



Efficacy of Mrudu Samvahana (Forehead Massage) over Takra Dhara (Buttermilk Dripping Therapy) in Anxiety and Stress Induced Essential Hypertension – A Randomized Clinical Trial.

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Abstract: Blood pressure level measuring above 140/90 mm of Hg is termed as hypertension. Hypertension is associated with various risk factors and also is mainly responsible for mortality in industrialized countries. The treatment for hypertension in modern science is palliative in nature. Many of these, along with its effectiveness in controlling the blood pressure, cause adverse side effects; hence the need for the hour is an alternate therapy with no potential side effects. Ayurveda has potential medicines to alleviate hypertension without causing any side effects. The study was to evaluate clinical efficacy of two Ayurveda procedures Mrudu Samvahana and Takradhara in essential hypertension. The study included a total of 40 patients, attending the Outpatient department of KLE Ayurveda hospital, randomized into Group A and Group B of 20 each. The patients in group A received Mrudu samvaahana with Murchita tila taila which was performed 20 minutes per day for 7 days. The patients in group B received Takra dhara with Amalaki siddha takra which was performed 40 minutes per day for 7 days. Statistical analysis revealed that both groups Mrudu Samvahana and Takradhara showed significant ($P < 0.0001$) results determined by unpaired T test in objective parameters. Between the group assessment, revealed that Takra dhara has shown better results compared to mrudu samvahana in reduction of systolic and diastolic blood pressure. ($P < 0.0048$).

Keywords: Ayurveda, Essential hypertension, Mrudu Samvahana, Panchakarma Takra dhara,

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Received On 22 June 2021

Revised On 04 September 2021

Accepted On 12 September 2021

Published On 05 October 2021

Funding This research did not receive any specific grant from any funding agencies in the public, commercial or not for profit sectors.

Citation Dr. Ashwini Patil, Dr. Pradeep L Grampurohit, Dr. Skandhan K P and Dr. Vinayak B Angadi , Efficacy of Mrudu Samvahana (Forehead Massage) over Takra Dhara (Buttermilk Dripping Therapy) in Anxiety and Stress Induced Essential Hypertension – A Randomized Clinical Trial..(2021).Int. J. Life Sci. Pharma Res.11(6), L8-13 <http://dx.doi.org/10.22376/ijpbs/lpr.2021.11.6.L8-13>

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1. INTRODUCTION

Persistent high blood pressure in systemic arteries is called as arterial hypertension. Blood pressure is expressed as ratio of systolic blood pressure (The pressure exerted by blood on walls of arteries when the heart contracts) to diastolic blood pressure (The pressure exerted by blood on walls of arteries when the heart relaxes). The Blood pressure level measuring above 140/90 mm of Hg is termed as arterial hypertension.¹ Several etiological factors play important role in the pathophysiology of hypertension with multifactorial gene environment interplay. The mechanisms of hypertension includes salt absorption leading to volume expansion, impaired response to renin

angiotension – aldosterone system, increased sympathetic tone leading to increased peripheral resistance and increased afterload leading to development of hypertension.¹⁹ In the year 2000, 26.4% of the overall adult population had hypertension and by the year 2025, 29.2% were projected to have this condition.² Essential or idiopathic hypertension is a form of hypertension which has no identifiable cause. It affects 95% of the hypertensive patients.³ The World Health Organization reports that suboptimal BP (>115 mm Hg SBP) is responsible for 62% of cerebrovascular disease and 49% of ischemic heart disease, with little variation by sex. In addition, suboptimal blood pressure is the number one attributable risk for death throughout the world.¹

Table 1: Classification of blood pressure for adults		
Blood Pressure	SBP	DBP
Classification	mmHg	mmHg
Normal	<120	and <80
Prehypertension	120–139	or 80–89
Stage 1 Hypertension	140–159	or 90–99
Stage 2 Hypertension	≥160	or ≥100

