CHAPTER 3

METHOD

The present study aims to study the effect of mindfulness on attention, learning and memory among adolescents. Present study is of interventional nature, as it tries to manage and maintain the attention, learning and memory. The present chapter gives a detailed account of the research method used to carry out the study. The description of various methodological aspects has been presented under various headings:

- Sample
- Measuring Instruments
- Administration of Tests
- Procedure
- Statistical Analysis

3.1 SAMPLE

The sample of 600 subjects for the present study was drawn from various schools of Hisar district in Haryana. A total of 600 subjects were drawn and equal numbers of male and female subjects were taken in sample for the study. After the screening of 600 subjects, 60 subjects were chosen for intervention having low level of attention, learning and memory. The age of subjects ranged between 13 to 16 years.

3.2 MEASURING INSTRUMENTS

The measures used in the study were selected in accordance with the objectives of the study. These measures are related to both verbal and non-verbal tests which were selected to assess the variables of the study such as intelligence, attention, learning and memory. The brief description of the measures used in the study is as under:

A). Standard Progressive Matrices (Raven, Court and Raven, 1996)
B). The d2 Attention Test (Brickenkamp & Zillmer, 1998)
C). Serial Learning (Janbandhu & Deshmukh, 1985)
D). Digit Span Memory Test from Wechsler Intelligence Scale for Children III (Wechler, 1992)

3.2.1 Standard Progressive Matrices

Standard Progressive Matrices (SPM) is a non-verbal assessment tool which was originated by Raven, Court and Raven, (1996) for the measurement of Intelligence. It consists of 60 diagrammatic puzzles. These puzzles are equally divided into five sets (A, B, C, D, and E) and each contains 12 items. Each puzzle has a part missing and in it subject’s task is to identify the missing part of the diagram from several alternatives. All subjects are given exactly the same series of problems and asked to work at their own speed. It is an untimed capacity test and the total score provides an index of intellectual capacity. Raven provided test-retest coefficients range from 0.80 to 0.93. Chronbach’s Alpha Coefficient of 0.89 and a Spearman Brown value of 0.74 and the internal consistency were found satisfactory (Raven et al. 1983). Concurrent validity correlations between SPM and Binet and Wechsler scale range from 0.54 to 0.86. A study reported the SPM correlation with other verbal and performance tests and findings revealed the coefficient .40 and .75 respectively. Various factorial analyses recommended that the SPM has been heavily loaded with a factor common to intelligence measures (Anastasi, 1997). Calculations of Standard Progressive Matrices are based on raw scores. Each of the 60 items were scored as 0 for incorrected or 1 for corrected. Total score is converted into percentile score which translated into IQ respectively according to norms table.

3.2.2 The d2 Attention Test

The d2 attention test has been developed by Brickenkamp & Zillmer (1998) to measure the selective attention and mind concentration in response to the discrimination of similar visual stimuli while selectively orient to relevant aspects in task and paying no attention to irrelevant tasks as well as performing so precisely and quickly. This test includes only one form which can be administered either individually or in group. This test can be administered on age group of 9 to 60 years. It comprised 14 lines with 47 characters for a total of 658 items. These includes characters “d” and “p” with one to four little dashes set either individually or in pairs above or below each letter. The subjects need to identify and cross out all “d’s” with two dashes. The d’s” with two
dashes considered as the relevant elements in this test and others two combinations which are the “p’s” (with or without any dashes) and the “d’s” (with one or with no any dash) considered as irrelevant elements since they should not be crossed out. The subject is permitted 20 seconds for each line. The internal stability of test proved to be very high (r>.90) and test-retest reliability also demonstrated satisfactory (r >.70). Many researches support the multiple clinical and empirical applications of the d2 test. For example, d2 test has been used in study of the remediation of attention deficits (Penkman, 2004), the neuropsychological markers of schizophrenia in adolescents (Stolz-Born, Heinrich, Kornhuber, & Born, 1992; Klemm, Schmidt, Knappe, & Blanz, 2006), the neuropsychological effects of irradiation for childhood leukemia (Langer et al. 2002). The d2 attention was scored with the help of two scoring keys 1 and 2 that are placed in the upper and lower lines so that the number is read off on the scale. The resulting score are TN i.e. total number of elements attempted on the 14 lines. Scoring Keys 1 computed E1 which is number of mistakes due to omission and scoring key 2 counted errors of commission. Then numbers of errors are added for each column (E = E1 + E2). For overall performance of d2 attention test; firstly, TN-E has been measured i.e. resulted from subtracting the number of errors (E) from the total numbers of characters processed and secondly, CP i.e. concentration performance which is derived by subtracting the type 2 errors (E2) from the number of correctly crossed out relevant items has been calculated. Standard Scores and percentile ranks can be determined by the raw scores from the appropriate norms table.

