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ORIGINAL RESEARCH ARTICLE

A Comparative Clinical Study on the Efficacy of Oral Sarasvata Ghrita and Sarasvata Ghrita Nasya in the Management of Vataja Shirah Shoola W. S. R. of Tension Headache

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ABSTRACT

Introduction: Acharya Charaka considered *Shiro-ruk* as a separate disease in 80 types of *Nanatmaja Vata- Vyadhi.* He has mentioned five types of *Shiroroga* (Headache) including *Vataja Shiroroga*. Considering the line of treatment, Charaka recommended specific ghee preparations for *Vatika Shiroroga. Vataja Shirah Shoola* (VSS) can be correlated with tension headache which is the most common type of headache. The prevalence of tension headache is about 3% of the general population.

Methodology: The present study is a comparative clinical study on the efficacy of oral *Sarasvata Grita* (SG) and *Sarasvata Ghrita Nasya* (SGN) on *Vataja Shirah Shoola*. Thirty patients were selected from the OPD of Ayurveda Hospital, Meegoda and were randomly divided into two groups: group A and group B. Group A was treated with oral SG, 10 ml orally twice a day before meals for a period of 30 days while group B was treated with SGN at the dose of 8 drops daily at 9.00 am after a light meal for same duration. Patients were evaluated before and after treatment. Data were analyzed using SPSS statistical software.

Results: The result revealed that the 36 – 45 age group (76.7%), female (56.7%), and *Vata-pitta prakriti* (56%) are more vulnerable to VSS. Oral SG improved subjective parameters and blood pressure in a highly significant manner ($P > 0.001$) whereas oral SG improved bi-temporal headache and disturbed sleep in a significant manner ($P < 0.05$).

Disscussion and Conclusion: Collectively, the ingredients of SG have *tridosha shamaka* effect, especially *Vata shamaka* effect. Due to synergistic effect of SG, most of the parameters have shown significant improvement. SGN improved subjective parameter in significant manner ($P < 0.05$) whereas the improvement of blood pressure is highly significant ($P < 0.001$). When comparing the effect of two treatments on VSS, it is reported that the difference of mean of most of the subjective parameters between group A and B is highly significant ($P < 0.001$). Hence, it is concluded that oral *Sarasvata Ghrita* has higher degree of efficacy on *Vataja Shirahshoola* over *Sarasvata Ghrita Nasya.*

1. INTRODUCTION

All Indian philosophies including Ayurveda have given prime importance to *shirah* (head). *Charaka samhitha* has considered *Shirah* has the supreme, important and major part of the body which is known as the *Uttamanga* (Supreme organ).[1] Ayurveda texts described not only *Shirah Shoola* (headache) as symptom of various diseases but also as an independent disease entity as "*Shiroroga*"(Diseases of head). *Susruta Samhitha* has specially mentioned *shiroroga* in *shalakyatanthra* (Ayurveda ENT and Opthalmology). *Charaka Samhita, Susrutha Samhitha, Ashtanga hridaya samhitha* and *Madhawa Nidana* have described all the *shiroroga* collectively. *Shirah shoola* (headache) which occurs due to vitiated *vata dosha* is called as *vataja shirah shoola*. It has identified by all *Acharyas* (Sages/teachers) as a main type of *shiroroga* in above texts.

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In present scenario, individual life style has been drastically changed and growing needs have no end. Speed and accuracy are the prime demands of modern era. To cope with this situation, everyone have to face hectic competitive and stressful life. People cannot pay attention to their physical and mental health. Irregular food habits, suppression of natural urges, lack of proper sleep, and less time for relaxation are being part of our life, which enhance incidences of many diseases mainly having psychosomatic origin are increasing due to urbanization, high industrial growth deforestation at a drastic speed.