SBP - systolic blood pressure;
DBP - diastolic blood pressure

According to Ayurveda, Acharya Charaka explains that if we come across a set of symptoms which have not been clubbed under one heading, the physician has to analyze the symptoms and understand the possible pathogenesis in terms of involving factors like Dosha (Bio humours), dushya (Pathological entities), dhatus (Body tissues).⁴ Various luminaries have tried to coin a name to the disease Hypertension viz- Raktachapa, Raktavata, Dhamani pratichaya, Raktagatavata, and Dhamani-prapurana and many others. Most of the disease entities are not in whole but collectively are the most probable routes of pathophysiology of hypertension according to the Ayurveda. The etiological factors and pathology of Essential Hypertension also have been widely studied; The dietary factors such as westernization, stress, anxiety^{5,6} and mutations are also considered in this regard. When we go through the pathophysiology of essential hypertension, it involves, prana vayu, vyana vayu, sadhaka pitta, rasa dhatu, rakta dhatu and manas. Although modern pharmacological treatments are effective in controlling the blood pressure, they have adverse side effects, such as excessive micturition, dry cough, dizziness depending on the group of drug prescribed, caused by exaggerated therapeutic effect, non - therapeutic pharmacological effect or non - therapeutic non - pharmacological effect;⁷ Non pharmacological alternative therapies would be of great help in this regard. Non pharmacological management including lifestyle modifications can account for upto 15% reduction in cardiovascular related events.¹⁹ Also non pharmacological interventions help to reduce daily doses of antihypertensive and delay progression from the stage of prehypertension to further stages of hypertension.²⁰ In the present study, two non-pharmacological interventions – Mrudu Samvahana and Shirodhara have been selected in the management of hypertension. Shirodhara has been explained in the category of Murdhitaila procedures ie procedures performed on head.⁸ Takradhara is a type of shirodhara in which medicated buttermilk is poured on forehead, when the patient lies on supine position. The

procedure is carried out with the help of a specialized instrument called Dhaara Paatra. The patient is made to lie in supine position and the Dhaara Paatra is positioned, so that it is around four inches above the forehead. The instrument is filled with warm buttermilk and dropped as a stream on the forehead of the patient. The buttermilk is collected in a vessel and reheated on a waterbath and then refilled in Dhaara Patra and the procedure is repeated.^{10, 11} It has been effective in reducing anxiety and stress and also proved beneficial in essential hypertension.⁹ The properties of Takradhara (buttermilk dripping therapy) being; it alleviates mental stress, headache, insomnia, balances the bioenergies, hrudaya raju (chest discomfort) corrects ojakshaya (enhances vigor), and improves digestion.¹¹ Due to these effects it was preferred as the control in the present study. Another procedure explained in the Ayurvedic classics with similar properties is Samvaahana, described with the properties of inducing Sukha (Comfort), Nidra (sleep), Vrushya (aphrodisiac), reduces Klama (fatigue) and does Twacha Rakta and Mamsa Prasaadana (improves quality of skin, circulation and muscle) and Vata Shaman (Pacifies bio humour Vata)²¹. It has been explained as a modality of treatment for the symptoms produced due to suppression of sleep.^{21,22} The procedure being explained as Sukha Sparsha Mardana (gentle and comforting massage)²³. In the present study Mrudu samvaahana (Rhythmic forehead massage) was performed in the Shirah predesha i.e on the forehead of the patient. The procedure was performed with patient lying comfortably in supine position as in that of Shirodhara. Also in the present study, an attempt was made to find out the effect of Mrudu samvahan (Rhythmic forehead massage) in comparison with that of Takradhara.

2. MATERIALS AND METHODS

The study was approved by the Institutional Ethics Committee bearing Ref no ID BMK/PG/11/10. A total number of 40 patients of either sex with prehypertension (SBP 120–139 mm of Hg, or DBP 80–89 mm of Hg) or stage I hypertension (SBP 140–159 mm of Hg, or DBP 90–99 mm of Hg) were selected from outpatient department of KLE Ayurveda hospital.

