ORIGINAL RESEARCH PAPER

Physiotherapy

EXPIRATORY CAPACITY IN GERIATRIC POPULATION A COMPERATIVE STUDY OF DIFFERENT BREATHING EXERCISES

KEY WORDS: Geriatric, pranayama, expiratory capacity, anulom vilom, brahmari.

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ABSTRACT

Introduction: Geriatric population encounter so many health-related problems like falls, depression, arthritis, obesity, respiratory diseases, heart disease, etc. Respiratory diseases include reduce lung capacities and volumes; reduce chest expansions etc. Pranayama works at mind and body level. It increases lung capacities by developing better lung function and increase the concentration of oxygen in the lungs. It helps to eliminate toxins and strengthen the immune system. **Materials and Methods:** Ethical clearance was taken from the institution. Consent was taken from the subjects. 60 geriatric subjects (55-75 years) were included in the study from in and around Pune city by simple random sampling method after inclusion and exclusion criteria. **Study design:** Quasi-experimental study. Subjects were divided into two groups: group A (n=30, experimental) and group B (n=30, control). Group A was given anulom viloma, brahmari pranayama and group B were given conventional breathing exercises for 12 weeks. **Results:** Data were analyzed by unpaired t-test with the help of SPSS software. Expiratory capacity (group A p-value is 0.01, group B- p-value is 0.04) which shows pranayama is more effective than breathing exercises. **Conclusion:** Pranayama is effective in increasing expiratory capacity in geriatrics.

INTRODUCTION

India is the second most populated country in the world, with over 1.21 billion people, and according to the population census in India 2011, the percentage of older adults above the age of 65 is 8.6% of the total population and this population is likely to increase to 198 million in 2030[1]. Aging describes changes that occur with advancing age. Normally physiological capacity of various systems attains a maximum level in the 3rd decade of life between the late teens and thirty years of age. After 35 years there occurs a decline in physiologic and performance measures[2]. With aging physiological changes occur in all organ systems. Arteriosclerosis develops in the arteries leads to increase in blood pressure, also cardiac output decreases. The renal function also decreases. In the gastrointestinal system, motility is altered and atrophic gastritis occurs. The respiratory system is no exception to these changes, the lungs show impaired gas exchange, a decrease in vital capacity and slower expiratory flow rates[3]. Demographic transition in India has led to an absolute increase in the older adult population, which in turn increases the demand on the health-care system to add the quality of life (QOL) to the years lived[4].With ageing developmental process starts to conception. Environmental factors can accelerate ageing. Diseases become more common while ageing. Respiratory changes which occur in geriatric population are the expansion of lungs is restricted as the elastic tissue in the lungs is being replaced by fibrous tissue and several alveoli break down leading to emphysema, and also respiratory muscles become weak. Regular practice of pranayama should produce a positive effect on the lungs by increasing the pulmonary capacity and thereby improving the lung functions[5].Decreased ciliary action of the lung and impaired cough mechanism to clear secretions happens, Residual volume (RV) increases and Altered pulmonary gas exchange falls. Cardiovascular function changes in the geriatric population are heart rate max (Hr max) decreases due to decreased sympathetic nervous system activity and changes in cardiac conduction. Aging is a process that is often accompanied by physiological changes. These physiological changes include slowing in muscle contractility, alteration in muscle metabolism and neuromuscular junction, and reduction in nerve conduction velocity (NCV). Age has been widely accepted to influence nerve velocity. It is well established that there is a decline in muscular performance with advancing age[2].Neurological system changes are atrophy of nerve cells in the cerebral cortex; overall loss of cerebral mass /brain weight and Changes in brain atrophy. Narrowing and flattening of gyri and widening of sulci and ventricular dilatation leads to decreased cerebral blood flow and energy metabolism. Speed and coordination of movements are decreased which leads to increase in difficulty with fine motor movements causes both reaction time and movement time is reduced. Overall changes increase depression and anxiety in the geriatric population. Breathing exercises enhance your body's ability to absorb more oxygen and make use of it improves the expiratory capacity. Regular breathing exercises strengthen and tone the lung and heart enabling the pulmonary system to increase the maximum amount of oxygen that the lungs can handle. Deep breathing exercises such as diaphragmatic breathing; pursed-lip breathing lowers the diaphragm to fully expand your lungs on inhalation and uses the abdominal muscles to squeeze the air out on exhalation. Exercise has been associated with improvements in cognitive function and may also provide benefits like reducing stress and anxiety, which improves their mental health and social engagements.

Pranayama is a technique of controlling and modulating breath and meditation, a process through which one attains a state of deep rest yet an active state of mind[5]. In elderly people, pranayama work in tandem to increase lung capacity by developing better lung function and increase the concentration of oxygen in the lungs. It also improves the circulation of blood and the lymphatic system, helping to eliminate toxins and strengthen the immune system. Pranayama offers many anti-aging benefits, beyond just the physical. It also provides emotional, spiritual and social advantages. It also reduces the stress and depression as the additional advantage of accessibility it can be practiced any time, any place, without special equipment or clothing[6].

