is an integral part of Ayurveda, an ancient holistic healing system from India that dates back 1000 of years. The term "*Shirodhara*" originates from the Sanskrit language and combines two words: "Shiro," which refers to the head, and "Dhara," which translates to flow. The therapy involves a continuous stream of warm herbal oil or other soothing liquids poured in a gentle, rhythmic manner over the forehead or "third eye" area, where the body's most vital energy centers are believed to reside.^[7]

3.3. The Technique and Benefits of *Shirodhara*

During a *Shirodhara* session, the recipient lies comfortably on a specialized table while the therapist carefully pours the liquid from a vessel suspended above the forehead. The liquid cascades down in a steady stream, creating a deeply relaxing sensation. Typically, the liquid used in *Shirodhara* is warm herbal oil, although variations may include medicated milk, buttermilk, coconut water, or even plain water, depending on the individual's constitution, and specific health needs. The mind-body connection is well-established, with stress and overthinking being identified as causative factors for various diseases.^[8] Ayurveda explains that excessive worry affects the flow of vital channels in the body, particularly the Rasavaha Srotas, leading to imbalances and diseases.^[9] Stress worsens Vata, which negatively impacts the heart and mental faculties.^[10] The three functional units of the body, known as Tridosha, maintain the body's equilibrium and health.

The benefits of *Shirodhara* extend far beyond mere relaxation. Numerous studies have highlighted its positive effects on stress reduction and overall well-being has been found effective for treating insomnia, anxiety, stress, headaches, and hypertension.^[11]

3.4. Scientific Explanation of the Mode of Action of *Shirodhara*

The physiological mechanisms behind *Shirodhara*'s stress-reducing effects are not yet fully understood. However, researchers propose several hypotheses for explaining the putative mechanism of *Shirodhara*.^[12,13]

1. Mechanical Effect: *Shirodhara* strengthens the Indriyas (sense faculties) in the head, maintaining the integrity of doshas through its mechanical impact.
2. Law of Drug Absorption: *Shirodhara*'s oil absorption is faster on the scalp due to its thinner skin.
3. Law of Energy Conservation: Pouring liquid on the forehead during *Shirodhara* causes voltage changes and nerve impulse stimulation, converting potential energy into kinetic energy.
4. Effect of Constant Pressure: Gentle vibrations and pressure in *Shirodhara* reduce sympathetic tone and decrease plasma noradrenaline and urinary serotonin.
5. Effect of Constant Temperature: The warm liquid flow in *Shirodhara* promotes mild vasodilation and enhances circulation.
6. Amplification of Vibrations: *Shirodhara* activates specific brain areas, releasing endorphins and serotonin.
7. Physiological Changes: *Shirodhara* lowers heart rate, diastolic blood pressure, and respiratory rate, providing an anxiolytic effect.
8. Marma Locations: *Shirodhara* focuses on seven key marmas in the head region, crucial for the procedure.

3.5. Probable Biomarkers for Assessment of Stress in the Body

There are several biomarkers that can be used to assess stress levels in the body. These biomarkers can provide objective measurements of physiological changes associated with stress. Here are some common biomarkers used to evaluate stress [Table 1].

It is important to note that stress affects individuals differently, and the choice of biomarkers may vary depending on the specific research or clinical context. In addition, interpreting biomarker results requires consideration of various factors, including baseline levels, diurnal variations, and individual differences.

4. DISCUSSION

Shirodhara, a time-honored upakarma procedure, has been practiced for centuries and holds a prominent place in traditional Indian wellness practices. Its application extends beyond therapeutic purposes and shamana karma; its renowned relaxation and calming effects are recognized and warrant investigation using modern methodologies. However, the body of research on stress management through *Shirodhara* therapy and the use of stress markers for observing its effects remain limited. Tubaki *et al.* recently delved into the impact of both Manasmitra Vataka (an Ayurvedic medication) and *Shirodhara* in individuals with generalized anxiety disorder.^[26]

In a separate study by Dhuri *et al.* involving healthy volunteers undergoing *Shirodhara* treatment, notable reductions in anxiety levels were observed according to mood assessment scores. This investigation also delved into changes in essential indicators such as vital signs, EEG, ECG, salivary cortisol, and urinary catecholamines, which are considered potential indicators of stress.^[27]

Japanese researchers have also contributed insights into the anti-anxiety effects of *Shirodhara* and significantly reduced the plasma levels of noradrenaline.^[28] Notably, earlier work by Herbert Benson highlighted the stress-alleviating effects of meditation through what he termed the "Relaxation Response."^[29] Similarly, Wallace explored the

physiological effects of long-term transcendental meditation, including effects on systolic blood pressure and oxygen consumption.^[30] Interestingly, *Shirodhara* appears to evoke the relaxation response even without formal meditation practice. Exploring the combined impact of meditation and a series of *Shirodhara* sessions holds promise for addressing stress-related disorders.