Comparative with modern science, among the several types of headaches tension headache (occurs due to tension) is indicating similarity with *vataja shirah shoola* in Ayurveda. It is estimated that 30–78% of headache occurs due to tension.[2] Its increasing global incidence is a cause of concern for all which has forced to initiate the research work to discover an effective medicine for the better management of this challenging ailment. Majority of the drugs employed in modern medicine for this disease are almost limited to suppress the symptoms. A repeated and long-term use of such drugs is found to cause serious side effects such as memory loss, gastrointestinal disorders, and weight gain and tend to be habit forming. Therefore, search for a safer management is of great importance.

2. AIMS AND OBJECTIVES

2.1. General Objective

- To evaluate the comparative effect of *Sarasvata Grita Nasya* and *sarasvata Grita Pana* in the management of *Vataja Shirah Shoola*.

2.2. Specific Objective

- Review on *Sarasvata Grita* and effect of *Sarsvata Grita nasya* and *Sarasvata Grita pana* in Ayurveda classical texts.
- Review on *Shiro roga* in Ayurveda classical texts.

3. LITERATURE REVIEW

Ayurveda has given prime importance to *Shirah* (Head), considering it is one of the three principle vital organ (*Marmasthana)* where the *Prana* (Vital force) resides.[3] According to Ayurveda texts, *Shirah shoola* consider as all *shiro roga* which are cause develop *ruja* (pain) and *Shirah shoola* is the main or only symptom of various *shiro roga*.

3.1. Classification of *Shiro Roga*[4,5]

In some Ayurveda authentic texts have described 10 types and some acharyas have described as 11 types of shiro roga. Given in Table 1.

3.2. Causative Factors of *Vataja Shiro Roga*[6]

Tikshna pana (Strong alcohol consumption), *Ucchairbhashya* (High tone speech), *Shoka* (grief), *Ati Vireka* (Excessive purgation), *Atibhashana* (Excessive talking), *Bhaya* (Fear), *Ati Vamana* (Excessive vomiting), *Prajagara* (Night awaking), *Trasa* (Mental stress), *Shitamarutasparsha* (Contact of cold wind), *Ati Vyavaya* (Excessive coitus), *Vega Nigraha* (Holding of natural urges of motion and urination), *Upavasa* (Fasting), *Abhighata* (Trauma/Injury of head), *Vyayama* (Excessive exercise), *Bashpa* (Excessive lacrimation), and *Ati Margakarshana* (Excessive walking) (Heavy weight lifting) are the etiological factors for *Vataja Sirah shoola*.

3.3. *Lakshana* (Signs and Symptoms) of *Vataja Shirah Shoola*[7]

The patient experiences severe pricking pain in both temple areas, a sensation of intense pain as if the *ghata* (above the temples) were opening, the forehead and center of the brows are falling out, the ears hurt and make noise, the eyes feel like they are being pulled out, the head reels and feels loose in all of its joints, the lower jaw and shoulders are rigid, the headache is sometimes relieved without any apparent reason, and its severity decreases.by rubbing, applying oil, and fermenting.

3.4. *Chikitsa* (Signs and Symptoms) of *Vataja Shirah Shoola*[8]

According to Vagbhata, it is customary to anoint the head, consume ghee at night, and then sip warm water. He can eat *Mudga* (*Vigna radiata*), *Kulattha* (*Macrotyloma uniflorum*), or *Masha* (*Vigna mungo*) with ghee added, or can consume *tila* (Sesame seeds) paste or oil. Applying poultices or fermenting well-cooked meatballs and maize are useful when done with milk. Luke warm milk boiled with *Dashamul* and other remedies that mitigate *vata dosha* should be poured. Lubricating nasal drops and inhalation recipes may also be performed.

3.5. Drug Review

According to the Ayurvedic pharmacopia of Sri Lanka-1976, there are 12 main ingredients in Sarasvata Grita. Given in table 2.

4. METHODOLOGY

4.1. Study Design

The study was a randomized comparative clinical study at Meegoda Ayurveda Provincial Hospital, Sri Lanka.

4.2. Selection of Cases

The study was conducted with 30 patients who has clinically diagnosed as *Vataja Shirah Shoola* (Tension headache). Patients were selected from the OPD of Meegoda Provincial Ayurveda Hospital, Sri Lanka, as per the selection criteria. All the patients were randomly divided into following two groups.

