# Materials and Methods

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MATERIALS AND METHODS

5.1 SUBJECTS

5.1.1 STUDY 1: Subjects comprised 108 healthy volunteers (male or female, aged 17-63 years, mean 31 ± 10.75) who came for attending one-month, residential, integral yoga courses due to their interest in yoga at Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA), Bangaluru in August 2005 or February 2006. (Sample size taken as per calculation of effect size = .33 (stat software), alfa = .05 and power = .80).

<table>
<thead>
<tr>
<th>Group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Age Range</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integral Yoga</td>
<td>N=53</td>
<td>N=55</td>
<td>N=108</td>
<td>17 to 63 yrs</td>
<td>31 ± 10.75</td>
</tr>
</tbody>
</table>

Inclusion criteria: Healthy student volunteers attending Yoga instructors course.

Exclusion criteria: Poor health as indicated by personal data, taking medication or initial GHQ value over 5. As per this criterion out of total 198 subjects, 108 subjects were selected and 90 were excluded.

5.1.2 STUDY 2: 43 healthy males aged 20-45 yrs (mean 28 yrs) volunteered from groups completing S-VYASA one month residential yoga courses. Self-control group of 43 males labeled as Kapālabhāti, (KB) and Breath Awareness (BA) groups. (Sample size taken as per calculation of effect size = .58(stat software), alfa = .05 and power = .80)

<table>
<thead>
<tr>
<th>Group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Age Range</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>KB VS BA</td>
<td>N=43</td>
<td>----</td>
<td>N=43</td>
<td>20 to 45 yrs</td>
<td>28 ± 6.91</td>
</tr>
</tbody>
</table>

Inclusion criteria: Only healthy volunteers who enrolled in monthly residential yoga course with 15 days of KB, BA training program.
Exclusion criteria: Poor health as indicated by personal data, taking medication and whose GHQ score was more than 5 (GHQ > 5). As per this criterion, out of 54 subjects, 43 subjects were selected and balances 11 were excluded.

5.1.3 STUDY 3: The 86 subjects, consisting of 56 male and 30 female volunteers from a group who had joined a one-month residential yoga course at S-VYASA University, Bangaluru, were divided randomly into two groups of 43 each for (i) Deep Relaxation Technique (DRT) and (ii) Supine Rest (SR). The aims and methods of the study were explained and informed consent was obtained. Ages ranged from 18 to 64 for both groups, mean ages being 30.14 and 28.35 respectively. (Sample size taken as per calculation of effect size=.62(stat software), alfa=.05 and power =.80)

<table>
<thead>
<tr>
<th>Group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Age Range</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRT</td>
<td>N=28</td>
<td>N=15</td>
<td>N=43</td>
<td>18 to 64 years</td>
<td>30.14 ±13.66</td>
</tr>
<tr>
<td>SR (control)</td>
<td>N=28</td>
<td>N=15</td>
<td>N=43</td>
<td>18 to 64 years</td>
<td>28.35±8.20</td>
</tr>
</tbody>
</table>

Inclusion criteria: Healthy volunteers who enrolled in monthly residential yoga course.

Exclusion criteria: Poor health as indicated by personal data, taking medication and whose GHQ score was more than 5 (GHQ > 5). As per this criterion, out of 50 subjects, 43 subjects were selected and balance 7 subjects were excluded.

5.2 INFORMED CONSENT

All volunteers of three different experimental studies i.e. of integral yoga, KB VS BA and DRT VS SR groups gave their informed consent to participate in the research study. The institutional review board including the ethical committee of S-VYASA approved the study protocol. (See appendix 11, 12, 13).
5.3 DESIGN

5.3.1 STUDY 1: INTEGRAL YOGA
Subjects were assessed in a single group before and after the yoga practice. As there is limitation involved in Randomized Control Trial (RCT) double blind study this design was selected without the same. Further there is a recent trend is of integral yoga (Gupta et al 2006), this study also designed for integral yoga but in a residential set up. As integral yoga program works holistically and not like symptomatic relief at physical level as seen in modern medicine. Integral Yoga works on all layers of personality.

Schematic representation of design:

<table>
<thead>
<tr>
<th>Pre-Assessment 1st day</th>
<th>Integral Yoga 28 days n=108</th>
<th>Post-Assessment 29th day</th>
</tr>
</thead>
</table>

5.3.2 STUDY 2: KAPALABHATI VS BREATH AWARENESS
This was a one group crossover self-control study. The self-control group was labelled into two groups as Kapālabhāti group, and Breath awareness group. Almost half of the KB group volunteers did kapālabhāti, on the sixteenth day and half on the seventeenth day; similarly for the BA group, the order was reversed as mentioned below in schematic. The group was trained for 15 days KB and BA and thereafter the pre-post one time assessment done with intervention of KB and BA in two consecutive days as mentioned above and in schematic representation below.
Schematic representation of design:

