Chapter – VI

MATERIALS AND METHODS
The present research study entitled, "Assessment of the effect of Yoga Therapy on Backache, using Infra Red Thermal Imaging System" is done in the Department of Human Consciousness and Yogic Science, Mangalore University, Mangalagangothri, Karnataka, under the guidance of Dr. K Krishna Bhat, Dean, Faculty of Science and Technology, Professor and Chairman of the Dept. The instrument Infra Red Thermal Imaging System (IRTIS) -200, used in the study is brought from Russia to the Dept under the project sanctioned by the Department of Science and Technology, Government of India, to Dr K Krishna Bhat, who is the Principal Investigator of the project. The subjects of the present study are the patients who came for treatment of backache to the Yoga Therapy Centre in the department and who were ready to cooperate as subjects of the research study.

The case history of each subject was taken in detail and all the subjects of backache were selected for the study according to the willingness of the subject for the review of the study. Case history of each subject is given in the Appendix – 2. Only serial number of the subject is given for maintaining the confidentiality. There are a total of 30 subjects of the age group of 22 to 56 years, 10 are gents and 20 are ladies. Yoga therapy was given for a period of minimum 15 days to maximum 11 months, including follow up, depending on the individual condition of the patient.

The IRTIS recordings are considered the main parameter for the present study. To substantiate the IRTIS recordings, a well known Oswestry Disability Index was chosen to record the changes in the condition of backache. The IRTIS is a precise infrared scanning device for the measurement and visualization of the thermal filed. The IR camera is designed as an optic-mechanical scanner with a single element liquid nitrogen cooled IR receiver. The optical system consists of line and frame scanning mirrors mounted in front of a lens objective which concentrates radiation on the IR-receiver. The motion of the frame and line scanning mirrors is mutually synchronized to...
ensure a high repeatability of the geometry of the successive frames. The image is focused by means of the movable lens. A small number of reflecting and refracting surfaces in the optical system make the camera highly sensitive. The interface board converts a video signal into an image frame sequence. Brightness of this image in each point corresponds to a specific temperature. The interface can be connected to the computer and thermo-grams of the scanned object can be stored in the computer discs. The thermo-grams can be displayed on the screen.

IRTIS Recording
IRTIS can indicate abnormality based on variations in IRTIS recordings. Therefore the efficacy of yoga therapy may be studied by studying the IRTIS recordings of the area of backache. In the present study, for recording the IRTIS recordings, the subjects were asked to stand in front of the IRTIS
camera, at a distance of one meter, with their back facing the camera. Then the back is scanned for IRTIS recordings. IRTIS Recordings are done in all the subjects in the Spot of Backache (Spot A), and the changes in readings are verified before and after the study. However, other factors, like external factors and physical factors, may also influence the body. To nullify the influence of the other factors with respect to the readings, IRTIS readings of three separate normal (without pain) spots, called Spot B, Spot C and Spot D, have been taken. Spot B is 2cm lateral to Spot A and is selected to verify the influence of other factors on Spot A. Similarly, to see the influence in the spinal column, Spot C is selected with a vertical distance of 5cm above the Spot A. Similarly, to verify the influence of other factors with respect to Spot C, Spot D is selected with a lateral distance of 2cm to Spot C.

The Oswestry Disability Index (ODI), the most recommended outcome measure for spinal disorders, is also recorded before the yoga therapy for comparison.

**Oswestry Disability Index (ODI):**

The Oswestry Disability Index (ODI) and the Roland Morris disability questionnaire (R-M) are the most commonly recommended condition specific outcome measures for spinal disorders.

The development of the Oswestry Disability Index was initiated by John O'Brien in 1976. Patients with back pain were interviewed by Stephen Eisenstein, an orthopedic surgeon, and Judith Couper, an occupational therapist. The questionnaire had been published in 1980 and widely disseminated from the 1981 meeting of the International Society for the Study of the Lumbar Spine (ISSLS) in Paris. This questionnaire has been designed to know how back pain has affected the patient’s ability to manage in everyday life. They did not specify the time frame in which the subject should answer the questionnaire, although it is implicit that it means “now”. The ODI questionnaire is given in the Appendix – 1.
Scoring System for Oswestry Disability Index (ODI): The Oswetry Disability Index (ODI) has 10 sections (questions). The patient is asked to answer every section and mark in each section, only one of the six statements which is applicable, which most closely describes his problem. For each section of six statements, the maximum score is 5. The first statement is marked the score 0 and the last statement is marked 5. Intervening statements are scored according to rank. If more than one box is marked in each section, take the highest score. If all 10 sections are completed the score is calculated as follows:

Example:
If 16 is the total score, scored out of 50, the total possible score, then
16/50 X 100% = 32%.

If one section is missed or not applicable, the score is calculated as follows:
Example: 16, total scored out of 45, the total possible score, then
16/45 X 100 = 35.6%.
So final score may be summarized as:
Total score / (5 X number of questions answered)) X 100%
It is suggested rounding the percentage to a whole number for convenience. ODI is the most commonly recommended condition specific outcome measure for spinal disorders.

Yoga therapy was given according to the guidance and the method developed by Dr. K. Krishna Bhat. Yogic practices were systematically taught to the subjects. Individual care was taken to all the subjects. Yogic practices were taught separately for every subject for the proper result. Following yogic practices were included and the practices were taught gradually, individually.

1. Svastikasana
2. Vajrasana
3. Suptavajrasana
4. Urdhavajrasana
5. Tadasana 1, 2
6. Katiparivarta
7. Ardhacandra
8. Trikonasana
9. Parsvakonasana
10. Parsvottanasana
11. Prasaritapadottansana
18. Paryankasana  19. Marjala 1,2  20. Navasana
27. Anuloma-Viloma pranayama  28. Bhasrika pranayama

All the practices were taught gradually individually for few days adding the practices one by one, and the complete yoga therapy course was repeated in the following days. Yoga therapy was given for minimum 15 days to maximum 11 months, depending on the individual patient for the accurate result. The IRTIS recordings were monitored according to the improvement. Similarly the Oswestry Disability Index was recorded.

**Hypothesis:** It is hypothesized that “The effect of Yoga therapy on back ache can be assessed by using IRTIS and it can be used as a parameter to the study the effect of yoga therapy”.

The null hypothesis for the present study can be framed as follows-

1 “There will not be significant change in the difference of IRTIS Readings in Spot A with respect to Spot B and in Spot C with respect to Spot D, before and after the study”.

2 “There will not be significant change in the difference of differences in the IRTIS Readings of Spot A and Spot B with respect to Spot C and Spot D, before and after the study”.

**Reference:**