Chapter-3

METHODOLOGY
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The techniques researchers use to structure a study and to gather relevant information and analyse them with reference to the selected research problem is referred to as research methods. A sound methodology is the most important determinant of a successful research project. Research methodology deals with all the systematic ways and specific steps in doing the research.

This chapter explains the research approach, research design, settings of the study, population, sample, sampling process, criteria for sample selection, data collection instruments, pilot study, data collection procedure and the plan of data analysis.

3.1 Research approach

The present study aims to measure the effect of Laughter Yoga on selected psycho physiological variables among the elderly clients residing in the old age homes of Kottayam District, Kerala. The Quantitative experimental approach was found to be suitable to accomplish the objectives of the study.

3.2 Research design

The research design is the overall plan for obtaining answers to the research questions. Research design indicate how often data will be collected, what types of comparisons will be made, and where the study will take place. The research design is the architectural back bone of the study (Polit 2012).

The design adopted by the researcher for the present study is basic pre test post test experimental design with repeated measurements in between the intervention at specific time intervals. As per the notation of Campbell and Stanley
The present study design can be diagrammatically represented in the following way.

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\text{R } P_1 O_1 \times P_2 O_2 \times P_3 O_3 \times P_4 O_4 \times P_5 O_5 \text{ Experimental group}
\]

\[
\text{R } P_1 O_1 \rightarrow P_2 O_2 \rightarrow P_3 O_3 \rightarrow P_4 O_4 \rightarrow P_5 O_5 \rightarrow X \text{ Control group}
\]

R- Randomization

P- refers to immediate pre and post interventional assessment of physiological variables

O- refers to measurement of psychological variables

X- refers to intervention (Laughter yoga).

\[
\text{RP}_1 O_1 \text{- Pre test}
\]

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P_2 O_2 \text{- Measurement after 2 weeks}
\]

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P_3 O_3 \text{- Measurement after 4 weeks}
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\[
P_4 O_4 \text{- Measurement after 6 weeks}
\]

\[
P_5 O_5 \text{- Measurement after 8 weeks}
\]

The researcher was trying to measure the effect of Laughter Yoga on selected psychological variables -- depression, subjective well-being and Morale and the selected physiological variables, heart rate, BP, respiratory rate, blood oxygen saturation, body surface temperature and ECG, of the elderly clients living in old age homes of Kottayam district. The effect of continuous practice of Laughter Yoga on the above mentioned variables was assessed with a time interval of 2 weeks for a period of 2 months. The control group subjects had assessment at the same time interval as that of the experimental group. But they were not receiving the intervention.
The control group was also taught the technique of Laughter Yoga after all the measurements were completed i.e. at the end of eighth week.

### Schematic Representation of the Study

**Research Approach**  
Quantitative

**Research Design**  
Experimental  
Basic pre test post test with Repeated measurements

**Study Setting**  
Selected old age homes of Kottayam District, Kerala

**Target Population**  
Elderly clients living in Old age homes of Kottayam district

**Sampling technique**  
Probability sampling,  
Randomly selected clusters  
(Two stage cluster Sampling)

**Tools for Data collection**  
Base line data sheet  
GDS, Hamilton Rating Scale for Depression,  
The Philadelphia Geriatric centre Morale scale,  
WHO-5 well being index  
BPL patient monitor model No. ULTIMA PRIME DNTA2C 1653

**Data Analysis**  
Descriptive Statistics Frequency and percentage  
Assessment of Skewness and Kurtosis  
Test for normality of data  
Inferential Statistics
3.3 Variables

Research involves abstractions and these abstractions are called concepts. In quantitative studies concepts are called variables. A variable as the name implies, is something that varies. There are dependent and independent variables. The presumed cause is the independent variable and dependent variable is the presumed effect. The independent variable in the present study is Laughter Yoga and the dependent variables are subjective well-being, morale, depression, (Psychological variables); Heart rate, respiratory rate, oxygen saturation, blood pressure, body surface temperature and ECG (Physiological variables). The variables that are inherent characteristics of research subjects are called attribute variables. In this study attribute variables include age, gender, marital status, number of children, religion, education, occupation, income, visitors, method of placement in old age home and duration of stay in old age home (Polit 2012).

