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Pre Operative Body Mass Index As Predictor of Post Operative Morbidity and Mortality in Emergency Abdominal Surgeries

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I.Introduction

Wound healing requires energy and is a catabolic process. Patients who are severely malnourished demonstrate impaired wound healing and predisposition to infection.

Malnutrition is common. It appears in about 30 per cent of surgical patients with gastrointestinal disease and up to 60 per cent of those in whom hospital stay has been prolonged because of postoperative complications. It is frequently unrecognized and therefore patients often do not receive appropriate support. There is a substantial body of evidence to show that patients who suffer from starvation or have signs of malnutrition have a higher risk of complications and an increased risk of death in comparison with patients who have adequate nutritional reserves. Long-standing protein-calorie malnutrition is easy to recognize. Short-term under nutrition, although less easily recognized, frequently occurs in association with critical illness, major trauma, burns or surgery, and also impacts on patient recovery. The degree of malnutrition is estimated on the basis of weight loss over the past 6 months, physical findings and plasma protein assessment.

The aim of of this study is to study the pre operative body mass index as predictor of post operative morbidity and mortality in emergency abdominal surgeries

II.Materials And Methods

Study design: A prospective Cross Sectional Study
Source of data: Patients admitted in Department of General surgery ,Mysore Medical College and Research Institute for any emergency abdominal surgery between 1st November 2017 and 30th June 2019.
.**Sample size** : n = 100 . The chi square test was used to calculate 'p-value' which was used as a measure of statistical significance.

Inclusion criteria

- Patients willing to give written informed consent.
- Patients aged >18 years of either sex
- Patients who were admitted for any emergency abdominal surgery under the department of General Surgery in MMC&RI, Mysuru.

Exclusion criteria

- Patients aged < 18 years
- Patients who do not give consent
- Patients with chronic liver diseases
- Patients with severe anemia Hb < 7 g/dl
- Patients with diabetes mellitus
- Patients with chronic renal disease
- patients on immuno-suppressants / immuno- compromised patients.

Procedure

- Details of cases was recorded including history and clinical examination

- Anthropometry– Height and weight recorded
- Follow up was done till patient was discharged from hospital.

III.Results

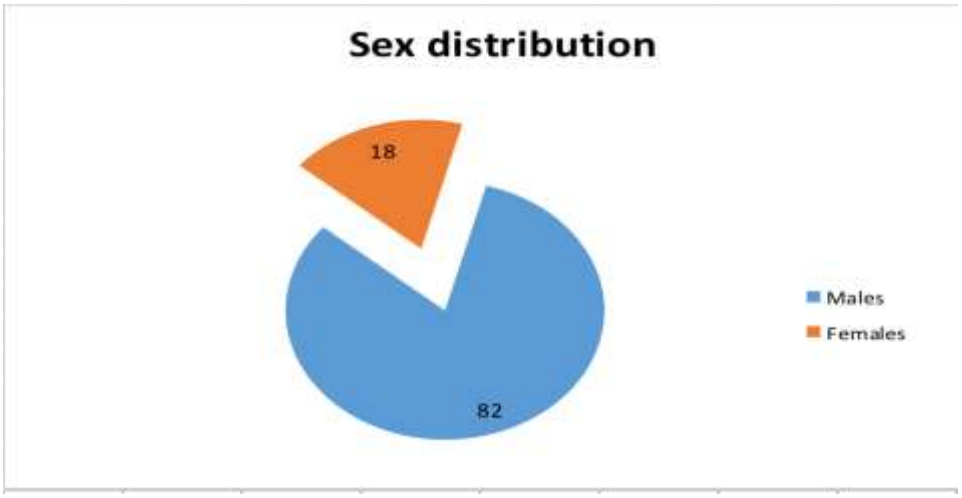
The study was conducted on 100 patients, aged between 18 -75yrs, who underwent any emergency abdominal surgery in MMC&RI .Mysuru from 1st November 2017 to 30th June 2019. Among 100 patients, 82 patients developed complications with 20 deaths and 19 had an uneventful recovery.

