The collected data by recording of Infra Red Theramal Imaging System (IRTIS) are verified for normal distribution using q-q plots. It is found, the IRTIS recordings are uniformly distributed according to the q-q plots as shown in No. 1 to No. 8. Therefore, paired t test is used with IRTIS thermal recordings before and after the treatment, to see the statistical significance of improvement in the case of patients of back ache.

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. Spot A is chosen in the area of backache in such a way that the spot A is the maximum pain spot. However, other factors, like external factors and other body factors, may also influence the body. To nullify the influence of the other factors with respect to the readings, three separate normal spots (without pain spots) are taken and they have been called Spot B, Spot C and Spot D. Spot B is 2cm lateral to Spot. It is selected to verify the influence of other factors with respect to Spot A. Similarly, to see the influence in the area of spinal column, Spot C is selected which is 5cm vertically above the Spot A. Similarly, to verify the influence of other factors with respect to Spot C, Spot D with a lateral distance of 2cm to Spot C is selected as shown in the figure.
IRTIS recordings are done in Spots A, B, C and D. The real change in the IRTIS readings is found as follows:

1. IRTIS readings in the ‘Spot A’, before and after yoga therapy
2. Difference between IRTIS readings in ‘Spot A’ and ‘Spot B’, before and after yoga therapy
3. Difference between IRTIS readings in ‘Spot C’ and ‘Spot D’, before and after yoga therapy
4. Difference of [Differences in IRTIS readings of Spot A and Spot B] and [Differences in IRTIS readings of Spot C and Spot D], before and after yoga therapy. For example, Difference of IRTIS readings of A and B is AB difference, Difference of IRTIS readings of C and D is CD difference, and difference of differences is difference of AB and CD.

A significant change in readings in the area of backache before and after yoga therapy has been seen and a quantitative statistical analysis was thought of for the purpose of evaluation of yoga therapy and the usage of Thermal Imaging System in the treatment of backache. Already a detailed research is done by finding the ‘Assessment of the Effect of Yoga Therapy on Sinusitis using Infra Red Theramal Imagmg System (IRTIS)’ to lead a doctoral degree.

Therefore, for the statistical evaluation by largely eliminating the influence of other factors, the IRTIS readings are recorded in the Spot A, B, C and D as explained above. The influence of external factors might be same in all the four Spots A, B, C and D. Therefore, 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 gives the change of IRTIS readings due to the influence of yoga therapy.
Therefore in this study, Null Hypothesis are –

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”

At the end of the study, all the subjects have shown substantial reduction in the IRTIS Readings in Spot A from 33 13067°C to 32 557°C with t-stat = 3.338801 and p = 0.002223 eventhough there is a small variation from subject to subject The level of significance is p < 0.05 and the result is statistically highly significant However, other factors can also influence the body with normal variation in different areas of the body To nullify this external influence, difference of IRTIS Readings in the Spot A and the Spot B, is calculated The difference of IRTIS Readings in Spot A and Spot B has reduced significantly from 1.277°C to 0.893°C with t-stat= 5.771015 and p=2.99X10^-6

The before and after IRTIS Readings of Spot C are 32.51233°C and 32.14433°C respectively, with p = 0.065093 The level of significance is 0.05 Therefore, the change is statistically not significant Similarly, the before and after differences of IRTIS readings in Spot C and Spot D are calculated There is no significant change in the differences of IRTIS readings, 0.714°C before and 0.767°C after, with t-stat = 0.66806 and p= 0.509375 Therefore, the first null hypothesis is rejected with respect to Spot A and Spot B

Significant reduction of the IRTIS Readings in Spot A and significant reduction of the difference of IRTIS Readings in Spot A and Spot B clearly show the positive influence of yoga therapy on backache The influence of external factors might be same on all the four Spots A, B, C and D in the variation of IRTIS Readings However, there might be slight variation of IRTIS
recordings in different areas of the body. To eliminate this variation, the difference of differences in the IRTIS Readings of Spot A and Spot B with respect to Spot C and Spot D is calculated. It gives the only variation of IRTIS Readings due to the influence of yoga therapy. The difference of differences in IRTIS Readings in Spot A and Spot B with respect to Spot C and Spot D has reduced significantly after yoga therapy, from 0.632333°C to 0.418°C with t-stat = 2.66766, p = 0.012368, level of significance is p < 0.05 Therefore the second null hypothesis is rejected.

The above result is verified by comparing with Oswestry Disability Index, the most recommended outcome measure for spinal disorders, well known in the assessment of backache. The Oswestry Disability Index also has shown significant reduction in the disability percentage from 56.933% to 8.897667%. This is statistically highly significant with t-stat = 14.85163 and p = 2.17X 10^-15, p < 0.05 The Thermal readings of IRTIS and significant reduction in the disability index percentage prove the relief.

The above experiment followed by the discussion shows, the yoga therapy helped to relieve the backache which is recorded by the Infra Red Thermal Imaging System. Therefore the present research study establishes the efficacy of yoga therapy on backache and the assessment of yoga therapy on backache by using IRTIS.

Reference:
