CHAPTER 5

5.0 MATERIALS & METHODS

5.1 PARTICIPANTS

The EPI data collected by SVYASA University during Meditation and Mudra session were used for the intervention recognition part of analysis. There were 200 records including pre and post Anapanasati meditation taken with and without using the filter (needed to separate physiologic from psychological responses respectively). There were 108 records of the EPI data collected two times a day for 3 days from a Mudra session conducted at SVYASA.

5.1.1 SAMPLE SIZE

- Meditation : 200 records of pre-post

- Mudra: 108 records of pre-post

- Diabetes:115, Non-Diabetes-84

5.1.2 SELECTION AND SOURCE OF PARTICIPANTS

Electro Photonic Imaging data was collected from a diabetic clinic at Bangalore, India from subjects who came for their regular blood sugar measurement. There were a total of 115 subjects diagnosed to be diabetic and 84 non-diabetics. The age of the subjects was between 20- 60 years.

5.1.3 INCLUSION CRITERIA

- All men and women of age group 20 – 60 years diagnosed as diabetic

- All men and women of age group 20-60 years diagnosed as non-diabetic

5.1.4 EXCLUSION CRITERIA

- Alcoholics

- Patients suffering with severe depression

- Duplicate data and corrupted EPI data

5.1.5 ETHICAL CONSIDERATIONS

EPI data was captured from all the ten fingers in sitting position. An informed consent was taken from all the subjects along with the permission from the diabetic center to participate in the study. The data was collected in the morning time from 9 am to 11am from all the subjects .EPI based instrument was used to collect the data (Korotkov, 2014). All protocols are approved by the University Ethics Committee.

5.2 DESIGN OF THE STUDY

This is a single group pre–post study for disease diagnostics and a two group pre-post study with control on intervention recognition.

The design parameters considered for the neural networks based classification are listed below.

- Multilayer perceptron

- Number of hidden layers -1

- Number of neurons in each hidden layer: 50

- Activation functions for hidden and output layers- Hyperbolic Tangent

- Learning algorithms used in training: Back Propagation

5.3 VARIABLES STUDIED

- Variables studied for Mudra Intervention: Area, Normalized Area, Entropy and Intensity.

- Variables Studied for Meditation Intervention: All the 84 variables corresponding to the meridians of the ten fingers with and without the filter.

- Variables Studied for Diabetes: Meridians of the Right and Left Ring Finger and all the 7 chakra data.

5.4 INTERVENTIONS

5.4.1 PRANA MUDRA PRACTICE

Subjects were randomly assigned to either mudra group or the control group by asking them to pick a paper slip that has the group name.

Mudra group practised prana mudra in the same sitting posture and for the same duration. The control group also followed the same procedure, except for not practicing the prana mudra, they sat quietly, closing their eyes for 5 minutes, in a similar sitting posture as described earlier. Pre and post assessments were made on both the groups.

The subjects were explained about the nature of the study and were given basic information about the EPI technique as well as the procedure for assessment. They had to keep all the ten fingers one by one on the glass surface of the EPI equipment and data recorded.

The second part of the study was a pre-post repeated measures study with varying duration of Prana Mudra practice. The practice was for 10 minutes on the first day, 15 minutes on the second day and 20 minutes on the third day.

The EPI variables, included for analysis are as follows Intensity which represents the energy of electrons that are drawn out giving a glow above a threshold (with units in pixel), Area which measures the area of light generated by each finger of the subject in pixels and is a measure of metabolic activity. The variable entropy is the measure of chaos in regulation of biological and physiological functions.

The EPI data was captured from all the ten fingers in sitting position. An informed consent was taken from all the subjects. This study was approved by the Institutional Ethical Committee.

5.4.2 PRACTICE OF ANAPANASATI MEDITATION

Five days of intensive anapanasati meditation was given under the supervision of trained meditators. Subjects practiced meditation for 3 hours 30 minutes daily for five days; 2 hours in the morning from 5 am to 7 am and in the evening from 7 pm to 8.30 pm consistently. Demographic information was collected to know their self-reported health status, age and earlier meditation experience.

EPI Electro Photonic Imaging (EPI) known as GDV (Gas Discharge Visualization, "EPI-camera" instrument produced by "Kirlionics Technologies International," Saint-Petersburg, Russia [GDV camera Pro with analog video camera, model number: FTDI.13.6001.110310], along with IBM SPSS R statistical packages Version 20.0 was used to collect data and process for statistical analysis respectively. Temperature and humidity were also measured (using a hygrometer -

Equinox, EQ 310 CTH) to account for undue effect of atmospheric influence during pre and post data collection time. Demographic sheets were administered to all subjects to obtain self-reported health status, age, meditation practice experience and for assigning to the groups.

5.4 DATA EXTRACTION

The Finger data has coronal discharges corresponding to meridians of the ring fingers of both the hands. The meridians correspond to Hypophysis, Thyroid gland, Pancreas, Adrenal, Urino-genital system, Spleen, Nervous system and Hypothalamus, which constitute 8 dependent variables.

The chakra data corresponds to the energy centers called chakras. There are seven chakras and the EPI instruments dumps out a value in terms of pixel units supposedly related to the size of the chakra. The data set has seven dependent variables for analysis. The variable names are the names of the chakras (i.e. Muladhara, Svadhisthana, Manipura, Anahata, Vishudha, Ajna and, Sahasrara).

The data in the third category has the energy numbers corresponding to the various organs and organ systems. Energy data corresponding to the Head, Cardiovascular system, Endocrine system, Urino genital system, and the Immune system are some of the variables considered in this category.

5.5 DATA ANALYSIS

Three categories of data were analyzed using IBM SPSS Ver 20. They are Right and Left Ring Finger data, Chakra data, Organs and Organ system data.

The means and standard deviations of the 3 categories of data were analyzed using general linear model in IBM SPSS. A built-in neural network classifier from IBM SPSS was used to classify

diabetic subjects from non-diabetic subjects. Multivariate tests were done to find out the statistical significance of the difference in mean values of each of the variables. Receiver operating characteristics (ROC) was also plotted for each of the variables and for the output of the neural network.

The "save predicted values for dependent variable" feature was selected to test the accuracy of neural network predictions for multiple runs. The IBM SPSS neural network uses 70% of the samples randomly, from the given data for training. It uses the remaining 30% of the data for testing the trained network. The classification report partitions the training and hold out records and gives the details of the accuracy of training for each of the dependent variable.

EPI data collected before and after the Mudra and Meditation intervention were analyzed using paired sample t test and independent sample t test between Mudra and Control groups. The significant variables then were used in training the neural network for classifying the pre and post mudra and Meditation samples.