Table 1: Sex distribution

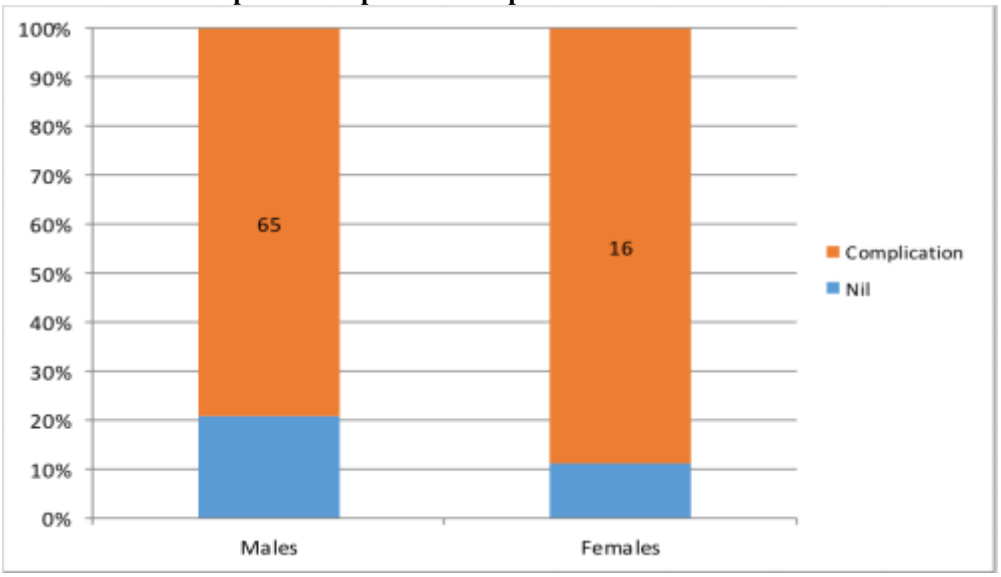
Sex	Number	Percentage (%)	Complication	Percentage (%)
Males	82	82	65	79
Females	18	18	16	89
Total	100		81	

Of the 100 patients studied, 82% were males and 18% were females. 79% of male patients had complications and 89% of female patients had complications.

GRAPH 1 – SEX DISTRIBUTION



Graph 2: Postoperative complication rate in both sexes

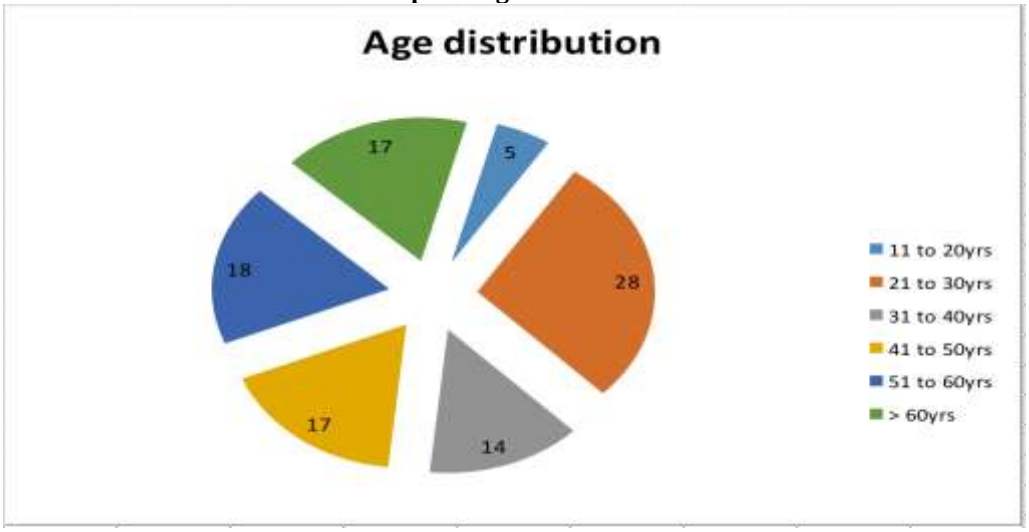


Graph showing complication rate in both sexes. 79% male patients and 89% female patients had complications.

Table 3: Age distribution

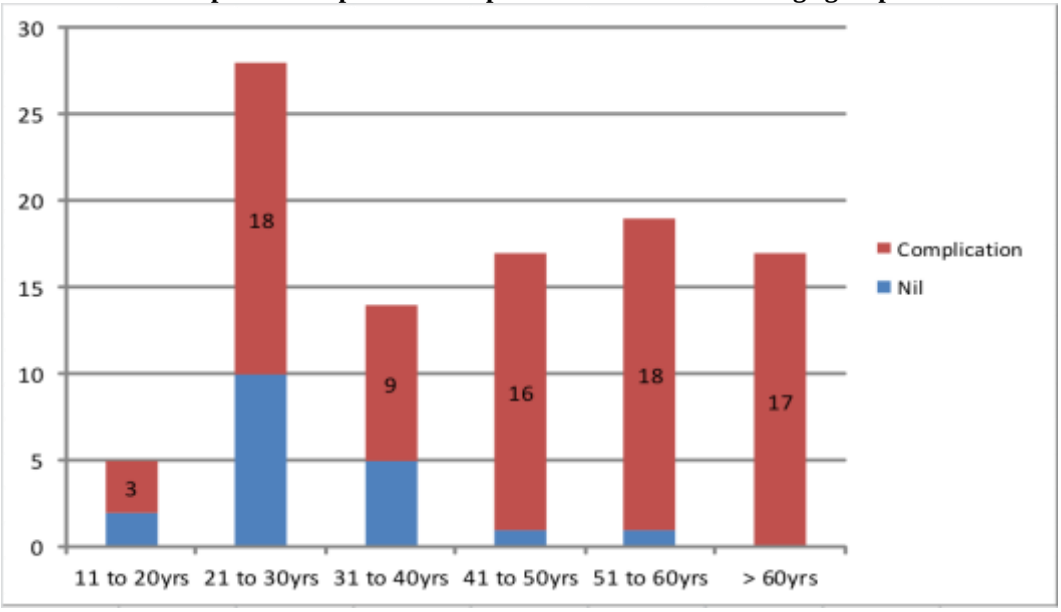
Age (yrs)	11-20	21-30	31-40	41-50	51-60	> 60	Total
Total no	5	28	14	17	19	17	100
Percentage (%)	5	28	14	17	19	17	
Complication	3	18	09	16	18	17	81
Percentage (%)	60.0	64.2	64.2	94.11	94.73	100	

