

Yoga for Sinusitis: A Research Study on the Effect of Yoga Therapy on Sinusitis by Using Infra-Red Thermal Imaging System (IRTIS) and Blood Test

Dr. K.Udayakumara

Department of Human Consciousness and Yogic Sciences,
Mangalore University, Mangalagangothri, Karnataka, India
Email: yogodaya@gmail.com

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Abstract - Sinusitis is an inflammatory disorder of the nasal sinuses. Yogic techniques have the potentiality to cure such conditions by relieving the inflammation and by increasing the resistance against the infection. The efficacy of the Yoga therapy on Sinusitis was studied with 20 sinusitis patients of age group 19-53 years along with a control group. The experimental group has shown significant change, with $p < 0.001$, in the IRTIS and blood test readings after Yoga therapy. These statistical significant changes were not seen in control group. Study proves that yoga therapy can be helpful in the treatment of Sinusitis.

Keywords: Yoga therapy, Sinusitis, Infra Red Thermal Imaging System, Blood test

I. INTRODUCTION

Yoga is an effective and time tested method for improving our health as well as prevention and management of the diseases. Yoga is becoming more popular as a therapeutical science nowadays. Sinusitis is an inflammatory disorder of the nasal sinuses. Most of the persons who were suffering from sinusitis, chronic cold and other disorders of the nose very often do not get substantially relieved or cured by most of the treatment techniques. Yogic techniques have the potentiality to prevent and cure such conditions of nose by relieving the inflammation and by increasing the resistance against the infection.

Classical yogic texts emphasize yogic techniques to remove the impurities of both body and mind. 'yogāngānustānāsuddhikāyā jñānadiptirāviveka khyāteh' says Maharshi Patanjali.¹ Studies proved that yogic practices are helpful to maintain healthy respiratory system.² Neti and Kapalabhati are the cleansing techniques mentioned in Hathayoga, recommended for the health of the nasal sinuses and the nasal passages³. Some work has been carried out so far to verify this claim^{4,5}.

The present available references showed that the medical world also recognizes the importance of nasal wash in various nasal conditions like sinusitis after 1980⁶. An Australian survey result shows that Jala Neti is useful to overcome the respiratory ailments like Sinusitis.⁷ Swami.B.Saraswati.et.al. of Sweden studied the effect of daily use of nasal cleansing with salt water for wood

industry workers, which has shown significant improvement in nasal problems⁸. Daine G.Heatley.et.al of America demonstrated that daily nasal irrigation with hypertonic saline water is an inexpensive treatment that overcomes chronic sinusitis⁹. A study based on the clinical trials, review and treatment guidelines in Canada and the United states concluded that nasal irrigation is an effective, inexpensive treatment for symptomatic relief of sinus discomfort and disease⁶. An article in a New York journal stated that hypertonic saline nasal irrigation is a safe, well tolerated, inexpensive, effective, long-term therapy for patients with chronic sino-nasal symptoms¹⁰.

Even though several studies⁵⁻¹⁰ on the effect of Yoga on Sinusitis have been done, no study was conducted with proper parameters for evaluation. The present study intends to show the improvement, by normal parameters (blood test) with a special parameter, Infra Red Thermal Imaging System (IRTIS), which is a non-invasive method. The instrument IRTIS-200 is brought from Russia under the project sanctioned by the Department of Science & Technology, New Delhi. Blood tests for ESR (Erythrocyte Sedimentation Rate), T.C (total white blood cell count) and DC (Differential count) are the other parameters considered.

It is hypothesized that yoga therapy can relieve the sinusitis condition and Infra Red Thermal Imaging System (IRTIS) along with blood test can show the effect of yoga therapy.

II. MATERIALS AND METHODS

The efficacy of the yoga therapy on Sinusitis has been studied with 20 sinusitis subjects of age group 19-53 years along with control group. The study was done at the Department of Human Consciousness and Yogic Sciences, Mangalore University, Mangalagangothri, Karnataka under the guidance of Dr.K.Krishna Bhat, who was the Professor and Chairman of the department of Human Consciousness & Yogic Sciences and also the Dean for the Faculty of Science & Technology, Mangalore University. Yoga therapy was given for a period of 6 months including follow-up. The IRTIS recordings were taken before starting the yoga therapy. Similarly, the blood tests for E.S.R, T.C and D.C were done before starting the therapy.