2.1 Inclusion Criteria

1. Patients with Prehypertension
2. Patients with Stage I hypertension

2.2 Exclusion criteria

1. Patients with stage II hypertension
2. Malignant hypertension
3. Patients with severe debilitating illness
4. Patients unfit for therapies

The sample size was calculated from the prevalence and number of patients visiting KLE Ayurveda Hospital in last two years. Patient written informed consent was taken prior to enrolment, and were randomly divided into two (A and B) groups of 20 each. Patients of group A, were treated by Mrudu samvahana i.e. gentle rhythmic massage over forehead by using Murchita tila taila (sesame oil processed with herbs)¹² 20 min per day for 7 days. Patients of group B were treated with Takradhara procedure⁷ 40 minutes per day for 7 days. Timings of the therapy were scheduled between 9.00am-11.am and were performed by trained male and female Panchakarma therapist in male and female subjects respectively. Follow up assessment of parameters was done on the 15th day. Intervention is for only 7 days that is

Intervention – 0th to 7th day

0th day – 1st assessment

7th day – 2nd assessment

15th day – 3rd assessment (1st follow-up)

3. STATISTICAL ANALYSIS

Paired and unpaired student “t” test, Wilcoxon matched-

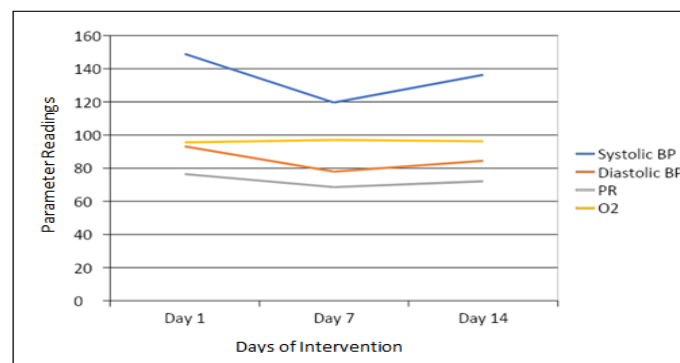
pairs signed rank test and Mann Whitney tests were applied. Among which for objective parameter, Systolic Blood pressure, Diastolic Blood Pressure, Oxygen saturation and Pulse rate Paired and Unpaired t test were applied, and for subjective parameters like Shrama, Krodha prachurata, Tamo darshana, Bhrama and Shira shoola Wilcoxon matched-pairs signed rank test was applied and for Insomnia grading Mann Whitney tests was applied.

3.1 Assessment criteria

Blood pressure was recorded 5 minutes before the procedure, during the procedure, five minutes after the procedure and during the follow up. Oxygen Saturation was recorded five minutes before the procedure, during the procedure, five minutes after the procedure and during the follow up. Insomnia- was assessed using Bergen insomnia scale before the treatment, after the treatment course that is on 7th day and during the follow up on 15th day.

4. RESULTS

Before treatment, group A (Mrudu Samvahana) has the mean systolic blood pressure was 145.3 mmHg and after the treatment it was reduced to 123.1 mmHg. The relief was statistically significant with p value (<0.001). However, during the follow up on 7th day it was increased to 134.9 mmHg but when compared to day 1 the difference was significant at ($p < 0.0001$). Mean of diastolic blood pressure before treatment was 92.7 mmHg and after the treatment it was reduced to 81 mmHg. The relief was statistically significant at $P < 0.0001$. During the follow up study it was increased to 84.7 mmHg, and was significant at ($p < 0.0001$) when compared to day 1 as shown in Figure 1.

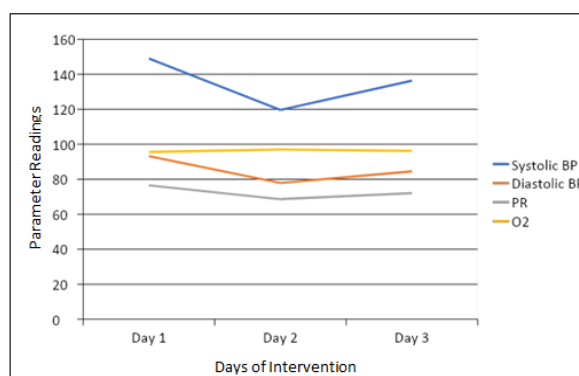


The values are expressed in Mean

Fig 01: Effect of M. Samvahana on objective parameters

In Group B (Takradhara), the mean of systolic blood pressure before the treatment was 149 which was reduced to 119.6 after the treatment. The effect of the therapy was statistically significant at $P < 0.0001$, however during the follow up it was increased to 136.35 and was significant at ($p < 0.0001$) when compared to day 1. The mean of

diastolic blood pressure before the treatment was 93.2 which was reduced to 77.9 after the treatment. The effect of the therapy was statistically significant at $P < 0.0001$, during the follow up though it was increased to 84.5 and was significant at $p < 0.0001$, when compared to day 1 as shown in Figure 2.