Graph 3: Age distribution



This graph shows age distribution of the study population. Maximum patients belonged to the age group of 21-30years

Graph 4: Postoperative complication rate in different age group

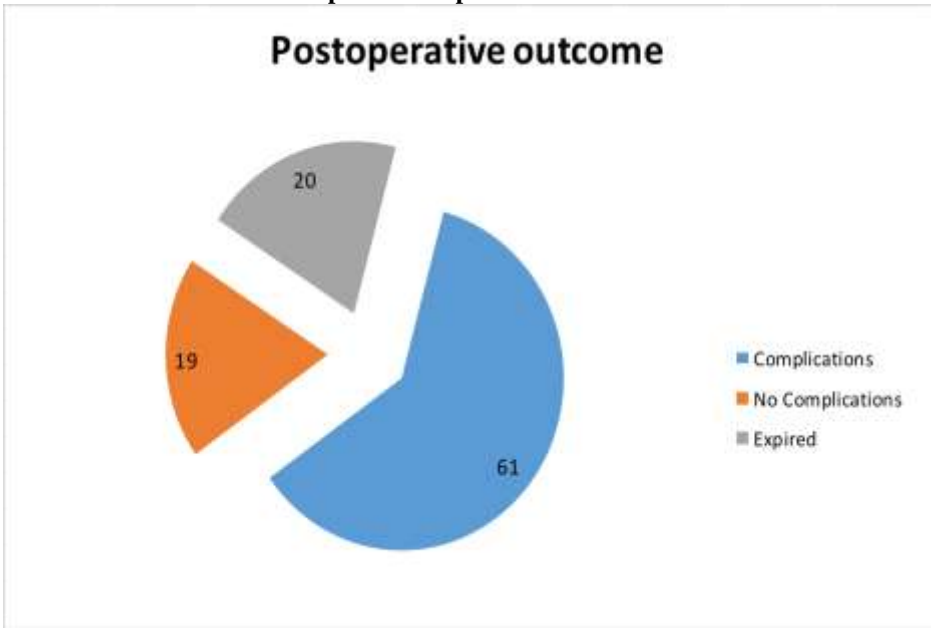


Of the 100 patients studied, the age varied from 18-75 yrs. The number of patients in the 21 – 30 years group was the highest (28%) with mean age being 42.68. This graph represents the complication rate in different age groups. The highest number of complications was noted in the age group of > 60 years (100%).

Table 5: Post operative outcome

	No. of cases	Percentage (%)
Post op complications	61	61
No complications	19	19
Death	20	20
Total	100	100

Graph 5: Postoperative outcome



This graph shows the complication rate in the study, 81% of patients had complications including deaths.

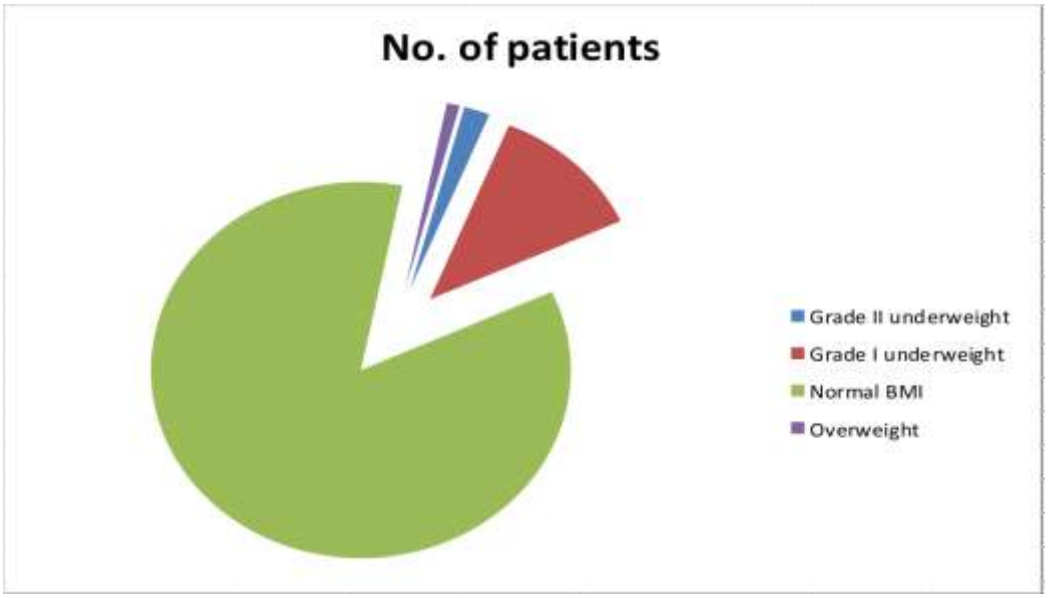
81 of the 100 patients, 81% had postoperative complications including deaths. The most common complication was surgical site wound infection 43(43%) followed by sepsis 37 (37%), pulmonary complications 36 (36%), requirement of ventilator support 33 (33%), renal complications 34 (34%), cardiac complications 3 (3%) and DVT 2 (2%).

