

Effectiveness of Balloon Therapy on Respiratory Status of Patients with Lower Respiratory Tract Disorders

Renuka K.¹, Helen Shaji J. C.², Kripa Angeline A.³

¹Principal, Kasturba Gandhi Nursing College, Puducherry, India

²Coordinator of Nursing Department, College of Applied Medical Sciences, Majma'ah University, Kingdom of Saudi Arabia,

³Associate professor, Kasturba Gandhi Nursing College, Puducherry, India

Abstract: *Breathing is the bridge between mind and body, the connection between consciousness and unconsciousness. Chronic respiratory disease is found to be one of the most distressful conditions, badly affecting the quality of human life in our society. The main aim of the study was to assess the effectiveness of balloon therapy on respiratory status of patients with lower respiratory tract disorders. Pre-experimental design was used for this study. Total 20 samples were selected using purposive random sampling technique and balloon therapy was given for two weeks. The data pertaining to respiratory status was collected using structured self administered questionnaire and respiratory assessment for respiratory rate, dyspnea, and lung capacity were done using incentive spirometry. Among 20 patients, 15(75%) of patients had poor respiratory rate, 5(25%) patients have poor lung capacity, 15(75%) patients had poor dyspnea score before the implementation of balloon therapy where as after the implementation of balloon therapy, 18(90%) of patients had normal respiratory rate, 12(60%) of patients had normal score in dyspnea scale and all of them (100%) attained normal lung capacity. The result of this study proved that regular practice of balloon therapy can improve the respiratory status to a greater extent among patients with lower respiratory disorders.*

Keywords: Effectiveness, balloon therapy, respiratory status, lower respiratory disorders, dyspnea scale.

1. Introduction

Breath is the key to health and wellness, a function can learn to regulate and develop in order to improve our physical, mental and spiritual wellbeing. Breathing is one of the most important functions to our body. A person can only live from 5 to 10 seconds without taking another breath. The main function of breathing is to deliver oxygen to our lungs and to remove carbon-di-oxide when necessary which is done by respiratory system.

Respiratory disease is a significant chronic health problem in our society. Chronic respiratory disease is found to be one of the most distressful conditions, badly affecting human life.

World health organization (2011) shows that by mid-century, morbidity and mortality from respiratory disease will reach record at High levels. The report of "WORLD HEALTH STATISTICS 2011" Says that, 235 million people currently suffer from asthma, 90% of COPD deaths occur in low and middle income countries and > 3 million people died of COPD in 2005. The lower respiratory tract infection pneumonia remains that most common infection seen in the community and among hospitalized patients.

National Disease Statistics (2011) Worldwide shows a high prevalence of respiratory morbidity among patients with respiratory disorders. It says that COPD is the third leading cause of death in America. 12.7 million U.S adults (aged 18 and above) were estimated to have COPD, 10.1 million Americans reported chronic bronchitis and 4.7 million with emphysema. Most of the disease burden in India is due to

the respiratory disorders namely asthma, bronchitis, and tuberculosis (TB) and Pneumonia. In low resource setting these diseases are mainly attributed with exposure to indoor pollution, solid cooking fuels, poor housing, low nutritional status and sanitary condition. The association of respiratory disorder with geographical region may be relevant with population density, industrial and textile pollutants, and tobacco consumption.

Over 35 million people in the United States are living with lung disease and one in seven people die from it each year. Respiratory disease accounts for 14% of total expenditure for health care in the United States (Health People, 2010).

Flick M.R, Moody LE et.al (2011, Sweden) conducted a study on effect of nebulization on arterial oxygen saturation in COPD. 20 patients with mild to severe COPD received ultrasonic nebulization to assess the danger of short term changes in blood gas level during this therapy. The status of arterial oxygenation was monitored during 20 minutes. In all 20 patients pulse oxymetry studies showed only a small mean change at ten minutes of nebulization therapy.

Kyndall L Boyle et.al (2010) conducted a study about the value of blowing up a balloon. A therapeutic exercise that promotes optimal posture (Diaphragm and lumbar spine position) and neuromuscular control of the deep abdominals, diaphragm and pelvic floor (lumbar-pelvic stabilization). This exercise was designed to optimize breathing and enhance both posture and stability in order to improve functions and /or decreases pain.

Most of the patients in India with chronic lower respiratory disorders used to be on some forms of broncho dilator therapy, which has its own side effects also. So the investigators felt that if this cost effective balloon therapy is found to be effective in improving the respiratory status of patients, can replace the drug usage or reduce its dosage and thereby can improve the Quality of life of patients with Lower respiratory disorders.