3.2.3 Serial Learning

Serial Learning is an experimental procedure developed by Janbandhu and Deshmukh (1985). This is an experiment in learning which includes a list of 10 nonsense syllables (CVC trigrams). In this experiment firstly subjects were shown the list of CVC combination and asked to pronounce the syllable that would follow the preceding one. In it subject recalls the list in serial order. In this experiment, first trial is considered as a learning trial, consist ‘no responses’. From the second trial onward the trials taken by subjects are noted down. The subjects were given trials till the time they were not able to recall complete list in serial order. The more the number of the trials taken by subjects, the more the time subjects will take to learn and recall which indicates slow learning. In this experiment, total numbers of trials were noted.
3.2.4 Digit Span Memory

Digit span memory test is the subtest of the Wechsler Intelligence Scale for Children III by Wechsler (1992). This subtest includes two parts a) digit forward and b) digit backward items. In it the researcher reads a series of numbers to the subject. In first part subject’s task is to listen and then recall these numbers correctly in sequence order as spoken by researchers. In second part, the subjects listen to a sequence of number and recall them in reverse order (Digit backward). The lengths of digit sequences begin with 2 digits, and two trials are given at each increasing list length. In both parts length of digit sequences increases as child responds correctly. Maximum scores of digit forward are 16 and of digit backward are 14. The average split-half reliability coefficient across all age group for digit span was .90 with an average standard error of measurement of .94. Digit span exhibited moderate criterion validity when correlated with the Stanford – Binet IV composite score (\( r = .48 \)) and Stanford – Binet IV short term memory (\( r = .52 \)) (Wechsler, 1997). In this test one score has been given to each correctly repeated digit forward items and digit backward items and then final score is total numbers of trials of both digit forward items and digit backward items.

3.3 ADMINISTRATION OF TESTS

The subjects were administered above described tests namely the standard progressive matrices, the d2 attention test, serial learning and digit span memory test. The subjects were approached directly in their institutions for data collection. They were tested in small groups ranging from 10 to 15 subjects or individually after obtaining their willingness to participate in the study.

The general testing conditions were satisfactory and atmosphere was uniform all through. Subjects were encouraged to respond in a realistic way without rumination on all tests too much. A good rapport was established with them in order to get real position on the measuring instruments. They were told about the importance of the study and that the data collected will not be made public, rather confidentiality of their responses will be maintained. Subjects were informed that their position on different behavioral measures would be intimated to them, if they desire so. Though there was no time limit, subjects were asked to complete the tests as early as possible. They generally completed serial learning task in 15 to 30 minutes, intelligence in 20 to 30 minutes, and digit span in 10 to 20 minutes and the d2 test is a timed test in which 20
seconds per line are allowed. The instructions and administration procedures were same for all the subjects, and in accordance with described by the respective test authors.

3.4 PROCEDURE

Before the beginning of intervention, the sample screening was done on a sample of 600 students. For measuring intelligence, standard progressive matrices by Raven, Court & Raven (1996) has been administered. In present research, intelligence has been used as a control variable to know about the normal IQ of the subjects. For the measurement of attention, the d2 attention test by Brickenkamp & Zillmer (1998), for learning, serial learning by Janbandhu and Deshmukh (1985) and digit span memory test by Weschler (1992) for the assessment of memory have been administered on students. These pretest tools were administered on students to measure the levels of decided dependent variables. The mindfulness procedure was being applied for a period of 6 months on students (N=60) having low score in attention, learning and memory. After 6 months’ training program, post testing was done on all the three variables i.e. attention, learning and memory.

Before Mindfulness practice, an orientation program for fifteen days has been designed for the subjects with the help of breathing exercises and imaginary techniques. At initial level, students were instructed to concentrate their attention towards the things present in their environment with the help of breathing exercise and imaginary techniques. Firstly they were instructed to notice and observe whatever sounds they heard from the external environment for example, sound of footsteps of passing person outside the room, ringing of bell, chirping of birds, any type of vehicle sound, sound of bench, noise of door etc. This procedure has been continued for a week for approx. 30-40 minutes per day. After that, students were asked to observe the movements of the children sitting around them, like sound of scrapping, sound of yawning, coughing. This procedure continued for seven days. In next session, with closed eyes they were asked to focus the attention on their own actions for instance, shaking of body, movement of hands, changing of body position etc.