16^{th} day

<table>
<thead>
<tr>
<th>Pre-Assessment</th>
<th>Kapalabhati n=22</th>
<th>Post-Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 minutes (1m KB – 1m rest)</td>
<td></td>
</tr>
<tr>
<td>Pre-Assessment</td>
<td>Breath Awareness n=21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 minutes (continuous awareness of breath)</td>
<td></td>
</tr>
</tbody>
</table>

17^{th} day

<table>
<thead>
<tr>
<th>Pre-Assessment</th>
<th>Breath Awareness n=22</th>
<th>Post-Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 minutes (continuous awareness of breath)</td>
<td></td>
</tr>
<tr>
<td>Pre-Assessment</td>
<td>Kapalabhati n=21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 minutes (1min. KB – 1min. Rest)</td>
<td></td>
</tr>
</tbody>
</table>

5.3.3 STUDY 3: DEEP RELAXATION TECHNIQUE VS SUPINE REST

The two separate groups of 43 subjects each were assessed immediately before and after intervention sessions. The first group was guided through a 20 minute DRT session on the first day, while the second group practiced supine rest for an equal time period, next day.

Schematic representation of design:

16^{th} day group of 43 volunteers

<table>
<thead>
<tr>
<th>Pre-Assessment</th>
<th>Deep Relaxation Technique (DRT) 20 min.</th>
<th>Post-Assessment</th>
</tr>
</thead>
</table>

17^{th} day separate group of 43 volunteers

<table>
<thead>
<tr>
<th>Pre-Assessment</th>
<th>Supine Rest (SR) 20 minutes</th>
<th>Post-Assessment</th>
</tr>
</thead>
</table>
5.4 INTERVENTION

5.4.1 STUDY 1: INTEGRAL YOGA

An Integral Yoga module includes yogasanas, pranayama, meditation, kriyas, lectures, singing, and yogic games. (For detailed schedule see appendix 1 & 16). This set of yoga practices are taken to have effect on all the five layers of human existence to bring about the quickest and holistic results and not only at physical level but also at pranic, mental, intellect and at blissfulness level.

5.4.2 STUDY 2: KAPĀLABHĀTI VS BREATH AWARENESS

To find out effect of stimulation (kapālabhāti) VS relaxation (breath awareness) these two interventions were chosen. Instructions were delivered by audiotape for the 20 minutes performance of both practices; one minute practice was followed by one minute relaxation, repeated 10 times. Subjects sat with their spine straight. For kapālabhāti, and breath awareness instructions were as per the format given. (see appendix 2).

5.4.3 STUDY 3: DEEP RELAXATION TECHNIQUE VS SUPINE REST

DRT is performed with eyes closed, in five, slowly practiced relaxation phases, guided by an audiotape. (see appendix 3).

5.5 ASSESSMENT

5.5.1 STUDY 1: INTEGRAL YOGA

1. The SLC test specifies six target letters to be cancelled on a test worksheet, consisting of 22 rows by 14 columns of randomly arranged letters (20). Subjects have to cancel as many target letters as possible in the 90 second test time. The six letter cancellation task has been used in similar design in an Indian population indicating the validity of the task to study immediate effects. (Natu & Agarwal, 1997). (See appendix-4).

2. Similarly, the DLS test gives a ‘Key’ specifying the digits 1-9 paired with letters of the alphabet. The test sheet consists of 12 rows by 8 columns of randomly arranged
digits (Natu 2004). Subjects have to substitute as many target digits as possible in the 90 second test time. The digit letter substitution task has been used in similar design in an Indian population indicating the validity of the task to study immediate effects. (Natu 2004). (See appendix-5).

3. Chadha’s EQ test consists of 15 questions, based on 15 socially neutral situations, offering five possible answers for each carrying scores 0-20. Total scores are converted into percentiles. Interpretation is as follows:

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentile</th>
<th>Interpretations</th>
</tr>
</thead>
<tbody>
<tr>
<td>285 and above</td>
<td>p-90</td>
<td>Extremely high EQ</td>
</tr>
<tr>
<td>250 to 274</td>
<td>p-75</td>
<td>High EQ</td>
</tr>
<tr>
<td>200 to 249</td>
<td>p-50</td>
<td>Moderate EQ</td>
</tr>
<tr>
<td>150 to 199</td>
<td>p-40</td>
<td>Low EQ</td>
</tr>
<tr>
<td>149 and below</td>
<td>p-15</td>
<td>Try some other day</td>
</tr>
</tbody>
</table>

The test was standardized on broad populations in Indian society, hence it is used here. Retest reliability: 0.94; test validity 0.78. (Singh D, 2006), (See appendix-6).

4. The GHQ 28 questionnaire provides individual diagnostic profile information: four 7-item sub-scales are based on factor analysis, with factor structures consistent with the original studies. (Killic C 1997). Internal consistency and reliability: Cronbach’s alpha, 0.85, and validity, 0.76. (Laxmibai A 1975, Goldberg D, 1979). It has no thresholds for individual sub-scales. Hence, the total of all sub-scales was used. All items have a 4-point scoring system: ‘better than usual’, ‘same as usual’, ‘worse than usual’, and ‘much worse than usual’, scored: 0-0-1-1. Goldberg D, 1997). (See appendix-7).

