International Journal of Research and Review
www.ijrrjournal.com E-ISSN: 2349-9788; P-ISSN: 2454-2237

Original Research Article

Effect of Inspiratory Muscle Training Vs Resisted Thoracic Expansion Exercise on Submaximal Endurance in Poultry Workers

Dr. Pournima. A. Pawar[1], Dr. Ujwal Yeole[2], Miss Shweta. V. Kshatriya[3], Dr. Rasika B. Panse[1]

[1]Assistant Professor Tilak Maharashtra Vidyapeeth, Pune.
[2]Associate Professor, Tilak Maharashtra Vidyapeeth, Pune.
[3]Intern, Tilak Maharashtra Vidyapeeth, Pune.

Corresponding Author: Dr. Pournima. A. Pawar

ABSTRACT

Background: Poultry workers display higher rates of asthma and respiratory symptoms than other workers as they are occupationally exposed to many respiratory hazards at work. Dust increases risk of adverse respiratory disease occurrence as it is one of the components present in poultry production. Dust originates from poultry residues, moulds, and feathers and is biologically active as it contains microorganisms. Poultry farm workers are more prone to suffer from respiratory ailments as they are exposed to higher concentration of dust that affects their inspiratory muscle strength to reduce. For this type, rehab can be given to increase their inspiratory muscle strength and therefore increase their endurance.
Aim: To compare the effect of inspiratory muscle training and resisted thoracic expansion exercise on submaximal endurance in poultry workers**.**
Objective: effect of thoracic expansion exercises and inspiratory muscle training in poultry workers with 6 minute walk test.
Material and methodology: Total number 30 poultry workers between age group of 30-50 years of both genders were selected by convenient sampling. 6 minute walk test outcome measure was taken pre and post intervention. Intervention is based on strengthening of inspiratory muscle 5 times a week for 4 weeks for 15mins.
Result: after comparing pre and post intervention data using paired t test showed that there was significant improvement in 6MWT($p<0.0001$) and in unpaired t test in 6MWT(p0.0445).
Conclusion: Both interventions were effective but inspiratory muscle training was more effective.

Keywords: poultry workers, resisted thoracic expansion exercise, inspiratory muscle training, 6minute walk test.

INTRODUCTION

Poultry farm supervisors develop farm schedules and meet processing goals while they communicate with other farm personnel. Their duties can include hiring and training personnel, ordering supplies and budgeting. Poultry farm supervisors oversee chicken farms and handle sales and shipping of chicken-based products to food manufacturers. Poultry workers are occupationally exposed to many respiratory hazards at work and display higher symptoms respiratory system and health risks than other workers. Dust increases risk of adverse respiratory disease of which occurrence is one of the components present

in production of poultry farm. Dust originates from poultry farm containing residues, moulds, and feathers in the dust as it contains microorganisms therefore are biologically active. Poultry farm workers are more prone to suffer from respiratory ailments as they are exposed to higher concentration of dust that affects their inspiratory muscle strength to reduce. Impairment of respiratory muscles that contain both inspiratory and expiratory muscle is a common clinical finding, in patients with neuromuscular disease and also in patients with primary disease of airways or parenchyma of lungs.

Inspiratory muscle weakness can cause dyspnea and exertion intolerance. However, diagnosis is usually delayed, because most screening protocols for dyspnea do not include assessment of respiratory muscle strength. In addition, while performing assessment of respiratory muscle strength, it includes high percentage test of false negatives, depending on patient cooperation. Maximal inspiratory pressure in patients with suspected respiratory muscle weakness, in respiratory muscle strength it is the most widely used measure. Being non-invasive it contains reference values that are well established, in different populations (lower limit of normal of 60 cmH_2O for females and 80 cmH_2O for males).