1.1 Objectives of the Study

- To assess the respiratory status of patients with lower respiratory tract disorders during pretest.
- To evaluate the effectiveness of balloon therapy on respiratory status of patients with lower respiratory tract disorders.
- To find out the association between respiratory status of the patient with lower respiratory tract disorders and selected demographic variables.

2. Methodology

2.1 Research Approach

Experimental research approach was adopted for the study as it was intended to assess the effectiveness of balloon therapy on respiratory status of the patient with lower respiratory tract disorders.

2.2 Research Design

Single group pre-test post-test pre experimental design was used.

2.3 Study Setting

The study was conducted in Mahatma Gandhi Medical College and Research Institute Puducherry. It is a Multi-Specialty Hospital situated 15 km away from Puducherry. It is a 850 bedded hospital with all speciality Wards.

2.4 Study Population

All the patients in male & female medical ward of MGMC&RI, who met the inclusion criteria.

2.5 Sample and Sample Size

Patient who got admitted in female and male medical ward with lower respiratory disorders and those who fulfill the criteria, were selected as sample. The sample size was 20.

2.6 Criteria for Sample Selection

2.6.1 Exclusion Criteria:

- Patient who were not willing to participate
- Patient with oral lesions
- Patient who cannot follow the instruction .e.g., deaf and dumb, psychiatric patients and blind patients.
- Patient who had chronic diseases like cancer, congestive cardiac failure etc.

2.6.2 Inclusion Criteria:

- Patients who were diagnosed as any form of Lower respiratory disorders such as asthma, pneumonia, tuberculosis, bronchitis etc.
- Patients who were not receiving any forms of Bronchodilator therapy.
- Patient with age of 20-60 years
- Both sexes

2.7 Sampling Technique

The patients who met the inclusion criteria during the data collection period were selected using purposive sampling technique.

2.8 Procedure for Data collection

Before starting data collection, the researcher obtained permission from the Head Of the Department of pulmonary medicine. The samples were selected based on the criteria and informed consent was obtained. Pre-test was done on the first day of data collection using the structured Questionnaire, Dyspnea scale and incentive spirometry. Balloon therapy was given for about 14 consecutive days. Commercially available balloons were used for the study. Patients were encouraged to inflate the balloon to the diameter of 7 inches about 8 to 10 times per day. The balloon was given with a measuring wire of 7 inches. A recording sheet was provided to the patients to document the frequency of the therapy and the procedure was monitored by the investigator. Post-test was done on the 14 th day after the balloon therapy. Data was collected using observation and interviewing method focusing on the improvement of respiratory status and lung capacity of patients. The data was collected for a period of four weeks.

3. Results

3.1 Background Variables

Considering the age group, 4(20%) of them were in the age group of 20-40 years, 13(65%) were in the age group of 41-60 years and 3(15%) belong to the age group of 61 & above.

With respect to the gender, 13(65%) are male & 7(35%) are female. With respect to the smoking habit 8(40%) are smokers and 12(60%) are non smokers (Fig.1). With respect to the duration of illness, 10(50%) had this illness less than 2 years, 8(40%) had illness 2-3 years and only 2(10%) had more than 2 years.

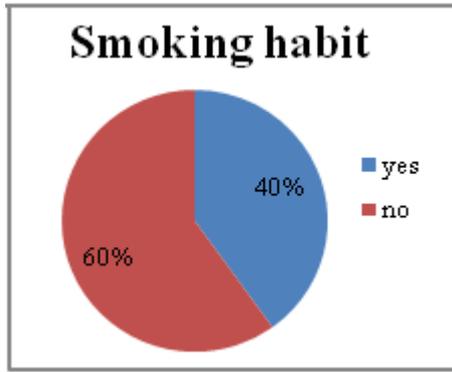


Figure 1: Percentage distribution of smoking habit among patients with lower respiratory tract disorders

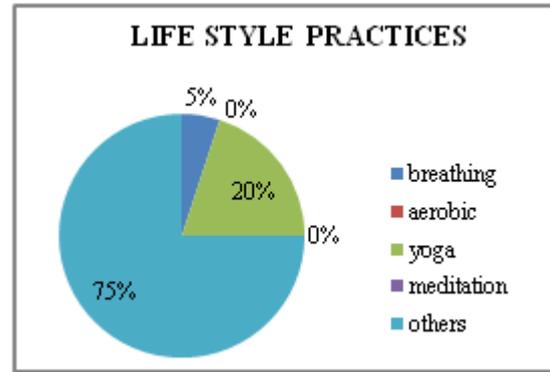


Figure 3: Percentage distribution of Life style practices among patients with lower respiratory tract disorders:

Table 1: Frequency And Percentage Distribution Of Type of Workers, Presence Of Co-Morbid Illness and alternative therapy practices among Patients With Lower Respiratory Tract Disorders

S.NO	Demographic variables	Frequency	Percentage
1	Types of workers		
	a) Sedentary workers	5	25
	b) Moderate workers	12	60
	c) Heavy workers	3	15
2	Presence of co-morbid illness		
	a) Anemia	5	25
	b) Ischemic heart disease	4	20
	c) Thyroid disorders	1	5
	d) None	10	50
3	Alternative therapy practices		
	a) Ayurveda	0	0
	b) Homeopathy	0	0
	c) Naturopathy	0	0
	d) Siddha	1	5
	e) Unani	0	0
	f) None	19	25

3.2 Effectiveness of Balloon therapy on respiratory rate, dyspnea scale and Lung capacity of patients with lower respiratory tract disorders

The findings of the study depicts that similar number 15(75%) of patients had poor respiratory rate as well as poor dyspnea score and 5(25%) patients had poor lung capacity before the implementation of balloon therapy where as 18(90%) patients had normal respiratory rate (Fig.4), 12(60%) patients had normal dyspnea score and 20(100%) patients had achieved normal lung capacity (Fig.5) after the implementation of balloon therapy. It was also noted that there was a highly significant improvement in the respiratory rate ($P < 0.001$), dyspnea score ($P < 0.01$) and lung capacity ($P < 0.05$) after balloon therapy.

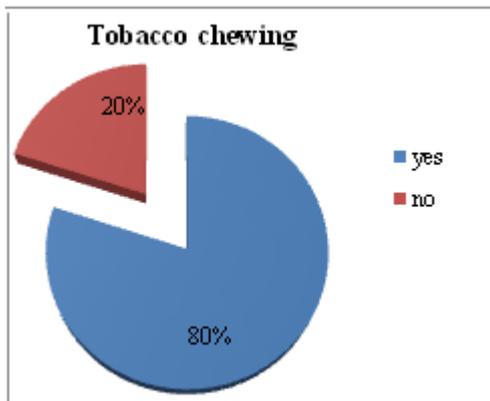


Figure 2: Percentage distribution of tobacco chewing habit among patients with lower respiratory tract disorders

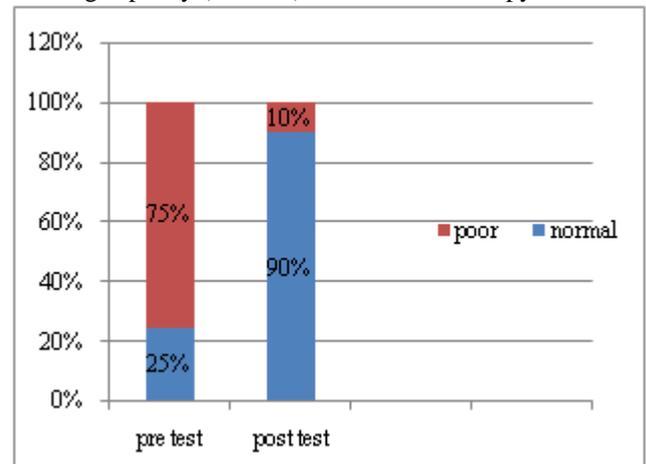


Figure 4: Effectiveness of Balloon therapy on respiratory rate of patients with lower respiratory tract disorders

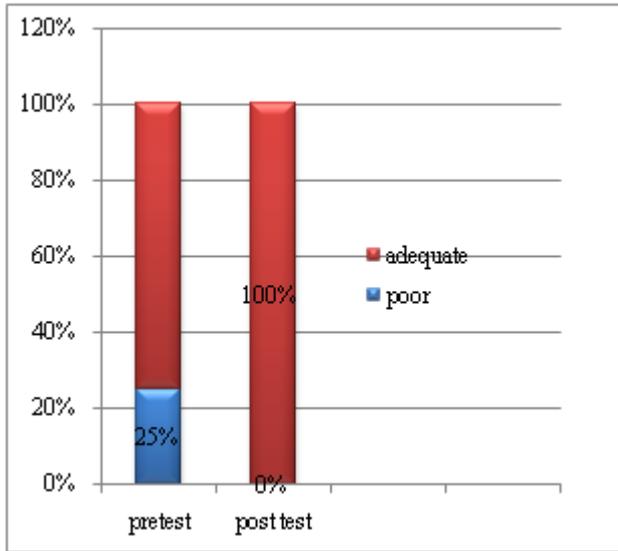


Figure 5: Effectiveness of Balloon therapy on Lung capacity of patients with lower respiratory tract disorders

3.3 Association between respiratory status of patient with lower respiratory tract disorder and selected demographic variables

There was no significant association between respiratory rate and selected variables like age, education status, occupation status, area of work, duration of illness, type of workers, co-morbid illness, tobacco chewing habit, alternative therapies, and life style practices except Gender ($P < 0.05$). The Chi square test revealed that balloon therapy was more effective to improve the respiratory status of males than females.