Table 6: Distribution of patients according to their BMI

BMI	No of pts	Percentage (%)
Grade II underweight	2	2
Grade I underweight	12	12
Normal	85	85
Overweight	1	1

This table shows distribution of patients according to their BMI, majority of which falling in the normal range (84%).

Graph 6: Distribution of patients according to their BMI



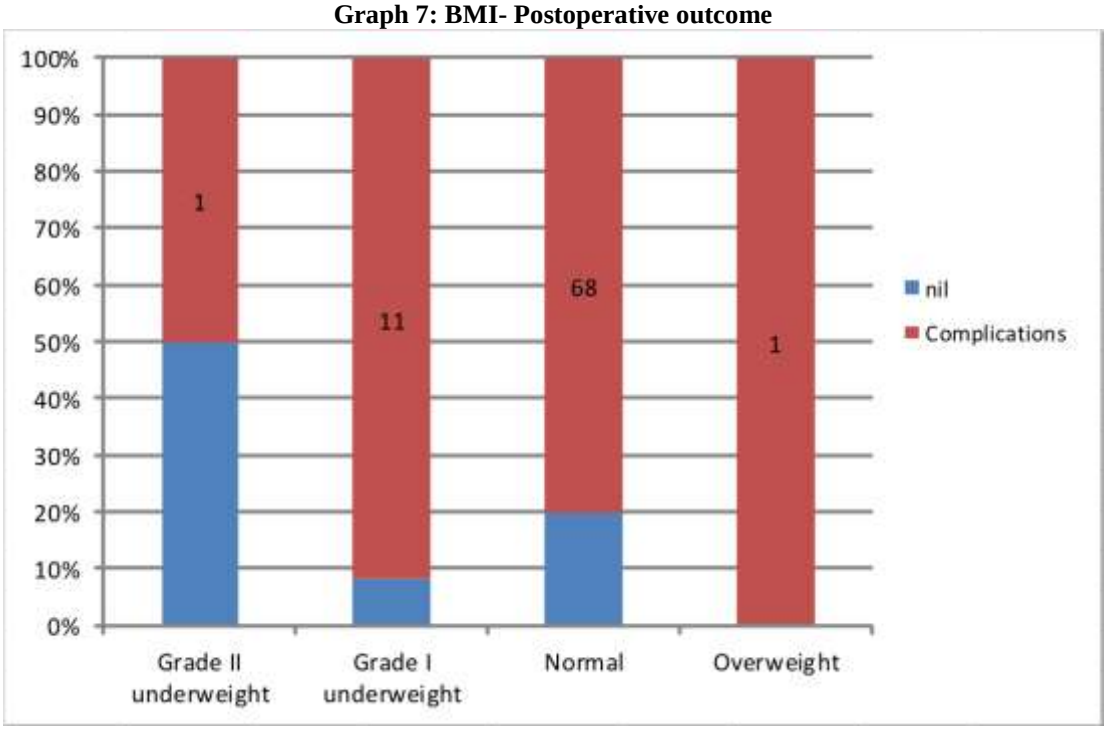
This graph shows distribution of patients according to their BMI, majority of which falling in the normal range (85%).

Table 7: BMI-Post operative outcome

BMI	No of pts	Complicated	Uncomplicated	Percentage (%)
Grade II underweight	2	1	1	50
Grade I underweight	12	11	1	91.6
Normal	85	68	17	80.0
Overweight	1	1	0	100

This table shows distribution of patients according to their BMI and their complication rate.

Graph 7: BMI- Postoperative outcome



This graph shows distribution of patients according to their BMI and their complication rate highest being in the group of grade I underweight.
Complications were found to be high in group with grade I underweight. (Excluding the group of overweight as the sample size is less). The calculation is not statistically significant (p = 0.352)