3.4 Research setting

A research setting is the physical location and conditions in which data collection take place in a study (Polit 2012). The present study was conducted in old age homes of Kottayam District, Kerala. There are 32 registered old age homes in Kottayam District which are distributed among the Five Talukes of the district (list of charitable institutions www.old.kerala.gov.in). M.G.M Abhayabhavan, Pothenpuram, Pampadi, Ozanam Bhavan Daivadan Centre, Chethimattom, Pala, Jubilee Bhavan Palai, Old age home, Mundakappadom Mandiram, Manganam were the centres selected for the present study. All these institutions are run by Christian managements and they cater to the needs of the elderly who are having no one for
their care. They are providing the general care; health care and spiritual care. Provision for recreational facilities are there in all these homes.

3.5 Population

A Population is the entire aggregation of cases in which a researcher is interested, and irrespective of the basic unit, the population comprises the aggregate of elements in which the researcher is interested (Polit 2012). The results of the study can be applied to the population of research. The population for the present study consisted of elderly clients who are above the age of sixty and living in old age homes of Kottayam district, Kerala.

3.6 Sample

A sample is a subset of population elements, which are the most basic units about which data are collected. Using samples is more practical than collecting data from an entire population (Polit 2012). Elderly clients who are 60 years and above living in randomly selected old age homes from Kottayam district are the sample for this study.

Based on the sampling criteria the researcher got one hundred and fifty three samples for the present study.

3.7 Sampling technique

Sampling is a process of selection of cases from the entire population in such a way to represent it so that inferences can be made about the population by studying the sample (Polit 2012). Probability sampling which involves random selection of elements has a greater confidence regarding the representativeness of
population. Randomness is a powerful tool for eliminating bias from a quantitative study. Randomization is an essential characteristic of a true experimental design.

The sampling technique used for the present study is cluster sampling. The old age homes are scattered throughout the five talukes of the district. It is not easy to get a sampling frame of subjects due to this reason. If samples from the control group and experimental group are selected from the same home there is possibility of sample contamination especially when interventions like laughter yoga is administered. Therefore cluster sampling which is a type of probability sampling was found most suitable in this study. Out of the five talukes of Kottayam district two talukes were selected randomly by lottery method. Kottayam and Meenachil talukes were selected randomly. Two old age homes from Kottayam taluk were selected in stage two by lottery method as the experimental group and two old age homes from Meenachil taluk were selected as the control group. All inmates who were eligible to participate in the study as per the inclusion criteria from all four clusters where selected as samples for the study.

3.8 **Inclusion criteria**

1. Elderly clients who are willing to participate in the study.

2. Elderly clients who are recommended by the old age home physician or nurse regarding their ability to comprehend and having fitness to participate in Laughter Yoga.

3.9 **Exclusion criteria**

1. Elderly clients who are seriously ill or suffering from a debilitating illness are excluded.
2. Elderly clients suffering from any kind of Hernia, advanced piles with active bleeding, Heart disease with current chest pain, epilepsy, prolapsed intervertebral disc, who had recent surgery (within three months), uterine prolapse, acute viral infections, and glaucoma are excluded from the study.

3. Elderly with severe hearing impairment and difficulty to communicate are excluded from the study.

3.10 Selection and development of Data Collection Instruments

Data collection tools are the procedures or the instruments used by the researcher to observe or measure the key variables in the research problem (Polit 2012).

The following instruments were used for the collection of data:-

1. Baseline data sheet.


5. WHO (Five)-Well-Being Index (1998 version) (Psychiatric Research Unit, WHO Collaborating Centre in Mental Health).

6. BPL EXCELLO/ULTIMA patient monitor model No, ULTIMA PRIME with Serial No.DNTA2C 1653 (for measurement of physiological variables).

Baseline data sheet was prepared after extensive review of literature and taking opinion from experts from field of psychiatry, psychology and psychiatric nursing, community medicine and social work. The researchers’ personal observations
and informal interviews with the elderly residing in the old age homes and in the community, participation in National and International Geriatric conferences etc helped the researcher to prepare the baseline data sheet. The original tool was prepared with 12 items and 2 more items were added based on experts’ suggestion and the final tool had 14 items. The items were about age, gender, educational qualification, previous occupation, marital status, number of children, nature of admission to the old age home, duration of stay in the old age home, whether the elderly is having visitors, source of income, any long time illness history, degree of physical dependence and the history of illness.