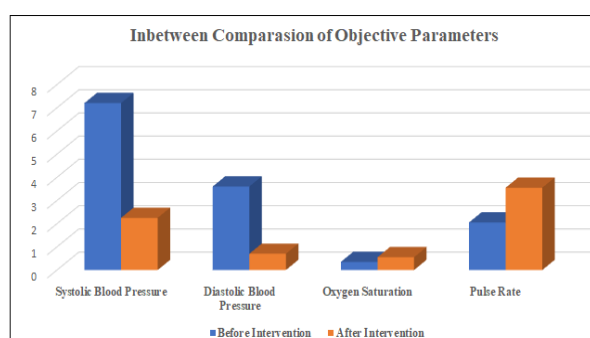


The values are expressed in Mean

Fig 2: Effect of Takradhara on objective parameters

In group A, 4 patients were suffering from insomnia. On the 7th the day, there was 100% relief and, on the 14th day the symptom relapsed in 1 patient. In group B, 2 patients were suffering from insomnia. On the 7th the day there was 100% relief, there was no relapse on the 14th day. There was a

significant change in the systolic and diastolic BP ($P < 0.05$) in both the groups. However, there was 19.7% reduction in systolic BP in group B when compared to 15.27% reduction in group A, and 16.41% reduction in diastolic BP in group B in comparison to 12.62% reduction in group A.



There was significant reduction ($P < 0.0001$) in systolic blood pressure by Mrudu Samvahana.

Fig 3: In-between the group effect of M. Samvahana and Takradhara on objective parameters

The mean of systolic blood pressure in Group A (Mrudu samvaahana) was 145.3 and after the treatment it was reduced to 123.1. The relief was statistically significant, however during the follow up though it was increased to 134.9 and, was significant ($p < 0.0001$) when compared to day 1. Mean of diastolic blood pressure, before treatment was 92.7 and after the treatment it was reduced to 81. The relief was statistically significant at $P < 0.0001$. During the follow up it was increased to 84.7, and was significant ($p < 0.0001$) when compared to day 1. The mean of O_2 Saturation on day 1, was 95.75 and after the treatment, on day 7 it was increased to 96.85. The increase was statistically significant at ($P < 0.0001$). However during the follow up, it was decreased to 95.8 was significant at ($p > 0.9999$) when compared to day 1. The mean of pulse rate on day 1 was 71.2 and after the treatment, on day 7 it was reduced to 65.7. The relief was statistically significant at ($P < 0.0001$), however during the follow up, it was increased to 70.7, and was insignificant ($p = 0.6848$) when compared to day 1.

5. DISCUSSION

According to Ayurveda, the shiraha pradesha (Head) is the seat of Mana (Mind), prana vayu. Also head is called as Uttamanga (Precious part of the body) due to the presence of vital organs. Hence a set of treatments performed on the

head called the Murdhnaitala were explained in Ayurveda literature²⁵. These are four in number viz Shiro abhyanga (Head massage), Shiro Dhaara (Oil dripping therapy), Shiro pichu (Placing of oil soaked cotton on head) and Shiro basti (Retention of oil on head). Among these Shiro dhara is also performed using different media other than oil like buttermilk, decoction, milk, etc. Previous studies have shown that Shiro dhara is effective in management of attention deficit hyperactivity disorder in children²⁶, Hypertension⁹, Menopause²⁷, Cerebellar ataxia²⁸, generalized anxiety disorder²⁹ chronic headache³⁰ and insomnia¹³. Along with Prana vayu, vyana vayu (Types of bio energies) is also present in head as it is sarva deha chara (Moving throughout the body). Manasika bhavas such as chinta, bhaya shoka, lead to vitiation of both manas and vata which may lead to the pathological process of hypertension. Sympathetic hyperactivity and parasympathetic withdrawal is a cause for hypertension, which leads to reset of baroreflex sensitivity and chemoreflex induced hyperventilation.¹⁷ In the present study Amalaki siddha takra was used, and the procedure was performed for 40 minutes. In shirodhara, due to the continuous pouring of the takra, the intermittent stimulation may provide afferent inputs to the cerebral cortex to produce tranquilizing effect. It induces Altered State of Consciousness (ASC) and act as anxiolytic.⁹ This action may stabilize the manasika doshas; raja, tama and prana, vyana vayu by acting on

