

## Obesity and Surgical Site Infection: A Study

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### **Abstract:**

**Background:** Obesity is defined as excessive accumulation of fat in the body and is the most common nutritional disorder in humans. The incidence of obesity has increased rapidly during recent decades. According to WHO definition, a person is considered overweight if her/his BMI is >25, and obese if BMI ≥30. Emerging data indicate an association between obesity and infectious disease. Infections that occur in wound created by invasive surgical procedure are referred to as surgical site infection (SSIs). Risk of SSI increased with increase with BMI.

**Objectives:** The objective of this study is to know more about obesity as a risk factor in causing surgical site infection in the patients operated for elective anterior abdominal wall surgery.

**Observation:** The present study is conducted to evaluate effect of increase in BMI on causing of surgical site infection. Obesity is an important risk factor for surgical site infections.

**Conclusion:** Obesity is considered as one of the risk factors in causing surgical site infection. Thus by doing this study the relation of BMI and obesity with surgical site infection will be studied for elective surgical procedures over anterior abdominal wall.

**Key words:** Obesity, BMI, Surgical Site Infections (SSIs).

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### I. Introduction

Obesity is defined as excessive accumulation of fat in the body and is the most common nutritional disorder in humans. It is major cause of mortality and morbidity for associated metabolic disorders and cardiovascular disease.<sup>16</sup> It is a medical condition that may have several adverse effects on health, leading to reduced life expectancy and / or increased health problems. Obesity increases likelihood of various diseases, particularly heart disease, type ii diabetes ,etc.

Busy lifestyles, improper diets, and inactivity have dramatically increased the number of overweight people in recent years. The incidence of obesity has increased rapidly during recent decades. According to WHO definition, a person is considered overweight if her/his BMI is >25, and obese if BMI ≥30. Emerging data indicate an association between obesity and infectious disease.<sup>1</sup> Obesity is an important risk factor for surgical site infections.<sup>11</sup>

The world health organization recently noted that the incidence of obesity is increasing worldwide. It is a significant independent risk factor for mortality from all causes. The significance of obesity as a public health problem is partly caused by the increasing degree of obesity .Obese patients are predisposed to many diseases and often require surgical intervention. In fact, diseases associated with obesity include diabetes, gallstones, reflux esophagitis, osteoarthritis, and several forms of cancer.<sup>15</sup>

Obesity is considered one of the most common medical disorders . Nosocomial infections pose significant risks for all hospitalized patients and can cause minor discomfort and/or life-threatening events. It also substantially increases the cost of care and length of hospital stay.<sup>15</sup> Prospective and retrospective cohort studies have indicated that obesity is associated with a significantly increased risk of skin and soft tissue infection after surgery.<sup>1</sup>

Infections that occur in wound created by invasive surgical procedure are referred to as surgical site infection (SSIs). An infection must occur within 30 days after surgery to be classified as an SSI. However, if the surgery includes an implanted device or prosthesis, then the infection window extends out to one year. Evidence of incisional pus, cellulitis, deliberate incision and drainage of surgical site and/or diagnosis of SSI by physician are also required for conformance with the definition.<sup>7</sup>

Surgical site infection is commonly seen due to one or many factors .Along with obesity it may be associated with other co morbid factors like diabetes ,hypertension. To find out association of obesity with surgical site infection independent of other co morbid factors the study has excluded them.

Adipose tissue is poorly vascularised and the consequent effect on oxygenation of the tissues and functioning of immune response is thought to increase the risk of SSI. In addition, operations on patients who are obese can be more complex and prolonged.<sup>2</sup> It is stated that obesity decreases preoperative tissue oxygenation.<sup>11</sup> Overall from the studies it is known that the risk of SSI increased with increase of BMI.<sup>3</sup>

## II. Aims And Objectives:-

The objective of this study is to know more about obesity as a risk factor in causing surgical site infection in the patients operated for elective anterior abdominal wall surgery.

## III. Methodology

The hospital based observational study done in Swami Ramanand Teerth Rural Govt. Medical College, Ambajogai for duration of 2 months. All male and female patients of age group between 18-45 years coming for elective anterior abdominal surgical procedures at S.R.T.R.GMC Ambajogai not having any other co-morbidity factors like hypertension, diabetes mellitus, immunodeficiency, tuberculosis, etc. are included in study .

After obtaining ethical clearance from ethical committee and verbal consent from patient further work is carried out. A total 30 patients fulfilling inclusion criteria are included in study .Weight and height of patients is recorded from which BMI is calculated. On the basis of BMI they are classified as normal, overweight and obese .These patients will be followed up for duration of 4 weeks.

Infections that occur in wound created by invasive surgical procedure are referred to as surgical site infection (SSIs) will be categorized according to criterion by US Centers for Disease Control and Prevention .We will study the possible role of obesity in surgical site infection.

The study will include patients having hernia (direct, indirect inguinal hernia, umbilical hernia),appendicitis like elective surgical procedures. Operative procedure will be done with proper preoperative care in all patients and also all procedures included in study will be operated by same surgeon to avoid error. Proper follow up of patient will be taken and observations regarding condition of surgical site will be noted to see colour, discharge, tenderness, swelling, wound gap, wound dehiscence, etc.

## IV. Observations & Results

**Table1.Distribution of study sample in various factors.**

	FREQUENCY	PERCENTAGE
<b>AGE</b>		
<20	1	3.3
20-30	11	36.66
30-40	13	43.33
>40	5	16.66
<b>SEX</b>		
Male	13	43
Female	17	57
<b>BMI</b>		
Overweight(25-30)	11	36.66
Class 1(30-35)	9	30
Class 2(35-40)	4	13.33
Class 3(>40)	6	20
<b>OPERATED FOR</b>		
Hernia	20	66.66
Appendicitis	10	33.33
<b>TOTAL</b>	30	100

In Table1. Study sample is distributed into various factors to know about frequency and percentage distribution in each group. Age wise distribution shows that maximum number of patients were from 30-40 age group (43.33%), followed by 20-30 age group (36.66%), least percentage is from <20 group(3.3%). There were 13 male (43%) and 17 female (57%) patients out of 30 patients. Thus the relative percentage of female was more.