Graph 8: Association of morbidity rate with BMI

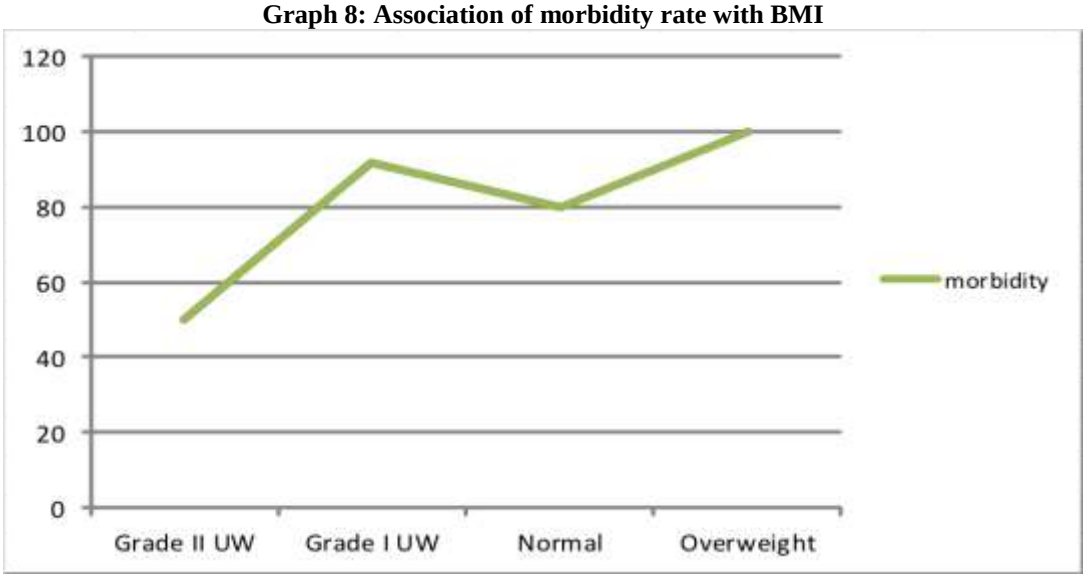
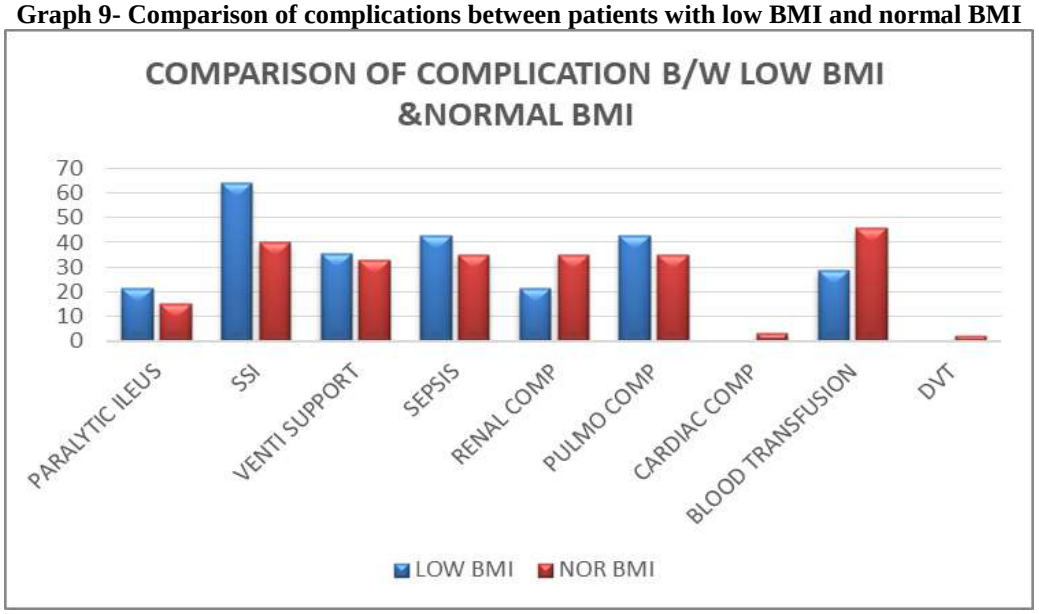


Table 8: Comparison of complications between patients with low BMI and normal BMI

Complications	Low BMI	Percentage (%)	Normal BMI	Percentage (%)	p value
Prolonged ileus	3	21.4	13	15.29	0.378
SSI	9	64.2	34	40.0	0.006
Ventilator support	5	35.71	28	32.9	0.056
Sepsis	6	42.8	30	35.29	0.546
Renal complications	3	21.42	30	35.29	0.534
Pulmonary complications	6	42.8	30	35.29	0.213
Cardiac complications	0	0	3	3.5	0.556
Blood & blood product transfusions	04	28.57	39	45.8	0.149
DVT	0	0	2	2.35	0.556

This table compares all complications between patients with normal BMI and patients with low BMI. The comparison was statistically significant ($p < 0.05$) only for surgical site infections.

Graph 9- Comparison of complications between patients with low BMI and normal BMI



This graph represents comparison between patients with normal BMI and low BMI in relation with all complications.

Table 9: Hospital stay

	Average
Normal BMI	13.84
Low BMI	15.92

This table shows average hospital stay in patients with normal BMI and low BMI, which higher in patients with low BMI.

