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"To study of the association of lifestyle risk factors with postoperative pulmonary complication in patients undergoing emergency laparotomy in acute abdomen"

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ABSTRACT

The present study was done to find out any association between life style risk factors and postoperative pulmonary complications in patients undergoing emergency laparotomy in acute abdomen. The present study was done at DR. Bhimrao Ambedkar Memorial Hospital, Raipur over a period of 1 year with an observation of 1 year. A total of 45 patients were included in the study that fulfilled the inclusion criteria. The results of the study were inferred and it was found that there was a significant association between life style related risk factors namely Diabetes and Hypertension and development of postoperative pulmonary complications after an emergency laparotomy. Also, it was found that there was no significant association between physical activity status and obesity in developing post operative pulmonary complications in EL in acute abdomen. There was association between genesis of lung complications with deranged spo2 and abnormal X ray findings. The results of the present study correlated fairly well with studies by other authors. However, further studies and follow-up are needed to figure out measures to prevent these complications. We conclude that Multiple factors, which include BMI, smoking, diabetes mellitus and abnormal findings in preoperative X ray, low spo2 levels are responsible for the genesis of PPC. Hence these parameters improve the prediction of PPC after emergency abdominal surgery.

INTRODUCTION

A significant contributing factor to patient's pain, a lengthier hospital stay, and a greater mortality risk following abdominal surgeries are pulmonary complications such pneumonia, atelectasis, as well as respiratory failure.[1] Postoperative pulmonary complications are acknowledged to be frequent, although reported incidence varies, ranging from 9% to 40%, most likely as a result of methodological differences between different studies.[2] After elective non thoracic surgery, a number of risk variables for PPC have been identified. Clinical histories, physical examination, pulmonary function test, chest X-rays, as well as other pre- or intra-operative considerations were used to identify these risk factors.[3] However, there is little information on the incidence and risk factors of pulmonary complications after emergency surgery. According to reports, emergency surgeries have greater rates of morbidity and fatality than elective ones.[4] Additionally connected independently to greater incidence of postoperative pneumonia as well as respiratory failure is the urgency nature of the procedure.[5] Because patients demographics, clinical features, preoperative diagnoses, as well as surgical methods utilized in emergency settings all are anticipated to be very different from those employed in elective surgery, we hypothesized that a set of new of predictors for PPC should be in place.[6] An association was found for both PPCs and mortality in relation to increased BMI. The likelihood for PPCs is greater starting with patients of BMI ≥ 25 kg/m^2 and increases with each higher category of BMI, culminating with a nearly 2.4 times increased likelihood for PPCs in morbidly obese patients. The likelihood for mortality increases in patients with BMI ≥ 40 kg/m^2. This suggests obesity should be accounted for in risk prediction models of trauma patients undergoing trauma laparotomy [66] the physical activity behavior during hospitalization do not reflect the daily life even in patients not restricted to bed. Their chance to develop PPC after abdominal surgery decreases when patients are still physically active during hospitalization.[67]

Following upper abdominal surgery, pulmonary complications are the main reason for mortality and morbidity.[7] Depending on the criteria employed for identification of postoperative pulmonary complications, the incidence for postoperative pulmonary complications in this population ranges between 9% to 40%.[8] There are several ways to prevent the development for pulmonary Complications because they lengthen hospital stays and raise the expense of medical ministration.[9] However, there is little research examining the effectiveness of these therapies. According to a recent comprehensive analysis, only lung capacity-improving exercise, such as deep breathing exercises incentive spirometry, and continuous positive airway pressure, significantly reduce the risk of postoperative pulmonary complications.[7] Additionally, preventative respiratory physiotherapy is used all around the world, and an important part of it is an intervention that increases lung volume.[10]

Patients with little risk of pulmonary problems may not need respiratory physiotherapy.[11] In order to better allocate resources, efforts were made to identify patients who would experience pulmonary issues following elective upper abdomen surgery. High risk patients will receive more intensive care. Several studies have looked into the risk factors for pulmonary complications following upper abdomen surgery.[5] There have been reports of conflicting findings, as well as the research had limitations. Fisher et al. (2002) failed to locate any reliable models for the prediction for postoperative pulmonary problems following non thoracic surgery in their systematic study.[12] The quality of the findings that may be derived from earlier research is significantly constrained by the inconsistent characterization of risk variables and outcomes, including the definition of postoperative pulmonary difficulties and the inclusion of clinically minor respiratory complications. Additionally, a lot of early researches have issues with poor observer blinding, small sample sizes, retroactive data collecting, and selection bias.[7] Early research cannot be validated due to issues with study design, such as inadequate disclosure of the model derivation procedures. Additionally, the majority of studies do not examine validity and/or reliability in a separate patient cohort, which limits their external validity. Pulmonary function is a predictor in several models. The utility of pulmonary function tests as a predictor of pulmonary risk has been questioned due to the fact that they are not frequently performed on patients before abdominal surgery.[13] Finally, just a few studies have looked at the dangers of patients having upper abdominal surgery alone.[14] Patients having upper abdomen surgery are more likely to experience postoperative pulmonary problems than other populations; therefore, they may exhibit unique risk factors.[15]

An additional obstacle to identifying risk variables is the absence of standardized, preventative respiratory physical therapy. When evaluating determinants of postoperative pulmonary difficulties, systematic prophylactic respiratory intervention may be required since lung expansion methods may avoid the development of pulmonary issues.[16] We are aware of no prognostic studies that have sought to standardize or record this intervention in individuals receiving upper abdominal surgery. By resolving these methodological issues, any model created to predict the likelihood of having postoperative pulmonary problems will be far more accurate and valid.[17]

MATERIAL & METHOD

Study Design	Prospective Observational Analytical Study
Study Site	Department of General Surgery, Dr. B.R.A.M. Hospital, Raipur
Study population	Patients admitted with complaints of acute abdomen
Sample Size	45
Sample size formula	$\frac{\frac{standard\ deviation^2 * proportion\ of\ population(1 - proportion\ of\ population)}{\text{confidence interval expressed as decimal}^2}}{1+\frac{\text{standard devia}standard\ deviation^2 * proportion\ of\ population(1 - proportion\ of\ population)\text{tion}}{population\ size * \text{confidence interval expressed as decimal}^2}}$

Estimated sample size: G* for association
Calculation of sample: effect size (d) =0.5

- (Alpha error probe=0.10 □ (90% confidence interval)
- Power 1-b) = 0.8 □ (80% power of the test)
- df = 6
- Total sample = 45 subjects

METHODOLOGY

- Detailed history was taken and examination of patients at risk of developing post-operative pulmonary complications was done.
- Patients who developed Post operative pulmonary complications were followed up closely with repeated

clinical examination, chest X-ray, SpO2 monitoring, Air entry.

- Physician reference was done to confirm about chest complications and their further management. In the end, collected data was analyzed to assess significance of suspected risk factors using chi square test.

The classifications used were as follows:

A. Classification of physical activity intensity as published in European heart journal advance access published June 2018

Absolute intensity			Relative intensity		
Intensity	MET	Examples	%HRmax	RPE (Borg scale score)	Talk Test
Light	1.1–2.9	Walking <4.7 km/h, light household work.	50–63	10–11	
Moderate	3–5.9	Walking briskly (4.8–6.5 km/h), slow cycling (15 km/h), painting/decorating, vacuuming, gardening (mowing lawn), golf (pulling clubs in trolley), tennis (doubles), ballroom dancing, water aerobics.	64–76	12–13	Breathing is faster but compatible with speaking full sentences.
Vigorous	≥6	Race-walking, jogging or running, bicycling >15 km/h, heavy gardening (continuous digging or hoeing), swimming laps, tennis (single).	77–93	14–16	Breathing very hard, incompatible with carrying on a conversation comfortably.

MET (metabolic equivalent) is estimated as the energy cost of a given activity divided by resting energy expenditure: 1 MET = 3.5 mL O_2 kg-1 min-1 oxygen consumption (VO_2).
RPE, rating of perceived exertion (20 value Borg score).
%HRmax, percentage of measured or estimated maximum heart rate (220-age).
Modified from Howley.[275]

B. Obesity as classified by Centre for Disease Control and Prevention:

1. Class 0: BMI <30
2. Class 1: BMI of 30 to < 35
3. Class 2: BMI of 35 to < 40 Class 3: BMI of 40 or higher.

C. X-ray findings were classified under:

1. No findings
2. Pneumothorax
3. Pleural effusion
4. Consolidation
5. Atelectasis
6. Others

D. Oxygen saturation were classified according to the classification described by NCBI:

1. 100-98%
2. 97-95%
3. 94-90%
4. <90%
5. <80%
6. <70%

E. Inclusion Criteria

1. All patients between 18-60 years of age undergoing open emergency abdominal laparotomy, who have hospital stay >7 days.

F. Exclusion criteria

1. Patients who refuse surgery.
2. Patients with systemic disorders who can't undergo surgery.
3. Laparoscopic procedures.
4. Retroperitoneal procedures.
5. Patient with RTA with poly trauma.

G. Risk Factors

Following variables were used for comparison:

Diabetes mellitus

1. Hypertension
2. Smoking
3. Asthma
4. Covid history
5. Physical activity
6. Obesity(BMI)

OBSERVATION AND RESULT

Association of risk factors with X-ray:

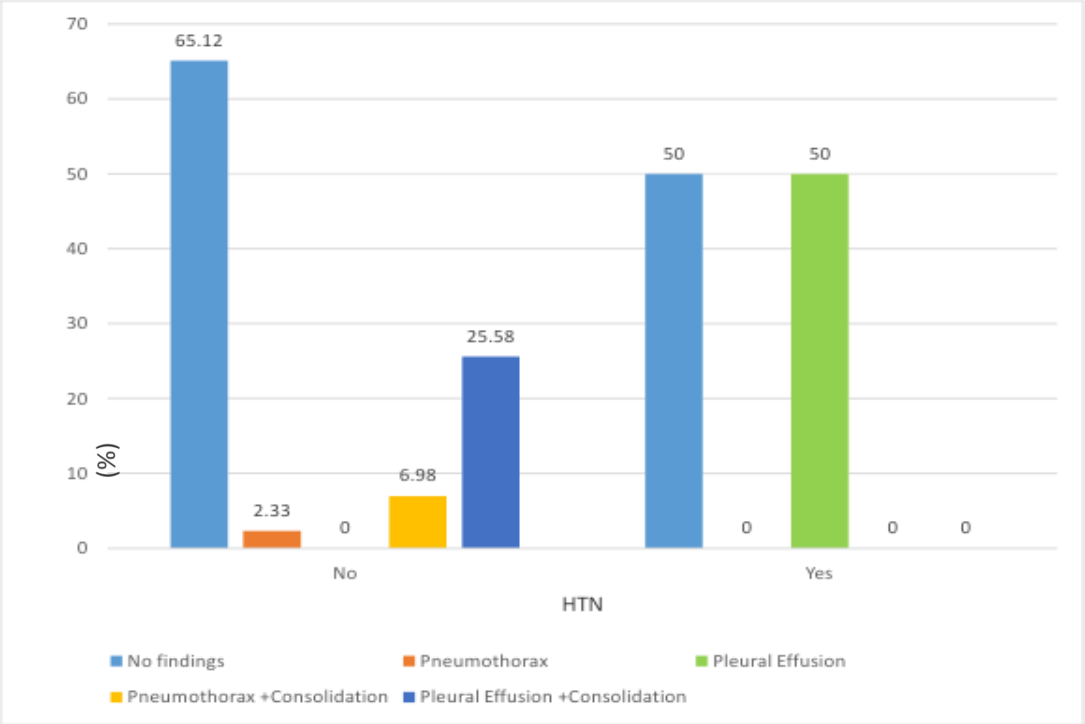
DM	Post-op Xray					Total	P value
	No findings	Pneumothorax	Pleural Effusion	Pneumothorax +Consolidation	Pleural Effusion +Consolidation		
No	28(68.29%)	1(2.44%)	1(2.44%)	1(2.44%)	10(24.39%)	41(100%)	0.008
Yes	1(25%)	0(0%)	0(0%)	2(50%)	1(25%)	4(100%)	0.008
HTN							
No	28(65.12%)	1(2.33%)	0(0%)	3(6.98%)	11(25.58%)	43(100%)	0.001
Yes	1(50%)	0(0%)	1(50%)	0(0%)	0(0%)	2(100%)	0.001
Physical activity							
Light	13(72.22%)	0(0%)	0(0%)	1(5.56%)	4(22.22%)	18(100%)	0.78
Moderate	11(50%)	1(4.55%)	1(4.55%)	2(9.09%)	7(31.82%)	22(100%)	0.30
Vigorous	5(100%)	0(0%)	0(0%)	0(0%)	0(0%)	5(100%)	0.54
Obesity							
<30	5(83.33%)	0(0%)	0(0%)	1(16.67%)	0(0%)	6(100%)	0.48
30-35	22(70.97%)	1(3.23%)	1(3.23%)	1(3.23%)	6(19.35%)	31(100%)	0.35
35-40	2(25%)	0(0%)	0(0%)	1(12.5%)	5(62.5%)	8(100%)	0.06
>40	--	--	--	--	--	--	--
SPO2	--	--	--	--	--	--	---
100-98 %	27(90%)	0(0%)	0(0%)	0(0%)	3(10%)	30(100%)	0.001
97-95 %	2(18.18%)	1(9.09%)	1(9.09%)	0(0%)	7(63.64%)	11(100%)	0.001
94-90 %	0(0%)	0(0%)	0(0%)	2(66.67%)	1(33.33%)	3(100%)	0.0001
<90%	0(0%)	0(0%)	0(0%)	1(100%)	0(0%)	1(100%)	0.001

The risk factors like presence of Diabetes mellitus, Hypertension, grades of physical activity and obesity in terms of BMI and saturation were associated with Post op Xray findings like no x ray findings, pneumothorax, pleural effusion, pneumothorax + consolidation and pleural effusion + consolidation using chi square.

According to the table, data of 45 patients was collected and analyzed for x ray changes in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that out of all the patients with no diabetes mellitus 68% of the patients had no X ray findings and normal breath sounds. The remainder of 24% of patients had pleural effusion and consolidation (p value=0.008 Which is significant).and patients with DM, 50% of the patients had pneumothorax and consolidation, out of which 25% had no findings and 25% had pleural effusion + consolidation (p value =0.008, which is significant)

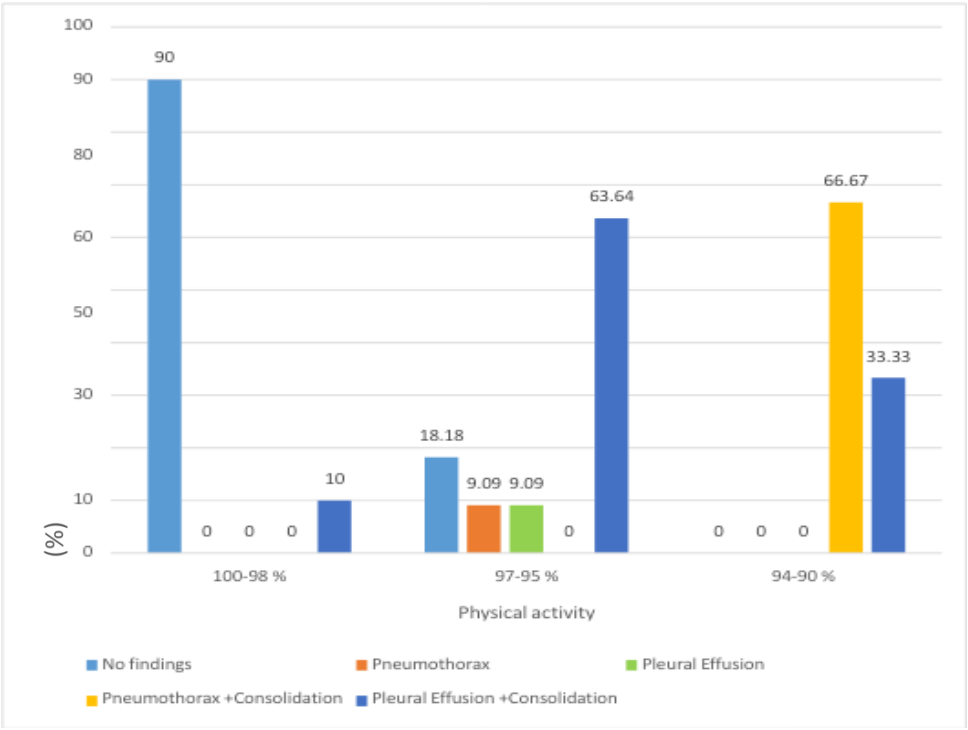
According to the table, data of 45 patients was collected and analyzed for x ray changes in patients with hypertension undergoing emergency laparotomy in acute abdomen. From which it was inferred that out of all the patients with hypertension 65% of the patients had no X ray findings. The remainder of 25% of patients had pleural effusion and consolidation. 50% of the patients had pneumothorax and pleural effusion, out of which 50% had no findings and 50% had normal pleural effusion. Lastly 6.9% of the patients had pneumothorax and consolidation.
P value of the patients with HTN comes to be 0.001, which is significant.

P value of the patients without HTN comes to be 0.001, which is significant



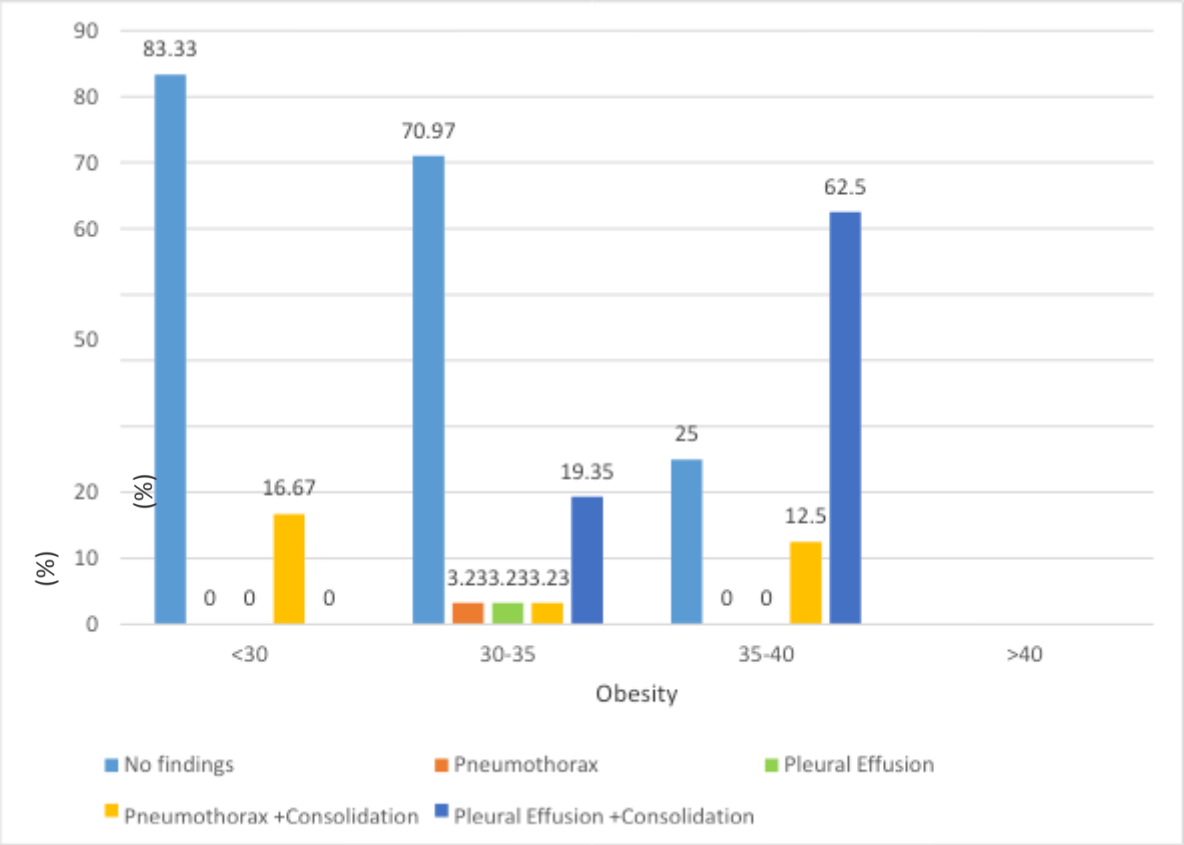
According to the table, data of 45 patients was collected and analyzed for x ray changes in patients with physical activity undergoing emergency laparotomy in acute abdomen. From which it was inferred that out of all the patients with active physical activity 90% of the patients had no X ray findings and normal breath sounds. The remainder patients with moderate physical activity 63% of the patients had pleural effusion and consolidation. Lastly patient with no physical activity 66% of the patients had pneumothorax and pleural effusion, and 33% pleural effusion and consolidation where all had added breath sounds.
P value of patients with light activity was 0.78 which is insignificant,

P value of the patients with moderate activity was 0.30, which is insignificant P value of the patients with vigorous activity was 0.54, which is insignificant



According to the table, data of 45 patients was collected and analyzed for x ray changes in patients with obesity undergoing emergency laparotomy in acute abdomen. From which it was inferred that out of all the patients with obesity with BMI less than 30, 83% had no findings and 16% had pneumothorax plus consolidation. The remainder patients with BMI from 30 to 35, 70% had no finding and 19% had pleural effusion and consolidation. Lastly all patients with bmi 35 to 40 62.5% of the patients had pleural effusion and consolidation where all had added breath sounds.
P value in patients with BMI <30 was 0.48 which is insignificant,

P value in patients with BMI between 30-35 was 0.35, which is insignificant P value in patients with BMI between 35-40 was 0.06, which is significant