The relationship between inspiratory muscle strength and lung volumes is not linear, the measurement of MIP can diagnose inspiratory muscle weakness earlier than possible based on changes in volumes of the lung. Measurements are usually made in a sitting position, with nose clips. Patients are asked to exhale to RV and then perform a maximal inspiratory effort, sustaining it for 1 to 2 seconds. To prevent overestimation of values because of pressure by the mouth muscles that are caused by glottal closure, there is a 2-mm-wide opening in the mouthpiece that is a rigid tubular mouthpiece. The latter gives slightly higher values. In the diagnosis of inspiratory muscle weakness, determining MIP is important which can occur in cardiac and pulmonary disease. In addition, MIP measurements can lead in the differential diagnosis of dyspnea and in the differential diagnosis of obstructive lung disease. In assessing response to cardiopulmonary physiotherapy and rehabilitation in prescribing and monitoring muscle training of respiration.

Threshold IMT device provides consistent and specific pressure for inspiratory muscle strength and endurance training, regardless of how quickly or slowly patients breathe. This device incorporates a flow-independent one-way valve to ensure consistent resistance and adjustable specific pressure setting in cm H2O to be set by a healthcare professional. When patients inhale through Threshold.

The 6 Minute Walk Test used to assess aerobic capacity and endurance and is a sub-maximal exercise test. The distance covered in a time of 6 minutes walk test is used as the outcome to compare changes in performance capacity. The aim of this test is to walk for 6 minutes as far as possible by walking back and forth in this hallway. A walking track is used to perform 6 minute walk test in our facility. The track needs to be marked at 3-m intervals so that accurate measurement of the distance covered by walking can be performed. Chairs are available at 30-m intervals in case the patients become so symptomatic that they have to stop and sit. After completion of a pulmonary rehabilitation program, The change in the distance walked in the 6MWT could be used to evaluate the exercise training program effectiveness and used to trace the natural history over time of change in exercise capacity. The 6 Minute walk test provides information of functional capacity, prognosis and therapy response across a broad range of cardiopulmonary conditions. Aim is to compare the effect of resisted thoracic expansion exercise and inspiratory muscle training in poultry workers and objectives are To find out the effect of resisted thoracic expansion exercises in

poultry workers with 6 minute walk test, To find out the effect of inspiratory muscle training device in poultry workers with 6 minute walk test, To compare the effect of resisted thoracic expansion exercises and inspiratory muscle training in poultry workers.

MATERIALS AND METHODS

Material

IMT device, pen, paper, stopwatch, chairs, theraband

Method

Total number 30 poultry workers between age group of 30-50 years of both genders were selected by convenient sampling method. The study duration was 6 months and study setting was poultry farm. The target population was poultry workers.

Inclusion Criteria

1. Both Male and female
2. Age : 30 – 50 years
3. Working in poultry for more than 10 years

Exclusion Criteria

1. Not willing to participate
2. Individuals with diagnosed cardio-respiratory conditions.
3. Chronic smokers

Outcome Measures

1. Inspiratory Muscle resistance

2. 6 Minute Walk Test

Statistical Methods

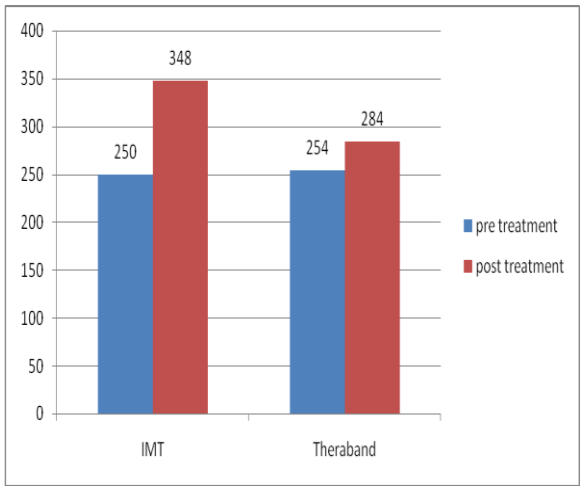
- Microsoft office excel 2010 and instat was used for statistical analysis.
- Average values for various parameters are calculated.
- Effect is tested using unpaired and paired 't'- test
- Level of significance was set at 5% (i.e. <0.05)

RESULT

The following table explains the pre and post values of group A i.e. Inspiratory muscle training group and group B i.e. Resisted thoracic expansion group.

