EFFECTS OF ANULOM-VILOM/ ALTERNATE NOSTRIL BREATHING ON CARDIORESPIRATORY FUNCTIONS IN PHASE 1

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ABSTRACT.

Objective: To determine the effects of ANB technique on cardiorespiratory parameters in phase 1 post Coronary artery bypass grafting patients.

Methodology: In current studies 22 patients were allocated randomly. Each group has equally distributed 11 patients. Both groups received Australian Cardiac health & Rehabilitation Association recommended phase 1 rehab protocol. Group A was instructed to practice Alternate nostril breathing twice per day while Group B did not practice. Patients were given the treatment session for one week and outcomes were observed at follow up intervals and final assessment was taken on 7th post day of intervention.

Results: ANB have significant effect to improve cardiopulmonary variables and functional capacity of the patient undergoing cardiac surgery. Both groups showed difference at end of study in terms of p value (<0.001) showing that difference existed between two treatment groups.

Conclusion: Alternate nostril breathing is effective for Post CABG phase 1 patients to improve their cardiopulmonary functions.

Keywords: Alternate nostril breathing, Anulom-Vilom pranayama, Cardiorespiratory functions, cardiovascular disorders, Coronary artery disease, Coronary artery bypass grafting surgery, Post-
operative complications, Australian Cardiac health & Rehabilitation Association, Cardiac Rehabilitation,
INTRODUCTION:

Coronary vessel disease (CVD) accounts for nearly 75% of all deaths from cardiovascular disorders worldwide caused by narrowing or obstruction of heart vessels as a result of atherosclerotic plaque or clot formation. While in Pakistani population illness leading to CVD include 41% hypertension, 211% obesity, 10% diabetes mellitus, and 2.8% stroke. In order to overcome CVD the coronary artery bypass grafting (CABG) surgery is carried worldwide and incidence rate of post CABG respiratory problems is reported approximately more than 50 %. Respiratory complications continue to increase and effecting patient’s stay in the hospital, expenditures, mortality, and morbidity at the same rate in spite of advancement in technology and pre and postoperative care. Alternate Nostril Breathing (ANB) is control breathing which has been known to effect cardio respiratory and autonomic responses. Done with thumb close the right nostril and inhale via left nostril while count to four/five and closing the left nostril with finger and Exhale via right nostril while counting to eight and repeating this cycle.

Due to high prevalence of CAD and high incidence rate of post-operative pulmonary complications it is required to conduct studies to assess the impact of different cardiopulmonary rehabilitation techniques to lessen of post-surgery complication. For this purpose this study aimed to assess effects of ANB technique specifically in phase 1 post CABG patients to find out improvement in cardiorespiratory variables regarding to patient’s health.

METHODOLOGY:

This is randomized control trial study with registration no NCT046774865, Conducted at Bahria International Hospital, Islamabad and for duration of 6 months (Jan 2020-july 2010), while duration got extend till November 2020 due to COVID 19. Sampling Technique used was
probability convenient sampling technique (Randomization was done by enveloped sealed method). Epi tool was used for sample calculation via Peak expiratory flow rate variable.\textsuperscript{13}

Study include participants from both genders aged between 40-75 years who underwent CABG surgery. Patients with any difficulty in communication, unstable vital signs, and smokers or with other severe complications like diabetes, stroke or cancer and Lung pathologies e.g. COPD were not included.

Measurement tools included for study were digital spirometer (To measure FEV1, FVC, and PEFR), ABGs test (To measure pH, PO2, PCO2, HCO3 values). Measuring tape (To measure chest expansion). BP monitor (To measure Systolic and Diastolic blood pressure). Pulse oximeter (To measure Heart rate and Oxygen saturation). Borg’s scale (6 min walk test to observe functional capacity).