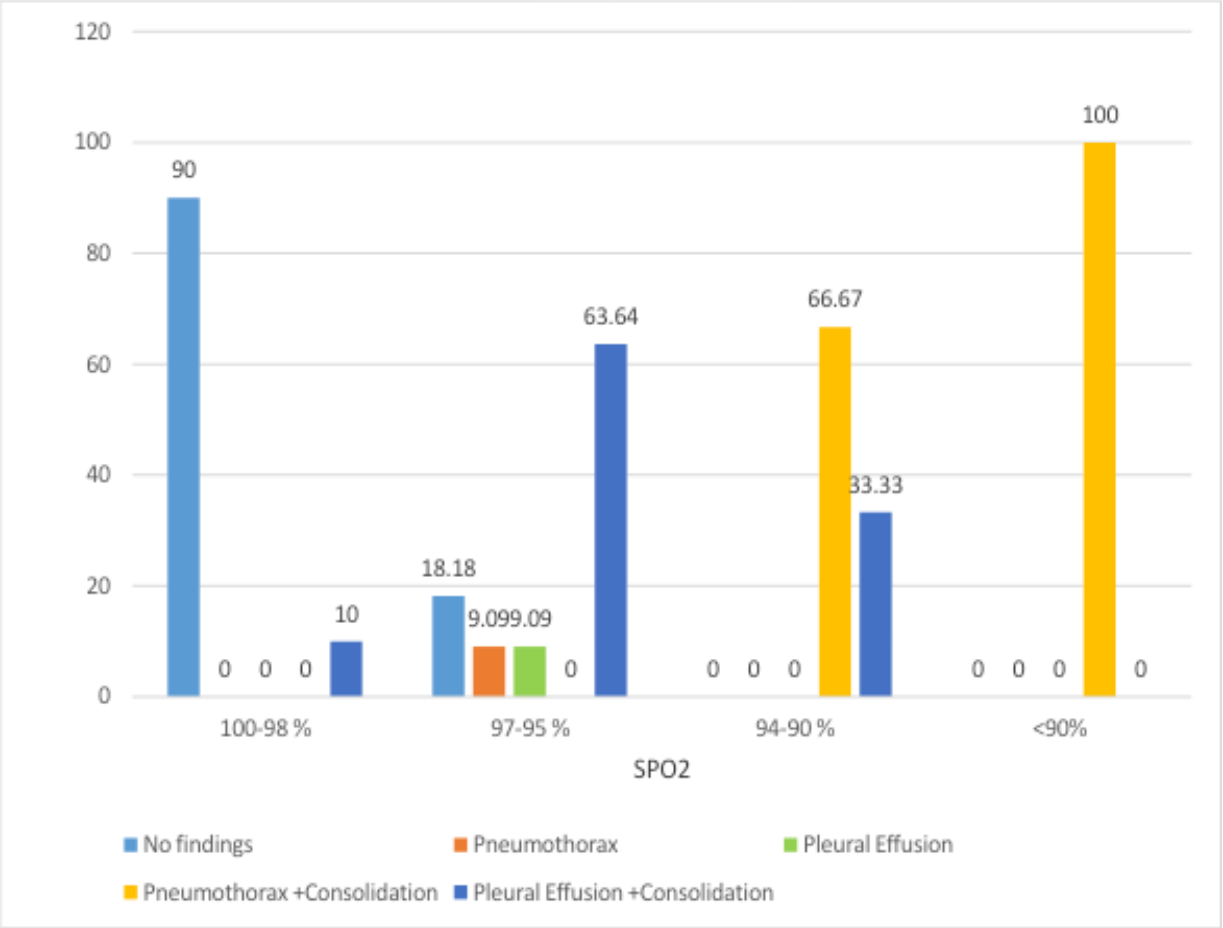
According to the table, Data of 45 patients was collected and analyzed for x ray changes in patients with saturation undergoing emergency laparotomy in acute abdomen. From which it was inferred that out of all the patients with saturation from 98 to 100, all patients no X ray findings and normal breath sounds.

The remainder of patients with saturation from 95 to 97, 63% had pleural effusion and consolidation. Lastly all patients with saturation less than 90%, all patients had pneumothorax and consolidation where all had added breath sounds.

P value for patients with spo2 between 100-98% was 0.001, which is significant.
P value for spo2 between 97-95% was 0.001, which is significant.

P value for spo2 between 94-90% was 0.0001, which is significant.

P value for spo2 between <90% was 0.001, which is significant.



Association of risk factors with breath sound:

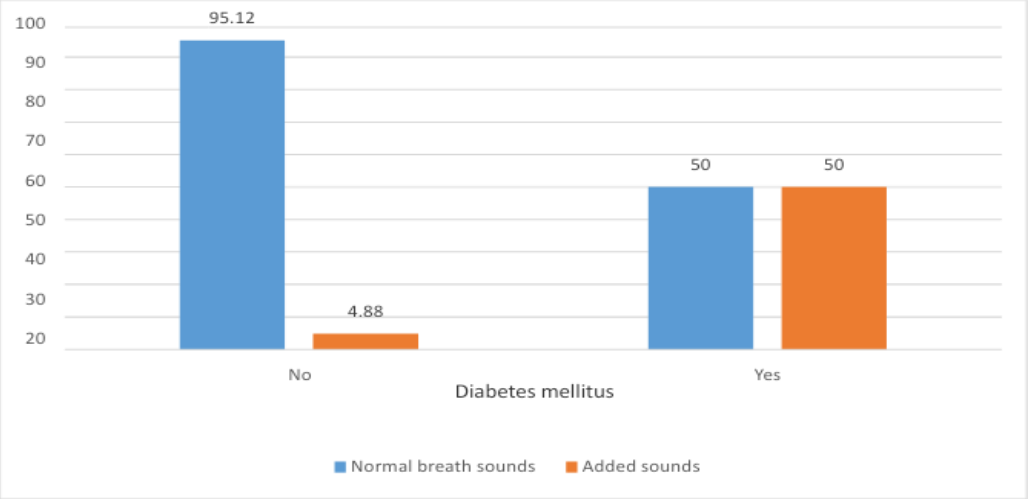
The risk factor like presence of Diabetes Mellitus was associated with the presence of postop normal breath sounds or added sounds in patients using chi square

	Breath sound		Total	P value
DM	Normal breath sounds	Added sounds		
No	39(95.12%)	2(4.88%)	41(100%)	0.002
Yes	2(50%)	2(50%)	4(100%)	0.002

According to the table, data of 45 patients was collected and analyzed for diabetes mellitus as a risk factors with postoperative pulmonary complications in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 50% of the patients with diabetes mellitus had normal breath sounds and 50% had added breath sounds as compared to patients without diabetes mellitus 95% had no added breath sounds and 2% had added breath sounds.

P value of patients with DM was 0.002 which is significant.

P value of patients without DM was 0.002 which is significant.

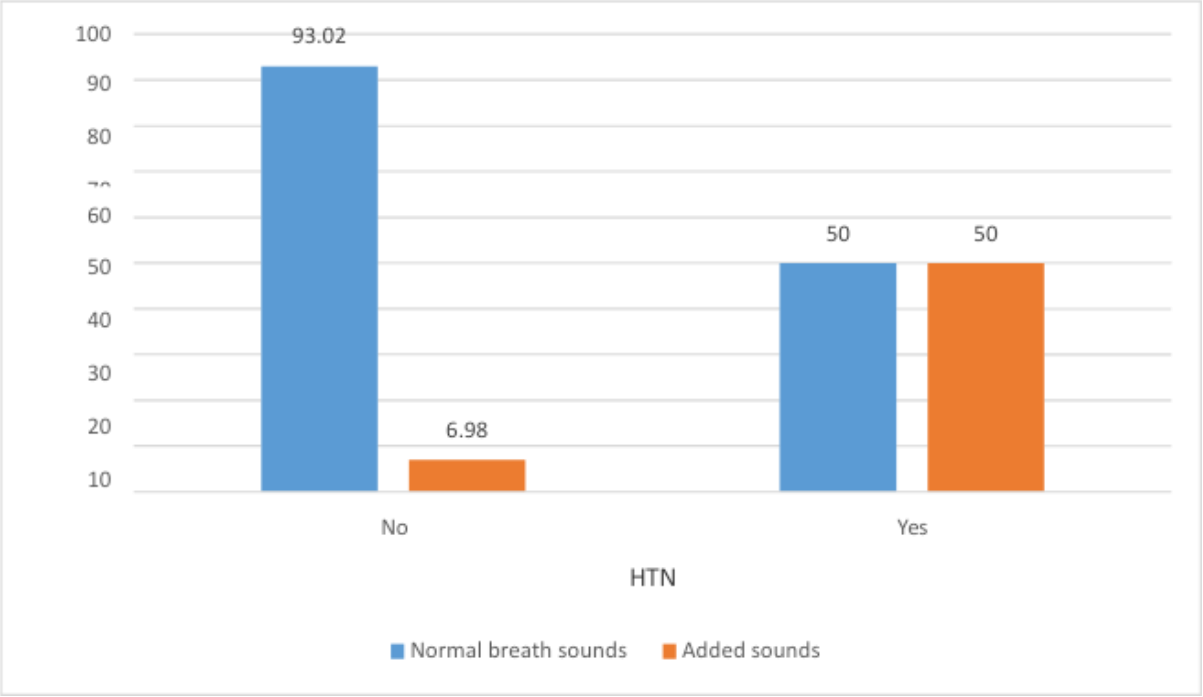


Presence of Hypertension was used as a risk factor and associated with presence of postop normal or added breath sound using chi square.

	Breath sound		Total	P value
HTN	Normal breath sounds	Added sounds		
No	40(93.02%)	3(6.98%)	43(100%)	0.036
Yes	1(50%)	1(50%)	2(100%)	0.036

According to the table, data of 45 patients was collected and analyzed for hypertension as risk factors with postoperative pulmonary complications in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 50% of the patients with hypertension had normal breath sounds and 50% had added breath sounds as compared to patients without hypertension, 93% had no added breath sounds and 7% had added breath sounds.

P value in patients without HTN was 0.036 which is significant
P value in patients with HTN was 0.036, which is significant



Grading of Physical activity was used as a risk factor and associated with post-op normal or added breath sounds using chi square.

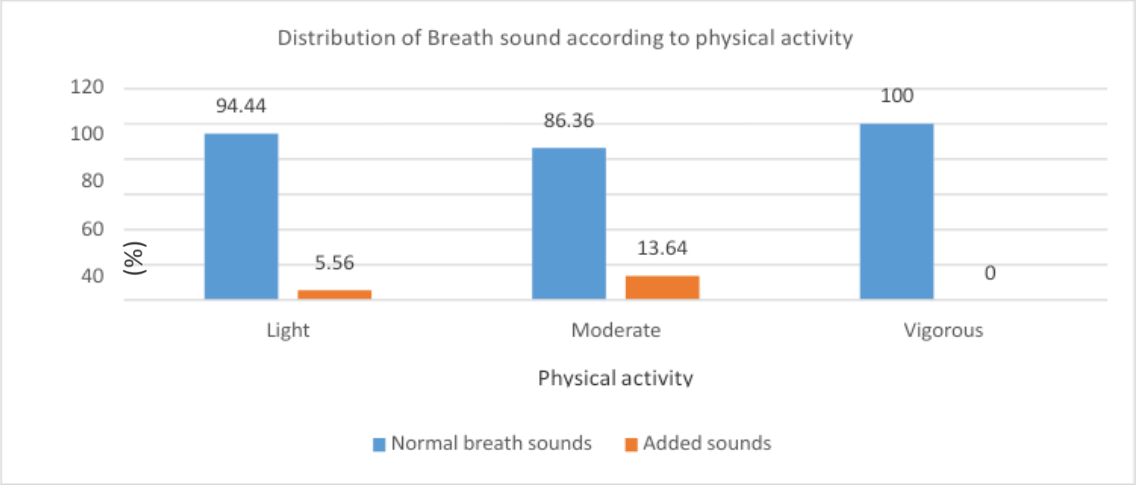
Physical activity	Breath sound		Total	P value
	Normal breath sounds	Added sounds		
Light	17(94.44%)	1(5.56%)	18(100%)	0.52
Moderate	19(86.36%)	3(13.64%)	22(100%)	0.27
Vigorous	5(100%)	0(0%)	5(100%)	0.45

According to the table, data of 45 patients was collected and analyzed for physical activity as a risk factors with postoperative pulmonary complications in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 94% of the patients with light physical activity had normal breath sounds and 6% had added breath sounds as compared to patients with moderate physical activity, 86% had no added breath sounds and 13% had added breath sounds. Lastly all patients with vigorous physical activity had no added breath sounds.

