CHAPTER- IV

METHED & PROCEDURE
The present study aims at testing the effectiveness of yogic practices on stress of senior secondary school students.

STATEMENT OF THE PROBLEM
The problem under investigation in the present study is stated as under:

*Impact of Yogic Shatkriyas, Pranayamas and meditation on reducing stress of Senior Secondary Students.*

OPERATIONAL DEFINITIONS

**Shatkriyas**
Shatkriyas is made up of two words ‘Shat’ and ‘Kriyas’, which means six Kriyas, with the help of these Kriyas the unwanted waste products are removed. Shatkarma or Shatkriyas form a part of Hatha yoga. They are the six purificatory techniques for the cleansing up of internal bodily organs. These six techniques are Dhauti, Basti, Neti, Nauli, Kapalbhati, and Trataka. In the present study only two of them namely: Kapalbhati and Trataka have been taken up.

**Kapalbhati:** The word Kapal means ‘cranium, ‘forehead’ or ‘frontal lobe of the brain’. Bhati means ‘light’ or ‘splendour’ and ‘to shine’. Thus translated literally its name means ‘skull shining’ exercise. Kapalbhati is one of the six Kriyas or purification practices. In Kapalbhati, the forced exhalation rids the lower lungs of stale air, making way for a fresh intake of oxygen, rich air and cleansing the entire respiratory system.

**Trataka:** Trataka means to gaze steadily. There are two forms of the practice, one is Bahiranga or external Trataka and the other is Antaranga or internal Trataka. Bahiranga is simpler to practice because one just has to gaze at an object or symbol. However, Antaranga Trataka involves clear and stable inner visualization of an object.
**Pranayamas**

Pranayama is a sort of yogic breathing exercise, which teaches to control breath or prana and thus to control the mind. It follows that by controlling the breath (Pranayama) one can learn to control one’s state of mind. By regulating, the breathing pattern not only the intake of oxygen and prana is increased in the body, but this also prepares one for the practice of concentration and meditation.

According to Hatha yoga text when prana moves, chitta (the mental force) moves. When prana is without movement, chitta is without movement, by this (steadiness of prana) the yogi attains steadiness and thus restrains the vayu (air).

There are eight techniques of Pranayamas, which are: Suryabhedhan, Shitkari, Sheetali, Bhastrika, Moorcha, Plawini, Anulom-Vilom and Bhramri. In the present study only the two of them namely: Anulom – Vilom and Bhramri have been taken up.

**Anulom – Vilom (Nadi-Shoudhan):** The word ‘Nadi’ means ‘channel’ or ‘flow’ of energy and Shoudhan means ‘purification’. Nadi shodhana, therefore, means that practice which purifies the nadis. Nadi is a tubular organ of the body like an artery or a vein for the passage of prana or energy.

**Bhramri:** Bhramri means breathing pattern with humming like a bee. After clear inhalation, one has to breathe out with vibrating the throat and nasal area. In Bhramri Pranayama, one has to breathe out with longer exhalation, which is much beneficial for the management of tension and stress related problems.

**Meditation**

A steady, continuous flow of attention directed towards the same point or region is meditation (Dhyana). It means that Dhyana is an uninterrupted flow of the mind towards the object chosen for meditation.

Transcendental meditation is a technique for expanding conscious awareness and for reducing stress and tension. The word “Transcendental” means, ‘going beyond’. The technique claims to take the practitioner beyond the general awareness coupled with heightened awareness.
METHODOLOGY OF THE STUDY

Design of the study

A pre-test, post-test, control group, randomized subjects, experimental design has been employed to conduct the present study. Subjects were assigned randomly to the different experimental and control groups. Further treatments were randomly assigned to different experimental groups. Shatkriyas, Pranayamas, Meditation and collective practices were independent variables and academic stress was the dependent variable. Training in Shatkriyas, Pranayamas, Meditation and combination of these three practices was given to the four experimental groups for three months whereas no training was given to the control group.