1. Group A were treated with *Sarasvata Grita Pana* (Ingestion)
2. Group B were treated with *Sarasvata Grita Nasya*.

4.3. Inclusion Criteria

The following criteria were included in the study:

- Male and female patients
- Patients with prominent *Vataja shirah shoola*
- Age between 18 and 45 years old
- Chronicity <05 years
- Both episodic and continues types of tension type headache.

4.4. Exclusion Criteria

The following criteria were excluded from the study:

- Age below 18 years old, over 46 years old.
- Pregnant mothers.
- Patients associated with other major systemic or psychiatric diseases.
- Headache due to other major causes like migraine, trigeminal neuralgia, and intracranial space occupying lesions.
- Headache due to other systemic diseases such as hypertension and refractive errors.
- Patients who has increased ICP history due to any kind of diseases.
- Pathological conditions occurred in eye, ear, nose, and oral cavity.
- Chronicity more than 05 years.

4.5. Investigation, Examination and Diagnosis

Patients having classical signs and symptoms of *Vataja shirah shoola* and Tension type Headache were selected to the study. Detailed clinical history was taken from each participant, and complete physical examination was done (Including *Ashtasthana* and *Dashawidha pariksha*). Routine UFR and FBC were done before and after treatment as safety measures since there is no any specific investigation for diagnose *Vataja shirah shoola*.

4.6. Administration of Drugs, Dose, and Duration

Group A with 15 patients was treated with *Sarasvata Grita* orally 10 mL intake, twice a day at 7.00 am and 4.00 pm before meal following lukewarm water for 30 days.

Group A with 15 patients was treated with *Sarasvata Grita Nasya* (Nasal drops), dose of 08 drops at 9.00 am after meals for 30 days. The routine diet was advised to the patients of both groups during the entire course of treatment. Follow-up period was another 30 days for each groups.

4.7. Assessment Criteria

Before treatment, all subjective parameters as well as objective parameters were evaluated to identify condition of the patients. All subjective parameters were evaluated to compare with final readings to prove safety of the patients. During the study and 1-month follow up study period, the patients were assessed on every 15th day up to 1 month on the basis of following parameters

4.8. Subjective Criteria

Main symptoms and signs of *Vataja shirah shoola* and Tension type of headache as follows. *Shankhanistoda* (Bi-temporal pain), *Ghatasambheda* (pain in posterior neck region), *Bhrumadhya evam lalata tapa* (pain and burning sensation in between eye brows and forehead), Disturbed sleep, Tinnitus (*Swanatah Srotre*) and pain in ear, Heaviness of head, Lack of concentration and anosmia.

All symptoms were recorded for the purpose of evaluating clinical improvement, the frequency of presenting characteristics was calculated, and each case's symptom severity was graded using following "Symptom Rating scale".[9]

Apart from that patients were advised to maintain "Headache Impact Test"[10] (HIT-6) for the self-assessment of headache and to identify and rule out the triggering factors and also relieving factors of the headache.

4.9. Data Collection and Analysis

Data were collected by a questionnaire and analyzed by SPSS statistical software. Qualitative data were analyzed by Wilcoxan sign-rank test whereas qualitative data were analyzed by paired and unpaired Student's 't' tests.

5.OBSERVATIONS AND RESULTS

5.1. Results on the effect of Sarasvatha Ghrita on Subjective and Objective Parameters

The mean value of pain in posterior neck region (2.53 ± 0.74 - 0.80 ± 0.77), burning in front region (2.26 ± 0.88 − 0.73 ± 0.79), heaviness in head (0.53 ± 0.92 - 0.00 ± 0.00), lack of concentration (2.40 ± 0.91 - 0.73 ± 0.70), anosmia (0.53 ± 0.83 - 0.07 ± 0.20) and (2.00 ± 1.00 - 0.47 ± 0.64) were decreased which is statistically highly significant (P>0.001). The mean value of bi-temporal headache (122.67 ± 12.23 - 76.67 ± 4.88), disturbed sleep (1.60 +1.35 - 0.33±0.49), was reduce which is statistically significant ($P < 0.05$). Given in Tables 4, 5.