P value in patients with light physical activity was 0.52 which is insignificant

P value in patients with moderate physical activity was 0.27, which is insignificant

P value in patients with vigorous physical activity was 0.45, which is insignificant



Grading of BMI was used to measure obesity as a risk factor and was associated with post-op normal or added breath sounds using chi square.

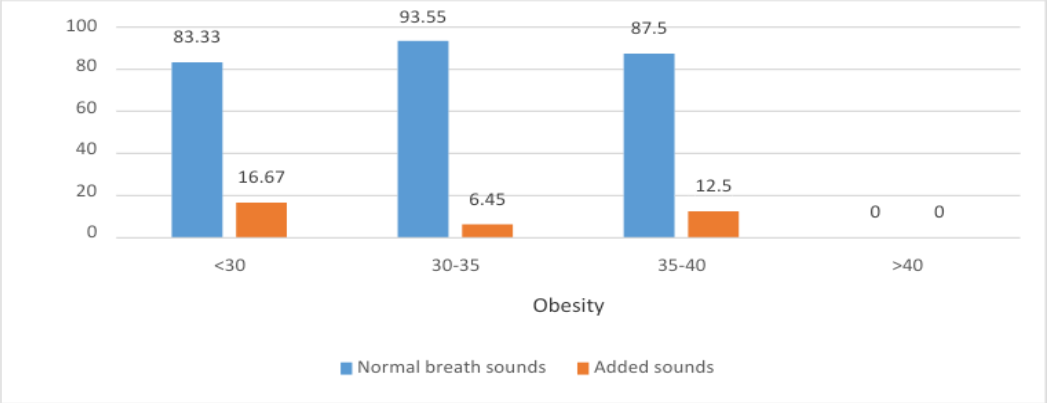
Obesity	Breath sound		Total	P value
	Normal breath sounds	Added sounds		
<30	5(83.33%)	1(16.67%)	6(100%)	0.47
30-35	29(93.55%)	2(6.45%)	31(100%)	0.39
35-40	7(87.5%)	1(12.5%)	8(100%)	0.69
>40	--	--	--	--

According to the table, data of 45 patients was collected and analyzed for obesity as risk factors with postoperative pulmonary complications in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 86% of the patients with BMI less than 30 had normal breath sounds and 17% had added breath sounds as compared to patients with BMI ranging from 30-35, 93% had no added breath sounds and 6% had added breath sounds. Lastly patients with BMI more than 40, 87% patients had normal breath sounds and 12.5% had added breath sounds.

P value for BMI <30 was 0.47 which is insignificant

P value for BMI between 30-35 was 0.39 which is insignificant

P value for BMI between 35-40 was 0.69 which is insignificant

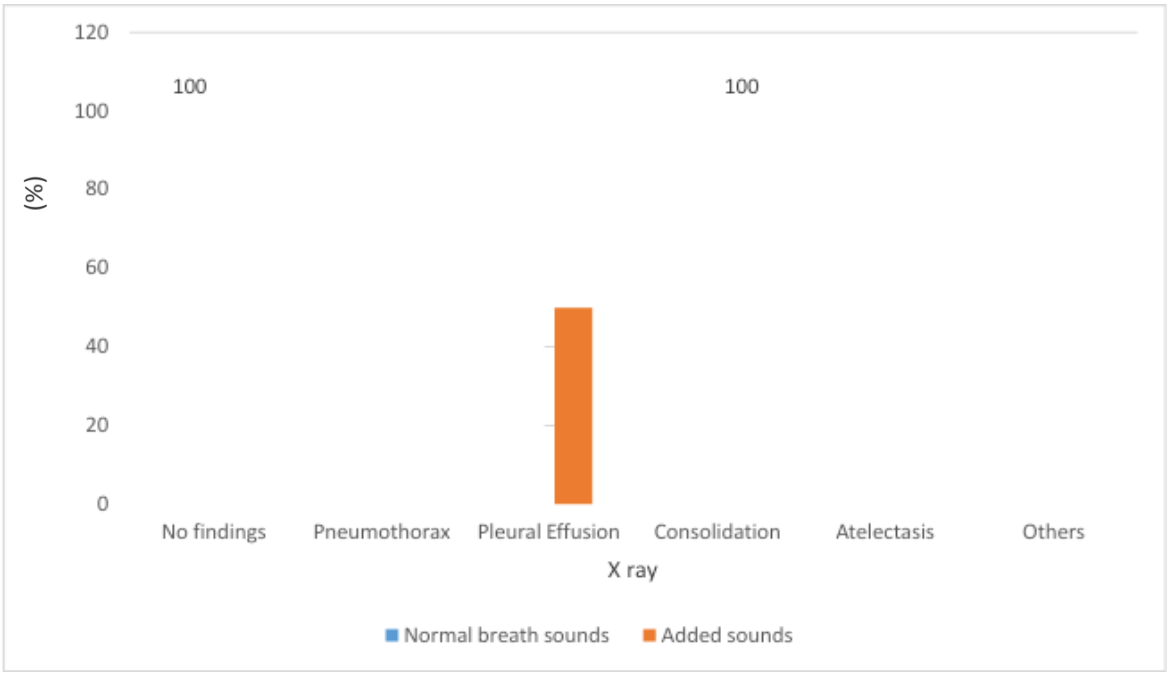


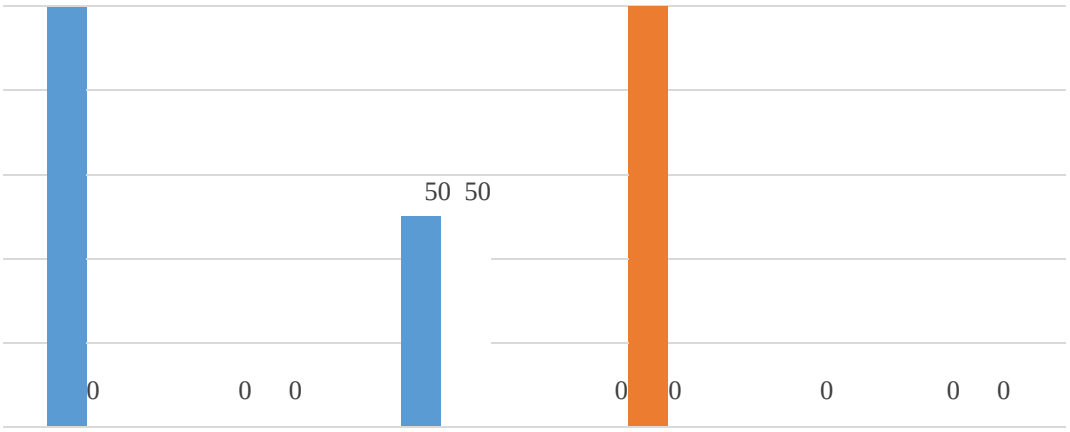
X-ray findings like pneumothorax, pleural effusion, consolidation, atelectasis were used as risk factors and associated with presence of post-op normal or added breath sound using chi square.

X ray	Breath sound		Total	P value
	Normal breath sounds	Added sounds		
No findings	40(100%)	0(0%)	40(100%)	<0.001
Pneumothorax	--	--	--	--
Pleural Effusion	1(50%)	1(50%)	2(100%)	0.036
Consolidation	0(0%)	3(100%)	3(100%)	<0.001
Atelectasis	--	--	--	--
Others	--	--	--	--

According to the table, data of 45 patients was collected and analyzed for x ray changes in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 88% of the patients had no X ray breath findings and normal breath sounds. The remainder of 11% of patients, 4% of the patients had pleural effusion, out of which 50% had added breath sounds and 50% had normal breath sounds. Lastly 6% of the patients consolidation where all had added breath sounds.

P value of patient with no x ray findings was <0.001 which is significant
P value for patient with pleural effusion was 0.036 which is significant
P value for patient with consolidation was <0.001 which is significan





Grading of Spo2 was used as a risk factor and was associated with the presence of postop bilateral equal or unequal air entry using chi square.

SPO2	Breath sound		Total	P value
	Normal breath sounds	Added sounds		
100-98 %	30(100%)	0(0%)	30(100%)	0.003
97-95 %	10(90.91%)	1(9.09%)	11(100%)	0.97
94-90 %	1(33.33%)	2(66.67%)	3(100%)	0.0002
<90%	0(0%)	1(100%)	1(100%)	0.001

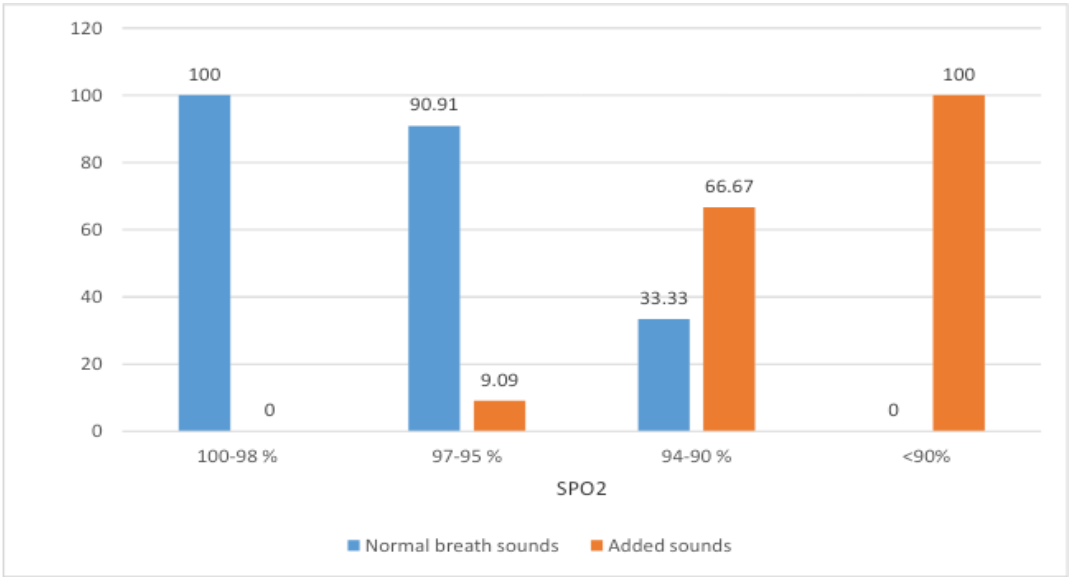
According to the table, data of 45 patients was collected and analyzed for saturation of patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 30 patients had saturation between 98-100% where all had normal breath sounds. As compared to 11 patients with saturation ranging from 95-97% where 90% had normal breath sounds and 10% had added breath sounds. 3 patients with saturation between 90-94%, 33% had no added breath sounds and 67% had added breath sounds. Lastly all patients with saturation below 90% had added breath sounds.