Informed consent was taken from eligible participants. Patients were random assigned to group A (n=11) and group B (n=11). Both group A and group B received Phase 1 Cardiac Rehabilitation protocol recommended by National Heart Foundation of Australia & Australian Cardiac health & Rehabilitation Association (ACRA) twice daily for 7 days. Group A practice ANB session along rehab protocol while group B did not practice ANB session. Group A patients instructed to do ANB practice as per capacity to max 15 min twice daily along with ACRA physiotherapy session which include chest physiotherapy, ankle pumping, spirometer, early mobilization and postural care with positioning. Assessment of variables at baseline, 3\textsuperscript{rd} and 7\textsuperscript{th} day of session. Functional capacity assessed through Borg’s scale on 5\textsuperscript{th} and 7\textsuperscript{th} day. Final reading was taken after 7\textsuperscript{th} session of intervention on 7\textsuperscript{th} day.
The data analysis was carried out on statistical packages for social sciences (SPSS) version 22.0. Shapiro Wilk test was used for normality analysis. According to result of normality Parametric and non-parametric tests were applied for baseline and post intervention days for between and within group comparison. Confidence interval was kept at 95% and a p value of less than 0.05 was considered significant.
Enrollment

Assessed for eligibility (n=26)

Excluded (n= 4)
- Not meeting inclusion criteria (n= 4)
- Declined to participate (n= 0)

Randomized (n=22)

Allocated to intervention (n= 11)

Experimental group: A
- This group received ANB b technique twice daily for 7 days with Cardiac rehabilitation protocol for phase 1 post CABG patients recommended by National Heart Foundation of Australia & ACRA

Control group: B
- This group received cardiac rehabilitation protocol recommended by National Heart Foundation of Australia ACRA twice daily for 7 days without ANB technique

Follow-Up
RESULTS:

A total of 22 post CABG patients were included in the study and randomly allocated in two groups with 11 participants in each group. There 10(90.9%) male and 1(9.1%) female in group A, while 9(81.8%) male and 2(18.2%) female were in group B. All participants in both group was married. Mean±SD of ages of patients in Group A was 61.18 ± 6.90 while Mean±SD of ages of patients in group B was 58.27 ± 9.078. Mean±SD of weight of patients in Group A was 75.90 ± 8.502. While Mean±SD of weight of patients in group B was 73.25 ± 7.145

Table 1. Mean and standard deviation in terms of FEV1 on baseline, 3rd post day and 7th post day of intervention

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group A</th>
<th>Group B</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1 baseline value</td>
<td>Mean± SD</td>
<td>Mean± SD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20.45±8.14</td>
<td>26.63±11.90</td>
<td>.170</td>
</tr>
</tbody>
</table>
P value .170 at baseline and p value of .40 3<sup>rd</sup> post day shows no significant difference between both groups and p value of <0.001 on 7<sup>th</sup> post day shows significant difference between groups in terms of FEV1 during treatment duration.

<table>
<thead>
<tr>
<th></th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; post day</th>
<th>7&lt;sup&gt;th&lt;/sup&gt; post day</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1</td>
<td>42.09±13.76</td>
<td>37.45±11.67</td>
</tr>
<tr>
<td></td>
<td>.405</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>42.09±13.76</th>
<th>37.45±11.67</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1</td>
<td>64.63±5.78</td>
<td>38.72±5.81</td>
</tr>
<tr>
<td></td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Table 2. Mean and standard deviation in terms of PEFR on baseline, 3rd post day and 7th post day of intervention.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group A Mean± SD</th>
<th>Group B Mean± SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEFR baseline value</td>
<td>31.00±15.63</td>
<td>31.72±17.16</td>
<td>.918</td>
</tr>
<tr>
<td>PEFR 3rd post day</td>
<td>58.36±16.26</td>
<td>44.45±13.11</td>
<td>.040</td>
</tr>
<tr>
<td>PEFR 7th post day</td>
<td>77.90±9.89</td>
<td>38.90±9.36</td>
<td>&lt;0 .001</td>
</tr>
</tbody>
</table>

P value .918 at baseline shows no significant difference between both groups while P value .040 3rd post day and <.001 on 7th post day shows significant difference between groups during treatment duration.

Table: 3. Median (IQR) and mean rank in terms of FVC on baseline, 3rd post day and 7th post day of intervention.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Median (IQR)</th>
<th>Group A Mean rank</th>
<th>Group B Mean rank</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC baseline value</td>
<td>25.00(19.5)</td>
<td>9.55</td>
<td>13.45</td>
<td>.157</td>
</tr>
<tr>
<td>FVC 3rd post day</td>
<td>44.00(24.25)</td>
<td>13.91</td>
<td>9.09</td>
<td>.081</td>
</tr>
<tr>
<td>FVC 7th post day</td>
<td>40.00(31.25)</td>
<td>17.00</td>
<td>6.00</td>
<td>&lt;0 .001</td>
</tr>
</tbody>
</table>