The other tools are standardized and they were selected by the researcher for the present study after an extensive review of literature and discussion with subject experts. The details of the collected tools were gathered using different websites too.

The tools were translated to the vernacular language Malayalam by five language experts in Malayalam and it was then retranslated to English by English language experts. The reliability of the translated tools were estimated by calculating Cronbach Alpha Coefficient.

**The Philadelphia Geriatric Centre Morale Scale [Lawton’s PGC Morale scale]**

The 17 item revised version of the PGC Morale Scale (Lawton, 1975) is the generally used scale with two alternative styles- interview style and questionnaire form. It provides a multidimensional approach to assessing the psychological state of older people. It has been developed by M. Powel Lawton and his staff at the Madelyn and Leonard Abrahamson Centre for Jewish Life (formally the Philadelphia Geriatric Centre) in response to longer more complicated tools, some of which conceptualize morale as unidimensional. The PGC Morale Scale is designed
to provide a measure of morale appropriate for very old or less competent individuals as it uses simpler wordings in its items and less complex response formats. Through factor analysis these areas were isolated namely agitation, attitude towards ageing and the older person’s acceptance or dissatisfaction with the amount of social interaction they are presently experiencing. For scoring, each high morale response gets a numerical score of one and others get no score. Totalling the number of high responses gives the individual score for a particular administration of the scale. The original author has not reported the validity and reliability of the scale. But Pinar and OZ (2011) have reported the validity and reliability of this tool among Turkish elderly people. According to this study reliability was calculated by internal consistency using Kuder Richardson 20 (KD -20) and item total correlation. KD-20 was 0.92 for total PGCMS and it ranged from 0.76 to 0.85 for subscales in the PGCMS with item total correlations ranging from 0.39 to 0.73. Confirmatory Factor Analysis (CFA) was used to test the structure of the PGCMS. By means of Convergent-divergent validity, correlations were calculated against social support scores and hopelessness scores. The tool was found to be valid and reliable. A study on the structure of PGC morale scale in American and Japanese aged, done by Liang, Jersey et al. (1992) has proved the usefulness of PGCMS in assessing morale among different cultural groups as well as elderly people living both in urban and rural areas.

PGC morale scale Malayalam version was administered to 30 old age home inmates and the Cronbach Alpha was calculated. It was 0.85 showing that the tool is reliable for the elderly population of Kerala.
Geriatric Depression Scale

The Geriatric Depression Scale which is develop by Yesavage et al. in 1983 represents a very effective quantitative method to gather information on depression in older adults. The GDS may be used with healthy, medically ill and mild to moderately cognitively impaired older adults. It has been used extensively in community, acute and long term care settings. The Geriatric Depression Scale has demonstrated very good internal consistency (\(\alpha = 0.94\)) and split-half reliability of 0.94, 92% sensitivity and 89% specificity. The validity and reliability of tool have been supported through both clinical practice and research. The Geriatric Depression Scale is a 30 item questionnaire that is a simple, clear, self administered scale that does not rely on somatic symptoms. 10 to 20 minutes are needed to complete the Yes/No questions. Depressive responses are assigned or point with a maximum possible score of 30. Tallied scores of 0-10 indicate normal mood, 11-20 indicate mild depression and 21-30 indicate moderate to severe depression. Translated version of this tool is found to have a Cronbach Alpha coefficient of 0.87 showing that the tool is highly reliable.

Hamilton Rating Scale for Depression.

The Hamilton Depression Rating Scale (Ham-D)/ HRSD, develop by Max Hamilton in the year 1960 is the most widely used outcome scale for depression studies. The Ham-D is based on a clinical interview with the patient and is rated by the interviewer. The interviewer asks the patient about symptoms experienced in the past week, compared to a time when they were well. There are various versions of the Ham-D, which was originally developed in the 1960s. The original version (17 items) and a later version (21 items) did not include items rating atypical symptoms
(like over sleeping, over eating, weight gain etc.). The resulting 29 item version is widely used in SAD studies. However, 4 additional items (including the diurnal variation item) on the Ham-21 and 1 item on the Ham-8 are not related to the severity of depression. Hence, the Ham-24 is a better indicator of severity than the Ham-29. The researcher has utilized the same for the present study in order to see the effectiveness of Laughter Yoga in reducing depression scores. Scoring of 9 or less is normal (not depressed), 10-19 is mildly depressed, and 20-29 moderately depressed and more than 30 is markedly / severely depressed. A number of studies have shown the internal consistency of different versions of Ham-D to range widely from 0.48 to 0.92. A recent study reported internal consistency coefficients 0.88 for Ham-D-24. Inter-rater reliability has been reported to be very high for HAM-D total scores (0.80-0.98). Test-retest reliability using HAM-D was reported as 0.81. Validity of the HAM-D has been reported to range from 0.65 to 0.90 with global measures of depression severity and to be highly correlated clinician rated measures, such as MADRS and IDS-C. The cronbach’s Alpha calculated is 0.85 for the present study.