Between group comparison of 6 minute walk test

	Inspiratory Muscle Training (Group A)			Resisted Thoracic Expansion Exercises (Group B)		
	Pre	**Post**	**p Value**	**Pre**	**Post**	**pValue**
6 MWT	250±33.38	348±40.56	<0.0001	254±39.060	284±39.06	0.0445



Interpretation: The graph shows group A as workers in inspiratory training group and group B as workers in Resisted thoracic expansion group. The graph shows improvement in 6 minute walk test in both group A and group B. Group A shows more improvement than group B in endurance training that increased their distance in 6 minute walk test.

After comparing pre and post intervention data using paired t test showed that there was significant improvement in 6MWT($p<0.0001$) and in unpaired t test in 6MWT(p0.0445).

DISCUSSION

The study was done to know the effect of inspiratory muscle training device vs resisted thoracic expansion exercise in poultry workers. The study done was experimental and sampling method followed was convenient sampling. Total 30 numbers of poultry workers were selected in which 15 were divided in group A and group B. Group A included the workers that were treated with inspiratory muscle strength and

group B included workers with resisted thoracic expansion exercise. The post treatments in both A and B group shows improvement.

Viegas S et al underwent a study on Occupational exposure to poultry dust and effects on the respiratory system in poultry workers. He concluded that poultry farm workers are more prone to suffer from respiratory ailments and this may be attributed to higher concentrations of dust paticles. Nield MA et al underwent a study on Inspiratory muscle training protocol using a pressure threshold device: effect on dyspnea in chronic obstructive pulmonary disease. He concluded that Using a constant-load pressure threshold device to attain loads of >30% of the patient's baseline PImax is a feasible way to accomplish inspiratory muscle training in adults with severe COPD. Eliane R. Winkelmann et al underwent a study on Addition of inspiratory muscle training to aerobic training improves cardiorespiratory responses to exercise in patients with heart failure and inspiratory muscle weakness. he concluded that Six-minute walk distance and quality of life scores improved similarly in both groups.

The diaphragm being the major muscle responsible for breathing, is a thin, dome-shaped muscle that separates the abdominal and the thoracic cavity. The diaphragm contracts during inhalation, so that its edges move upward and its center moves downward. This compressing the abdominal cavity, raises the ribs upward and outward and thus causes expansion of the thoracic cavity allowing the air into the lungs. When diaphragm relaxes, it causes thoracic cavity to contract because of the elastic recoil of the thoracic wall, forcing air out of the lungs. The primary inspiratory muscles are the external intercostals and the diaphragm. The muscles of inspiration elevate the ribs and sternum, and the muscles of expiration depress them.

The 6-min walk test is a submaximal exercise test that entails measurement of distance walked over a span of 6 minutes. The 6-minute walk distance provides a measure for integrated global response of multiple cardiopulmonary and musculo-skeletal systems involved in exercise. The 6 Minute Walk Test provides information regarding functional capacity, response to therapy and prognosis across a broad range of chronic cardiopulmonary conditions. Main strengths of the 6 Minute Walk Test stem from its simplicity in performance, low cost, ease of standardization, acceptance by test subjects, including the deconditioned, elderly, or frail.

The change in the distance walked in the 6 Minute Walk Test is after completion of a pulmonary rehabilitation program it can be used to evaluate the effectiveness of the exercise training program. it could be also used to trace the natural history of change in exercise capacity over time. The minimum improvement in the distance walked in a 6 Minute Walk Test is 30 metres.

CONCLUSION

In this study we concluded that, both interventions were effective but inspiratory muscle training was more effective.

REFERENCES

- Caruso P, Albuquerque AL, Santana PV, et. al. Diagnostic method to assess inspiratory and expiratory muscle strength. J Bras Pneumol. 2015 Mar-Apr;41(2):110-23.
- Viegas S1, Faísca VM, Dias H, et. al. Occupational exposure to poultry dust and effects on the respiratory system in workers. J Toxicol Environ Health A. 2013;76(4-5):230-9.
- Clanton TL, Dixon G, Drake J, et. al. Inspiratory Muscle conditioning using a Threshold Loading Device. Chest. 1985 Jan;87(1):62-6.
- Larson JL1, Kim MJ, Sharp JT, et. al. Inspiratory Muscle Training with a Pressure Threshold Breathing Device in Patients with Chronic Obstructive Pulmonary Disease. Am Rev Respir Dis. 1988 Sep;138(3):689-96.
- Rimac D, Macan J, Varnai VM, et. al. Exposure to poultry dust and health effects in poultry workers: impact of mould and