P value .157 at baseline, .081 on 3rd post day shows no significant difference existed between both groups but P value on 7th post day <.001 showed significant difference between groups on last day of treatment.
Table: 4. Median (IQR) and mean in terms of Chest expansion on baseline, 3\textsuperscript{rd} post day and 7\textsuperscript{th} post day of intervention.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Median(IQR)</th>
<th>Group A Mean rank</th>
<th>Group B Mean rank</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest expansion Baseline</td>
<td>1.00(1.0)</td>
<td>9.77</td>
<td>13.23</td>
<td>.190</td>
</tr>
<tr>
<td>Chest expansion 3\textsuperscript{rd} post day</td>
<td>1.50(0.36)</td>
<td>14.55</td>
<td>8.45</td>
<td>.019</td>
</tr>
<tr>
<td>Chest expansion 7\textsuperscript{th} post day</td>
<td>2.00(1.13)</td>
<td>16.82</td>
<td>6.18</td>
<td>.000</td>
</tr>
</tbody>
</table>

P value .119 at baseline shows no significant difference existed between both groups while p value .019 3\textsuperscript{rd} post day and <0.001 on 7\textsuperscript{th} post day showed significant difference existed between groups during treatment sessions.

DISCUSSION:

The findings of current study show that ANB technique is significantly effective (P<0.001) improving outcomes in terms of FVC, FEV1, PEFR, SPO2, HR, BP, chest expansion, and functional capacity. While ABGs parameters (PH, PO2, PCO2, HCO3) did not show significant result. (P>0.05).

These findings are in accordance of the literature as well, in which various studies have shown significance of ANB technique in terms of improving cardiorespiratory parameters. Outcomes of current study are important because of limited literature regarding ANB’s effect on Post CABG phase 1 patients. A study have found which results and methodology was more similar to current
Moreover, effects Alternate breathing technique has also been investigated in various trials and in different cases. A study indicated improvement in FEVI, FVC and PEFR in experimental participants, which resultantly superimposed the findings of current study.\(^7\) In a study on Patients with early bronchitis conducted in 2015 results indicated that ANB training clearly showed an increment in pulmonary efficiency in terms of FEV1, FVC and PEFR (P<0.001).\(^8\) The result of our study also show significant difference with p value of (P<0.001) in terms of FEV1, FVC and PEFR. Another RCT study conducted on healthy young individuals reported a significant improvement in lung volumes (PFTs) in terms of FVC, FEVI and PEFR with (P<0.001). Current study also support these findings in terms of FVC, FEV1 and PEFR with (P<0.001).

Furthermore, in terms of between groups comparison as expected group A shows significantly improvement as compare to group B in terms of variables FVC,FEV1,PEFR , SPO2, HR, Borg’s scale and chest expansion. (P<0.001). Which is the result of various previous studies in literature. Thus proved that patients those practice ANB exercise significantly improved lung volumes, chest expansion and functional capacity as compare to group B which did not practice ANB exercise. Besides this it is imperative to point out that there was no significant difference (P>0.05) between groups A and B in terms of ABGs variables and blood pressure. The possibility of no significant difference in blood pressure between groups can be the stressful environment of ICU as blood pressure can fluctuate and regarding to ABGs parameters there can factors such as patients were on Inotropes and IV lines. It could be the logical reason of no significant difference found between both groups. These findings support previous study’s result.\(^9\)

Within groups results were significant in group A in terms of FEV1, PEFR, FVC, HR and chest expansion (P<0.001). Borg’s scale and BP showed significant result in both A and B groups
(P<0.05), while PH parameters did not show significant results (P>0.05). These results are consistent with outcomes of other studies. Ghana et al stated that there is an improvement in Heart rate after one session of ANB while two other studies show no response in blood pressure and heart rate changes after the ANB session.10

Studies have been done on the efficacy of ANB exercise practice in healthy and clinical populations on cardiovascular and autonomic functions proving that training of ANB improves lung volume, supports the result of current study.11

**CONCLUSION:**

This study concluded that Alternate nostril breathing is effective for improving cardiopulmonary parameters including HR,SPO2,BP,FEV1,FVC,PEFR,chest expansion and functional capacity in post CABG phase 1 patients.

**Study Limitation:** If data would be collected from multiple settings.

**Recommendation:** Study needs to be conducted at larger scale and in multiple hospitals so that results could be generalized
REFERENCES