Distribution according to degrees of overweight was made with the help of classification according to WHO criteria. Most of the patients were overweight (BMI-25-30) i.e. about 37%, class 1 included 30% of total study sample, 13% were from class 2, while class 3 included 20% patients. Study on the basis of type of surgery showed that 66.66% patients were operated for various types of hernia, 33.33% were operated for appendicitis.

**Table 2. Association of different factors with Surgical Site Infection (SSIs)**

	SSI present	SSI absent	P Value
<b>AGE</b>			
<20	0	1	0.99
20-30	2	9	
30-40	2	11	
>40	1	4	
<b>Sex</b>			
Male	3	10	0.367
Female	2	15	
<b>BMI</b>			
Overweight(25-30)	0	11	0.034
Class 1(30-35)	1	8	
Class 2(35-40)	1	3	
Class 3(>40)	3	3	
<b>Wound</b>			
Clean Wound	3	17	1.0
Clean Contaminated Wound	2	8	
Contaminated Wound	0	0	
Dirty Wound	0	0	
<b>TOTAL</b>	5	25	

(if p value <0.05 ,statistically significant :Fischer Exact Test)

Table 2.shows the association of different factors with Surgical Site Infection (SSIs).Age wise presence of study found that 2 patients were from 20-30 age groups and also 2 were from 30-40 age groups. From >40 age 1 was found to have SSI. Out of total 5 infected patients 3 were male while 2 were female.

According to BMI classification given by WHO<sup>11</sup> maximum infected patients were from class 3 obesity group. Out of 5 infected patients 3 were from class 3 obesity.BMI was found to have significant association with Surgical Site Infection as p value is 0.034 (<0.05,statistically significant).Study in different categories of wound classification showed 3 patients were having clean wound and 2 were having clean contaminated wound.

## V. Discussion

The present study is conducted to evaluate impact of obesity in causation of surgical site infection. Obesity is considered an important risk factor for surgical site infection. we want to study the correlation of obesity and SSI in a rural setup. Obesity usually defined as having a body-mass index greater than or equal to 30 kg/m<sup>2</sup>.

The study found that out of 6 patients from class 3 obesity, 3 had surgical site infection. Out of 4 patients from class 2 obesity ,1 got surgical site infection while out of 9 patients from class 1 obesity, 1 had surgical site infection.

The study was done in rural setup at S.R.T.R.Govt.Medical College Hospital, Ambajogai with sample size of 30 patients fulfilling selection criteria .Follow up of patients was taken for 2-6 weeks to observe infection in them. The percentage of obese persons in rural area is less as compared to urban area. Obesity is at least three times more common in cities than in villages, although it is increasing rapidly even in villages because traditional villages are also becoming urbanized in their habits .

Misra et al. in 2001 did study in slum area of India, study included 170 male and 362 female within age group of 18–50 years. Out of that 13 %male and 16% female patient found obese having BMI >25.5By evaluating this study found the ratio of obese patients in slum area of India.

Thirty-seven percent of the elective adult surgical population is overweight, and 17% are severely overweight as assessed by the National Center for Health Statistic criteria using BMI. 1

Zeynep,Canturk et al carried out a study of nosocomial infection and obesity in surgical patients, found that 96 out of 395 patients were surgically operated and found to have infection. It was also found that the infection rate was more in obese patients. From this study, obesity was found as independent risk factor for surgical patients.15 In our study we found significant relationship between BMI of patients and surgical site infection(P=0.034;if P<0.05,statistically significant :Fischer Exact Test) In our study the incidence of surgical site infection found to have increased with increase in BMI.

Observations were done according to different views -by distributing study sample age wise ,sex wise ,according to degrees of overweight by WHO classification, wound classification given by CDC (Centre For Disease Control) and based on surgeries done. The association of these is shown with surgical site infection.

According to one cohort study done by Dindo D et al comparison of obese and nonobese patients was made to find risk of Surgical Site Infection. This study found increased incidence of wound infections after open surgery in patients who were obese (p=0.03).<sup>17</sup>

According to one study done in United states by Jon Stuart Hourigan showed impact of obesity on postoperative complications in patients undergoing elective general surgery and this was confirmed in our study.<sup>16</sup>In our study also obese patients for elective surgeries were included and observed for surgical site infection .

In our study it is found that there is no significant relationship between age and surgical site infection.

## VI. Conclusion

Obesity is considered as one of the risk factors in causing surgical site infection. Thus, this study showed the relation of BMI and obesity with surgical site infection in case of elective surgical procedures over anterior abdominal wall.

- The following conclusions were drawn based on the findings of the study:
  1. Among the total study subjects 43% were male while 57% were female.
  2. Majority of patients were overweight (37%).
  3. Total 5 patients found to have Surgical Site Infection.
  4. Out of that 3 patients were from class 3 obesity i.e. BMI>40.

- Findings regarding relation of BMI and Surgical Site Infection-  
Surgical site infection is caused by many factors, obesity is one of that.

It is having its contribution in causing surgical site infection.

Study found that patients having more BMI value are at more risk than those having less BMI.

The risk can be reduced by some factors like maintaining sterilization ,proper cleaning, painting and draping of surgical site with antiseptics, reduced use of electrocautry in obese (as it cause saponification of fat will cause seroma formation later on) etc.

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