5.2 Results on the effect of *Sarasvatha Ghrita Nasya* on Subjective and Objective Parameters

Data were analyzed by Wilcoxon Sign test using SPSS statistical software. The mean value of bi-temporal headache (116.67 ± 6.17 - 76.00 ± 5.07), disturbed sleep (2.13±0.99 - 0.27 +0.46), pain in posterior neck region (2.47+ 0.51 - 0.27+ 0.45), burning in front region (2.53+ 0.52 - 0.27 ± 0.46), lack of concentration (2.27 ± 0.46 - 0.00 ± 0.00), anosmia (0.67 ± 0.98 - 0.00 +0.00) were decreased which is statistically significant ($P > 0.05$). Given in Table 6,7.

5.3 Comparative effect of oral *Sarasvata Grita and Sarasvata Grita nasya* on subjective parameters of *Vataja Shirah Shoola*

Difference of mean of pain in posterior neck region (0.26 ± 2.09), pain in front region and burning (−0.16 ± 1.87), disturbed sleep (−0.30 ± 1.89), tinnitus of both ears (0.06 ± 1.27), heaviness in head (−0.86 ± 1.59), and lack of concentration (0.50 ± 1.45) between group A and B was statistically highly significant ($P < 0.001$). Difference of mean of anosmia (0.23 ± 0.56) between group A and B was statistically significant ($P < 0.05$). Difference of mean of bi-temporal headache (0.13 ± 0.73) between group A and B was statistically insignificant ($P > 0.05$) given in table 8.

5.4 Comparative effect of oral *Sarasvata Grita and Sarasvata Grita nasya* on objective parameters

Difference of mean of pulse rate (46.46 ± 2.05), blood pressure (84.00 ± 1.98), Hb (13.27 ± 0.32), RBC (−9.08 ± 0.19), neutrophil (−41.57 ± 2.26), lymphocyte (−10.33 ± 1.68), and eosinophil count (−32.53 ± 1.22) between group A and B was statistically highly significant ($P < 0.001$) given in table 9.

6. DISCUSSION

The highest percentage of patients (76.7%) is reported in 36–45 age group and 13.33% were reported in 26–35 age group. Young and children have the least incidence of tension head ache (10%). This results indicate that *vataja shirah shoola* is more common among young adults and adults which may be due to these age group face more stress and tension in their lives due to various reasons.

The majority of patients of tension headache are female (56.7%), but nearly equal number of male patients (43.3%) are also reported indicating both female and female are vulnerable to have tension headache. Considering education level, people who are having secondary education (40%) are more prone to have tension headache which may be due to their working environment. The might be facing more stress and strains while they are working. Based on this sample, the majority of patients are Buddhist (93.4%) which in inevitably due to their geographical majority. The 50% of patients are married and nearly equal proportion of patients is unmarried (44.4%) which indicate marital state has no specific effect on tension headache. Considering chronicity of the disease, the majority of patients are chronic cases with 3-year history of disease (44.3%) and 30% patients are with 2-year chronicity. This finding reveals that tension headache is a chronic disease due to various reasons.

People who consume mixed food are more chance to develop tension headache (76.7%) that the people who eat (23.3%) vegetarian food. The final conclusion for which cannot be made. People who consume rich in *amla, lavana,* and *katu rasa* are more prone (50%) to develop tension headache. In the same way, people who eat food rich in *ruksha* and *laghuguna* (53.3%) are also develop tension headache. These *rasa* and *guna* collectively may aggravate *vata* resulting in *vataja shirah shoola*. Results also report that night awaking (83.3%) trigger tension headache in majority of patients which is a known factor for vitiation of *vata.*

In this sample, *vata-pitta* type of *prakriti* (56%) is among the majority of patients indicating this type of *prakriti* is more prone to have *vataja shirah shoola*. Considering *ahara-shakti, the* majority of patients (93.3%) has *madyama abhyavaharana sakti* (93.3%) and *madyama jarana sakti* (90%). The majority of patients has *madyama koshta* (70%), irregular bowel moment (36.7%), and constipation (36.7%). The majority of patients is not doing exercises (76.7%), addicted to tea (40%), and depressed emotional make-up (66.7%).

