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# Compare Effect of Glossopharyngeal Breathing v/s Segmental Breathing in Controlling the Vital after 6MWT Amongst Post Covid Individual

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**ABSTRACT:** When you exercise and your muscles work harder, your body uses more oxygen and produces more carbon dioxide. To cope with this extra demand, your breathing must increase from about 15 times a minute when you are resting, up to about 40–60 times a minute during exercise. Your circulation also speeds up to take the oxygen to the muscles so that they can keep moving. Any kind of exertion causes some change in vitals. Some amount of fluctuation in vitals after any kind of exertion occurs in every individual and is normal. But if there is extreme fluctuation in vitals even after mild or moderate form of exertion, it indicates abnormality or an increased stress on cardiovascular or respiratory system and needs attention. In any case if the vitals fluctuate during any kind of exertion it needs to be stabilized so that its harmful effects can be avoided. For these breathing exercises have been proven to be very beneficial. There are several types of breathing exercises such as deep breathing, diaphragmatic breathing, pursed lip breathing, etc. The objective of this study is to assess the effect of Glossopharyngeal and Segmental breathing exercises on vitals after exertion and the comparison of both techniques. In the present study we took 100 subjects randomly from Physiotherapy OPD of Saaii college, Kanpur. Method of data collection is random and study design is comparative study with study duration of 6 weeks. Subjects were divided into two equal groups. The paired samples t-test shows significant changes observed i.e., null hypothesis is rejected, and alternate hypothesis is accepted, and we observed that significant improvement along with effectiveness of Segmental breathing on controlling vitals in post covid normal weight individuals.

**KEYWORDS:** Glossopharyngeal Breathing, Segmental Breathing, 6MWT, Vitals, Blood pressure, Heart rate, Respiratory rate, SPO<sub>2</sub>.

## I. INTRODUCTION

Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure. The energy expenditure can be measured in kilocalories. Physical activity in daily life can be categorized into occupational, sports, conditioning. Household. Or other activities. Exercise is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness. Physical fitness is a set of attributes that are either health-or skill -related. The degree to which people have these attributes can be measured with specific tests.<sup>1</sup>

Physical activity is commonly described by the following four dimensions; *frequency* – ‘the number of events of physical activity during a specific time period’, *duration* – ‘time of participation in a single out of physical activity’, *intensity* – ‘physiological effort associated with participating in a special type of physical activity’, type of activity, during exercise, two of the most important organs come into action: the heart and the lungs. The lungs bring oxygen into the body to provide energy and to remove carbon di oxide, the waste product created when you produce energy. The heart pumps oxygen to the muscles that are doing the exercise. Exercise induces stress on one's body by increasing heartrate and blood pressure, just to name a couple of resulting factors. The autonomic nervous system (ANS) influences the cardiovascular system through the sympathetic nervous system (SNS) and parasympathetic nervous system (PNS).

Heart rate recovery (HRR) has been used to determine the health of the cardiovascular system post-exercise. An abnormal HRR has been shown to predict, or is strongly associated with, coronary artery disease, pre-hypertension, hypertension, and all-cause mortality. The respiratory rate or the number of breaths per minute is defined as the one breath to each movement of air in and out of the lungs. The normal breathing rate is about 12 to 20 breaths per minute in an average adult. In the paediatric age group, it is defined by the age group.<sup>2</sup>

BP is proportional to blood flow and resistance. During exercise BP increase in a stepwise progression along with an increase in exercise intensity in order to meet oxygen demand to the active muscles through increase in cardiac output. When you exercise and your muscles work harder, your body uses more oxygen and produces more carbon dioxide. To cope with this extra demand, your breathing must increase from about 15 times a minute (12litres of air) when you are resting, up to about 40-60 times a minute (100litres of air) during exercise. Your circulation also speeds up to take the oxygen to the muscles so that they can keep moving.<sup>3</sup>