FIGURE 4.1: Diagrammatic Layout of the Design
SAMPLE

Two-stepped randomized sampling technique was used in the present study. The details are:

Initial Sample

In the Initial sample, 400 adolescent male and female students studying in 11th standard in Govt. Model Senior Secondary School, Sector 46-D, Chandigarh were taken up. They were administered Raven’s Standard Progressive Matrices (1988), Bisht Battery of Stress Scales by Abha Rani (1987) and Short Term Memory Test by B.B. Asthana (1982). On the basis of test score, those adolescents who were:

a) in the age group of 14-16 years.
b) with average intelligence,
c) with stress score 70 & above

were included in the final sample.

Final sample

Final sample consisted of 100 adolescent students in the age group of 14-16 years studying in 11th standard in Govt. Model Senior Secondary School, Sector 46-D, Chandigarh with average intelligence and high academic stress. Twenty students were assigned randomly to each of five groups four experimental and one control group.

HYPOTHESES

The study was designed to test the following hypotheses:
I. There would be differentials in the level of academic stress between male and female senior secondary students.
II. Yogic Shatkriyas would be effective in reducing academic stress of senior secondary students.
III. Pranayamas would be effective in reducing academic stress of senior secondary students.
IV. Meditation would be effective in reducing academic stress of senior secondary students.

V. Yogic Shatkriyas, Pranayamas and Meditation trio would be effective in reducing academic stress of senior secondary students.

VI. There would be differentials in the effectiveness of yogic Shatkriyas, Pranayamas, Meditation and Collective Approach in reducing academic stress of senior secondary students.

VII. There would be an increase in the intelligence of senior secondary students as a side effect of reduction in academic stress.

VIII. There would be an increase in the memory of senior secondary students as a side effect of reduction in academic stress.

TOOLS USED

After clear conceptualization of the various aspects of the problem under investigation, a thorough search was made to find out the most appropriate tools in the form of inventories, scales and questionnaire. Review of the literature available and discussion with the experts in the field revealed that the following three tools were most appropriate:

1. Bisht Battery of Stress Scales by Abha Rani. [1987]

DESCRIPTION OF TOOLS

Bisht Battery of Stress Scales (BBSS)

The BBSS was developed and standardized by Bisht (1987) for the measurement of thirteen types of stresses. Out of 13 scales, “Scale of Academic Stress” was selected for the present study. The Scale of Academic Stress (Appendix II) contains 80 items. For development and standardization purpose, six approaches were adopted for the scales of Battery, viz. methodological approach, theoretical approach, rational approach, static approach, empirical approach and normative approach. For developing the battery of stress scale, idiographic method was taken because
this is widely used method of measuring stress. It measures stress through subjective feelings of distress or interpretative perceptual responses. Stress was conceptualized as having following components: a) Frustration, b) Conflict, c) Pressure, and d) Anxiety. The inventories for different types of stresses were prepared in Hindi. The items were distributed over the four components of the different types of stresses.

**Scoring:** For scoring, the five-point scale is selected because it takes into account the average category too. The two continua are taken: one is of frequency i.e. Always (a), Often (O), Sometimes (S), Rarely (R) and Never (N). The other is of quantity along with which items are located in terms of quantity i.e. Very much (VM), Much (M), So-so (SS), Little (L) and Not at all (NA).

The positive items of the Scale of Academic Stress are:

1, 2, 3, 4, 5, 8, 9, 11, 13, 17, 18, 20, 22, 24, 25, 26, 27, 28, 30, 31, 32, 34, 35, 36, 37, 38, 40, 41, 43, 44, 45, 46, 48, 50, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 64, 65, 68, 70, 72, 73, 76, 77, 79 and 80. Rest of the items are negative statements and are scored in an inverse manner. There are 26 items of Academic Frustration and these are: 2, 5, 7, 15, 18, 20, 22, 25, 33, 39, 44, 45, 46, 50, 52, 55, 56, 57, 62, 63, 67, 68, 69, 72, 75, 77. Number of items of Academic Conflict is 15 and these are: 8, 11, 16, 21, 24, 28, 37, 41, 42, 43, 47, 54, 59, 71, 79. Number of items of Academic Pressures is 24 and the items numbers are: 3, 4, 6, 10, 14, 23, 26, 29, 31, 32, 34, 35, 38, 53, 58, 60, 61, 64, 70, 73, 74, 76. Further, there are 15 items of Academic Anxiety and items numbers include 9, 12, 13, 17, 19, 27, 30, 36, 40, 48, 49, 51, 65, 66, 80. The total score on academic stress was obtained by adding the scores of these four areas. Percentile-norms were established for the scales of the battery. The corresponding grouping of low, average and high stress in terms of percentiles for interpretation is:

- **Low stress** - $P_{30}$ or below
- **Average stress** - $P_{31}$ to $P_{69}$
- **High stress** - $P_{70}$ or above.
Reliability of the Scale: Normative data were collected from a sample of 300 students of class IX and X in the age group from 13 to 17 years. Reliability of the scales of the battery was calculated in three ways for knowing:

i) Dependability i.e. short term test-retest correlations,

ii) Stability i.e. retest after a longer interval and

iii) Internal consistency i.e. split – half correlations.

Dependability, stability and internal consistency coefficients for the scale of academic stress were 0.87, .82, and 0.88 respectively. Internal consistency coefficients (correlation between total and component scores) were 0.37, 0.52, 0.39 and 0.58 for frustration, conflict, pressure and anxiety respectively. All these correlations were found significant at the 0.05 level of confidence.

Validity: Content validity and item validity were determined. Construct validity (discriminability) was estimated in two-fold fashion. The first type tested if the construct measured differentiated students on some related construct. For this, memory was taken as the related construct. The second type tested if the construct measured by the scales was not related to the construct predicted by the theory. For this, internal evaluation was taken. In both, the construct validity was affirmed. The methods of selecting items support the fact of item validity.

Transferability: For this, the 100 students of Almora district and same number from Lucknow district were drawn. The means of various scale scores were tested for difference by t-test. The non-significant t-value indicated that items of scales were not concentrating on one kind of situation and they can be used across different populations.

The Short Term Memory (STM) Test

The Short Term Memory (STM) Test by B.B Asthana consists of 24 CVC trigrams prepared in such a way that eight CVCs have an association value of more than 80 (72 to 97; M = 81.00; High association value); and eight CVC have an association value of 45.00 (Moderate AV); and eight CVCs have an association values less than 8 (3 to 13, M = 8.10; low AV). These 24 CVCs are randomly assigned to the presentation and test phase.
Scoring: The data are recorded on a data sheet (Appendix III) and the responses are arranged in a Table format to enable statistical analysis.

The 24 cvc are arranged in random order. The independent variables of time and association value are predetermined. The last two columns are for recording the response in terms of association value and recall. After the data has been recorded and arranged in Table, the percentage recalled for (i) Time and (ii) Association are calculated and compared. Finally, the results are interpreted in terms of decay theory and interference theory.

Raven's Standard Progressive Matrices (SPM)

Raven's Standard Progressive Matrices, (1988) is used internationally and consists of five sets (A, B, C, D and E) meant to test a person's capacity for apprehending meaningless figures, seeing relation between them, completing each system of relations presented and developing a systematic method of reasoning. It is a non-verbal test of mental maturity.

The scale consists of 60 problems, that is, twelve in each of the five sets. Each problem consists of an incomplete figure or an incomplete design with various alternative responses. The subject is to select the best 'missing piece' to complete the figure or the design.

The scale can be used for children as well as the adults of average or more than average intellectual ability. A person's total score furnishes an index of his intellectual capacity.

It has a test retest reliability, which varies with age from 0.83 to 0.93 with the higher values being associated with younger subjects. It correlates .86 with the Terman Merrill Scale and has a 'g' saturation of .82.

Under normal condition, after maturity is reached, the scores on the Vocabulary test tend to remain constant, at least up to the age of 65 years. Scores on the Matrices test reach their maximum somewhere about the age of 14, remain constant for about 10 years, then begin to decline slowly, but with remarkable uniformity. Physical or mental illness does not seriously affect the test retest reliability of the SPM. In the relatively, few cases where it does, the cause has usually been traced to temporary toxic effect or to permanent
brain damage. Raven's Standard Progressive Matrices was first prepared in 1938 and no general revision of it has been required except for minor variation in 1947 and 1956.

