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Effect of Deep Breathing and Coughing Exercises in Improving Pulmonary Functions among the Patient Undergoing Abdominal Surgery in Gauhati Medical College and Hospital (GMCH), Guwahati, Kamrup (M) Assam

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ABSTRACT

A non randomized quasi-experimental study on "Effect of Deep Breathing and Coughing Exercises in Improving Pulmonary Functions Among the Patient Undergoing Abdominal Surgery in Gauhati Medical College and Hospital (GMCH), Guwahati, Kamrup (M) Assam". The research approach adopted for this study is a quantitative evaluative approach. The aim of the study is to identify the effect of deep breathing and coughing exercises on level of pulmonary functions among patients undergoing abdominal surgery in experimental group and to determine the association between pre-test level of pulmonary functions among abdominal surgery patients with selected demographic variables in experimental and control group. A consecutive sample of total 60 patients were studied (30 experimental group and 30 control group) based on inclusion and exclusion criteria. Data were collected through demographic profile, Peak Flow Meter reading scale, observation checklist of deep breathing and coughing exercises. Deep breathing and coughing exercises are taught and practiced by the patients in experimental and control group routine treatment was followed. According to the findings of this study showed that mean pre test peak expiratory flow volume was 364.0±32.33 and in post test mean peak expiratory flow volume was 410.0±17.61 with mean difference was 46.0. It reveals that there was significant improvement in pulmonary function in the experimental group after the intervention of deep breathing and coughing exercises. Based on the study there was an association between the pre test level of pulmonary functions are age of patient, BMI, history of smoking habit in experimental group, a significant association between pre test level of pulmonary function are gender, BMI in control group.

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KEYWORDS: *Deep breathing and coughing exercises, pulmonary functions, peak flow meter, abdominal surgery*

Need for the study

Breathing and coughing exercises are crucial for assisting breathing and clearing excess secretion in the recovery stage. Diaphragmatic breathing, or "belly breathing," engages the diaphragm, which is supposed to do most of the heavy lifting when it comes to breathing. Pursed-lips breathing can slow down our breathing, reducing the work of breathing by keeping airways open longer. This makes it easier for the lungs to function and improves the exchange of oxygen and carbon dioxide.

Also, from the personal experience of the investigator while working in the hospital setting many a time it was felt that, most of the surgical patients do not receive adequate education about deep breathing and coughing exercises in time. Most of them received this education only after their surgeries, therefore this may have affected patient's ability to perform during exercises. So, it was felt that through participation by providing adequate education, one can enhance the patient participation in exercise as an intervention.

Hence, the need for the study was felt and the study on the effect of deep breathing and coughing exercise in improving the pulmonary functions among the patients undergoing abdominal surgery was taken up.

Objectives of the study:

1. To assess the effect of deep breathing and coughing exercises on level of pulmonary functions among patients undergoing abdominal surgery in experimental group.
2. To determine the association between pre-test level of pulmonary functions among abdominal surgery patients with selected demographic variables in experimental and control group.

Material and method:

Research approach and design: Quantitative Evaluative approach with non randomized quasi experimental design was adopted.

Setting of the study: Surgery wards of Gauhati Medical College and Hospital (GMCH)

Study population: Patient undergoing abdominal surgery in Gauhati Medical College and Hospital (GMCH)

Sample size: 60

Sampling technique: Non- probability consecutive sampling technique

Inclusion criteria:

1. Patients who gave written consent to undergo deep breathing and coughing exercise.
2. Patients diagnosed with appendectomy, cholecystectomy, herniectomy, colectomy surgery.
3. Patients who were allowed by doctors by giving written consent to undergo deep breathing and coughing exercise.
4. Patients who were undergoing general anesthesia in the abdominal surgery.

Exclusion criteria

1. Patients who were seriously ill for head injury, severe infection, unconscious, hyperthermia, and O2 on therapy.

Variables under study:

Independent variable: Deep breathing and coughing exercise

Dependent variable: Improving pulmonary functions among the patient undergoing abdominal surgery.