Six-minute walk test is one such activity that places some amount of stress on the cardiorespiratory system. It can also be used to test the exertion level. The six-minute walk test is an objective method, to measure the ability to perform daily living activities. It is more often performed, to evaluate the functional status, monitor therapy, or assess the prognosis in patients with cardiac and pulmonary diseases. In comparison to traditional pulmonary exercise test, 6MWT needs less technical support or equipment, making it a simple and in expensive method to measure functional capacity. The validity and the reliability of 6MWT was studied in different conditions, including obstructive lung diseases, interstitial lung diseases, pulmonary hypertension, heart failure and peripheral arterial diseases.<sup>4,5,6,7,8,9,10,11,12,13</sup>

The safety of 6MWT was explored in several populations. A study of 6MWT in elderly individuals and in patients with ischemic heart disease found the test to be safe, reliable and correlates with several other parameters.<sup>14,15,16</sup> Glossopharyngeal breathing is a form of positive pressure breathing technique that can be used to assist failing respiratory muscles. As an analogy to positive pressure breathing used by amphibians, it is called frog breathing. Glossopharyngeal breathing can sustain ventilation for several hours in patients who are fully ventilator dependent. It can also be used to improve voice and cough efficacy.<sup>17</sup>

Segmental breathing may be defined as localized respiration consciously directed to one segment of the chest while the other segments remain relaxed. The term 'segmental' is not to be confused in meaning with anatomical segments of the lobes or of the lungs. The lungs are the essential organs of respiration. They are two in number and are divided into five lobes, two on the left and three on the right which are further divided into segments. It is not these anatomical segments with which we are concerned, but rather with four segmental areas of the chest. The purpose of this paper is to present a method of teaching patient show to breathe in specific areas of the chest, primarily in each of the five lobes of the lung. The enlargement of the chest in one segment at a time creates a greater area into which the remaining lobe or portion of a lobe can expand from the nature of this action is derived the term, "segmental breathing." Utilization of segmental breathing exercises accomplishes many objectives, the most important of which is to promote the expansion or re-expansion of an anatomical segment, lobe or lung in order that a pleural space, which may be a potential danger space or pocket for the accumulation of fluid, may be obliterated. Other objectives of breathing exercises include; Improved aeration and expansibility, thus reducing the possibility of atelectasis, Stimulation of the cough reflex mechanism, thus preventing excessive accumulation of secretions in the bronchial tree, Development of normal motion within an operated area with a concomitant decrease of paradoxical breathing (deflation of a lung or portion of a lung during the phase of inspiration and the inflation of the lung during the phase of expiration), Prevention of panic response in the patient through development of a sense of confidence derived from a feeling of controlled breathing.<sup>18</sup>

Positive end-expiratory pressure (PEEP) is the positive pressure that will remain in the airways at the end of the respiratory cycle (end of exhalation) that is greater than the atmospheric pressure in mechanically ventilated patients.<sup>19</sup> An analogous term used for non-invasive ventilation is end positive airway pressure (EPAP) for patients receiving bi-level positive airway pressure (BPAP). Continuous positive airway pressure therapy (CPAP), although not an interchangeable term, works by delivering a constant pressure, which at the time of exhalation works in the same way as PEEP. PEEP can be a therapeutic parameter set in the ventilator (extrinsic PEEP), or a complication of mechanical ventilation with air trapping (auto-PEEP). Extrinsic PEEP can be used to increase oxygenation. By Henry's law, the solubility of a gas in a liquid is directly proportional to the pressure of that gas above the surface of the solution. This applies to mechanical or non-invasive ventilation in that increasing PEEP will increase the pressure in the system. This, in turn, increases the solubility of oxygen and its ability to content in the blood. Extrinsic PEEP also can be used to improve ventilation- perfusion (VQ) mismatches. The application of positive pressure inside the airways can open or