The IRTIS is a precise scanning infrared device for the measurement and visualization of the thermal field. IRTIS can indicate abnormality based on variations in thermal temperatures. Its major benefit is total non-invasiveness. Increased thermal temperature can be found over the areas involved with an inflammatory process. IRTIS recordings can show an increase in thermal temperature at the areas of the sinuses where there is an inflammation. To study the effect of yoga therapy, the temperature at the area of the sinuses, where there is a pain can be compared before and after the yoga therapy. However naturally there will be a temperature variation in different parts of the body. Similarly, other external facts may also effect the body temperature. To nullify this fact, the difference between the temperatures of the frontal sinus area and near by area were calculated by recording the temperatures of the two near by areas.

The erythrocyte sedimentation rate (ESR) is the rate at which red blood cells precipitate in a period of 1 hour (mm/hr). It is a common hematology test which is a non-specific measure of inflammation. The ESR is increased by

any cause or focus of inflammation. Normal values for ESR are 05-15 mm/hr in male and 10-20 mm/hr in female.

White blood cells are the principal components of the immune system and function by destroying foreign substances such as bacteria and viruses. When an infection is present, the production of WBC increases. White Blood Cell Count means the number of white blood cells in a micro liter of blood. Normal values range from 4000/ml to 11000/ml.

WBC Differential Count (DC) determines the percentage of each type of white blood cell in a sample. Neutrophils are the major players in the body's defense against bacterial infections. Normally a serious bacterial infection causes the body to produce an increased number of neutrophils, resulting in a higher than normal white blood cell count. Neutrophil count decreases whenever there is a viral infection. The number of lymphocytes will increase in response to infections, especially by viruses or by some bacteria. Eosinophils can increase whenever there is an allergic reaction.

TABLE I NORMAL VALUES OF BLOOD CELLS

Type	Percentage	Number (/cumm)
Neutrophil	50 - 70%	3,000 - 6,000
Lymphocytes	20 - 40%	1,500 - 2,700
Eosinophils	1 - 4%	150 - 300
Monocytes	2 - 8%	300 - 600
Basophils	< 1%	10 - 100

The following yogic practices were systematically taught for the experimental group. While giving therapy individual care has been taken and practices were taught separately to each subject. The Yogic practices given include *Jalaneti kriya, Sūtraneti kriya, Kapālabhāti, Svastikāsana, Vajrāsana, Suptavajrāsana, Simhāsana, Tadāsana I, Trikonāsana, Parśhvakonāsana, Pascimatānāsana, Purvatānāsana, Pavanamuktāsana, Bhujangāsana, Śalabhāsana, Dhanurāsana, Bharadwājāsana, Ardhamatsyendrāsana, Viparitarani, Halāsana, Uttānapādāsana, Ujjayi Pranāyāma, Anuloma-Viloma Prānāyāma, Bhastrika Prānāyāma and Shavāsana/Yoganidra* depending on their severity and causes of the Sinusitis condition.

All the practices were gradually taught within the first 15 days and next 15 days they were taught the full course of practices. There after 5 months follow up was taken for all the subjects. After six months, the IRTIS recordings in frontal sinus areas were monitored and the temperature difference is calculated as before. Similarly the blood test is also done.

III.OBSERVATIONS AND RESULTS:

It is observed that all the subjects either relieved or reduced from their sinusitis condition in the experimental group. But no such changes were found in case of control group. The observations were correlated with data collected through IRTIS recordings and blood test. The data collected for different parameters were analyzed using Student paired ‘t’ test. The obtained values are tabulated in the next pages.

TABLE II IRTIS READINGS –EXPERIMENTAL GROUP

Right Frontal Sinus area							
IRTIS readings	Mean TT (in °C)		S.D.		t stat value	p-value	Significance
	Before	After	Before	After			
Spot 1*	33.12	32.54	0.6363	0.5311	3.3534	0.0033	HS
Diff. between spot 1 & spot 2**	1.184	0.172	0.4787	0.1543	9.8856	< 0.001	HS

Spot 1- a spot in frontal sinus area, Spot 2 - a spot about 1.5cm upward vertical distance from spot 1, TT - Thermal Temperature, HS- Highly Significant

TABLE III LEFT FRONTAL SINUS AREA							
IRTIS readings	Mean TT (in °C)		S.D.		t stat value	p-value	Significance
	Before	After	Before	After			
Spot 1*	33.11	32.61	0.6442	0.4605	3.0904	0.006	HS
Diff. between spot 1 & spot 2**	1.1295	0.2365	0.4714	0.2184	10.4401	< 0.001	HS

Spot 1- a spot in frontal sinus area, Spot 2 - a spot about 1.5c.m upward vertical distance from spot 1, TT - Thermal Temperature, HS- Highly Significant