aagnya chakra and sthapani marma.⁸ Sthapani marma and Aagnya chakra are located at the level of point between the eyebrows, which may correspond to the site of pituitary gland and pineal gland. Pituitary gland is capable for the maintenance of all the endocrine functions. By indirect stimulation of this gland, it regulates the normal function of the same and exhibit sympatholytic activity by promoting a decrease in plasma noradrenaline levels.⁹ EEG changes were observed during the shirodhara procedure in previous studies and were similar to those observed after deep meditation and alert relaxation, which are known to have effect on the blood pressure.¹⁵ Mental stress, irritability, anger are known to cause imbalance in pituitary functions via hypothalamus, in turn increasing the sympathetic activity contributing to pathophysiology of essential hypertension. Acharya Sushruta has explained the procedure of Samvahana In 'Anaagata baadha pratisheda chikitsa adhyaya' as a comfortable touch, squeezing with gentle pressure from pada(feet) till kati (low back). In the present study, samvahana was done with minimal pressure rhythmically on the forehead of the patient, with oscillatory movements similar to those in takra dhara. The procedure was carried out for 20 minutes with the intent to observe its efficacy in essential hypertension, compared to that of takradhara as it is very easy to perform and less time consuming and needs no instrumentation. Murchita tila taila was used for comfortable and easy performing of the procedure. The effect of mrudu samvahana may be similar to that of takradhara. In addition, murchita tila taila used aids for vata shamana due to its snigdha guna (unctuous nature), ushna veerya (hot potency) and madhura rasa. Tactile kinesthetic stimulation provided by samvahana may works by limbic system and exerts positive physiological action through hypothalamus.¹⁶ The samvahana also leads to stimulation of pituitary and hypothalamus due to the rhythmic movements and pressure, via somato-autonomic reflex through thermo sensors or pressure sensors in the skin via the trigeminal cranial nerve and may act as sympatholytic. As response to stress, CRF is released into hypophyseal portal vessels that access the anterior pituitary gland. Binding of CRF to its receptor on pituitary corticotropes induces the release of adrenocorticotrophic hormone (ACTH) into the systemic circulation.²⁴ Both the therapies were also seen to be effective in insomnia. Also these non-pharmacological interventions may contribute in the initial stages of

hypertension. Both the groups, showed significant reduction in systolic and diastolic BP and pulse rate. Though there was a significant increase in oxygen saturation, the levels were within the normal limits. However, the percentage of improvement in takradhara was greater than that of Mrudu samvahana. This was seen probably because of the virtue of additional properties possessed by Takra (Buttermilk) which are Madhura Vipaka (Sweet potency), Ushna Veerya (Hot potency), and Kapha Vaata Hara (Alleviating bio humors Kapha and Vata), Hridya (Good for Heart) and Mutrala (Diuretic) and Shotahara (Reducing Edema).¹⁸ During the follow up, the systolic as well diastolic levels of BP were increased, in both the groups, which indicates the palliative nature of the treatments and might be due to the short time stimulation of the Parasympathetic response.

6. CONCLUSION

Takra Dhaara and Mrudu samvahana are effect in reducing the Systolic and Diastolic blood pressure in Essential hypertension. Takradhara has shown the better results as compared to the Mrudu samvahana in terms of percentage of improvement of study parameters and consistent results in the follow up. The present study can be further evaluated by incorporating the stress biomarkers.

7. ACKNOWLEDGEMENTS

We are thankful to Dr. B. S. Prasad Sir, President NCISM, Government of India, for extending full support for this work.

8. AUTHORS CONTRIBUTION STATEMENT

Dr. Ashwini patil involved as principal investigator and for article drafting. Dr. Pradeep I gramapurohit guided the study, dr. Skandhan k p, guided for the publication and dr. Vinayak b angadi was co – investigator for this study. All the authors read and approved the final version of the manuscript.

9. CONFLICT OF INTEREST

Conflict of interest declared none.