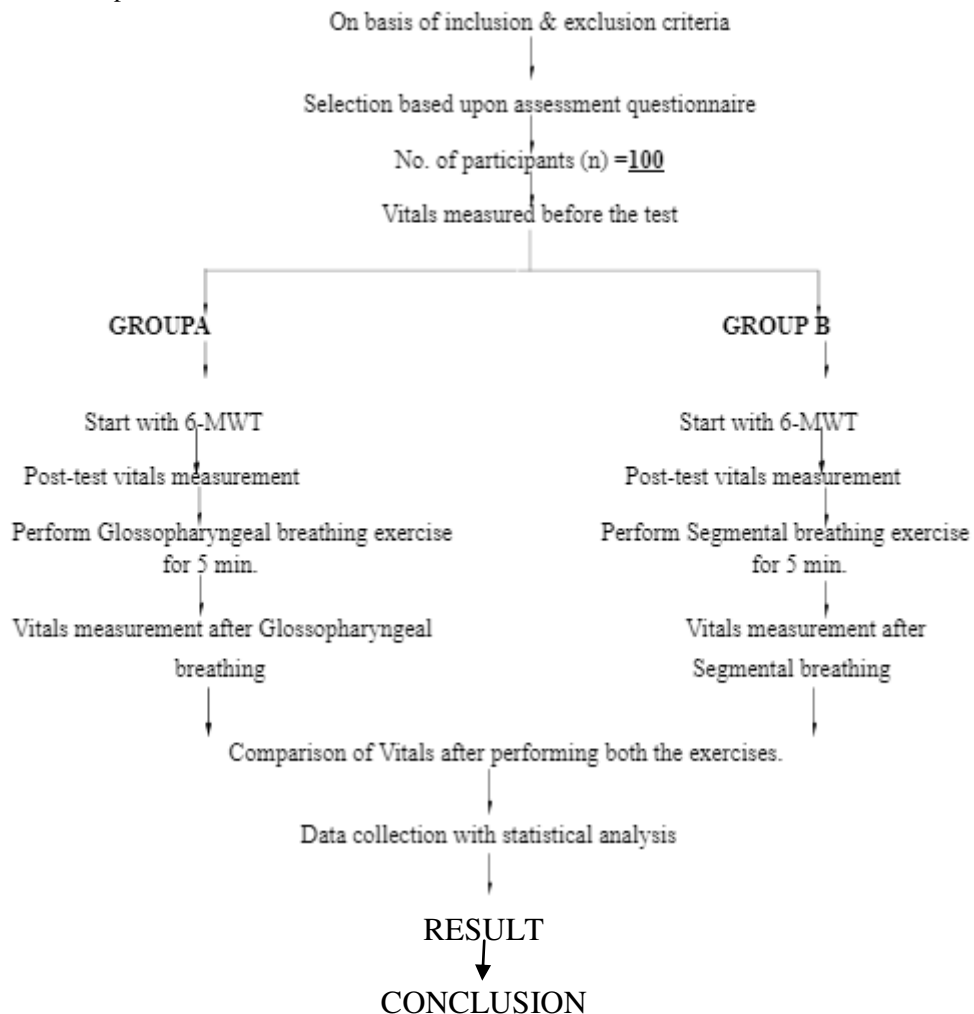
“splint” airways that may otherwise be collapsed, decreasing atelectasis, improving alveolar ventilation, and, in turn, decreasing VQ mismatch.<sup>20</sup>

**II. METHODOLOGY**

This chapter deals with the methods used for the study. this includes the information on subject, inclusion criteria, exclusion criteria, protocol and procedures used in this study. source of data: physiotherapy opd of saaii college of medical science and technology, chaubepur, kanpur. method of data collection is random, sample size is 100 subjects, study duration is 6 weeks and study design are comparative study.

In inclusion criteria is subjects willing to participate in the study, age is 18-30 years, both genders male and female can participate, normal weight, stable vitals, asymptomatic subject with no history of any cardiovascular, skeletal, neuromuscular disease and there is no use of tobacco, non-alcoholics and non-smokers in subjects.