**WHO (Five) Well-Being Index (WHO-5)**

World Health Organization-5 (WHO-5) well-being Index is a short and quick screening tool for detecting depression. It is derived from the original version of the well-being index to measure health related personal wellbeing, which consisted of 28 items. Following psychometric analysis it was reduced to the five item WHO-5 well-being index (1998 version) develop by psychiatric research unit WHO collaborating center in mental health, Frederiksborg general Hospital. In a study to detect the reliability and validity of the Thai version WHO-5 well being index in
primary care patients (Saipanish, Lotrakul and Sumrithe 2009) had reported a satisfactory internal consistency (Cronbach’s alpha =0.87 and moderate convergent validity with the Hamilton Rating Scale for Depression ($r =-0.54; p<0.001$). The optimal cut-off score of the WHO-5-Thai version revealed a sensitivity of 0.89 and a specificity of 0.71 in detecting depression. Heun, Burkert, Maier and Bech (1999) has also reported good internal validity with alpha coefficient 0.95 (0.91-0.99) among the elderly population and had recommended the tool as a means to identify elderly with low subjective well-being.

The tool contains five items rated on 6-point Likert scale. Subjective quality of life based on positive mood (good spirits, relaxation), vitality (being active and waking up fresh and rested) and general interest (being interested in things). Higher scores mean better well-being. Raw score totals the figures of the five answers which can be 0-25. Zero represents worst possible quality of life. A percentage score is obtained by multiplying the raw score by 4 and it ranges from 0-100. This is used for monitoring the possible changes in well-being, a 10% difference indicating a significant change. If the raw score is below 13 or if the patient has answered 0-1 to any of the five items it shows poor subjective well-being indicating depression and such cases are recommended further for depression screening. Cronbach’s Alpha calculated for the present study is 0.85 that shows the tool is highly reliable.

**BPL Excello/Ultima Patient Monitor**

This monitor is having multiple measuring functions like 3 lead, 7 lead, 12 lead ECG/Heart Rate, Respiratory Rate, Dual Temperature, SPO$_2$, Pulse and Blood pressure. It has a complete built- in module design ensuring stable and reliable performance. It is a portable machine. The monitor can only be applied to one
patient at a time. The researcher has decided to use this patient monitoring system in consultation with the experts since all these parameters could be assessed for a single patient within 5 minutes time (including the time for attaching the electrodes or cables etc to the patient and removing the same after the procedure) The measurement for the sample had to be conducted after 20 to 30 minutes of resting after the therapy and 3 to 5 patients could be assessed after a therapy session using this device with the help of two trained assistants, to ensure the measurement were done within 25-45 minutes after the procedure.

Researcher used a new calibrated machine for the research purpose. The technicians were available to check the procedures and to train the researcher and assistants regarding the accurate use of the monitor. The readings were noted down from the display screen of the monitor.

Normal values for the physiological variable of the elderly are the following (Berman, Snyder, Kozier & Erb (2008)).

Heart Rate (HR)- 60-100 beats per minute was treated as normal. <60 and >100 was treated as abnormal.

Respiratory Rate (RR)- 12-20 rpm was treated as normal and less or more than this range was considered as abnormal.

Oxygen Saturation (SPO2) - 90-100% were treated as normal.

Blood Pressure Systolic <120 mm of Hg was treated as normal. 120-140 mm of Hg –prehypertension

140+ hypertension.
Blood pressure Diastolic -<80 mm of Hg Normal, 80-90 mm of Hg prehypertension, 90+ Hypertension.

The following categories were used to identify the changes that happened in blood pressure measurement after the therapy.