The ingredients properties that composed of *sarasvata grita* are *tikta* (66.6%), *katu* (66.6%), *madhura* (50.54%), *kashaya* (16.6%), *amla* (8.3%) and *lavana rasa* (8.3%). *Laghu* (75%), *snigdha* (41.6%), *ruksha* (41.6%), *tikshna* (16.6%), *sara* (8.3%) and *mrudu guna* (8.3%). *katu* (33.3%) and *madhura* (25%), and *ushna virya* (66.6%) and *shita virya* (8.3%). *Go-Grita* has *vata* and *pitta shamaka* effect. *Bhrahmi* has *vata shamaka* and *nadi balakaraka* effect. *Haridra* has *kapa* and *vata shamaka* effect. *Jati* has *vata shamaka* effect. *Kusta* has *kapha* and *vata shamaka* effect. *Trivit* has *kapa* and *pitta shamaka* effect. *Harithaki* has *tridosha shamaka*, especially *vata shamaka* effect. *Pippali* has *vata* and *kapha shamaka* effect. *Vidanga* has *kapha* and *vata shamaka* effect. *Saindhawa* has *tridosha shamaka*, especially *vata shamaka* effect. *Vacha* has *kapha* and *vata shamaka* effect. *Sharkara* has *vata shamaka* effect. Due to synergistic effect of *sarasvata grita,* most of the subjective as well as objective parameters are improved significantly.

7. CONCLUSION

When considering changes of subjective parameters of both A and B groups, all measures are statistically highly significant ($P < 0.05$). Considering the comparative evaluation of study findings, it can be conclude that oral *Sarasvata Ghrita* has more effect on *Vataja Shirah shoola* management over *Sarasvata Ghrita Nasya*.

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Nil.

9. AUTHORS' CONTRIBUTIONS

All the authors contributed equally in the design and execution of the article.

10. FUNDING

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11. ETHICAL APPROVALS

This study is approved by the Institutional Ethical Committee for Ethical Clearance.

12. CONFLICTS OF INTEREST

Nil.

13. DATA AVAILABILITY

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

14. PUBLISHERS NOTE

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Table 1: Classification of Shiro roga

Charaka samhitha	Susruta samhitha	Ash.Hridaya samhitha	Madhava nidana
Vataja	*Vataja*	*Vataja*	*Vataja*
Pittaja	*Pittaja*	*Pittaja*	*Pittaja*
Kaphaja	*Kaphaja*	*Kaphaja*	*Kaphaja*
Sannipataja	*Sannipataja*	*Sannipataja*	*Sannipataja*
-	*Raktaja*	*Raktaja*	*Raktaja*
-	*Kshayaja*	-	*Kshayaja*
Krimija	*Krimija*	*Krimija*	*Krimija*
Suryavarta	*Suryavarta*	*Suryavarta*	*Suryavarta*
Anatavata	*Anatavata*	-	*Anatavata*
Ardhavabedhaka	*Ardhavabedhaka*	*Ardhavabedhaka*	*Ardhavabedhaka*
Shamkhaka	*Shamkhaka*	*Shamkhaka*	*Shamkhaka*
Shirah kampa	-	*Shirah kampa*	-

Table 2: Pharmacodynamics of *Sarasvata Grita* ingredients[11]