Exclusion criteria are resting bp>139/89mmhg, resting heart rate >100bpm, if there is any difficulty in walking, vertigo, subject with underweight, normal bmi, any kind of neurological disease, asthma, pregnant females, individuals involved in regular exercise or sports.



*Flowchart 1: represent the whole protocol of present study.*

**III. PROCEDURE**

Subjects were selected based upon the inclusion & exclusion criteria. they were explained in detail about the type & nature of study before participation. consent was taken by each subject before participating in the study by signing a consent





form that contained all the information necessary for them about the study. procedure was explained in detail and all the necessary precautions were taken to avoid any inconvenience. subject preparation was carefully done. they were asked to not to indulge in any kind of vigorous activity prior to the test or to take any heavy meal up to 1 hour by the test. all the subjects were made sure to be properly hydrated, wore comfortable clothing & comfortable footwear. before starting the test, necessary assessment was done and vitals (BP, HR, RR, SPO<sub>2</sub>) were measured. all the necessary data such as age, sex, height, weight and BMI were also documented. according to the **guidelines published in American thoracic societies**, all 6mwt were conducted using a marked corridor 30 m in length in SCMAT.

The subjects were divided into 2 groups, group A & group B. both groups was asked to perform 6-mwt and participants were asked to walk back & forth along this pathway at their own best pace but not to run or race. we encouraged the participants with statements like “you are doing well” or “keep walking, you are halfway done”. subjects were allowed to stop and rest during the test but instructed to resume walking as soon as they were able to do. after completion of 6mwt, SBP, DBP, HR, RR, SPO<sub>2</sub> were measured. in ‘group a’, immediately after the vitals measurement, glossopharyngeal breathing exercise was performed while in ‘group b’, segmental breathing exercise was performed, for 5 min. after this, again vitals were measured in both groups and the difference in vitals was measured between the 2 groups to see which type of breathing exercise was better to stabilize the vitals after exertion.

#### IV. ANALYSIS

**Table 1: Showing descriptive data of Group 1: GLOSSOPHARYNGEAL BREATHING**

	N	Minimum	Maximum	Mean	Std. Deviation
Age (Years)	50	22	28	24.80	1.710
Weight (Kg)	50	61	90	74.00	7.870
Height (cm)	50	154	185	167.63	8.143
BMI	50	23	25	24.16	.781

Data analysis was done using IBM SPSS statistics (software package used for statistical analysis 2019 version - 26). Descriptive statistical analysis was done to determine the demographic characteristics of the subjects recruited in the study; paired sample t-test used in the analysis of this study. P – value used in the study to test hypothesis, which help in deciding whether to reject or accept the Null hypothesis. The p – value is probability of obtaining a test value that is at least extreme as the actual calculated value, if the null hypothesis is true. A commonly used value for the p – value is 0.05.

The descriptive data of **table 1** shows average age for Group 1 participants was 24.80 years and the average weight was 74.00 Kg. The participants had an average height of 167.63 cm and correspondingly the average for Group-1 BMI was calculated to be 24.16. This reflects that average participant were in the normal weight category in Group-1.

**Table 2: Showing descriptive data of Group 2: SEGMENTAL BREATHING**

	N	Minimum	Maximum	Mean	Std. Deviation
Age (Years)	50	22	30	25.03	1.847
Weight (Kg)	50	60	80	71.00	7.502
Height (cm)	50	151	185	164.17	8.726
BMI	50	23	26	24.32	.839

The descriptive data of **table 2** shows average age for Group 2 participants was 25.03 years and the average weight was 71.00 Kg. The participants had an average height of 164.17 cm and correspondingly the average for Group-2 BMI was calculated to be 24.32. This reflects that average participant were in the normal weight category in Group-2.