Table 2: Association between dyspnea scale with selected demographic variables

S. N O	Demographic variables	Respiratory rate of patient with lower respiratory tract disorder				X ² value
		Poor		Adequate		
		F	%	F	%	
1	Age					X ² =6.188
	20-40	2	10	2	10	df=2
	41-60	12	60	1	5	P=0.045
	61 and above	1	5	2	10	S**
2	Gender					X ² =3.590
	Male	8	40	5	25	df=1
	Female	7	35	0	0	P=0.058
3	Educational status					X ² =4.711
	Non literate	3	15	2	10	df=1
	primary	10	50	2	10	P=0.194
	secondary	2	10	0	0	NS**
4	Occupational status					X ² =1.908
	Un-employed	3	15	2	10	df=2
	Self-employed	11	55	2	10	P=0.385
	Employment in public sector	1	5	1	5	NS**
5	Area of work					X ² =0
	Cotton industry	0	0	0	0	df=0
	Chemical factory	0	0	0	0	P=0
	Mining industry	0	0	0	0	NS**

	Others	15	75	5	25	
6	Duration of illness					X ² =1.467
	<2years	8	40	25	10	df=2
	2-3 years	5	25	2	10	P=0.48
	>2years	2	10	0	0	NS**
7	Types of workers					X ² =1.600
	Sedentary workers	3	15	2	10	df=2
	Moderate workers	9	45	3	15	P=0.449
	Heavy workers	3	15	0	0	NS**
8	Co-morbid illness					X ² =2.400
	Anemia	3	15	2	10	df=3
	IHD	4	20	0	0	P=0.494
	Thyroid disorder	1	5	0	0	NS**
9	Smoking Habit					X ² =4.444
	Yes	8	40	0	0	df=1
	No	7	35	5	25	P=0.035
10	Tobacco chewing habit					X ² =0.000
	Yes	12	60	4	20	df=1
	No	3	15	1	5	P=1
11	Alternative therapies if any					X ² =0.351
	Ayurveda	0	0	0	0	df=1
	Homeopathy	0	0	0	0	P=0.554
	Naturopathy	0	0	0	0	NS**
	Siddha	1	5	0	0	
	Unani	0	0	0	0	
	None	14	70	5	25	
	Bronchodilators	10	50	4	20	
	Antibiotics	4	20	1	5	
	NSAIDS					
	12	Life style practices				
Breathing		1	5	0	0	=2.222
Aerobic		0	0	0	0	df=2
Yoga		4	20	0	0	P=0.32
Meditation		0	0	0	0	9
Others		10	50	5	25	NS**

s* significant, NS**-non significant

Table:2 describe the association between Dyspnea scale of patients with lower respiratory tract disorders and selected demographic variables. There was no association of respiratory rate with selected variables like education status, occupation status, area of work, duration of illness, type of workers, co-morbid illness, tobacco chewing habit, alternative therapies, and life style practices where as there was a significant association between age, gender and smoking habit at $p < 0.05$. It was clearly evident that there was a significant improvement seen in the dysnea score of non smokers than smokers after ballon therapy.

3.5 Association between lung capacity of patients with lower respiratory tract disorders and selected demographic variables

There was no significant association between lung capacity and selected demographic variables like age, gender, education status, occupation status, area of work, smoking habit, type of workers, co-morbid illness, tobacco chewing habit, alternative therapies, and life style practices. However there was a significant association found between duration of illness at $P < 0.05$ and lung capacity. It was clearly evident from the findings that patients who had

illness for less than 3 years showed more improvement in lung capacity after balloon therapy than those who were ill more than 3 years. Hence it showed that lung capacity decreases based on the duration of illness among patients with lower respiratory tract disorder.

4. Discussion

The main objective of the study was to evaluate the effectiveness of balloon therapy on respiratory status of patient with lower respiratory tract disorders during posttest. On conducting post-test to the selected 20 samples, 18(90%) was found to have normal respiratory rate, 2(10%) was found to have poor respiratory rate. With regard to dyspnea scale 12(60%) was found to be non dyspnoeic, 8(40%) were dyspnoeic. With regard to lung capacity 20(100%) was found to have adequate lung capacity. This shows improvement in respiratory status of patient with lower respiratory tract disorders after balloon therapy.