Ingredient	Scientific name	*Rasa*	*Guna*	*Virya*	*Vipaka*
Grita[12]	Cows ghee	*Madhura*	*Guru, Snigdha*	*Shita*	*Madhura*
Brahmi[13]	*Bacopa monniera*	*Thikta*	*Laghu, Snigdha*	*Ushna*	*Madhura*
Haridra[14]	*Curcuma longa*	*Thikta, katu*	*Ruksha, Laghu*	*Ushna*	*Katu*
Jati[15]	*Jasminum grandiflorum*	*Thikta, katu*	*Laghu, Snigdha, Mridu*	*Ushna*	*Katu*
Kushta[16]	*Saussurea lappa*	*Katu, Thikta, Madhura*	*Laghu, Ruksha, Theekshna*	*Ushna*	*Katu*
Trivrit[17]	*Operculina turpethumm*	*Madhura, Kashaya, thikta, Katu*	*Laghu, Ruksha, Theekshna, Sara*	*Ushna*	*Katu*
Haritaki[18]	*Terminalia chebula*	*Kashaya, Amla, Katu, Thikta, Madhura*	*Laghu, Ruksha*	*Ushna*	*Madhura*
Pippali[19]	*Piper longum*	*Katu*	*Laghu, Snigdha*	*Anushna*	*Madhura*
Vidanga[20]	*EMbelia ribes*	*Katu, thikta*	*Ruksha, Laghu, Deepana*	*Ushna*	*Katu*
Saindhava[21]	Rock salt	*Lavana, madhura*	*Laghu, Snigdha*	*Sheeta*	
Vaca[22]	*Acorus calamus*	*Katu, Thikta*	*Medya*	*Ushna*	*Katu*
Sharkara[23]	Sugar candy	*Madhura*	*Guru, Snighdha*	*Shita*	*Madhura*

Table 3: Symptom grading scale for assessment

Symptoms	Grades	*n* (%)
Absent	0	0
Mild	1	25%
Moderate	2	50%
Severe	3	75%
Agonizing	4	100%

Table 4: Results on the effect of oral *Sarasvata Ghrita* on subjective parameters

Variable	Mean		SD		*P*
	BT	AT	BT	AT	
Bi-temporal pain	122.67	76.67	12.33	4.88	<0.05
Pain in back neck	2.53	0.80	0.74	0.77	<0.001
Burning in front region	2.26	0.73	0.88	0.79	<0.001
Disturbed sleep	1.60	0.33	1.35	0.49	<0.05
Tinnitus	2.00	0.47	1.00	0.64	<0.001
Heaviness in head	0.53	0.00	0.92	0.00	<0.001
Lack of concentration	2.40	0.73	0.91	0.70	<0.001
Anosmia	0.53	0.07	0.83	0.26	<0.001

SD: Standard deviation, AT: After treatment, BT: Before treatment

Table 5: Results on the effect of oral *Sarasvatha Ghrita* on objective parameters

Variable	Mean		SD		SE	
	BT	AT	BT	AT	BT	AT
Pulse	73.60	72.67	2.26	1.49	0.58	0.39
BP	124.00	80.66	13.52	8.83	3.49	2.28
Hematology						
Hb	0.20	0.07	0.77	0.26	0.20	0.06
RBC	12.79	12.86	1.47	1.42	0.38	0.37
Neutrophil	4.13	4.17	0.49	0.45	0.13	0.12
Eosinophil	36.40	36.20	4.63	4.36	1.19	1.13
Monocytes	2.33	2.40	0.98	0.99	0.25	0.25
Basophil	0.53	0.40	0.83	0.75	0.22	0.19
UFR						
Protein	0.00	0.00	0.00	0.00	0.00	0.00
pH	0.00	0.00	0.00	0.00	0.00	0.00
Glucose	5.88	5.85	0.32	0.31	0.08	0.89
Pus cells	0.00	0.00	0.00	0.00	0.00	0.00
Red cells	1.93	1.80	1.22	0.94	0.32	0.24
Epithelial cells	0.33	0.33	0.72	0.72	0.19	0.19
Casts	0.47	0.47	0.57	0.57	0.13	0.13
Crystals	0.07	0.07	0.26	0.26	0.06	0.07

SD: Standard deviation, SE: Standard error, RBC: Red blood cell count, BP: Blood pressure, AT: After treatment, BT: Before treatment, Hb: Hemoglobin count