The **table 3** shows the statistical data of group-1 i.e., Glossopharyngeal breathing, while analysing the group 1 data it has been found that Glossopharyngeal breathing was significant in improving the vital signs. There is improvement in systolic blood pressure with Mean ( $\pm$ SD) of 10.400 ( $\pm$ 3.997) and t – value was 14.253 with p – value of .000, diastolic blood pressure with Mean ( $\pm$ SD) of 4.767 ( $\pm$ 1.794) and t – value was 14.551 with p – value of .000, heart rate with Mean ( $\pm$ SD) of 12.300 ( $\pm$ 6.081) and t – value was 11.079 with p – value of .000, There is improvement in respiratory rate with Mean ( $\pm$ SD) of 2.567 ( $\pm$ 1.591) and t – value was 8.839 with p – value of .000, There is improvement in SPO2 with Mean ( $\pm$ SD) of 1.267 ( $\pm$ .450) and t – value was 15.452 with p – value of .000. so, the table three shows that Glossopharyngeal breathing was significant at the 95% confidence level.

**Table 3: Showing statistical data of Group A: GLOSSOPHARENGEAL BREATHING**

	N	Mean	Std. Deviation	df	t – value	p - value
SBP	50	10.400	3.997	29	14.253	.000
DBP	50	4.767	1.794	29	14.551	.000
HR	50	12.300	6.081	29	11.079	.000
RR	50	2.567	1.591	29	8.839	.000
SPO2	50	1.267	.450	29	15.452	.000

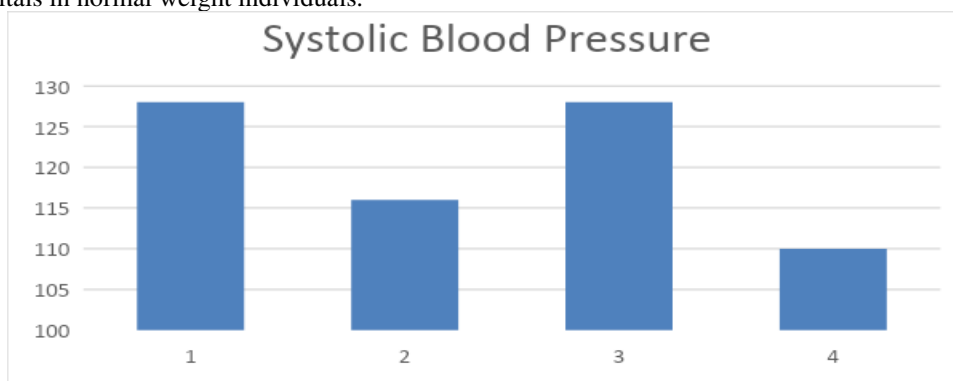
The **table 4** shows the statistical data of group-2 i.e., Segmental breathing, while analysing the group 2 data it has been found that Segmental breathing was significant in improving the vital signs. There is improvement in systolic blood pressure with Mean ( $\pm$ SD) of 18.067 ( $\pm$ 5.583) and t – value was 17.725 with p – value of .000, diastolic blood pressure with Mean ( $\pm$ SD) of 8.600 ( $\pm$ 5.654) and t – value was 8.331 with p – value of .000, heart rate with Mean ( $\pm$ SD) of 12.033 ( $\pm$ 5.102) and t – value was 12.918 with p – value of .000, There is improvement in respiratory rate with Mean ( $\pm$ SD) of 2.500 ( $\pm$ 1.757) and t – value was 7.794 with p – value of .000, There is improvement in SPO2 with Mean ( $\pm$ SD) of 1.300 ( $\pm$ .596) and t – value was 11.948 with p – value of .000. so, the table 4 shows that Segmental breathing was significant at the 95% confidence level.