TABLE IV IRTIS READINGS –CONTROL GROUP							
Right Frontal Sinus area							
IRTIS readings	Mean TT (in °C)		S.D.		t stat value	p-value	Significance
	Before	After	Before	After			
Spot 1*	33.23	33.19	0.6354	0.5713	0.28616	0.7779	NS
Diff. between spot 1 & spot 2**	0.8445	0.9535	0.4982	0.5147	1.37397	0.1854	NS

Spot 1- a spot in frontal sinus area, Spot 2 - a spot about 1.5c.m upward vertical distance from spot 1, TT - Thermal Temperature, NS- Non Significant

TABLE V LEFT FRONTAL SINUS AREA							
IRTIS readings	Mean TT (in °C)		S.D.		t stat value	p-value	Significance
	Before	After	Before	After			
Spot 1*	33.18	33.08	0.6192	0.6259	0.6451	0.5266	NS
Diff. between spot 1 & spot 2**	0.762	0.7755	0.4575	0.4307	0.1838	0.8561	NS

Spot 1- a spot in frontal sinus area, Spot 2 - a spot about 1.5c.m upward vertical distance from spot 1, TT - Thermal Temperature, NS- Non Significant

TABLE VI BLOOD TEST–EXPERIMENTAL GROUP							
Blood test	Mean		S.D		t stat value	p value	Significance
	Before	After	Before	After			
ESR (mm/hr)	14.2	9.5	10.8657	9.0117	4.3085	0.0004	HS
T.C. (/ ml)	7783.25	6772.5	2362.01	1162.74	2.1191	0.0475	S
Neutrophils (%)	56.9	63.05	8.0844	3.7483	3.9994	0.0007	HS
Lymphocytes(%)	37.95	32.95	7.4018	4.0585	3.4374	0.0028	HS
Eosinophils (%)	4.4	3.3	1.8750	1.7199	2.7277	0.0134	S
Monocytes (%)	0.7	0.65	1.2183	0.9881	0.3697	0.71	NS

S- Significant, HS- Highly Significant, NS- Non Significant

TABLE VII BLOOD TEST–CONTROL GROUP							
Blood test	Mean		S.D		t stat value	p value	Significance
	Before	After	Before	After			
ESR (mm/hr)	13.25	13.3	10.351	8.67	0.0507	0.9601	NS
T.C. (/ml)	7434.75	7330	1138.54	1033.19	1.0905	0.2891	NS
Neutrophils (%)	60.55	60.85	5.4818	4.0946	0.4457	0.6609	NS
Lymphocytes(%)	34.65	34.55	4.7047	3.3478	0.1487	0.8833	NS
Eosinophils (%)	4.25	4.2	1.7434	1.43637	0.1951	0.8474	NS
Monocytes (%)	0.4	0.35	0.5982	0.5871	1	0.3299	NS

NS- Non Significant

IV.DISCUSSION

The experimental group has shown highly significant reduction in the mean thermal temperatures(TT) in the IRTIS readings of a spot (near supra-orbital foramen) in frontal sinus area (spot 1) in both right and left frontal sinuses from 33.12⁰C to 32.54⁰C and 33.11⁰C to 32.61⁰C with t stat = 3.3534, p =0.0033 and t stat = 3.0904, p =0.006 respectively. The decrease in the IRTIS reading indicates the reduction in inflammation of the sinuses.¹⁰ However naturally there will be a temperature variation in different parts of the body. Similarly, other external facts may also affect the body temperature. To nullify this fact the difference between the TT of spot 1 and a near by spot, spot 2 (about 1.5c.m upward vertical distance from spot 1) were calculated by recording the TT of these two spots. The experimental group has shown highly significant reduction in the TT difference of IRTIS readings (from 1.184⁰C to 0.172⁰C & from 1.1295⁰C to 0.2365⁰C) with t stat = 9.8856, p < 0.001 and t stat = 10.4401, p < 0.001 for right and left frontal sinuses respectively. However, symptomatically all the subjects in experimental group were got relief from their symptoms of sinusitis. This improvement is statistically proved by the readings of IRTIS. It is important to know that this is correlated by the significant improvement in the blood test readings.