Table 6: Results on the effect of *Sarasvata Ghrita* Nasya on subjective parameters

Variable	Mean		SD		*P*
	BT	AT	BT	AT	
Bi-temporal pain	116.67	76.00	6.17	5.07	<0.05
Pain in back neck	2.47	0.27	0.5	0.45	<0.05
Burning in front region	2.53	0.27	0.52	0.46	<0.05
Disturbed sleep	2.13	0.27	0.99	0.46	<0.05
Tinnitus	2.27	0.00	0.46	0.00	<0.05
Heaviness in head	0.33	0.00	0.89	0.00	<0.05
Lack of concentration	2.27	0.00	0.46	0.00	<0.05
Anosmia	0.67	0.00	0.98	0.00	<0.05

SD: Standard deviation, AT: After treatment, BT: Before treatment

Table 7: Results on the effect of Sarasvatha Ghrita Nasya on objective parameters

Variable	Mean		SD		SE	
	BT	AT	BT	AT	BT	AT
Pulse	73.20	72.60	1.86	1.12	0.48	0.29
BP	118.67	76.00	7.43	6.32	1.98	1.63
Hematology						
Hb	0.00[a]	0.00	0.00	0.00	0.00	0.00
RBC	13.16	13.19	1.08	1.08	0.28	0.28
Neutrophil	4.18	4.19	0.39	0.37	0.10	0.09
Eosinophil	35.26	35.20	4.72	4.81	1.22	1.24
Monocytes	1.93	2.00	0.45	0.53	0.11	0.13
Basophil	0.53	0.46	0.83	0.74	0.21	0.19
UFR						
Protein	0.00[a]	0.00[a]	0.00	0.00	0.00	0.00
pH	0.00[a]	0.00[a]	0.00	0.00	0.00	0.00
Glucose	5.90	5.84	0.38	0.36	0.09	0.09
Pus cells	0.00[a]	0.00[a]	0.00	0.00	0.00	0.00
Red cells	1.93	1.80	1.22	0.94	0.31	0.24
Epithelial cells	0.40[a]	0.40[a]	0.73	0.73	0.19	0.19
Casts	0.47[a]	0.47[a]	0.51	0.51	0.13	0.13
Crystals	0.20[a]	0.20[a]	0.41	0.41	0.10	0.10

SD: Standard deviation, SE: Standard error, RBC: Red blood cell count, BP: Blood pressure, AT: After treatment, BT: Before treatment, Hb: Hemoglobin count

Table 8: Comparative effect of oral *Sarasvata Grita* and *Sarasvata Grita nasya* on subjective parameters of *Vataja Shirah Shoola*

Variable	Difference of mean	Difference of SD	*Z*	*P*
Bi-temporal pain	0.13	0.73	−1.00	>0.05
Pain in back neck	−0.26	2.09	−4.87	<0.001
Burning in front region	−0.16	1.87	−4.82	<0.001
Disturbed sleep	−0.30	1.89	−4.84	<0.001
Tinnitus	0.60	1.27	−4.46	<0.001
Heaviness in head	−0.86	1.59	−4.92	<0.001
Lack of concentration	0.50	1.45	−4.65	<0.001
Anosmia	0.23	0.56	−2.39	<0.05

SD: Standard deviation

Table 9: Comparative effect of oral *Sarasvata Grita* and *Sarasvata Grita nasya* on objective parameters

Variable	Difference of mean	Difference of SD	*Z*	*P*
Pulse rate	46.46	2.05	22.56	<0.001
BP	84.00	1.98	42.33	<0.001
Hb	13.27	0.32	41.13	<0.001
RBC	−9.08	0.19	−46.01	<0.001
Neutrophil	−41.57	2.26	−18.33	<0.001
Lymphocyte	−10.33	1.68	−6.13	<0.001
Eosinophils	−32.53	1.22	−26.52	<0.001

BP: Blood pressure, SD: Standard deviation, Hb: Hemoglobin count, RBC: Red blood cell count