**Table 4: Showing statistical data of Group 2: SEGMENTAL BREATHING**

	N	Mean	Std. Deviation	df	t – value	p - value
SBP	50	18.067	5.583	29	17.725	.000
DBP	50	8.600	5.654	29	8.331	.000
HR	50	12.033	5.102	29	12.918	.000
RR	50	2.500	1.757	29	7.794	.000
SPO2	50	1.300	.596	29	11.948	.000

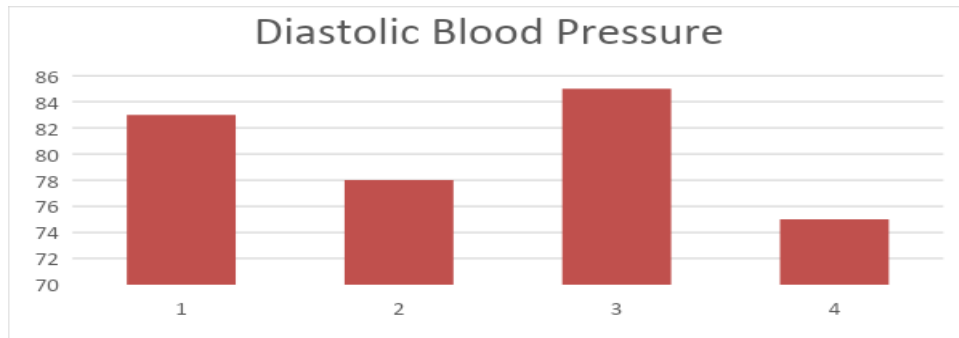
**V. RESULT**

The 95% confidence level of paired samples t - test shows significant improvement i.e., null hypothesis is rejected, and alternate hypothesis is accepted, and we statistically observed improvement along with effectiveness of segmental breathing on vitals in normal weight individuals.

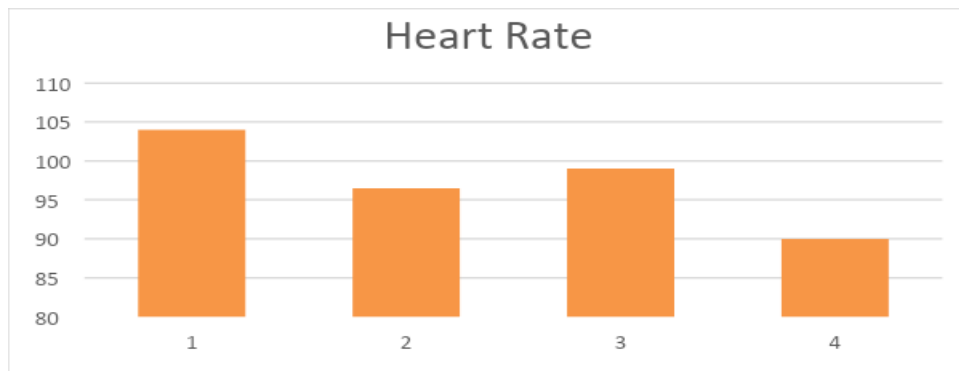




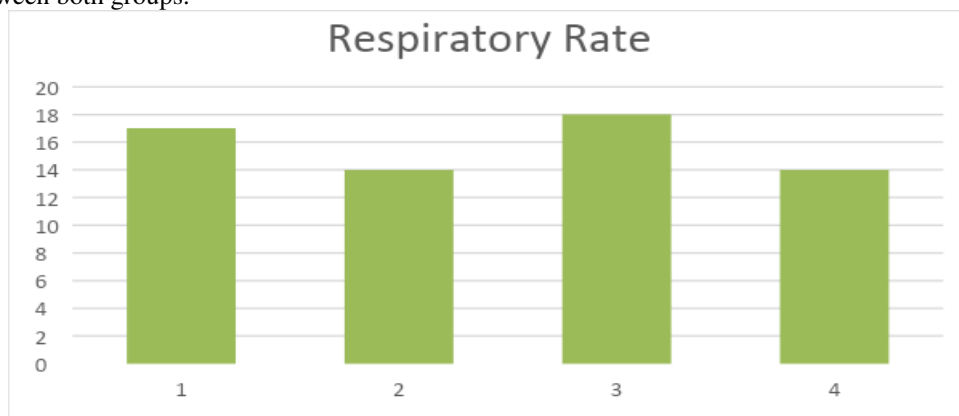
**Graph – 1:** show the systolic blood pressure distribution of all the study subjects of both groups i.e., Glossopharyngeal breathing group & segmental breathing group. A finding shows SBP with Means( $\pm$ SD) of 10.400 ( $\pm$ 3.997) for Glossopharyngeal breathing & SBP with Means( $\pm$ SD) of 18.067 ( $\pm$ 5.583) for segmental breathing, which shows statistically significant difference between both groups.