Demographic Variable: age, sex, educational qualification, occupation, marital status, monthly income of family, source of health information, BMI, allergic reaction, use of inhaler, smoking habit.

Descriptions of the Tools

The tool used for the dad collection was organized into three sections:

Section A: Structured questionnaire on socio-demographic variables A tool was developed for collecting selected variables for research study. There are 11 items namely; age, sex, educational qualification, occupation, marital status, monthly income, source of health information, BMI, allergic reaction, use of inhaler, smoking habit.

Section B: Assessment of pulmonary function by Peak Flow Meter reading scale The resulting scores were ranged as follows: Mild affected pulmonary function (Green Zone): >400 L/min Moderate affected pulmonary function (Yellow Zone): 250-400 L/min Severe affected pulmonary function (Red Zone):

Section C: Deep breathing and coughing exercise as intervention The researcher included deep breathing and coughing exercise techniques like Diaphragmatic exercise, Pursed lip breathing, Glossopharyngeal breathing, coughing exercises. There is total 13 number of items included in deep breathing and coughing exercises checklist. There is a particular space against the steps to tick the participants responds in 'Yes' or 'No'. If the participants responded 'Yes' then score will 1 and the participants responded 'No' then score will 0.

Data collection procedure:

The investigator utilized the convenient sampling technique to select the study subject. Investigator first took permission from head of the pulmonary medicine department, head of the surgery department of Gauhati Medical College and Hospital (GMCH) and then personally contact telephonically with each respondent, first investigator introduced himself and explained the purpose of the study ascertained the willingness of the participants. The respondents were assured anonymity and confidentiality of the information provided by them. Investigator taught and practiced the deep breathing and coughing exercises before patient undergoing abdominal surgery. Approximately 60 patients participated in the survey.

Limitation of the study

- The study is limited to only 60 sample sizes so, the results may have limitation in terms of generalization.
- Since the study included in patients of the hospital, therefore some of the patients may have received deep breathing and coughing exercises as a part of treatment. So, the investigator may have failed to control some of the extraneous variables/ factors in the control group.

- For the present study, the investigator used Peak Flow Meter to check peak expiratory flow volume (PEFV), whereas the other instrument like Incentive Spirometry, Respirometer used to check forced vital capacity (FVC), forced expiratory flow (FEF) etc were also available which were not included in the study.
- Samples of the study were not tracked/ followed up at home after their discharge from hospital, hence the assessment of improvement in pulmonary functions in the later period could not be known.

Analysis and interpretations

Section I: Effect of deep breathing and coughing exercises on level of pulmonary functions among patients undergoing abdominal surgery.

Table 1: Effect of deep breathing and coughing exercises on level of pulmonary functions among patients undergoing abdominal surgery.

n=30

Experimental Group	Mean	SD	Mean Difference	t test value	df	p value
Pre test Post test	364.0 410.0	32.33 17.61	46.0	7.667	29	0.001**

After administration of deep breathing and coughing exercise, the post-test mean and standard deviation was found to be 410.0±17.61 in the experimental group revealing the mean difference 46.0 with t value 7.667 at df 29 which was significant at (p= 0.001). Statistically it reveals that there was significant improvement in pulmonary function in the experimental group after the intervention of deep breathing and coughing exercise.

Section II: Association between pretest level of pulmonary function among abdominal surgery patients with socio demographic variables.

Table 2: Association between pre-test level of pulmonary functions among patients undergoing abdominal surgery with selected socio demographic variables in experimental group.

n=30

Demographic variables	Pre test level of pulmonary functions		$\chi 2$ value	df	p value
	Yellow	Green			
Age in years					
18-27 years	3	0			
28-37 years	11	1	14.07	3	0.003*
38-47 years	12	1			
48-57 years	0	2			
Gender					
Male	19	2	0.879	1	0.348NS
Female	7	2			
Education					
No formal education	2	2			
Primary school	7	1	5.629	3	0.131NS
High school	16	1			
Higher secondary and above	1	0			
Occupation					
Industrial worker	5	1			
Private employee	12	1	2.438	4	0.656NS
Government employee	1	0			
House wife	5	2			
Self employed	3	0			
Marital status					
Married	21	4			
Unmarried	5	0	0.923	1	0.337NS
Divorce	-	-			
Widow	-	-			