The concurrent and predictive validities of SPM vary with the age, possibly sex, and homogeneity of the sample, the method of the assessment of the criterion to which the test was related and the reliabilities of the test and criterion measured in the context considered. The external criterion commonly adopted in the predictive validity investigations is scholastic achievement assessed some time after the administration of the SPM. Validity coefficients reported in studies with English and non-English speaking children and adolescents generally range up to +0.70.

Scoring of the test is very easy and requires the use of only one scoring stencil. The raw scores can be used as such or converted into percentiles. The results obtained in the form of percentile scores can be interpreted into five broad categories; 'intellectually superior', 'definitely above average in intellectual capacity', 'intellectually average', 'definitely below average in intellectual capacity' and intellectually impaired'.

PROCEDURE OF DATA COLLECTION

The data of the present study were collected in four phases given as under:

Phase I – Pre-test: The process was started on 15th July, 2003. In the first phase, 400 adolescent students in the age group of 14-16 from 11th standard of Govt. Model Senior Secondary School, Sector 46-D, Chandigarh were taken up. They were administered Raven's Standard Progressive Matrices (1988), Bisht Battery of Stress Scale by Abha Rani (1987) and Short Term Memory Test by B.B. Asthana (1982). On the basis of test scores, those 100 subjects who were having average intelligence and high academic stress were selected for final sample. Out of 100 subjects who were included in the final sample, 20 subjects were randomly assigned to each of the five groups (four experimental and one control group). Further, treatments were randomly assigned to different groups. Homogeneity of the final sample was tested with the help of ANOVA.
Phase II: In the second phase, the subjects were given an orientation by the researcher. She explained in detail about the purpose, of the present study and procedures of the experiment. She assured them that their scores would be used for research purpose only. The subjects were told the advantages of yogic practices. Step-wise technique of performing each of Shatkriyas, Pranayamas and Meditation was demonstrated to them. The subjects were not allowed to undergo any other treatment or systematic training program during the intervention period. They were asked to be regular and punctual throughout the experiment duration.

Phase III: The experimental treatment comprised Kriyas, Pranayamas, Meditation and Combined Procedure. All the four experimental groups, i.e. EG1, EG2, EG3 & EG4, were given regular training in Shatkriyas, Pranayamas, Meditation and Combined procedure for 10, 10, 20, and 40 minutes daily for 3 months. Separate instructions were given to all the experimental groups given as under:

Instructions given to the subjects of EG1 who were provided training through Shatkriyas while performing Kapalbhati

“Assume a meditative pose. Sit erect, keeping the body steady with head, neck and the back in straight line. One round of Kapalbhati comprises: two normal breaths, quick sharp jerky and audible exhalation with upward and inward movement of the stomach muscles, smooth passive and silent inhalation with relaxation of abdominal muscles. This process is repeated in quick successions for 15 to 20 times maintaining steady rhythm and emphasizing on the exhalation. This is followed by one round of normal inhalation and exhalation and the next round of complete inhalation, retention (as long as one can retain without feeling uncomfortable) and slow exhalation. If pain or dizziness is experienced, stop the practice and sit quietly for some time. When the sensation has passed, recommence the practice with more awareness and less force. If the problem continues, consult me immediately”, It was taken care of that Kapalbhati practiced only empty stomach, 3 to 4 hours after meals. (Those suffering from heart disease, high blood pressure, vertigo, epilepsy, stroke, hernia or gastric ulcer should not practice Kapalbhati.)
Instructions given to subjects of EG₁ who were trained through Shatkriyas while performing Trataka

“Sit in Sukhasana about three feet away from the object. Place a burning Deepak or candle, a flower or a black dot in front of eyes. Look at the object without straining the eyes. Hold back the winking of the eyes. When the eyes are tired or they shed tear, shut them and imagine the picture of that object between your eyebrows. Put your palms slowly after sometime”. Care was taken that Trataka was practiced on a steady flame and there was no draught in the vicinity. The subjects were cautioned to avoid undue strain. The ability to keep the eyes open without blinking was developed gradually with consistent practice.