<table>
<thead>
<tr>
<th>Pre test</th>
<th>Post tests</th>
<th>code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Normal</td>
<td>1</td>
</tr>
<tr>
<td>Abnormal</td>
<td>Normal</td>
<td>1</td>
</tr>
<tr>
<td>Normal</td>
<td>Abnormal</td>
<td>-1</td>
</tr>
<tr>
<td>Abnormal</td>
<td>Abnormal</td>
<td>0</td>
</tr>
</tbody>
</table>

The average peripheral skin temperature of older adult is approximately 96.8°F (36°C).

ECG was interpreted with the help of subject expert for presence of Normal rhythm or abnormal rhythms like Sinus Tachycardia or bradycardia.

The elderly were to remain calm and relaxed during the measurement of physiological variables. They were instructed to sit quietly and not to talk, laugh, or cough during the procedure.

Standard infection control techniques were followed for the use of transducers and BP cuff while measuring the physiological variables with the patient monitor.

**Research technique**

Research technique explains the methods by which the data are collected for the study. The researcher used a combination of techniques for the study. Baseline
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Data sheet and Hamilton Depression rating scale were administered using interview technique. WHO 5 well-being index, Geriatric depression scale and Philadelphia Geriatric Centre Morale Scale were questionnaires. Those elderly who were comfortable in filling the questionnaires did it by themselves. But most of them wanted the researcher to fill in those questionnaires for them. So for those elderly the questionnaires were read out clearly (and repeatedly, when asked for) along with the options for answers. The subjects mentioned their responses for each item and the researcher marked the same. Privacy was provided and the procedure was done on a one to one basis. The patient monitor was set up in the interview room (which was the treatment room of the old age home in some settings). It was ensured that the elderly where resting for at least 20 minutes (most cases 30 minutes) prior to the checking of physiological variables.

The Laughter Yoga sessions were administered in a common room where the elderly usually gather for activities like reading or recreation or chatting. All these rooms were well ventilated with ample light and pleasant surroundings (for eg. near the institution’s garden where they could watch the flowering plants or fruit trees or a vegetable garden). Elderly were allowed to sit in a circle where they could see each other and the researcher and the research assistants along with old age home staff (whenever they wanted to be part of the session).

The elderly were sitting on chairs or benches with back support (according to the availability in old age home setting). Those who were on wheel chairs were permitted to sit on the wheel chair during the course of the therapy. For measuring the physiological variables after the therapy a resting period of 20-30 minutes were
permitted. Subjects were not allowed to eat or drink anything during this time. Those who requested bathroom privileges were given the same.

**Ethical Considerations**

- Researcher took permission from the old age home authorities to carry out the research study.
- Obtained written informed consent from each participant.
- Researcher assured confidentiality of the data collected from the elderly for the study.
- Privacy was provided for the interviews and other data collection procedures.

**Pilot Study**

“A Pilot study is a small-scale version or trial run designed to test the methods to be used in a larger, more rigorous study” (Polit 2012). This helps to assess the feasibility of the major study. Pilot study helps to check the adequacy of study methods and procedures, it shows the likely success of participant recruitment strategies, helps to know about the appropriateness and quality of instruments, strength of relationships between key variables can be evaluated so that the number of needed study participants can be estimated. Pilot study also helps to identify the confounding variables that need to be controlled. Pilot study also helps in evaluating adequacy of training for research assistants if any, potential problem like participant loss during course of the study, project costs etc. Pilot study is extremely important in the case of intervention studies since it works as a test for intervention itself, especially if the intervention is a new one. The intervention can be refined and improved with the observation from the pilot study. In the case of intervention
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studies pilot study can shed light on - the acceptability of intervention to the intended beneficiaries (e.g. Patients), intervention agents (e.g. nurses) and administrators, the adequacy, comprehensiveness and clarity of intervention protocols, the appropriateness of dose of intervention, the extent to which the intervention fidelity can be maintained (i.e. the faithfulness with which the protocols are actually adhered to). The rate of retention in the intervention, and the safety of the intervention, and any unforeseen side effects it might yield. In short the outcomes of a pilot study are lessons that can inform subsequent efforts to generate valid evidence for nursing practice.

Pilot study was planned and executed exactly how the researcher planned for conducting the major study. Old age homes were selected randomly from Pathanamthitta and Kottayam districts. Pilot study started in the month of June 2012 and it continued up to August 2012.