Sometimes in old age, due to immobility at joints, regular physical exercise is not possible. But to have a good quality of life, the lungs can be kept functional. This can be possible if regular breathing exercise can be done. Pranayama if done regularly can be good breathing exercise to the respiratory system. "Pranayama is control of Breath". "prana" is Breath or vital energy in the body. On subtle levels, prana represents the pranic energy responsible for life or life force, and "Ayama" means control. Hence, pranayama is "control of breath". One can control the rhythms of pranic energy with pranayama and achieve a healthy body and mind[7].Quality of life also improves by doing pranayama. Anuloma-viloma is the alternate nostril breathing is to balance the physical energy and mental energy. Benefits are a proper supply of

oxygen is ensured and CO2 is effectively removed. Blood is purified from toxins. It helps in reducing depression, stress, anxiety, and other illnesses. Bhramari pranayama helps to release the mind of agitation, frustration or anxiety and get rid of anger. It Improves concentration, memory and helps in reducing blood pressure. It builds confidence to mitigate migraines. Thus a study is needed to see the effects of different breathing exercises on depression scale in Indian geriatric population. The aim was to compare the effect of different breathing exercises on expiratory capacity in the geriatric population.

MATERIALS AND METHODS:

The present study conducted with a sample size of 60, all the subjects were included in the city of Panipat, Haryana, India. Convenient sampling was used and the study was Comparative experimental study.

Materials used were (a) Geriatric depression scale,(b) Peak flow meter. Subjects with an age group of 65-75 years. They were Physically Healthy Geriatric, both male and female genders with were included in the study. Subjects having any type of neurological or psychological disorders, musculoskeletal conditions; OA was excluded from the study.

Outcome measures: Expiratory capacity: - It is measured by using peak flow meter. It is used to measure the amount of air that is expelled from the lungs. If the airways become narrowed or blocked due to asthma, peak flow values drop because the person cannot blow air out of the lungs.

Procedure: Subjects were divided into two groups. Group A (n=30) and Group B (n=30). Ethical clearance was taken from the institution. Consent was taken from the subjects. Subjects were selected as per the inclusion and exclusion criteria. Subjects in the age group of 65-75 years were included in the study. The mean age in group A was 69.9, and the mean age in group B was 70. Therefore there was no significant difference in the age groups included in the study as the p-value was >0.15 which is considered to be significant. Subjects of Group A were given breathing exercises like Pranayam i.e anulomavilom and brahmari Pranayam with the frequency of 10-15 minute, thrice a day for 12 weeks. Subjects of Group B were the control group and conventional breathing exercises were taught to them like deep breathing exercises, pursed-lip breathing, frequency of 10-15 minutes, and thrice day duration for 12 weeks. On day 1- All parameters were checked and the technique was explained. Re-evaluations and recording took on 1st week, 6th and 12th week.

Data Analysis: Data were analyzed by paired t-test and comparison was done by unpaired t-test with the help of SPSS Software.

Group A - expiratory capacity p-value is 0.01 which shows Pranayam is effective. Group B expiratory capacity p-value is 0.04 which shows breathing exercises are also effective. By comparing group A and group B Peak flow reading show Pranayam is more effective than conventional breathing exercises.

RESULTS & DISCUSSION:

The expiratory capacity of the geriatric population between age group of 65-75 years old both male and female age group of 60 samples was analyzed, which are divided into two groups A and B. Group A consist of 30 samples, 15 males and 15 females which are in experimental group and Pranayam were taught to them. Group B consists of 30 samples, 15 males and 15 females which are in the control group conventional breathing exercises were taught to them. The increased values of post-intervention treatment suggest that both exercises were effective for increasing expiratory capacity in the geriatric population. Usually breathing is regulated automatically by the nervous system through the respiratory centers. Dorsal and ventral group of neurons located in the medulla, the pnemotaxic center and the apneustic center located in the pons regulate breathing. Regular practice of slow and deep breathing exercises improves muscle strength and flexibility due to work hypertrophy. Pranayam cleanses the airways secretion. Pranayam practices for short term increases maximum expiratory pressure and flow rate. It decreases reaction time indicating improvement of the neuromuscular system. Deep and controlled breathing desensitizes the sensory nerve ending and reduces the allergic conditions of the environment. Besides, increased the development of respiratory musculature and endurance due to the regular practice of Pranayam delays the onset of fatigue. In the present study, 12 weeks protocol of regular including two groups of breathing exercises were done and expiratory capacity was assessed with the help of peak flow meter and post-intervention results show that both exercise, as well as pranayama, increases expiratory capacity.

The result of a recent study done by Harshita Jain et al state that both pranayama and breathing exercise increases expiratory capacity in obese women. And by comparing it shows that pranayama is more effective than breathing exercise[8].

Study supporting this by T Dinesh et al, on comparative effect of 12 weeks of slow and fast pranayama training on pulmonary function in young, healthy volunteers concluded that twelve weeks of pranayama training in young subjects showed improvement in the commonly measured PFT values[9].

Pooja Akhtar and et. Al conducted a study on the Effects of yoga on functional capacity and wellbeing and concluded that pranayama and yoga practices are beneficial in improving functional capacity[10]. As a deep breathing technique, pranayama reduces dead space ventilation and decreases the work of breathing. It also refreshes the air throughout the lungs, in contrast with shallow breathing that refreshes the air only at the base of the lung[9].

FUTURE SCOPE: Further studies with a larger sample size can be conducted. The outcome of the intervention can be compared in patients with asymptomatic and symptomatic respiratory conditions. Other lung parameters like inspiratory capacity, expiratory capacity, total lung capacity, residual volume, etc can be used.

CONCLUSION:

Pranayama and breathing exercises improve the expiratory capacity of the lungs. Regular practices help in setting the mind better and prevent many cardio-respiratory complications.

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