After an orientation program, mindfulness training was imparted to the students. Mindfulness training focuses on various aspects such as external environment, understanding of the body, giving attention to thoughts, feelings and mind and
meditative exercise. The following are some exercises which were adopted by subjects during 6 months intervention program.

1. **Mindfulness of the Environment:** At initial level, Mindfulness Training directed the attention of the subjects towards the things present in their environment. The following two exercises were introduced in this section.

   **A) Awareness of objects:** In first exercise, subjects were shown an object (e.g. clock, scenery) and asked to draw it. They were educated to spend their time by observing the object and focusing attention to minor and major details. Next day, same procedure was repeated. They were instructed to compare the drawings and were also asked to recognize the missing details of the first drawing that they memorized in the second time. This procedure was followed for seven days for 30-40 minutes a day.

   **B) Awareness of self in the environment:** In this exercise subjects were asked to focus attention on themselves or their experiences in the environment. This session was conducted in evening in which subjects were instructed to remember and put in writing all the moments and activities step by step which they did from morning to evening. They repeated this exercise for seven days and paid attention to their whole day activities and added new things from the previous one.

2. **Mindfulness of the Body:** The next exercise was to focus on their body awareness. This session follows three steps:

   **A) Attending the Senses: The raisin meditation:** This step involves awareness of personal experiences of an object. For example, subjects were given 3 raisins and instructed to bring their attention on first raisin and observe carefully as if they had never seen it before. They were asked to observe the thoughts and feelings regarding raisin while looking at it. After that they were asked to smell the raisin, and put it into their mouth, chew that slowly and feel the actual taste. They were instructed to consciously experience their all thoughts, feelings, smell and taste of the raisin. Later, they were instructed to repeat the same procedure with second raisin considering it as the first raisin which they have ever seen. Same procedure was followed with third raisin. This exercise was
also continued for seven days with another small food items such as popcorn, almonds and chocolate etc.

B) **Awareness of movement:** In this step subjects were asked to pay attention to their own body while interacting with environment. They were instructed to move around the room and to become aware of each movement of their body posture e.g. feeling the movement of thigh muscles, movement of hands and arms and realizing each and every movement of footsteps from the floor and setting it in return. It was also noticed that they were moving slowly or fastly at times. They were also instructed that if their thoughts begin to wander from their body, they should observe it and return their attention on their body parts.

C) **Meditation on the breath:** This 10 days exercise begins with a simple practice of breathing exercise. In this step subjects were asked to notice the movement of their breath in all parts of their body (lungs, stomach, ribs, chest, and shoulder). They were asked to be aware of the natural rhythm of the breath, how fresh air comes into the nose and warm air is breathed out. Later on, subjects were instructed to count how many breath they inhaled. One breath equals one inhalation plus an exhalation. They were told to avoid distracting thoughts and only to pay attention to their breath. This exercise focuses on the current breath and effectively enhances the subject’s awareness on the present moment.

3. **Mindfulness Meditation:** Mindfulness meditation focused on the present moment, although having awareness regarding internal sensation, thoughts and feelings. This mindfulness meditation process follows under the headings:

A) **Attending to the thinking process:** The purpose of this exercise is to bring subject’s awareness to their thoughts and feelings. Subjects become aware that how they are the architect of their personal thoughts. They were instructed to close their eyes and wonder what their next thought is going to be so that they become very observant and wait for the afterwards thought. This exercise has been continued for 10 days.

B) **Meditation on the bubble:** Subjects were instructed to observe their thoughts, release them and let them go without any judgement. For this, subjects continued the meditation in silence for a few minutes. After that they were asked to envision the bubble slowly rising up in front of them. They were told to
visualize as if each bubble contains thoughts, feelings and perception. They were asked to notice the first bubble rising up and observe every thought slowly floating away with bubbles. The procedure was same with each bubble. Then they were asked to observe their mind going blank, and then visualize the bubble rising up with “blank” inside and slowly floating away. Another example like imagination of clouds was also included. This procedure has been continued for 10 days.

C) Visualization Meditation: Finding a safe heaven: This exercise is related to visualization in which subjects were instructed to visualize a place that they feel contented, peaceful and soothing. It might be a beach, lake, temple and their bed. Slowly the place is becoming clearer to them. They were asked to look at the surrounding of that place and walk around the place. They were asked to stay focused on that place, look closer at certain things and observe their own feelings. If they found that their thoughts were wandering, they were asked to monitor them, and then try to bring the image back in their place into focus in front of them. Further, they were told that when they feel relaxed, they can open their eyes.

3.5 STATISTICAL ANALYSIS

The obtained data were subjected to various statistical analyses. These are descriptive statistics, Pearson product moment method of correlation and t-test.