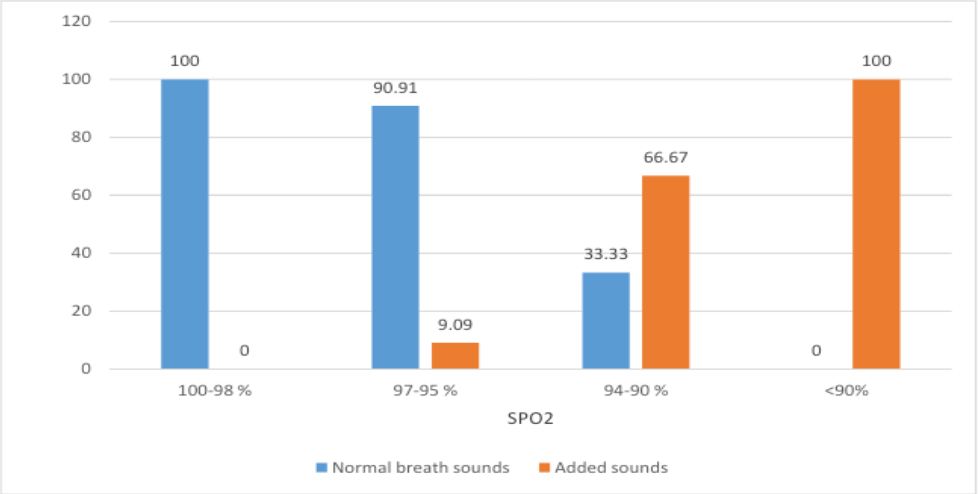
P value of patient with spo2 between 100-98% was 0.003 which is significant

P value of patient with spo2 between 97-95% was 0.97 which is insignificant

P value of patient with spo2 between 94-90% was 0.0002 which is significant

P value of patient with spo2 between <90% was 0.001 which is significant





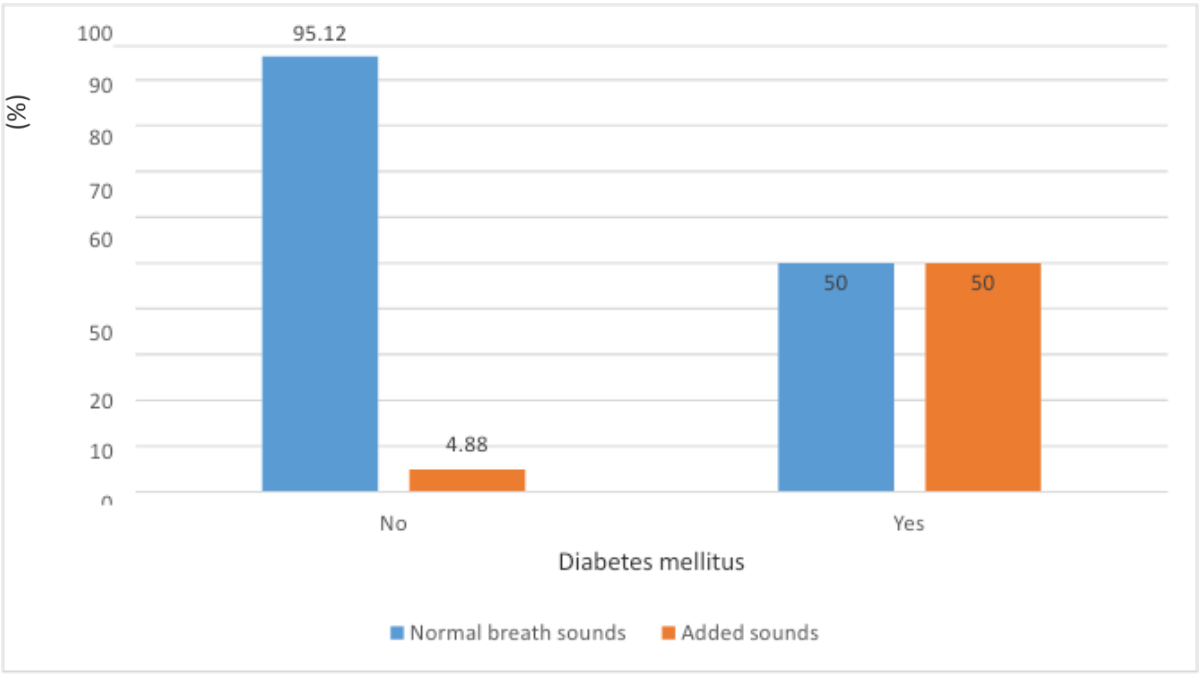
Association of risk factors with air entry:

The risk factors like presence of Diabetes mellitus were associated with the presence of post-op equal and unequal air entry using chi square.

	Air entry		Total	P value
DM	Equal	Unequal		
No	39(95.12%)	2(4.88%)	41(100%)	0.002
Yes	2(50%)	2(50%)	4(100%)	0.002

According to the table, data of 45 patients was collected and analyzed for air entry in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that out of 4 patients with diabetes mellitus 50% had equal sounds and 50% had unequal air entry sounds. As compared to patients without diabetes mellitus 95% had no equal air entry and 5% had unequal air entry.

P value in non diabetes was 0.002 which is significant
P value in diabetes was 0.002 which is significant

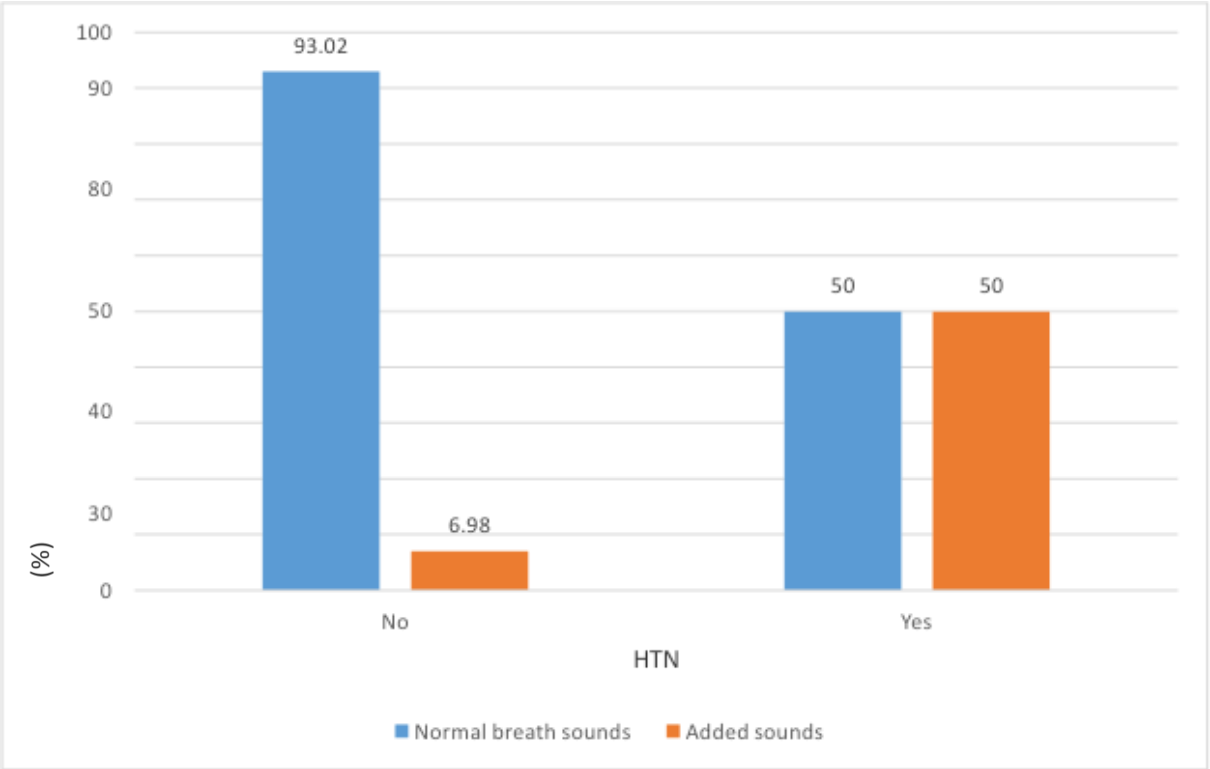


The presence of risk factor like hypertension was associated with the presence of post-op equal and unequal air entry bilaterally using chi square.

	Air entry		Total	P value
HTN	Equal	Unequal		
No	40(93.02%)	3(6.98%)	43(100%)	0.036
Yes	1(50%)	1(50%)	2(100%)	0.036

According to the table, data of 45 patients was collected and analyzed for air entry in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that out of 2 patients with HTN 50% had equal sounds and 50% had unequal air entry sounds. As compared to patients without HTN 95% had no equal air entry and 5% had unequal air entry.

P value in non hypertensive was 0.036 which is significant
P value in hypertensives was 0.036 which is significant

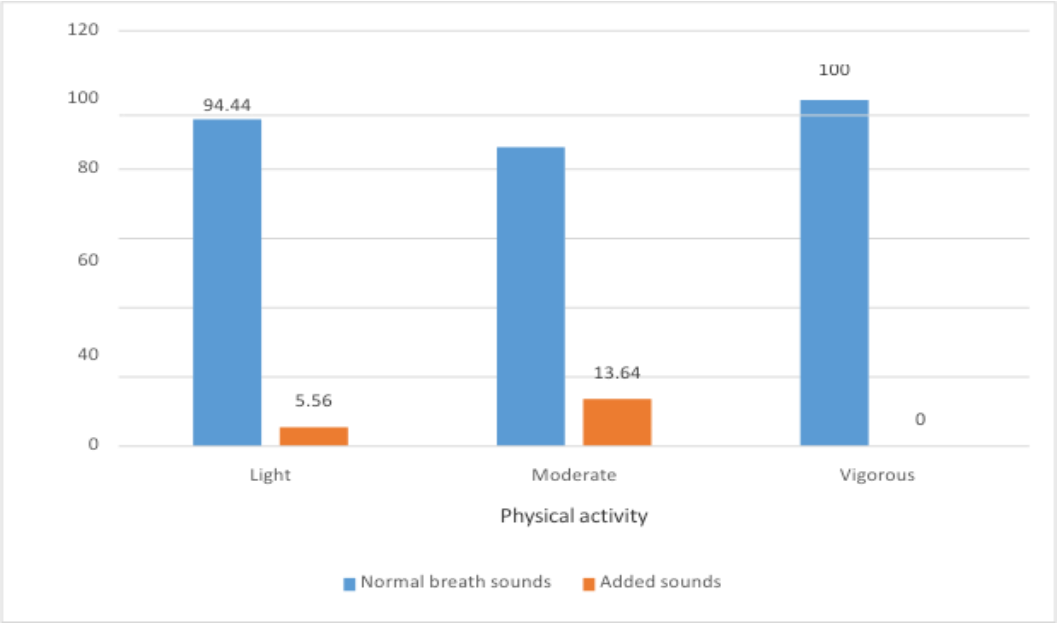


Grading of physical activity was associated with presence of post-op bilateral equal and unequal air entry using chi square.

Physical activity	Air entry		Total	P value
	Equal	Unequal		
Light	17(94.44%)	1(5.56%)	18(100%)	0.52
Moderate	19(86.36%)	3(13.64%)	22(100%)	0.27
Vigorous	5(100%)	0(0%)	5(100%)	0.45

According to the table, Data of 45 patients was collected and analyzed for physical activity in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 94% of the patients with light physical activity had equal air entry and 6% had unequal air entry as compared to patients with moderate physical activity, 86% had equal air entry and 13% had unequal air entry. Lastly all patients with vigorous physical activity had equal air entry.