**Graph – 2:** show the diastolic blood pressure distribution of all the study subjects of both groups i.e., Glossopharyngeal breathing group & segmental breathing group. A finding shows DBP with Means( $\pm$ SD) of 4.767 ( $\pm$ 1.794) for Glossopharyngeal breathing & DBP with Means( $\pm$ SD) of 8.600 ( $\pm$ 5.654) for segmental breathing, which shows statistically significant difference between both groups.



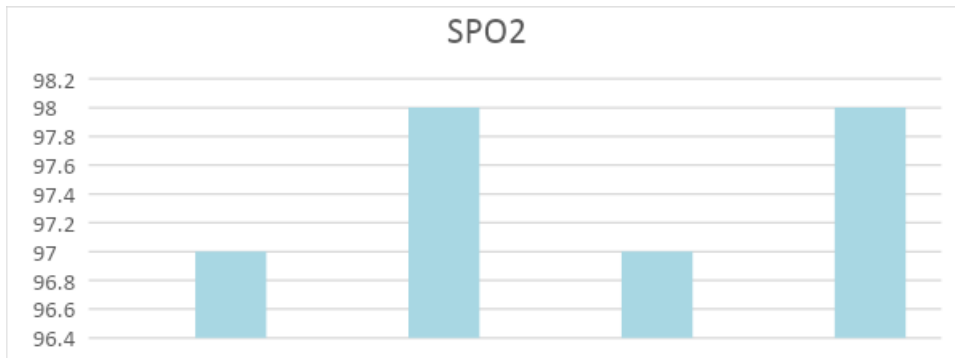
**Graph – 3:** show the Heart Rate distribution of all the study subjects of both groups i.e., Glossopharyngeal breathing group & segmental breathing group. A finding shows HR with Means( $\pm$ SD) of 12.300 ( $\pm$ 6.081) for Glossopharyngeal breathing & HR with Means( $\pm$ SD) of 12.033 ( $\pm$ 5.102) for segmental breathing, which shows statistically significant difference between both groups.



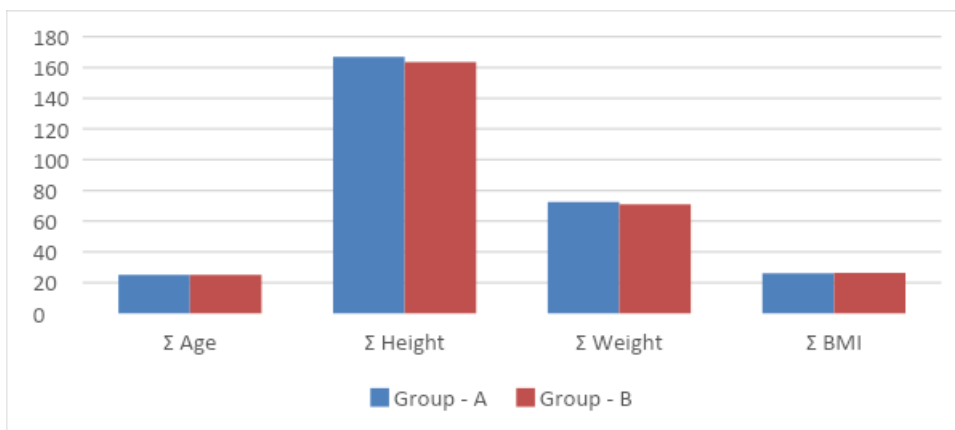
**Graph – 4:** show the Respiratory Rate distribution of all the study subjects of both groups i.e., Glossopharyngeal breathing group & segmental breathing group. A finding shows RR with Means( $\pm$ SD) of 2.567 ( $\pm$ 1.591) for



Glossopharyngeal breathing & RR with Means( $\pm$ SD) of 2.500 ( $\pm$ 1.757) for segmental breathing, which shows statistically significant difference between both groups.