5. Pathak et al (1992) developed a Triguna-based personality test, with items taken from guna depictions in Sankhya Karika. (Virupakshananda S. 1995). It consists of 88 items: 24 sattva, 34 rajas and 30 tamas, scored on a five point scale ranging from ‘not at all’ to ‘very much’. Low between scale correlations were reported. Test reliability coefficients were reported: sattva r =0.62, rajas r =0.83 and tamas r =0.70. Population norms, percentiles and categorizations were given. (See appendix-8).
5.5.2 STUDY 2: KAPĀLABHĀTI VS BREATH AWARENESS

1. The STAI-A State test comprises four statements describing four different kinds of feelings. Subjects state how often they experience that feeling: almost never, sometimes, often, or almost always. The scores have a direct interpretation: high scores mean more state anxiety; low scores mean less. A state anxiety scores have high degrees of internal consistency. Their point–biserial r (Pb) correlations are 0.60 and 0.73, respectively. (Spielberger CD 1968), (See appendix-9).

2. The SLC test specifies six target letters to be cancelled on a test worksheet, consisting of 22 rows by 14 columns of randomly arranged letters. Subjects have to cancel as many target letters as possible in the 90 seconds test time. The six letter cancellation task has been used in similar design in an Indian population indicating the validity of the task to study immediate effects. (Natu & Agarwal, 1997), (See appendix-4).

3. Similarly, the DLS test gives a ‘Key’ specifying the digits 1-9 paired with letters of the alphabet. The test sheet consists of 12 rows by 8 columns of randomly arranged digits. Subjects have to substitute as many target digits as possible in the 90 seconds test time. The digit letter substitution task has been used in similar design in an Indian population indicating the validity of the task to study immediate effects. (Natu 2004), (See appendix-5).

4. The verbal memory test consists of 4 different sets of 10 nonsense syllables, e.g. ZOC enough to be presented both pre and post the KB and BA interventions. The spatial memory test consists of 10 line drawings of easily described geometrical or other shapes, that are simple and reproducible (not square or circle). As for verbal memory, 4 similar sets of drawings are used, one each, pre and post KB and BA interventions. (Baddelay A, 1993, Manjunath N, 2004).

Each test is projected on a laptop for the subjects allowing 10 seconds for each slide. Immediately after the slides, subjects are shown a mathematical problem on the screen to answer at the end. (e.g. 3+5-2+4-2-5+6-3). Subjects are then asked to recall and write down (or draw in the case of spatial memory) as many of the 10 test items as they can within 60 seconds. For both verbal and memory tests a correct answer was scored as “1”
and a wrong answer was scored “0”. (See appendix-10).

Schematic representation of assessments made in sequence as shown below:

![Diagram showing assessments made in sequence]

Kapalabhati 1st day  n = 43

- Pre
  - STAI
  - SLCT
  - DLST
  - Memory (Verbal)
  - Memory (Spatial)

- Post
  - STAI
  - SLCT
  - DLST
  - Memory (Verbal)
  - Memory (Spatial)

Breathe Awareness 2nd day  n = 43 (Same group)

- Pre
  - STAI
  - SLCT
  - DLST
  - Memory (Verbal)
  - Memory (Spatial)

- Post
  - STAI
  - SLCT
  - DLST
  - Memory (Verbal)
  - Memory (Spatial)

5.5.3 STUDY 3: DEEP RELAXATION TECHNIQUE VS SUPINE REST

1. The STAI-A State test comprises four statements describing four different kinds of feelings. Subjects state how often they experience that feeling: almost never, sometimes, often, or almost always. The scores have a direct interpretation: high scores mean more state anxiety; low scores mean less. A state anxiety scores have high degrees of internal consistency. Their point–biserial r (Pb) correlations are 0.60 and 0.73, respectively. (Spielberger CD 1968), (See appendix-9).

2. The SLC test specifies six target letters to be cancelled on a test worksheet, consisting of 22 rows by 14 columns of randomly arranged letters (Lezak M, 1995). Subjects have to cancel as many target letters as possible in the 90 second
test time. The six letter cancellation task has been used in similar design in an Indian population indicating the validity of the task to study immediate effects. (Natu & Agarwal, 1997), (See appendix-4).

3. Similarly, the DLS test gives a ‘Key’ specifying the digits 1-9 paired with letters of the alphabet. The test sheet consists of 12 rows by 8 columns of randomly arranged digits (Natu M, 2004). Subjects have to substitute as many target digits as possible in the 90 seconds test time. The digit letter substitution task has been used in similar design in an Indian population indicating the validity of the task to study immediate effects. (Natu 2004), (See appendix-5).

Schematic representation of assessments made in sequence as shown below:

```
DRT 1st day  n = 43

Pre
STAI
SLCT
DLST

Post
STAI
SLCT
DLST

Supine Rest 2nd day  n = 43

Pre
STAI
SLCT
DLST

Post
STAI
SLCT
DLST
```