The findings of this study was supported by the study conducted by **Lai Dee et, al (1998)** on significance of regularly blowing up ordinary rubber balloons in people suffering from chronic lung disease. Randomly 22 participants with chronic bronchitis and emphysema were selected. In that, 11 women, 9 men with average age 65 were randomly assigned to the balloon blowing group and asked to inflate one new ordinary balloon to a diameter of 7 inches 40 times a day for 8 weeks. The rest 11 men whose mean age was taken as control group, without treatment. The study reported a significant reduction in breathlessness after regular balloon inflation.

5. Conclusion

The study findings clearly reveal that regular practice of balloon therapy improves the respiratory status of patients as there was a significant improvement in the respiratory status measured in terms of respiratory rate, dyspnea scale and lung capacity in patients with lower respiratory tract disorders who underwent balloon therapy. This simple cost effective intervention can also be considered as an alternative measure to improve the lung function among patients with respiratory disorders.

Reference

- [1] Joyce.M.Black, **Medical Surgical Nursing Clinical management of positive outcome**, 6th edition, 1st volume, Elsevier Publications (2004) pp:1651-1746.
- [2] Brunner &Suddarth's , **Medical Surgical Nursing**, 10th edition, Lippincott publications, (2004), pp:516-633.
- [3] Lewis, Heitkemper, et al, **Medical Surgical Nursing**, 6th edition, Mosby Publications, 2004.
- [4] Basvanthappa BT, **Medical Surgical Nursing**, 1st edition, Jaypee publications, NewDelhi, 2003.
- [5] Shelter's et al, **Medical Surgical Nursing**, 3rd edition, B.I.Publications Pvt.Limited, New Delhi, 2002.
- [6] P.S.SunderRao, **An Introduction to Biostatistics**, 3rd hail of Indira Publications, Prentice.

- [7] Boon M.Davidson's, **Principles and Practices of Medicine**, 20th edition, Philadelphia: FA Dais company.
- [8] Black MJ, Hawks, **Medical Surgical Nursing Clinical Management for Postive Outcome**,7th edition, Elseiver publications, NewDelhi, 2004.
- [9] Burns Nancy , **Understanding Nursing Research**, 3rd edition, London:WB Saunders company, 1999.
- [10]Kumar v, Abbas AK, Fausto n, Robbins and Cotran , **Pulmonary basis of disease**, 7th edition, ElseiverPublications, New Delhi, 2004.
- [11]Brun P.P., Boer A.H.et al, "Nebulisation in worsenity of Chronic Obstructive Lung Disease Importance of Anticholinergic Agents", The Multicenter Group **International Journal of Medicine**, 43(4); pp543-623, 2007.
- [12]Morillas HN, Zariwale M, Knowles MR, "Genetic causes of Bronchiectasis; Primary Ciliary Dyskinesia". **Journal of Respiratory Disorders**, 72(3), pp253-263, 2007.
- [13]Benzo R, Kelley G.A., Recchi C Hofman A, Scriurba F, "Compliations of Lung Resection and Exercise Capacity; a Meta Analysis" *Respire Medical*, 101(8), pp1790-7, 2007.
- [14]The Marfan Trust, Retrieved Crofton J,"Respiratory Tract Disease Diagnosis and Treatment of Bronchiectasis. I. Diagnosis". **British Medicine Journal**, 8(54), pp721-726, 2002.

Author Profile



Dr. Renuka K pursued her M.Sc (medical surgical nursing) in saveetha college of nursing, Chennai, India and P.hd in Nursing at vinayaga mission university, salem. She is currently working as a Principal at Kasturba college of nursing, pillaiyarkuppam, pudhucherry, India.



Dr. Helen Shaji J.C. pursued her M.Sc (Medical and surgical nursing) in Saveetha College of Nursing, Chennai, India and Ph.D in Nursing at The Tamilnadu Dr. M.G.R. Medical University, Chennai, India. She has got 15 years of teaching experience in the field of Nursing education both India as well as Overseas and currently working as a Head of the Department – Nursing (Female section) at College of Applied Medical Sciences, Majma'ah University, Kingdom of Saudi Arabia



Mrs. Kripa Angeline pursued her M.Sc (medical surgical nursing) in kovai medical college and hospital, India. She is currently working as Associate professor in department of medical surgical nursing at Kasturba college of nursing, pillaiyarkuppam, pudhucherry, India.