P value in patients with light activity was 0.52 which is insignificant
P value in patients with moderate activity was 0.27 which is insignificant
P value in patients with vigorous activity was 0.45 which is insignificant

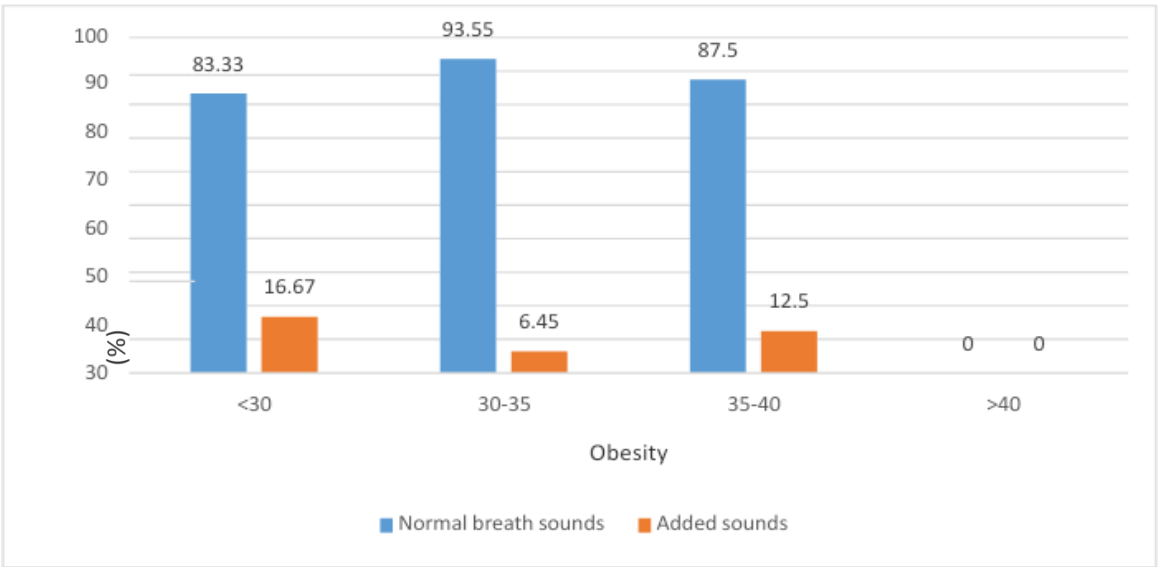


Grading of BMI was used to classify obesity and was associated with presence of post-op bilateral equal and unequal air entry using chi square.

Obesity	Air entry		Total	P value
	Equal	Unequal		
<30	5(83.33%)	1(16.67%)	6(100%)	0.47
30-35	29(93.55%)	2(6.45%)	31(100%)	0.39
35-40	7(87.5%)	1(12.5%)	8(100%)	0.69
>40	--	--	--	--

According to the table, Data of 45 patients was collected and analyzed for obesity as a risk factors with postoperative pulmonary complications in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 83% of the patients with BMI less than 30 had equal air entry and 17% had unequal air entry as compared to patients with BMI ranging from 30-35, 93% had equal air entry and 6% had unequal air entry. Lastly patients with BMI more than 40, 87% patients had equal air entry and 12.5% had unequal air entry.

P value in patients with BMI <30 was 0.47 which is insignificant
P value in patients with BMI 30-35 was 0.39 which is insignificant
P value in patients with BMI 35-40 was 0.69 which is insignificant

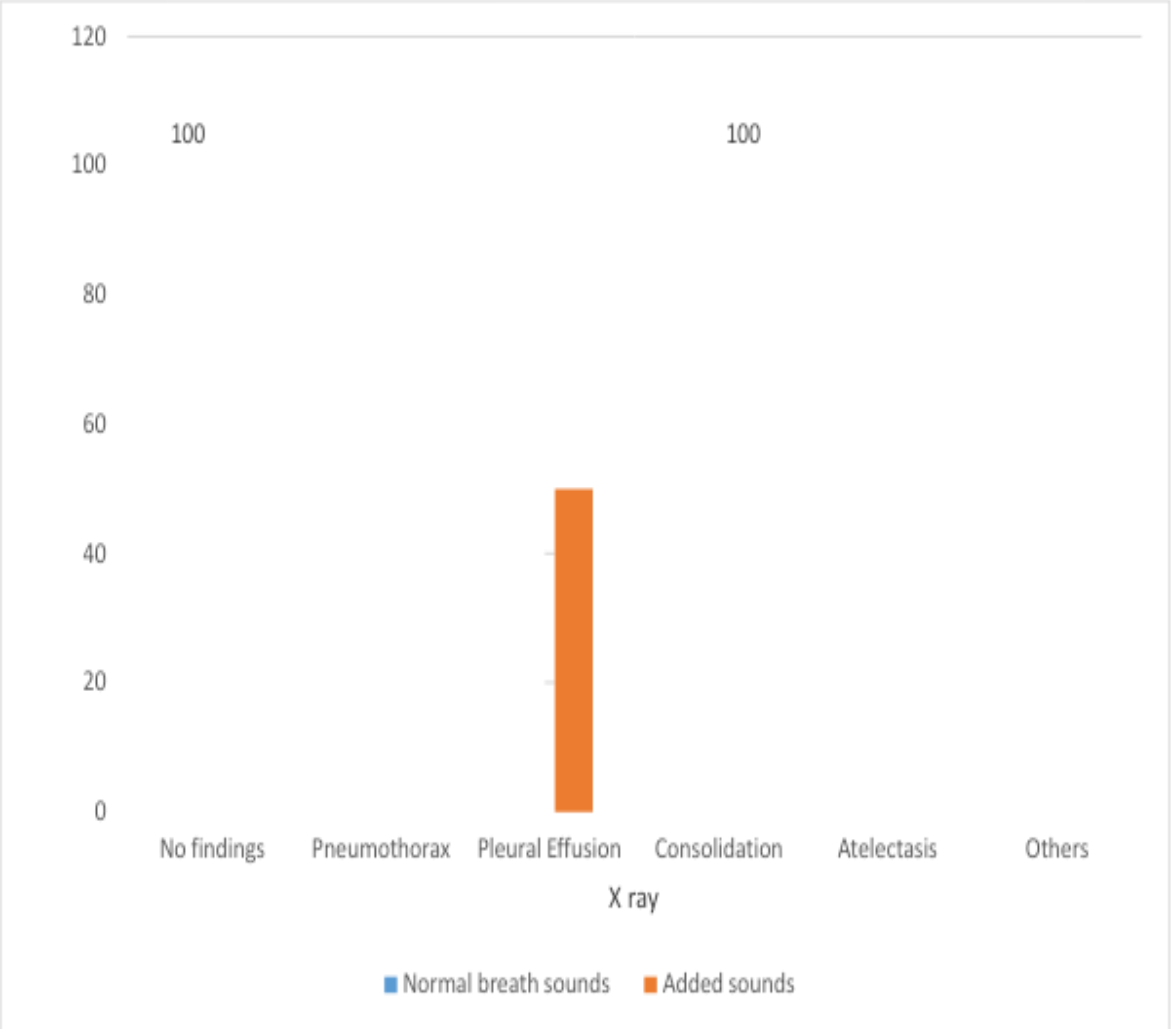


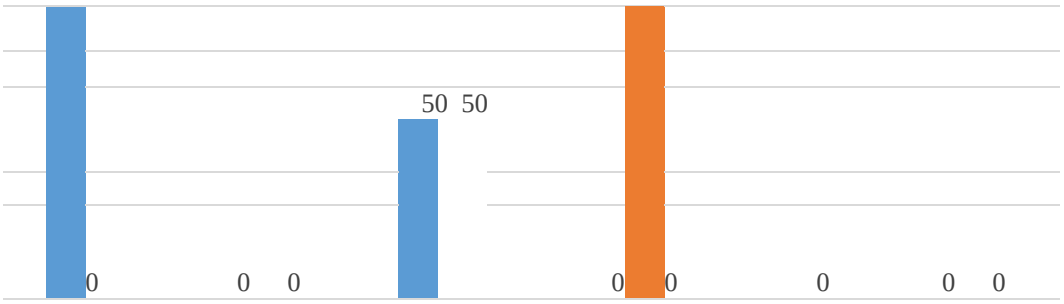
The abnormal X-ray findings like pneumothorax, pleural effusion, consolidation, atelectasis and others were associated with presence of post-op bilateral equal and unequal air entry using chi square.

Xray	Air entry		Total	P value
	Equal	Unequal		
No findings	40(100%)	0(0%)	40(100%)	<0.001
Pneumothorax	--	--	--	--
Pleural Effusion	1(50%)	1(50%)	2(100%)	0.036
Consolidation	0(0%)	3(100%)	3(100%)	<0.001
Atelectasis	--	--	--	--
Others	--	--	--	--

According to the table, Data of 45 patients was collected and analyzed for x ray changes in patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 88% of the patients had no X ray breath findings and normal breath sounds. The remainder of 11% of patients, 4% of the patients had pleural effusion, out of which 50% had added breath sounds and 50% had normal breath sounds. Lastly 6% of the patients consolidation where all had added breath sounds.

P value in patients with no x ray findings was <0.01 which is significant
P value in patients with pleural effusion was 0.036 which is significant
P value in patients with consolidation was <0.001 which is significan



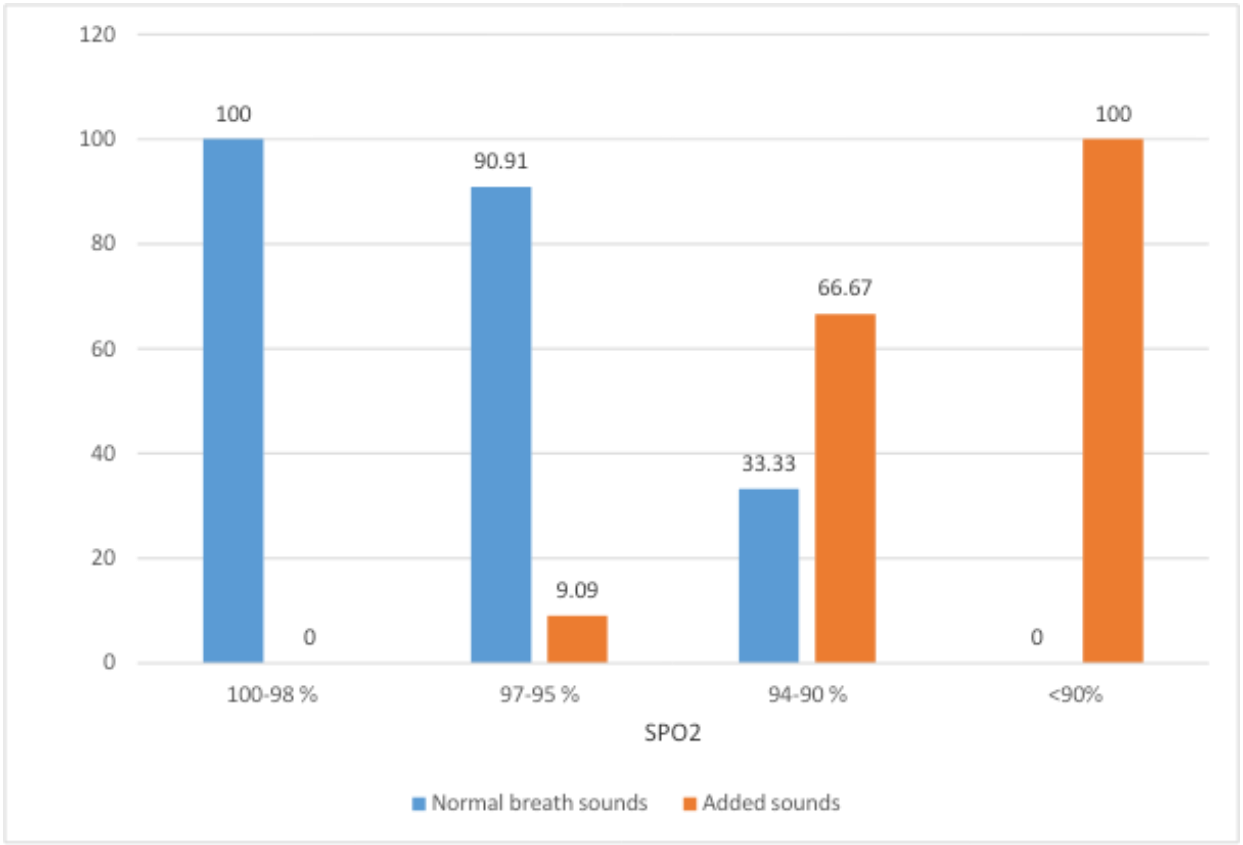


Grading of Spo2 was used as a risk factor and was associated with the presence of post-op bilateral air entry equal or unequal using chi square.