mite allergens. Int Arch Occup Environ Health. 2010 Jan;83(1):9-19
- de Troyer A, Yernault JC Inspiratory muscle force in normal subjects and patients with interstitial lung disease. Thorax 1980;35:92-100. Volume 35-2
- Allison McConnell "Respiratory Muscle Training: Theory and Practice" McConnell AK, Romer LM. Respiratory Muscle Training Int J Sports Med 2004; 25: 284 ± 293
- Makoto Sasaki, Hajime Kurosawa, Masahiro Kohzuki. Effects of inspiratory and expiratory muscle training in normal subjects J Jpn PhysTherAssoc.2005;8(1):29-37doi: 10.1298/jjpta.8.29
- Winkelmann ER, Chiappa GR, Lima CO, et. al. Addition of inspiratory muscle training to aerobic training improves cardiorespiratory responses to exercise in patients with heart failure and inspiratory muscle weakness. Am Heart J. 2009 Nov;158(5):768.e1-7.
- Jose M. Martin, Santiago J. Carrizo. Inspiratory Capacity, Dynamic Hyperinflation, Breathlessness, and Exercise Performance during the 6-Minute-Walk Test in Chronic Obstructive Pulmonary Disease. Vol. 163, No. 6 | May 01, 2001
- Quackenboss JJ, Lebowitz MD, Krzyzanowski M. The Normal Range of Diurnal Changes in Peak Expiratory Flow Rates: Relationship to Symptoms and Respiratory Disease. Am Rev Respir Dis. 1991 Feb;143(2):323-30.
- Sciurba F, Criner GJ, Lee SM, et. al. Six-Minute Walk Distance in Chronic Obstructive Pulmonary Disease Reproducibility and Effect of Walking Course Layout and Length. Am J Respir Crit Care Med. 2003 Jun 1;167(11):1522-7
- Rasekaba T, Lee AL, Naughton MT, et. al. The six-minute walk test: a useful metric for the cardiopulmonary patient. Intern Med J. 2009 Aug;39(8):495-501.
- Ramirez-Sarmiento A, Orozco-Levi M, Guell R, et. al. Inspiratory Muscle Training in Patients with Chronic Obstructive Pulmonary Disease Structural Adaptation and Physiologic Outcomes. Am J Respir Crit Care Med. 2002 Dec 1;166(11):1491-7.
- Guillam MT, Pédrono G, Le Bouquin S, et. al. Chronic respiratory symptoms of poultry farmers and model-based estimates of long-term dust exposure. Ann Agric Environ Med. 2013;20(2):307-11.
- Faria NM, Facchini LA, Fassa AG, et. al. Farm work, dust exposure and respiratory symptoms among farmers. Rev Saude Publica. 2006 Oct;40(5):827-36.
- Clanton TL, Dixon G, Drake J, et. al. Inspiratory Muscle Conditioning Using a Threshold Loading Device. Chest. 1985 Jan;87(1):62-6.
- Eastwood PR, Hillman DR. A threshold loading device for testing of inspiratory muscle performance. Eur Respir J. 1995 Mar;8(3):463-6.
- Martyn JB, Moreno RH, Paré PD et. al. Measurement of Inspiratory Muscle Performance with Incremental Threshold Loading. Am Rev Respir Dis. 1987 Apr;135(4):919-23.
- Gibbons WJ, Fruchter N, Sloan S et. al. Reference Values for a Multiple Repetition 6-Minute Walk Test in Healthy Adults Older Than 20 Years. J Cardiopulm Rehabil. 2001 Mar-Apr;21(2):87-93.

How to cite this article: Pawar PA, Yeole U, Kshatriya SV et.al. Effect of inspiratory muscle training vs resisted thoracic expansion exercise on submaximal endurance in poultry workers. International Journal of Research and Review. 2018; 5(12):18-22.

******