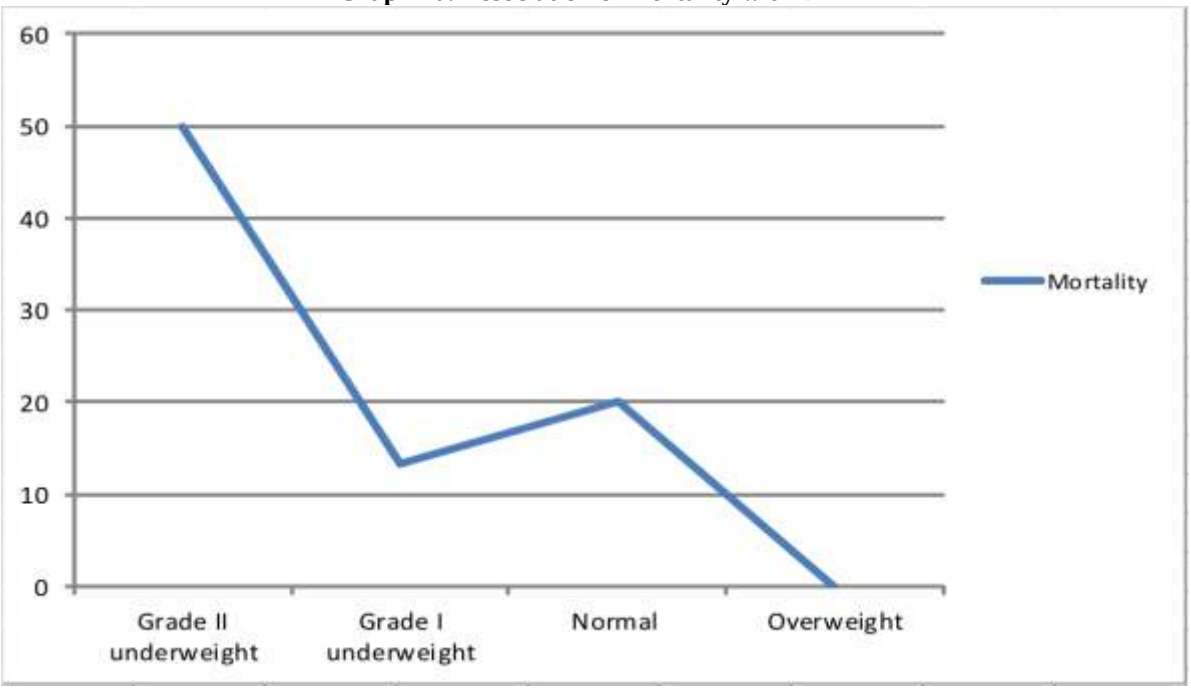
Table 10: Associaton of mortality with BMI

BMI	**No of pts expired**	**Percentage (%)**

Grade II underweight	1	50
Grade I underweight	2	13.3
Normal	17	20.0
Overweight	0	0

Total of 20 patients expired during this study of 100. Mortality was highest in the group of overweight. This calculation is not statistically significant (p= 0.487).

Graph 10: Association of mortality with BMI



This graph shows the pattern of mortality in this study according to BMI.

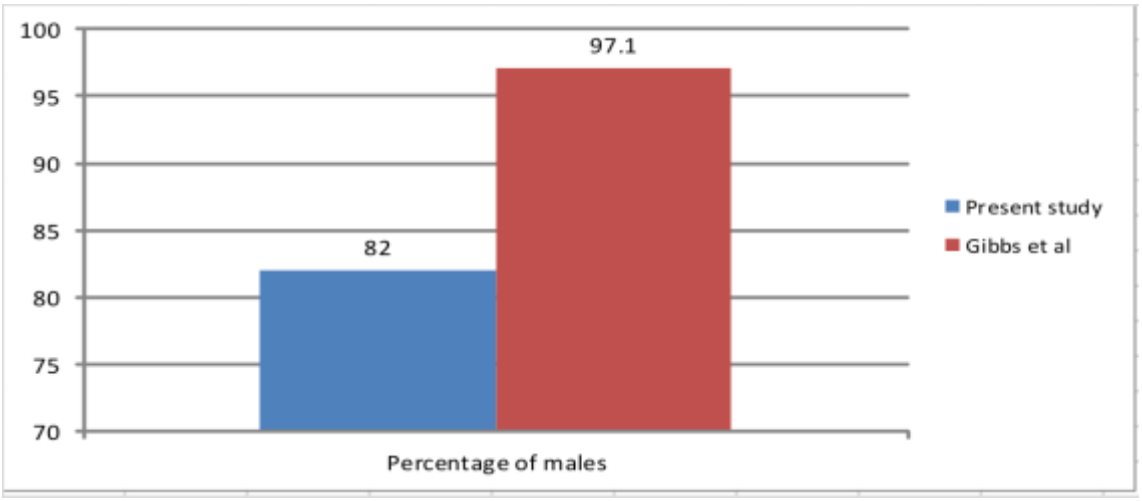
IV.Discussion

Nutritional assessment is essential for identifying patients who are at an increased risk of developing post operative complications. A variety of nutritional indices have been found to be valuable in predicting patient outcome. In our study preoperative serum albumin level and BMI were used for nutritional assessment.