Instructions given to EG₂ who were provided training in Pranayama through Anulom – Vilom or Nadi shoudhan

“Sit in any comfortable asana. Close the right nostril with your thumb and start inhaling through the left nostril very slowly. Close your nostrils with your thumb and ring finger and hold your breath inside. Then open the right nostril and exhale the air slowly. Now again breath through the right nostril, retain your breath inside and after that exhale through the left nostril. Depending on the phase of the moon, one of the two nostrils usually becomes strongly dominant during the time of sunrise and sunset. This is a period of intense nostril ‘breath’ activity and it is not advisable to alter the flow at this time. Do not take forced break under any circumstance. Never breathe through the mouth. Proceed carefully.” At the slightest sign of discomfort, the subjects were asked to reduce the duration of inhalation / exhalation / retention and, if necessary, discontinue the practice for the day.

Instructions given to EG₃ who were provided training in Pranayama through Bhramri Pranayama

“Sit in any meditative posture. Siddhasana is the best posture. Prepare the mind for this Pranayama. With the index finger of both the hand, close the ear. Now, breath in slowly and completely. Now, exhale and while releasing the breath, make sound like a honeybee. The sound is produced by saying Aum (Om) with giving a little time to ‘o’ then ‘m’, and the whole left time to humming sound repeating it from 7 to 10 times. While performing this
Pranayama keep, spine and neck straight in one line and keep the eyes closed and body relaxed. The sound should be produced in constant speed. After the practice is over try to listen the “Om” inside yourself. Nails of the fingers should be properly cut. Feel the vibration in the brain and skull, and temporal region – by keeping one hand on parietal’s front part.”

Instructions given to subjects of EG3 who were trained through Meditation

“Imagine that nothing exists outside this room. You feel completely insulated from the outside world and free to explore your inner world. You turn all your attention inward, concentrating your thought, energy, on the center of the forehead. You feel a sense of detachment from your physical body and the physical surroundings. You become aware of the stillness around you and within you. You feel that the natural peacefulness begins to steal over you. Waves of peace gently wash over you, removing any restlessness and tension from your mind. You concentrate on this feeling of deep peace. Just peace.... peace is your true state of being. Your mind becomes very calm and clear. You feel easy and content.”

Before actual meditation session, it was made sure that subjects were not wearing tight clothes as tight clothes interfere in the breathing process. Also, a reasonable amount of space was around them so that furniture or other objects do not disturb.

Instructions given to subjects of EG4

The subjects of this group were given separate instructions in Shatkriyas, Pranayamas and Mediation as they are provided training through the combined procedure of these three Yogic practices. (Detailed instructions along with precautions are given in Appendix IV).

Phase IV - Post-test: In the fourth phase, Raven’s Standard Progressive Matrices (1988), Abha Rani Bisht Battery of Stress Scale (1987) and B.B. Asthenia’s Short-Term Memory Test (1982) were re-administered to find out if there were any significant differences in the scores of all the students because of treatment provided to the them.
STATISTICAL ANALYSIS

Following statistical techniques were employed for testing research hypotheses:

1. Descriptive statistics namely, Mean and SD for all variables were obtained.
2. Analysis of variance was worked out to test homogeneity of the experimental and control groups and find out variance between treatment techniques.
3. ‘t-test’ was applied to test the effectiveness of different yogic techniques.
4. Graphic representation was done wherever necessary.

TABLE OF CODES

The variables (Vs) with their corresponding codes used for the purpose of experimental study has been presented as under:

1. Experimental Group₁  EG₁
2. Experimental Group₂  EG₂
3. Experimental Group₃  EG₃
4. Experimental Group₄  EG₄
5. Control Group  CG
6. Variables  Vs
7. Transcendental Meditation  TM
8. Shatkriyas  SHK
9. Pranayamas  PRYM
10. Meditation  MDT
11. Academic Stress  AS
12. Eclectic  ECT
13. Asanas  ASN
14. Psychology  PSY
15. Physiology  PHY