10. REFERENCES

1. National High Blood Pressure Education Program. The seventh report of the Joint National Committee on Prevention, detection, evaluation, and treatment of high blood pressure. Bethesda: National Heart Lung and Blood Institute (US); 2004 Aug. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK9630/REFERENCES>.
2. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet*. 2005;365(9455):217-23. doi: [10.1016/S0140-6736\(05\)17741-1](https://doi.org/10.1016/S0140-6736(05)17741-1), PMID [15652604](https://pubmed.ncbi.nlm.nih.gov/15652604/).
3. Carretero OA, Oparil S. Essential hypertension. Part I: definition and etiology. "Essential hypertension. Part I: definition and etiology." *Circulation* vol. 2000;101(3):329-35. doi: [10.1161/01.cir.101.3.329](https://doi.org/10.1161/01.cir.101.3.329), PMID [10645931](https://pubmed.ncbi.nlm.nih.gov/10645931/).
4. Agnivesa Charaka, Dridhabala, revised by. 'CHARAKA SAMHITHA' Yadavji trikamji Comment: Chakrapanidatta, Ayurvedadipika [publication]. Varanasi: Chaukhambha Viswabharathi(UP) Reprint 2009;Sutrasthana 18/44-46. Pp 108.
5. Zimmerman RS, Frohlich ED. Stress and hypertension. *J Hypertens Suppl Off J Int Soc Hypertens*. 1990;8(4):S103-7.
6. Sanz J, García-Vera MP, Espinosa R, Fortún M, Magán I, Segura J. Psychological factors associated with poor hypertension control: differences in personality and stress between patients with controlled and uncontrolled hypertension. *Psychol Rep*. 2010 Dec;107(3):923-38. doi: [10.2466/09.15.20.PRO.107.6.923-938](https://doi.org/10.2466/09.15.20.PRO.107.6.923-938).
7. Husserl FE, Messerli FH. Adverse effects of antihypertensive drugs. *Drugs*. 1981;22(3):188-210.