Table 11: Comparison of Sex Distribution

	Present study	**Gibbs et al**
Percentage of males (%)	82	97.1

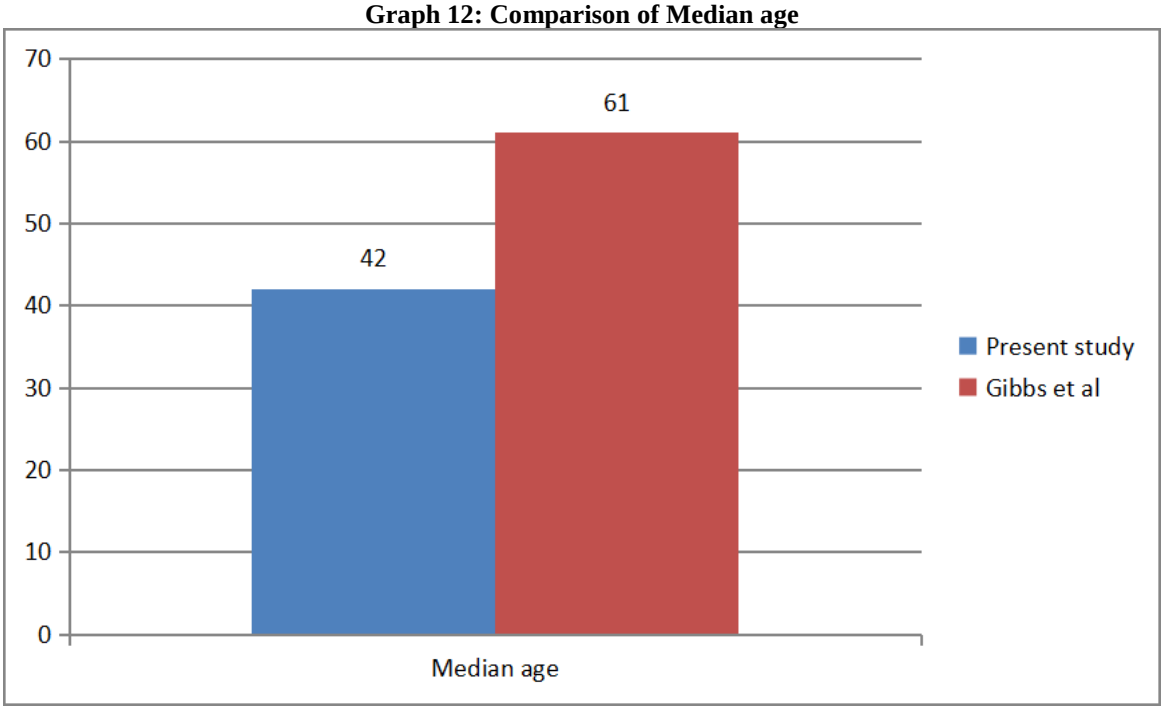
Graph 11: Sex distribution



Males constituted 82% (82) of the study population of the present study in comparison to 97.1% (52,642) of the study by Gibbs et al.

Table 12: Comparison of Median age

Graph 12: Comparison of Median age



The median age of the present study was 41.48(42) years and that of the study by Gibbs et al was 61years.

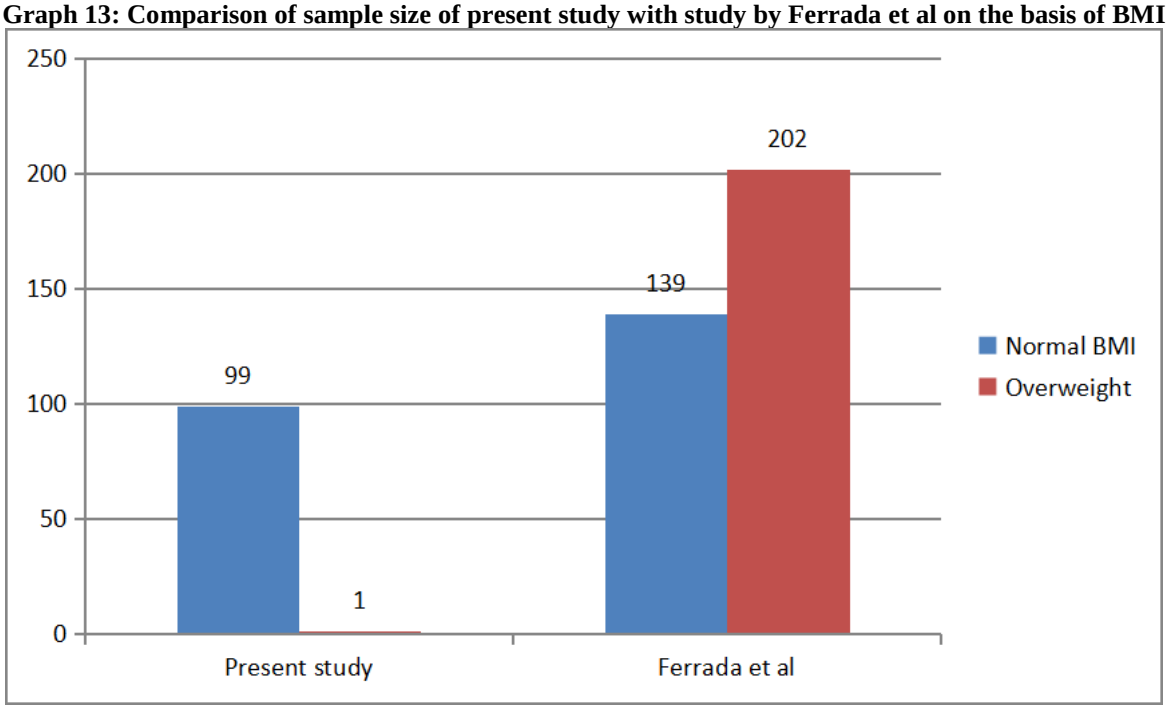
The present study has also been compared to a study conducted by Paula Ferrada et al[36] on **'Obesity Does Not Increase Mortality after Emergency Surgery'**. A total of 341 patients were included in their study who underwent emergency surgeries.