The total white blood cell count (T.C) decreased significantly from 7783.25/ml to 6772.5/ml with t=2.1191 and p=0.0475. The ESR also significantly reduced from 14.2 mm/hr to 9.5 mm/hr with t stat = 4.3085, p= 0.0004 indicating a significant reduction in the inflammation. Neutrophil percentage has been normalized with t=3.9994 and p=0.0007. Lymphocytes percentage has been decreased from 37.7857 to 34.5 with t stat = 3.4374, p= 0.0028 indicating a reduction in the infections. Eosinophils percentage significantly reduced from 4.4 to 3.3 with t stat = 2.7277, p= 0.0134 indicating a reduction in the allergic reaction and an increase in body resistance against the allergens. But these significant statistical changes were not seen in control group. There is no significant change in mean TT of control group at spot1 in right and left frontal sinuses (before=33.23⁰C; after=33.19⁰C & before=33.18⁰C; after=33.08⁰C) with t stat = 0.28616, p =0.7779 and t stat = 0.6451, p =0.5266 respectively. Control group has got statistically non significant values for TT difference (before=0.8445⁰C; after=0.9535⁰C & before=0.762⁰C; after=0.7755⁰C) with t stat = 1.7688, p =0.1004 and t stat = 0.9351, p =0.3668 respectively for right and left frontal sinuses. Similarly all the statistical values for ESR, T.C and D.C were non significant in case of control group.

Above discussion shows that yoga therapy helped to relieve the inflammation of sinusitis and improved the resistance of the body in experimental group. In the present study it is important to observe that this improvement is clearly shown by Infra Red Thermal Imaging System. There is no such instrument which can assess the improvement in the treatment of sinusitis. Thus the research study scientifically

proved that the effect of yoga therapy on sinusitis and which can be assessed by Infra Red Thermal Imaging System. Study shows IRTIS which is a totally non-invasive method can be used as an effective tool to assess the efficacy of yoga therapy.

V.CONCLUSION

Based on the discussion of the data obtained we can conclude that Yoga can be used as a better therapeutical method in the treatment of Sinusitis. Present research work showed that Infra Red Thermal Imaging System, which is a totally non-invasive method, can be used as a parameter to assess the efficacy of yoga therapy on Sinusitis. Study may be done with more number of subjects, which may justify the above result.

REFERENCES

- [1] Swami Vivekananda, *Raja Yoga*, IInd Chapter-28th sutra, Avaita Ashrama, 5 Delhi Entally road, Kolkata, 700014, 2011, page 204
- [2] Bhole M.V, *Chronic diseases of nose and their yogic treatment*, Yoga Mimamsa, Vol.XIV, No.1&2, Kaivalyadhama, Lonavala, 1971, page 27-32.
- [3] Digambarji S, *Hathapradīpika* of Svātmārma, Lesson II, 31st & 36th sloka, Kaivalyadhāma, S.M.Y.M. Samiti, Lonavala, Pune - 410403, 1998, page 49,51
- [4] H.R.Nagendra and R.Nagarathna- *Applications of integrated approach of Yoga – A Review*, Research contributions of VYASA, Bangalore, 1983.
- [5] Bhole M.V, *Yogic treatment of chronic Rhinitis and Sinusitis*, Maharashtra MedicalJournal, Vol.XVII : 8; 359-364, published on Yoga Mimamsa, Kaivalyadhama, Lonavala, 1970, page 117.
- [6] Papsin B, McTavish A, *Saline Nasal Irrigation-its role as an adjunct treatment– based on the clinical trails, reviews and treatment guidelines in Canada and the United States* obtained from January 1980 to December 2001
- [7] *Survey results of Jala Neti on 200 yoga students* in Western Sydney, Australia, 1993-94.
- [8] Saraswati S B, Rabone S, Report on a pilot study into the 'Effects of saline nasal irrigation upon nasal symptoms in woodworkers', Sweden, 1997
- [9] Heatley D G.et.al, *Study report on 'Nasal Irrigation for alleviation of Sinusitis'*, American Academy of Otolaryngology, Head and Neck Surgery, Washington, 2000
- [10] Rabago D et.al, *Qualitative Aspects of Nasal Irrigation Use by Patients with Chronic Sinus Disease in a Multi method Study*, Journal of Family Medicine, New York, August 2006 11.
- [11] Torossian F, et.al- *Digital thermography for the evaluation of the effect of betamethasone in the treatment of acute sinusitis*, Paris, France, 1997.
- [12] www.irtis.ru, the official website for Infrared Thermal Imaging Systems, 101000, Starosadskyyer, 8, Moscow, Russia.
- [13] Gore M.M., *Kapalabhati- a review of scientific and textual research*, Yoga Mimamsa, Vol.XXXVII.No.1 &2, April & July 2005
- [14] Balayogi A, *Scientific basis for some Yoga practices in Sinusitis*, Yoga Mimāmsa, Vol.XXXIX.No.1 &2, April & July 2007
- [15] Vicent, Pedro De, *Neti kriya in the management of bronchial asthma and spastic descending conditions of the respiratory tract*, Yoga Mimāmsa, Vol.XXXX.No.1 &2, April & July 2008