Monthly income of family					
≤ 10,001	8	2			
Rs 10,002-29,972	17	1			
RS 29,973-49,961	1	1	3.654	2	0.161NS
Rs 49,962-74,755	-	-			
Rs 74,756-99,930	-	-			
Rs 99,931-1,99,861	-	-			
≥ 1,99,862	-	-			
Source of information					
Internet	6	1			
Newspaper	13	1	2.184	3	0.535NS
Magazine	2	0			
Healthcare provider	5	2			
BMI					
Underweight	0	1			
Ideal weight	26	3	6.724	1	0.009*
Overweight	-	-			
Obesity	-	-			
History of allergic reaction					
Yes	-	-	NA	NA	NA
No	26	4			
Use of inhaler					
Yes	-	-	NA	NA	NA
No	26	4			
History of smoking habit					
Yes	4	4	12.69	2	0.001*
No	18	0			

*p<0.05 level of significance NS- Non significant

Table 3: Association between pre-test level of pulmonary functions among patients undergoing abdominal surgery with selected socio demographic variables in control group.

n=30

Demographic variables	Pre test level of pulmonary functions		χ^2 value	df	p value
	Red	Yellow			
Age in years					
18-27 years	5	1			
28-37 years	11	2	0.571	3	0.903NS
38-47 years	7	1			
48-57 years	3	0			
Gender					
Male	17	3	3.606	1	0.047*
Female	19	1			
Education					
No formal education	3	0			
Primary school	8	1	1.909	3	0.591NS
High school	11	3			
Higher secondary and above	4	0			
Occupation					
Industrial worker	3	0			
Private employee	5	0	2.184	4	0.702NS
Government employee	1	0			
House wife	11	3			
Self employed	6	1			

Marital status					
Married	23	3			
Unmarried	3	1	0.544	1	0.461NS
Divorce	-	-			
Widow	-	-			
Monthly income of family					
≤ 10,001	9	1			
Rs 10,002-29,972	13	3			
RS 29,973-49,961	4	0	1.118	2	0.572NS
Rs 49,962-74,755	-	-			
Rs 74,756-99,930	-	-			
Rs 99,931-1,99,861	-	-			
≥ 1,99,862	-	-			
Source of information					
Internet	6	1			
Newspaper	14	3	1.202	2	0.548NS
Magazine	-	-			
Healthcare provider	6	0			
BMI					
Underweight	1	1			
Ideal weight	25	1	17.35	2	0.001*
Overweight	0	2			
Obesity	-	-			
History of allergic reaction					
Yes	3	0	0.513	1	0.474NS
No	23	4			
Use of inhaler					
Yes	1	0	0.159	1	0.690NS
No	25	4			
History of smoking habit					
Yes	6	0	1.154	1	0.283NS
No	20	4			

*p<0.05 level of significance NS- Non significant

It can be summarized from the above data that there is a significant mean difference between posttest level of pulmonary functions between experimental and control group among patient undergoing abdominal surgery following deep breathing and coughing exercise technique.

Conclusion:

This study examined the effect of deep breathing and coughing exercises in improving pulmonary functions among patients undergoing abdominal surgery in a Gauhati Medical College and Hospital (GMCH). The interesting findings of the study were there was an improving pulmonary function in experimental group following deep breathing and coughing exercises and in control group the pulmonary functions were seen worsening among patients undergoing abdominal surgery. There is a significant association between level of pulmonary functions and age of the patient, gender, BMI. So, nurses play an important role in assessing and if needed, addressing these factors with available interventions or resources. It is found that deep breathing and coughing exercises is effective in improving pulmonary functions and nurses need to employ preoperative abdominal surgery preparations in the management of ineffective pulmonary functions among patients undergoing abdominal surgery.

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