Furthermore, the possibility of the secretion of neurotransmitters through such procedures presents an intriguing avenue for investigation. A study conducted at NIMHANS examined the effects of *Shirodhara* coupled with medhya rasayanas in patients with cerebellar ataxia, yielding clinical improvement.^[31]

5. CONCLUSION

Shirodhara, an ancient Ayurvedic technique, offers a unique and effective approach to combatting stress and promoting relaxation. With its roots deeply embedded in Ayurvedic wisdom, *Shirodhara* has garnered scientific interest and recognition for its stress-reducing benefits. As stress continues to be a significant concern in modern life, exploring natural and time-tested remedies like *Shirodhara* can provide individuals with a valuable tool to enhance their overall well-being. Although some research has been conducted on the impact of *Shirodhara* therapy on stress-related biomarkers,^[32] the body of evidence remains limited. There is a need for further validation and exploration of these biomarkers to fully understand the effects of *Shirodhara* on physiological stress responses. Additional studies are necessary to investigate the specific changes in cortisol levels, heart rate variability, inflammatory markers, and other relevant biomarkers after *Shirodhara* therapy. Such research would contribute to a more robust and evidence-based understanding of the therapeutic potential of *Shirodhara* in stress management. By expanding the scope of research in this area, we can enhance our knowledge and provide more concrete evidence for the effectiveness of *Shirodhara* therapy in modulating stress-related biomarkers.

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All authors give equal contribution while preparing this manuscript.

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10. CONFLICTS OF INTEREST

None.

11. DATA AVAILABILITY

This is an original manuscript and all data are available for only review purposes from principal investigators.

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Table 1: Biomarkers for assessment of stress in the body

Biomarker	Description	Measurement/Assessment Methods
Stress hormones ^[14]	Cortisol, adrenaline, noradrenaline	Blood, saliva, or urine samples
Sympathetic nervous system activity ^[14]	Alpha-amylase	Saliva samples
Autonomic nervous system activity ^[15]	HRV	Electrocardiography (ECG)
Cardiovascular function ^[16]	Blood Pressure	Blood pressure measurement
Inflammatory markers ^[17]	CRP, IL-6, TNF-alpha	Blood samples
Immune function ^[18]	IgA	Blood, saliva, or mucosal samples
Neuroplasticity and mood ^[19]	BDNF	Blood samples
Neurotransmitters ^[20]	NPY, serotonin, dopamine, GABA	Blood or cerebrospinal fluid samples
Metabolic Markers ^[21]	Glucose, insulin, lipid profile (cholesterol, triglycerides)	Blood samples
Oxidative stress ^[22]	MDA, GSH, SOD, ROS	Blood or urine samples
DNA damage ^[23]	8-OHdG, micronucleus assays	Blood or urine samples, micronucleus scoring
Brain imaging ^[24]	fMRI, PET	Imaging techniques (fMRI, PET)
Sleep patterns ^[25]	Sleep efficiency, total sleep time, sleep architecture (e.g., REM sleep, deep sleep)	Polysomnography, actigraphy, sleep questionnaires

8-OHdG: 8-hydroxy-2'-deoxyguanosine, MDA: Malondialdehyde, GSH: Glutathione, SOD: Superoxide dismutase, ROS: Reactive oxygen species, fMRI: Functional magnetic resonance imaging, PET: Positron emission tomography, NPY: Neuropeptide Y, serotonin, dopamine, GABA: Gamma-aminobutyric acid, HRV: Heart rate variability, CRP: C-reactive protein, IL-6: Interleukin-6, TNF-alpha: Tumor necrosis factor-alpha, IgA: Immunoglobulin A