Pilot study Results

There was no difference between control group & experimental group in subjective well being during Pre test using Mann-whitney test (z=- 1.342, p=0.180). Post test Null hypothesis is rejected since chisquare value is more than the tabled value for the control group and experimental group compared to pre-test level (control $\chi^2 = 25.500$, df=4, p=.0001 Exp group $\chi^2 = 33.357$, df = 4, p=.0001) Both groups showed improvement in well being (Fried Mann test)

Geriatric Depression Scale

From the pre test level depression scores improved for both the experimental and control group ($\chi^2 = 13.156$, df= 4, p=.011)
The null hypothesis is rejected

At pre test 43.3% of subject in the control group and 30.0% in the experimental group were found normal. 40.0% of control group subject and 53.3% of experimental group were having mild depression. 16.7% from the control group as well as experimental group showed severe depression.

By 8th week 53.3% of the control group subjects became normal whereas 73.1% of the experimental group subjects became normal. Percentage of mildly depressed was reduced to 30.0% in the control group and 23.1% in the experimental group. But the severely depressed (16.7%) remained the same for control group whereas it got reduced to 10.7% for the experimental group.

The results showed a gradual progress in depression improvement in the experimental group. Mann-whitney test showed a significant difference between the experimental and control group subjects at end of week four data ($z = -3.224, p=.001$). The mean rank of control group was 35.22 whereas that of experimental group was 22.09.

Friedman Test on the scores of Hamilton Rating Scale for depression (HRS) showed a gradual improvement in depression over the weeks ($\chi^2 = 30.354, df=4, p=.0001$) for both the control and experimental group. The difference observed at the end of 4th week was significant for HRS scores too ($z = 3.097, p=0.00$). The mean rank for Man-whitney test for the control group was high (35.18) compared to that of experimental group 22.13). Cross tabulation for HRS at the end of 8th week showed 40.0% of normal control group subjects and 42.3% of experimental group subjects. 40.0% of the control group were mildly depressed whereas 46.2% of
experimental group subjects had mild depression. But there is difference in the case of subjects suffering from moderate level of depression and severe depression between the control and experimental group -13.3% and 6.7% for the control and 11.5% and 0% for the experimental group, respectively.

On Philadelphia Geriatric Centre Morale Scale (PGCMS) Friedman Test showed no significant difference in morale of the total subjects between pre-test to 8th week post test. At pre-test level 56.7% of control group subjects and 63.3% of experimental group had low morale score. By fourth week it became 73.3% for the control group and 55.6% for the experimental group repeating the same trend observed for GDS, and HRS Scores. By 8th week subjects with low morale in the experimental group became 38.5% and that of the control group became 53.3%. Mann-Whitney U test showed no significant difference between the two groups in morale scores.

The trend observed for the control as well as the experimental group can be summarized as follows:-

1. Both groups were similar on the four scales at pre test.

2. More number of subjects were identified with depression, low morale and low subjective well-being at post-test one. Three of the scores were depending on patient’s self report and one scale was researcher’s observations about the subjects. Subjects were found to be more open in sharing their true feelings with increased rapport at the end of second week.

3. Experimental group subject and control group subjects were different at the 4th week measurement. Control group showed increase in depression scores.
This can be explained by analysing what happened to the group at the middle of the intervention. It was the month of July and due to heavy rains most of the elderly became sick. This has disturbed them and they showed a reduced level of motivation in study participation due to their physical complaints and increased irritability.

It was observed that compared to the control group subjects the experimental subjects were showing a gradual improvement in subjective well being, morale and depression. Due to the very nature of the elderly living in old age home as soon as the researchers established a good rapport with the elderly, they started ventilating their problems to the researcher and assistants. This has understandably done the effect of a counselling session. Even the measurement of physiological variables had an intervention effect by giving the elderly a lot of attention. The experimental group as well as the control group used to wait for the researcher and her team.

But as shown by the results the experimental group showed improvement in a gradual manner.

These results are suggestive of the need for genuine human interaction for the elderly residing in old age homes. The living conditions, the same type of food and the same faces caring them everyday causes boredom and loss of morale for the elderly. It is noticeable that the experimental group had gradual changes. This shows the importance of a regular intervention that can engage them positively and in a pleasurable manner. The ups and downs seen in the scores show how a change in the living system or for the self affects the subjective well-being and mood of the elderly.
Physiological Variables of the pilot study showed an improvement in Heart rate, Respiratory rate, Blood pressure, Oxygen saturation, ECG and skin temperature of the experimental group compared to the control group. The values showed stability in hemodynamic parameters of the experimental group. Those who were having hypertension experienced a reduction in blood pressure and a trend towards normalisation. Control group subjects also showed the effect of relaxation in their physiological variables. This could be explained in terms of one hour of relaxation they got (1/2 an hour prior to the test at measurement intervals) and the diversion they had in just waiting for their turn for the measurement.