SPO2	Air entry		Total	P value
	Equal	Unequal		
100-98 %	30(100%)	0(0%)	30(100%)	0.003
97-95 %	10(90.91%)	1(9.09%)	11(100%)	0.97
94-90 %	1(33.33%)	2(66.67%)	3(100%)	0.0002
<90%	0(0%)	1(100%)	1(100%)	0.001

According to the table, data of 45 patients was collected and analyzed for saturation of patients undergoing emergency laparotomy in acute abdomen. From which it was inferred that 30 patients had saturation between 98-100% where all had normal breath sounds. As compared to 11 patients with saturation ranging from 95-97% where 90% had normal breath sounds and 10% had added breath sounds. 3 patients with saturation between 90-94%, 33% had no added breath sounds and 67% had added breath sounds. Lastly all patients with saturation below 90% had added breath sounds.

P value in spo2 between 100-98% was 0.003 which is significant
P value in spo2 between 97-95% was 0.97 which is insignificant
P value in spo2 between 94-90% was 0.0002 which is significant
P value in spo2 between <90% was 0.001 which is significant



DISCUSSION

Pulmonary complications like pneumonia, atelectasis, and respiratory failure are major causes of patient pain, a longer hospital stay, and a higher risk of death following abdominal surgery. Postoperative pulmonary problems are considered to be common, but reported incidence varies, range from 9% to 40%, probably due to methodological variations across studies.

Variables	Normal breath sound	Added sounds	P value
DM	2(50%)	2(50%)	0.002
Hypertension	1(50%)	1(50%)	0.036
Physical activity	5(100%)	0(0%)	0.45
Obesity	7(87.5%)	1(12.5%)	0.69
X-ray	1(50%)	1(50%)	0.036
SPO2	0(0%)	1(100%)	0.001

Variables	Equal air	Unequal air	P value
DM	2(50%)	2(50%)	0.002
Hypertension	1(50%)	1(50%)	0.036
Physical activity	5(100%)	0(0%)	0.45
Obesity	7(87.5%)	1(12.5%)	0.69
X-ray	1(50%)	1(50%)	0.036
SPO2	10(90.91%)	1(9.09%)	0.97

A. Association of risk factors with X-ray:

Variables	No findings	Pneumothorax	Pleural Effusion	neumothorax+ Consolidation	Pleural Effusion +Consolidation	P value
DM	1(25%)	0(0%)	0(0%)	2(50%)	1(25%)	0.008
Hypertension	1(50%)	0(0%)	1(50%)	0(0%)	0(0%)	0.001
Physical activity	5(100%)	0(0%)	0(0%)	0(0%)	0(0%)	0.54
Obesity	2(25%)	0(0%)	0(0%)	1(12.5%)	5(62.5%)	0.06
SPO2	27(90%)	0(0%)	0(0%)	0(0%)	3(10%)	0.001

In our study with 45 samples, there was significant association between Hypertension, Diabetes and pre-op abnormal X-ray findings and deranged oxygen saturation with post operative pulmonary complications.

B. Association of diabetes, hypertension and obesity with postoperative pulmonary complications:
In our study with 45 sample, 4 patients had DM and 4 developed post operative lung complications. And out of 2 Hypertensives, 2 had post operative lung complications. And Out of 45 patients, 6 had BMI <30 only 1 patient had post op lung complications,31 patients had BMI between 30-35, 9 developed PPC and 8 had BMI between 35-40, 6 developed PPC.

(**Fransvea, 2022)[17]** Of the 2,318 patients included in this study, MetS has a significantly higher rate of morbidity (353 (35.%) vs. 385 (29.4%), p = 0.005). The mortality rate in patients with MetS (98/1010, 10%) was similar to that in patients without it (129/1308, 10%). Considering patients with MetS who developed SIRS and those who had frailty or both, the occurrence of these conditions was associated with a higher rate of morbidity and mortality.

(Smith et al., 2021)[22] Those who have diabetes, hypertension, and active are among those who are more likely to get an Abdomen Emergency. There was a higher rate of co-morbidities among those that died after Emergency laparotomy. This cohort included 1461 patients undergoing a laparotomy for an EL condition. The mortality rate was 12.4% (181). Nine hundred and ten patients (62.3%) had at least one known co-morbidity on admission. There was a higher rate of co-morbidities among those that died (154; 85.1%). Patient factors found to be associated with mortality were the age of 46 years or greater ($p < 0.001$), current tuberculosis ($p < 0.001$), hypertension ($p = 0.014$), at least one co-morbidity (0.006), and malignancy (0.033)

(**Ahmadieh et al. 2013)**[9] A retrospective cohort research was undertaken to determine the risk variables for the emergence of Pulmonary morbidity in patients of Diabetes after an abdominal procedure. In this study it was found

that 100% of the patients developed lung morbidity followed by abdominal procedures
Findings of present studies were comparable with other studies

C. Association of deranged spo2 with post-operative pulmonary complications:
In our study, out of 45 patients 30 were classified under class 0 spo2 grading and none of them developed PPC.11 were under class 1 and 9 of them developed PPC.3 patients were under class 2 and all 3 of them developed PPC only 1 patient was classified under class 3 and he developed PPC.

(S. Verma & Bhardwaj, 2018)[35] Pre-op oxygen saturation abnormalities were 3 times more common in case group. Upper abdomen surgeries were 20% more common in Case group. Total hospital stay was 21.7 days in cases (12.5 in control), total ICU stay was 8.5 days (1.4). 28% of the PPCs patients could not be saved.

(S. S. V. Verma, 2018) [36] In sample size of 50, 2/3rd of cases had abnormal chest examination while rest of the Controls had normal chest examination. It was found abnormal spo2 findings to be a significant risk factor (p value=0.038) predisposing post operative lung complications. So, sequential spo2 monitoring must be done along with abdominal x-rays in emergency scenarios.

The findings of our study were comparable with findings of other authors.

D. Association of physical activity with postoperative pulmonary complications:
In our study out of 45 patients 18 were classified under light physical activity (PA) 5 had post op lung complications, 22 with moderate PA 11 had post op lung complications and 5 with vigorous PA 0 had any post op lung complications.

(Bouldin et al. 2012)[8] Veteran status was associated with a reduced but significantly larger amount of weekly average moderate PA (2.2 minutes, P = 0.0058), but not with average weekly vigorous PA (0.02 minutes, P = 0.98), after adjusting for gender, race, and ethnicity, household income, educational levels, body mass index (BMI), & recent health examination.

Findings of our study were comparable with findings of other studies.

E. Association of obesity (BMI) with postoperative pulmonary complications:
In our study, out of 45 patients, 6 had BMI <30 only 1 patient had post operative lung complications, 31 patients had BMI between 30-35, 9 developed PPC and 8 had BMI between 35-40, 6 developed PPC.

(Fu, 2020)[24]Obesity is associated with increased mortality in abdominal trauma patients who received laparotomies versus those who did not. body composition measurements of their initial model, the predictive ability to identify patients. A total of 33,798 abdominal trauma patients were evaluated, 10,987 of them received laparotomies. Of these patients, the proportion of obesity in deceased patients was significantly higher when compared to the survivors (33.1% vs. 26.2%, p\ 0.001). Obese patients undergoing laparotomies had significantly higher mortality rates [3.7% vs. 2.4%, standardized difference (SD) = 0.241], longer hospital (11.1 vs. 9.6 days, SD = 0.135), and longer intensive care unit (3.5 vs. 2.3 days, SD = 0.171) than non-obese patients undergoing laparotomies.

Serejo et al., 2007[65] In this study it was stated that PPC can be predicted by features such as age, an abnormal BMI, upper or lower abdominal incisions, and the number of procedures performed in the context of this disease. Study results showed an association between PPC and BMIs of 21 kg/m (2) or 30 kilograms/2 had higher rate of post operative morbidity and mortality.

Findings of our study was comparable with findings of other studies.

CONCLUSION

1. The purpose of this study was to find out any association of life style related risk factors with post operative pulmonary complications in government hospital, Raipur. Previous studies have shown PPC varied between 5-70%, the highest rates were for upper abdominal procedures. Despite many advances in medical and surgical practice, the incidence of PPC has not changed appreciably over the past many years[14].
2. In my study there is Statistically significant association between risk factors like Diabetes, Hypertension and development of PPC.
3. I've also found that there was association between pre operative abnormal X- ray findings and lower spo2 levels and the development of PPC following an emergency laparotomy in acute abdomen.
4. Here, I conclude that multiple co-morbid conditions like Diabetes, Hypertension, Obesity and an inactive lifestyle may lead to the genesis of PPC after an emergency laparotomy.

REFERENCES

[1]. CHAKRAVARTHI K et. a. Mortality in emergency laparotomy on acute abdomen: A Retrospective study in King George Hospital, Visakhapatnam. *INDIAN J Res*. 2015;4(2).

[2]. Armita ML and MA, Et.al. Acute Abdomen; Pre and Post-Laparotomy Diagnosis. Published online 2009.