- doi: [10.2165/00003495-198122030-00002](https://doi.org/10.2165/00003495-198122030-00002), PMID [7021123](https://pubmed.ncbi.nlm.nih.gov/7021123/).
8. Sanpeti R, a clinical study on the effect of takradhara in essential hypertension, 2006. department of panchakarma, SDMCA, Udupi.
9. Kundu C, Shukla VD, Santwani MA, Bhatt NN. 'The role of psychic factors in pathogenesis of essential hypertension and its management by Shirodhara and Sarpagandha Vati.' Ayu. 2010;31(4):436-41. doi: [10.4103/0974-8520.82035](https://doi.org/10.4103/0974-8520.82035), PMID [22048535](https://pubmed.ncbi.nlm.nih.gov/22048535/).
10. Dr.D.V. Panditrao, Dr.SharadaNayar, Edited by Dr. Mahendrapalsimhaaarya, Sahasrayoga, ayush, yugantarprakashandehi (1990);dhaarakalpaie 13/8-9: p523
11. Panditrao DV, Nayar S. ayush, yugantarprakashandehi. dhaarakalpaie Dr. Mahendrapalsimhaaarya S, editor. Vol. 13(8-9); 1990. p. 522.
12. Anonymous. The ayurvedic formulary of India. 2nd rev ed, Govt of India Ministry of health and family welfare, Department of Indian Systems of Medicine and Homeopathy, Published by The Controller of Publications Civil Lines Delhi. Part I; 2003. p. 365, appendix II.
13. Uebaba K, Xu FH, Ogawa H, Tatsuse T, Wang BH, Hisajima T, Venkatraman S. Psychoneuroimmunology effects of ayurvedic oil-dripping treatment. J Altern Complement Med. 2008;14(10):1189-98. doi: [10.1089/acm.2008.0273](https://doi.org/10.1089/acm.2008.0273), PMID [19123874](https://pubmed.ncbi.nlm.nih.gov/19123874/).
14. Ajanal M, Chougale A. Action of Shirodhara – A hypothetical review, Global J Res. Med. Plants & Indigen. Med. 2012;1(9):457-63.
15. Dhuri KD, Bodhe PV, Vaidya AB. Shirodhara: A psycho-physiological profile in healthy volunteers. J Ayurveda Integr Med. 2013;4(1):40-4. doi: [10.4103/0975-9476.109550](https://doi.org/10.4103/0975-9476.109550), PMID [23741161](https://pubmed.ncbi.nlm.nih.gov/23741161/).
16. Kajaria D. Text book of panchakarma. Varanasi: Choukamba publications; 2012. p. 4.
17. Joseph CN, Porta C, Casucci G, Casiraghi N, Maffei M, Rossi M, Bernardi L. Slow breathing improves arterial baroreflex sensitivity and decreases blood pressure in essential hypertension. Hypertension. 2005;46(4):714-8. doi: [10.1161/01.HYP.0000179581.68566.7d](https://doi.org/10.1161/01.HYP.0000179581.68566.7d), PMID [16129818](https://pubmed.ncbi.nlm.nih.gov/16129818/) (Dallas T.: 1979).
18. Sushruthacharya. Susrutha Samhita, Edin 2009. Commentry: Dalhanacharya Nibandhasangraha, Chaukhamba Orientalia, Varanasi, Sutrasthana Chap 45, Verse-84 pp 203.
19. Iqbal AM, Jamal SF. Essential hypertension. StatPearls [Internet]. Updated 2021 Jul 10;2021 Jan-.
20. Mahmood S, Shah KU, Khan TM, Nawaz S, Rashid H, Baqar SWA, Kamran S. Non-pharmacological management of hypertension: in the light of current research. Ir J Med Sci. 2019 May;188(2):437-52. doi: [10.1007/s11845-018-1889-8](https://doi.org/10.1007/s11845-018-1889-8), PMID [30136222](https://pubmed.ncbi.nlm.nih.gov/30136222/).
21. Vagbhata. 'AstangaHridayam' commen:Arunadatta-sarvangasundari; Hemadri-Ayurvedarasayana [reprint:2000]. Varanasi, India: Chaukhamba Orientalia,Sutrasthana 4/12. p. 55.
22. Agnivesa Charaka, Dridhabala, revised by. Charaka SAMHITHA. 1st ed Yadavji trikamji Commen: Chakrapanidatta, Ayurvedadipika [publication],Chaukhambha Viswabharathi, Varanasi(UP) Reprint 2009;Sutrasthana 7/23. P5.
23. Sushrutacharya. Sushruta Samhita, Edin 2009. Commentry: Dalhanacharya Nibandhasangraha, Chaukhamba Orientalia, Varanasi, Chikitsasthana Chap 24, verse – 83 pp 498.
24. Smith SM, Vale VW. The role of the hypothalamic-pituitary-adrenal axis in neuroendocrine responses to stress. Dial Clin Neurosci. 2006;8(4):383-95. doi: [10.31887/DCNS.2006.8.4/ssmith](https://doi.org/10.31887/DCNS.2006.8.4/ssmith), PMID [17290797](https://pubmed.ncbi.nlm.nih.gov/17290797/).
25. Vagbhata "Astanga Hridayam" commen:Arunadatta-sarvangasundari; Hemadri-Ayurvedarasayana. Reprint 2000 Chaukhamba Orientalia,Varanasi, India ,Sutrasthana Chap-22 , Verse- 23-24; pp 301.
26. Chawla J. *Insomnia treatment & management*. <http://emedicine.medscape.com/article/1187829-treatment> AccessedDecember4, 2013
27. Santwani K, Shukla VD, Santwani MA, Thaker G. An assessment of Manasika Bhavas in menopausal syndrome and its management. Ayu. 2010; 31(3): 311–8 [PMC free article] [PubMed] [Google Scholar]
28. Sriranjini SJ, Pal PK, Devidas KV, Ganpathy S. Improvement of balance in progressive degenerative cerebellar ataxias after Ayurvedic therapy: a preliminary report. Neurol India. 2009; 57(2): 166–71 [PubMed] [Google Scholar]
29. Tubaki BR, Chandrashekar CR, Sudhakar D, Prabha TNS, Lavekar GS, Kutty BM. Clinical efficacy of Manasamitra Vataka (an Ayurveda medication) on generalized anxiety disorder with comorbid generalized social phobia: a randomized controlled study. J Altern Complement Med. 2012; 18(6): 612–21 [PubMed] [Google Scholar]
30. Gupta R, Singh RH. A clinical study on Ayurvedic management of chronic daily headache with special reference to sirodhara and sirovirecana. J Res Ayurveda Siddha. 2001; 12: 81–94 [Google Scholar]