The intervention was well accepted by the elderly, old age home authorities and care takers. Those who were not eligible for inclusion due to age less than 60 requested to participate in the group. They were permitted with the explanation that there will not be any measurements for them. This helped in having bigger groups for therapy sessions which is highly desirable. The old age home authorities reported that the elderly were found to repeat the techniques even when they were doing gardening or kitchen work sometimes.

The pilot study helped the researcher to evaluate the feasibility of the protocol and to effect necessary modifications in the main study in discussion with the guide and other experts.

**The laughter yoga intervention (The Independent Variable)**

Laughter Yoga is a method founded by M. Kataria in the year 1995. One session was for 30 minutes.
**Step 1:** Clapping in a rhythm 1-2... 1-2-3 along with chanting of Ho-Ho-, Ha-Ha-Ha-Clapping hands parallel to each other for full finger –to –finger and palm –to –palm contact. According to M. Kataria this stage stimulate acupressure points in hands to increase energy level.

Ho –Ho -, Ha – Ha –Ha chanting works as heavy exhalations that come from the abdomen, to stimulate diaphragmatic breathing.

**Step 2:** Greeting Laughter - Joining both the hands and greeting in Indian style. The participants were sitting in a circle and they were encouraged to look at the person sitting to their left and right and also in front with laughter and say Namasthe. The researcher made it a point to call every participant by name, looked into their eyes, smiled and then said a Namasthe. This encouraged the building up of rapport through eye contact.

**Step 3:** Gibberish talking - This was used as a warm up exercise to help individuals to reduce inhibitions and to come out of shyness. The researcher talked to a participant in a childish way without any words which are having meaning. Exactly the way children do when they play. Many emotions like anger, sorrow, and happiness were expressed through this gibberish talk. All participants did this with their adjacent subjects and those who are sitting across.

**Step 4:** Deep breathing with inhalation through the nose and prolonged exhalation (3-5 times). This was done in a special way for the elderly. An imaginary rose flower was given to each participant and they were encouraged to breathe in the fragrance through the nose and exclaim about the same by opening the mouth and by saying Ha..... deeply. This was repeated by exchanging the flowers. This
encouraged playfulness, imagination, creativity etc and the eye contact. This gesture of sharing the flowers also helped in improving positive and playful conversation and we feeling among the participants.

**Step 5:** Milk shake Laughter: Holding two imaginary glasses of milk the researcher asked the subject to pour milk from one to the other by chanting Aeee, and then pour it back in to the first glass by chanting Aeee, After that every one laughs, while making a gesture as if they are drinking milk. Then they were asked to repeat the same, this time pouring it on to the neighbours head instead of drinking it like a very naughty child. (This resulted in roaring laughter).

**Step 6:** Lion Laughter – Extrude the tongue fully with eyes wide open and hands stretched out like the claws of a lion and laugh from the tummy. (This is similar to “Simha Mudra” of yoga. This posture has proved to be a good exercise for facial muscles, and beneficial for throat ailments. It also stimulates the thyroid gland).

**Step 7:** Appreciation Laughter - Join your pointing finger with the thumb to make a small circle while making gestures as if you are appreciating your group members and laughing simultaneously.

**Step 8:** Argument Laughter - Laugh by pointing finger at different group members as if arguing.

**Step 9:** Forgiveness/Apology Laughter- Immediately after argument laughter catches both your ear lobes and laughs while shaking your head (Indian Style) or raise both your palms and laugh as if saying sorry.
Step 10: Blowing birth day candles- The subjects had to imagine that he/she is cutting a birth day cake and blowing out the candles. Then the group laughs with the individual subject who is performing the same.

Each of the exercises were repeated for 1-2 minutes with rhythmic clapping and Ho –Ho- HA- HA – HA chanting. Deep breathing techniques (smelling the rose, candle blowing) was placed in between with shoulder exercises for shoulder mobility.