Table 13: Comparison of sample size of present study with study by Ferrada et al on the basis of BMI

	Normal + low BMI	**Overweight**	**Total**

Present study	99	1	100
Ferrada et al	139	202	341

Graph 13: Comparison of sample size of present study with study by Ferrada et al on the basis of BMI

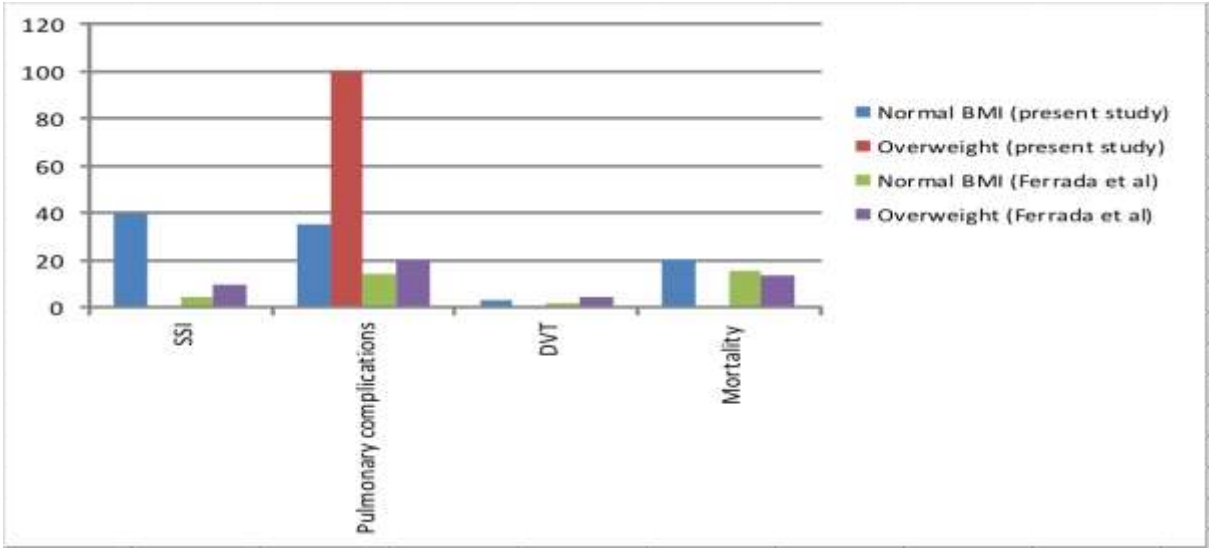


This graph represents the sample size in both study groups. Ferrada et al had highest patients in overweight group whereas present study had more patients in normal BMI group.

able 14: Comparison of selected complications based on BMI

	Normal BMI (present study)	**Overweight (present study)**	**Normal BMI (Ferrada et al)**	**Overweight (Ferrada et al)**
SSI	40.0	-	4.3	9.95
Pulmonary complications	35.29	100	14.4	20.3
DVT	3.5	-	2.2	4.5
Mortality	20.0		15.8	13.6

Graph 14: Comparison of selected complications based on BMI



This graph depicts the comparison of selected complications between the present study and the study conducted by Ferrada et al. The complication rates were noted to be higher in the present study. The relationship was statistically significant for wound infections in the case of study by Ferrada et al ($p < 0.05$) and similarly in present study too ($p = 0.006$)

Table 15: Significance of BMI levels in predicting postoperative outcomes.

Study name	BMI (kg/sq.m.) associated with increased complications	p value
Engelman et al	<20	0.0005
Mullen et al	<18.5	<0.005
Giles et al	<18.5	<0.05
Ferrada et al	>25	<0.05
Present study	<18.5	>0.05

The present study did not show any statistically significant difference when BMI was considered as a preoperative predictor of morbidity and mortality in emergency abdominal surgeries unlike other studies. This requires in detail study with a larger sample size.

V.Conclusion

Our study shows that an abnormal BMI was associated with more complications but was not statistically significant.

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