**Graph – 5:** show the Oxygen Rate distribution of all the study subjects of both groups i.e., Glossopharyngeal breathing group & segmental breathing group. A finding shows SPO2 with Means( $\pm$ SD) of 1.267 ( $\pm$ .450) for Glossopharyngeal breathing & SPO2 with Means( $\pm$ SD) of 1.300 ( $\pm$ .596) for segmental breathing, which shows statistically significant difference between both groups.



**Graph – 6:** shows compare wise distribution on Age, Height, Weight & BMI of all subjects of both groups i.e., Group – A: Glossopharyngeal Breathing & Group – B segmental Breathing. A finding shows no significant difference between in all four parameters among both groups.

## VI. CONCLUSION

Hence, we concluded that, based on the results of this study and previous research, null hypothesis is rejected, and alternate hypothesis is accepted. As per the result, it has been also concluded that Glossopharyngeal Breathing and Segmental breathing both can used to control the vitals in normal weigh patients. While both the protocols were effective, there is segmental breathing statistically shows significant improvement over Glossopharyngeal breathing.

## VII.DISCUSSION

The present study was done to determine the efficacy of Glossopharyngeal and segmental breathing on vitals. The study was done on normal weighted individuals. The pre and post effect of Glossopharyngeal and segmental breathing is taken with the help of stethoscope, sphygmomanometer and pulse-oximeter. There is total 100 subjects (50 subjects in each group) were recruited according to inclusion and exclusion criteria. Those who satisfied the criteria were allowed to perform the study. All total 100 subjects were successfully completed the study. All the subjects were taken from Saaii college, Kanpur.

The data collected from the study represents that null hypothesis is rejected and alternate hypothesis is accepted, which means both treatment protocol i.e., Glossopharyngeal and segmental breathing were effective in lowering the vitals in



normal weight subjects. The study also represents that the average mean of both group shows that segmental breathing statistically significant than Glossopharyngeal breathing.

We also found same conclusion in 2020, Sunja parket et.al suggested that the lumbar segmental stabilization exercise activates the deep muscle and improves the respiratory function and respiratory pressure, when used for chronic low back pain patients with segmental instability.<sup>21</sup>

2009, Mike Thomas et. Al. suggests that Breathing exercises for asthma: a randomized controlled trial Concluded that Breathing training resulted in improvements in asthma - specific health status and other patient - centered measures but not in asthma pathophysiology. Such exercises may help patients whose quality of life is impaired by asthma, but they are unlikely to reduce the need for anti-inflammatory medication.<sup>22</sup>

2007, Ralph Potkin et. Al. Concluded that Glossopharyngeal insufflation causes hypotension by inducing bi ventricular systolic dysfunction. The echocardiographic pattern of right ventricular systolic dysfunction is quite like that seen in acute pressure overload and is likely due to the transmission of acutely increased intra thoracic pressure to the pulmonary vasculature. The concomitant development of left ventricular systolic dysfunction likely reflects a combination of impaired left ventricular filling and decreased contractility from ventricular inter dependence. Due to its marked depressive effect on cardiac function, glossopharyngeal insufflation is associated with serious hemodynamic consequences for divers in the non-immersed state; therefore, the safety of this practice warrants further investigation.<sup>23</sup> The current study is very unique, so we can do a lot in future. This study was conducted for a short period of time and with small sample size; future research involving long time period and larger sample size and comparing of two different intervention is also possible. The result of this study will help the physiotherapist to choose whether which intervention is best for lowering the vitals in normal weight subjects.

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