Shoulder exercise Place your finger tips on both shoulders and point both the elbows straight and move them slowly in a circle, backwards to forwards (anti – clockwise) five times.

Laughter Meditation was the next step after laughter yoga exercises and breathing exercises. Here the subjects stopped laughing they were asked to sit quietly closing their eyes if possible and just to watch how they were breathing. Sitting quietly for 5 minutes and they could laugh without talking anything (If it happened spontaneously). After this 5 minutes relaxation the last 5 minutes were used for prayer for world peace. All members were holding others hands to complete a circle. Subjects were encouraged to feel the warmth of touch and closeness they experienced by holding two other people’s hands. In this position with their chin raised up (facing the sky) the subjects prayed for world peace, peace of their mind and for elderly residing in old age homes all over the world and for the health and prosperity of everybody.

Finally the session was concluded with a slogan that “we are the happiest people in the world. (Kataria, 2002).
**Data Collection Procedure**

None of the experimental and control group subjects had prior knowledge or exposure to Laughter Yoga.

After obtaining informed written consent from the eligible subjects the researcher administered the data collection instruments individually for collecting the pre test data. After the interviews with all the selected subjects were over the small groups in different blocks were identified. There were about 4 subgroups in all selected old age homes. Physiological variables were measured prior to the beginning of laughter yoga sessions. Then laughter yoga was administered. The subjects were given a resting time of 20 - 30 minutes and post test of physiological measurements were done. Laughter yoga was administered 6 days a week with one day break by the researcher and the trained volunteers. The subjects could do it all seven days individually if they wanted.

Tools were repeatedly administered during the second week, 4th week, 6th week and 8th week. The therapy sessions were arranged flexibly during morning, midmorning or afternoons according to the convenience of the old age home authorities and inmates, without causing disturbance to the routines or programmes of the old age home. But the physiological measurements were carried out during morning sessions between 9 - 12 hours.

For the control group the same procedure was adopted except the administration of laughter yoga sessions. So there was no daily contact with the control group subjects. A subject in control group had 5 interview sessions with the researcher and 5 days of contact for the pre test, and post test for measurement of physiological variables.
The control group subjects had 20-30 minutes of rest before the pre test measurement of physiological variables. They were asked to take rest for another 20-30 minutes and the physiological measurements were repeated. The same procedure was continued at 2\textsuperscript{nd} week, 4\textsuperscript{th} week, 6\textsuperscript{th} week and 8\textsuperscript{th} week simultaneously with that of the experimental group. After the 8\textsuperscript{th} week of measurement the control group subjects were also taught laughter yoga techniques for relaxation and well being. But no measurements were taken afterwards.

The experimental group consisted of 34 male subjects and 57 female subjects Total of 91 subjects to begin with. At the end of 8\textsuperscript{th} week the experimental group had 77 members due to attrition at different weeks because of sickness, hospitalization and death.

The control group consisted of 30 male subjects and 32 female subjects a total of 62 subjects to begin with. At the end of 8\textsuperscript{th} week there were only 61 participants and there was one attrition due to sickness.

**Plan of data analysis**

The statistical analysis of the data were done by using statistical package for social sciences (SPSS) version 20.0. The data were checked coded and were entered on a master sheet. Then the computations were done. Descriptive statistics like frequency and percentages were computed for baseline variables and the dependent study variables. Skewness and kurtosis of the distribution were calculated. Based on the findings Kolmogorov-Smirnove and Shapiro-Wilk tests of normality were done. Since the data were found to be not normally distributed it was planned to use nonparametric tests for hypothesis testing (Indrayan, 2008).
Changes in psychological variables between pre testing, and the post tests were done with frequency and percentage and Mann-Whitney Test to compare the control group and experimental group.

Within group comparisons from pre tests to post tests for the psychological variables for the control and experimental group were done with Friedman test.

The experimental and control group were compared on physiological variable from pre test to post tests with Mann-Whitney test. The association between psychological variables and the socio demographic variables were studied using Chi-square test.

Summary

The overall plan of the research problem is presented in systematic and scientific manner in research methodology. This chapter dealt with the research approach, research design, setting of the study, population, sample, sampling technique, selection and development of the tools, description of the tools with validity and reliability, ethical considerations, procedure for intervention, pilot study, data collection procedures and plan of data analysis. The next chapter deals with Analysis and interpretation of data.