[3]. Yue Jin, Guohao Xie E a. Incidence and Risk Factors of Postoperative Pulmonary Complications in Noncardiac Chinese Patients: A Multicenter Observational Study in University Hospitals. Published online 2015. https://www.hindawi.com/journals/bmri/2015/265165/

[4]. E. C. McIlveen, E. Wright E a. A prospective cohort study characterising patients declined emergency laparotomy: survival in the 'NoLap' population. Published online 2019. https://associationofanaesthetists-publications.onlinelibrary.wiley.com/doi/full/10.1111/anae.14839

[5]. Kodra N and VS. Risk Factors for Postoperative Pulmonary Complications after Abdominal Surgery. Published online 2016. https://www.researchgate.net/publication/303464418_Risk_Factors_for_Postoperative_Pulmonary_Complications_after_Abdominal_Surgery

[6]. Nertila Kodra VS et. a. Risk Factors for Postoperative Pulmonary Complications after Abdominal Surgery. Published online 2016. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4908742/

[7]. Ashenafi Eshetu and SA. Incidence and Associated Factors of Postoperative Pulmonary Complications after Abdominal Surgery in the Public Hospital, Addis Ababa, Ethiopia. Published online 2022. https://www.hindawi.com/journals/arp/2022/8223903/

[8]. Li-Ping Peng And LYP et. a. Predictive factors of cough after uniportal video-assisted thoracoscopic pulmonary resection. Published online 2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7656438/

[9]. Kodra N, Shpata V, Ohri I. Risk factors for postoperative pulmonary complications after abdominal surgery. *Maced J Med Sci*. 2016;4(2):259- 263. doi:10.3889/oamjms.2016.059

[10]. Verma S, Bhardwaj A, Patil SM. Study of post-operative pulmonary complications in patients of emergency abdominal surgeries. *Int Surg J*. Published online 2018. doi:10.18203/2349-2902.isj20183723

[11]. Fernando J, Loh SM. The Elderly Emergency Laparotomy Patient - More Than Just the Operation. *Ann Acad Med Singapore*. Published online 2019. doi:10.47102/annals-acadmedsg.v48n11p382

[12]. Toshniwal S. Evaluation of Post-operative Pulmonary Complications in Patients of Emergency Abdominal Surgeries: A Teaching Hospital Based Study. *Ann Int Med Dent Res*. 2016;2(1). https://aimdrjournal.com/

[13]. Kassahun WT, Mehdorn M, Babel J. The impact of obesity on surgical outcomes in patients undergoing emergency laparotomy for high-risk abdominal emergencies. *BMC Surg*. Published online 2022. doi:10.1186/s12893-022-01466-6

[14]. Dr.M.Saravanan "POST OPERATIVE PULMONARY COMPLICATIONS IN PATIENTS UNDERGOING THORACIC AND ABDOMINAL SURGERIES AND THE ROLE OF SPIROMETRY AND OTHER PARAMETERS PREDICTING POST OPERATIVE PULMONARY COMPLICATION – A Follow up study" file:///D:/CG- DTE%20Profile/Downloads/mom%20thesis.pdf

[15]. 17. Fransvea PGC. Metabolic Syndrome (MetS), Systemic Inflammatory Response Syndrome (SIRS), and Frailty: Is There any Room for Good Outcome in the Elderly Undergoing Emergency Surgery? Published online 2022. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9240383/

[16]. 19. Kouli OWAC et. ai. Evaluation of prognostic risk models for postoperative pulmonary complications in adult patients undergoing major abdominal surgery: a systematic review and international external validation cohort study. Published online 2022.

[17]. Smith MTD, Bruce JL, Clarke DL. Health-Related Behaviours, HIV and Active Tuberculosis are Associated with Perioperative Adverse Events Following Emergency Laparotomy at a Tertiary Surgical Service in KwaZulu-Natal, South Africa. *World J Surg*. Published online 2021. doi:10.1007/s00268-021-05986-9

[18]. Smith, Michelle T. D. JLB& DLC. Using Machine Learning to Establish Predictors of Mortality in Patients Undergoing Laparotomy for Emergency General Surgical Conditions. Published online 2021. https://link.springer.com/article/10.1007/s00268-021-06360-5

[19]. Uma V. Effectiveness of early ambulation on pain daily activities and bio physiological parameters among abdominal surgery patients. Published online 2021. http://hdl.handle.net/10603/362963

[20]. Fu CYFB• SP. Obesity is Associated with Worse Outcomes Among Abdominal Trauma Patients Undergoing Laparotomy: A Propensity- Matched Nationwide Cohort Study. Published online 2020. https://www.proquest.com/openview/f52ad45dd1e25baa4036784985e0a 8e3/1?pq-origsite=gscholar&cbl=47185

[21]. Lee KC, Sturgeon D, Lipsitz S, Weissman JS, Mitchell S, Cooper Z. Mortality and Health Care Utilization among Medicare Patients Undergoing Emergency General Surgery vs Those with Acute Medical Conditions. *JAMA Surg*. Published online 2020. doi:10.1001/jamasurg.2019.5087

[22]. Ross SW, Kuhlenschmidt KM, Kubasiak JC, et al. Association of the risk of a venous thromboembolic event in emergency vs elective general surgery. *JAMA Surg*. Published online 2020. doi:10.1001/jamasurg.2020.0433

[23]. E.Poulton TR. Socioeconomic deprivation and mortality after emergency laparotomy: an observational epidemiological study. Published online 2020. https://www.sciencedirect.com/science/article/pii/S0007091219306531

[24]. Hartley R. Assessment and Perioperative Management. Published online 2020. https://www.taylorfrancis.com/chapters/edit/10.1201/9780429186516- 6/assessment-perioperative-management-robert-hartley-oliver-pratt- dominic-slade
[25]. Assouline1 BML. Preoperative Exercise Training to Prevent Postoperative Pulmonary Complications in Adults Undergoing Major Surgery: A Systematic Review and Meta-analysis with Trial Sequential Analysis. Published online 2020. https://serval.unil.ch/resource/serval:BIB_C48F37E60AB1.P001/REF.p df
[26]. Lumb AB. Pre-operative respiratory optimisation: an expert review. Published online 2019. https://associationofanaesthetists- publications.onlinelibrary.wiley.com/doi/full/10.1111/anae.14508
[27]. Fernandes AJR. Root causes and outcomes of postoperative pulmonary complications after abdominal surgery: a retrospective observational cohort study. Published online2019. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6889593/
[28]. Gurunathan U, Rapchuk IL, Dickfos M, et al. Association of Obesity with Septic Complications after Major Abdominal Surgery: A Secondary Analysis of the RELIEF Randomized Clinical Trial. *JAMA Netw Open*. Published online 2019. doi:10.1001/jamanetworkopen.2019.16345
[29]. Disler RT, Gallagher RD, Davidson PM, et al. Factors impairing the postural balance in COPD patients and its influence upon activities of daily living. *Eur Respir J*. Published online 2019.
[30]. Verma S, Bhardwaj A. Study of post-operative pulmonary complications in patients of emergency abdominal surgeries. Published online 2018.
[31]. https://www.researchgate.net/publication/327229266_Study_of_post-operative_pulmonary_complications_in_patients_of_emergency_abdom inal_surgeries
[32]. Verma SSV. Study of post-operative pulmonary complications in patients of emergency abdominal surgeries. Published online 2018. https://www.ijsurgery.com/index.php/isj/article/viewFile/3176/2303
[33]. Sharma PV. Influence of Risk Factors on Incidence, Management, Recurrence, and Follow-up of Acute Diverticulitis. Published online 2018.
[34]. Alghamdi. The Role of Body Composition in Predicting Outcomes in the Elderly Following Acute Abdominal Surgery. Published online 2018. https://era.library.ualberta.ca/items/212928d6-035e-4233-b97e-2826a3012320
[35]. Ludbrook G. Hidden pandemic of postoperative complications—time to turn our focus to health systems analysis. Published online 2018. https://www.bjanaesthesia.org/article/S0007-0912(18)30654-8/fulltext
[36]. Ana Fernandez-BustamanteFernandez-Bustamante A. Postoperative Pulmonary Complications, Early Mortality, and Hospital Stay Following Noncardiothoracic Surgery. Published online 2017.
[37]. https://jamanetwork.com/journals/jamasurgery/article-abstract/2577338
[38]. Oldroyd C, Scholz AFM, Hinchliffe RJ, McCarthy K, Hewitt J, Quinn TJ. A systematic review and meta-analysis of factors for delirium in vascular surgical patients. In: *Journal of Vascular Surgery*. ; 2017.
[39]. doi:10.1016/j.jvs.2017.04.077
[40]. Witherspoon J. A study of the factors influencing outcome after emergency laparotomy for non-traumatic abdominal pathology. Published online 2017. https://orca.cardiff.ac.uk/id/eprint/113173/
[41]. Toiyama Y, Hiro J, Ichikawa T, et al. Colonic necrosis following laparoscopic high anterior resection for sigmoid colon cancer: Case report and review of the literature. *Int Surg*. Published online 2017. doi:10.9738/INTSURG-D-17-00001.1
[42]. Nayak BS. Effectiveness of comprehensive nursing intervention programme CNIP on anxiety fatigue self efficacy and quality of life among patients undergoing coronary artery bypass graft surgery in a tertiary care hospital a randomized controlled tria. Published online 2017. https://shodhganga.inflibnet.ac.in/handle/10603/180729
[43]. Thakur A. Effects of Different Types of Transcutaneous Electrical Nerve Stimulation on Post Incision Pain following Abdominal Surgery A Randomized Controlled Trial. Published online 2016. https://shodhganga.inflibnet.ac.in/handle/10603/203378
[44]. De'Angelis NFE. Emergency abdominal surgery after solid organ transplantation: a systematic review. Published online 2016. https://link.springer.com/article/10.1186/s13017-016-0101-6
[45]. Banerjee A, Selzer DJ. Optimizing perioperative management: Perioperative care and protocols to prevent and detect early complications. In: *Bariatric Surgery Complications and Emergencies*. ; 2016. doi:10.1007/978-3-319-27114-9_3
[46]. Kannan S. A Study on stomas in emergency laparotomies. Published online 2016. http://repository-tnmgrmu.ac.in/3375/
[47]. Barrett IM. Predictors of in-hospital mortality amongst octogenarians undergoing emergency general surgery: A retrospective cohort study. Published online 2014. https://www.sciencedirect.com/science/article/pii/S1743919114008899
[48]. Mathus-Vliegen EMH. The cooperation between endoscopists and surgeons in treating complications of bariatric surgery. *Best Pract Res Clin Gastroenterol*. Published online 2014.
[49]. doi:10.1016/j.bpg.2014.07.011
[50]. Haines KJEHS. Association of postoperative pulmonary complications with delayed mobilisation following major abdominal surgery: an observational cohort study. Published online 2013.
[51]. https://pubmed.ncbi.nlm.nih.gov/23219632/

[52]. BASAVANTHAPPA BT. EFFECTIVENESS OF MODIFIED EARLY AMBULATION ON ACTIVITIES OF DAILY LIVING FUNCTIONAL ACTIVITY AND PSYCHOLOGICAL WELLBEING AMONG THE PATIENTS UNDERGONE ABDOMINAL SURGERY. Published online 2013. http://hdl.handle.net/10603/32015

[53]. Goitein D, Matter I, Raziel A, et al. Portomesenteric Thrombosis Following Laparoscopic Bariatric Surgery. *JAMA Surg*. Published online 2013. doi:10.1001/jamasurg.2013.1053

[54]. HimaniGuptaMD H. Impact of COPD on Postoperative Outcomes: Results From a National Database. Published online 2013. HimaniGuptaMD

[55]. Piessen G, Muscari F, Rivkine E, et al. Prevalence of and risk factors for morbidity after elective left colectomy: Cancer vs noncomplicated diverticular disease. *Arch Surg*. Published online 2011. doi:10.1001/archsurg.2011.231

[56]. Poirier P, Alpert MA, Fleisher LA, et al. Cardiovascular Evaluation and Management of Severely Obese Patients Undergoing Surgery. *Circulation*. Published online 2009. doi:10.1161/circulationaha.109.192575

[57]. Croissant K, Shafi MI. Preoperative and postoperative care in gynaecology. *Obstet Gynaecol Reprod Med*. Published online 2009. doi:10.1016/j.ogrm.2008.11.007

[58]. Serejo LGG, da Silva-Júnior FP, Bastos JPC, de Bruin GS, Mota RMS, de Bruin PFC. Risk factors for pulmonary complications after emergency abdominal surgery. *Respir Med*. Published online 2007.

[59]. doi:10.1016/j.rmed.2006.07.015