

Effect Of Body Mass Index On The Time Of Orthopedic Surgeries

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Abstract

Background: Obesity has a direct and indirect effect on surgery in general and orthopedic surgery in particular. It is no secret that orthopedic surgery has a direct relationship with BMI, so obesity is one of the factors that may have the most impact in terms of the time and recovery period. The purpose of the research that we are conducting right now is to investigate the impact that obesity has on the length of time needed for orthopedic surgeries.

Material and method: A case control study design for the period extended from 1st November 2021 to 2nd October 2022, a total 200 patients were selected from (Mosul General Hospital, Al-Salam Teaching Hospital, and Al-Jumhuri Teaching Hospital) by non-probability sampling at Mosul city in northern of Iraq. In order to conduct statistical data analysis, version 26 of the Statistical Package for Social Science (SPSS) was utilized.

Result: Obese patients exhibited a highly significant increase (at p-value 0.000) in the time of the three types of surgery (emergency, elective, and planned) when compared to non-obese patients.

Conclusion: Obesity has a clear effect on the time taken to perform orthopedic surgeries.

Key word: Effect, Body Mass Index, Orthopedic surgeries.

Introduction:

Obesity and overweight are well-known risk factors for medical co-morbidities include metabolic and cardiovascular illnesses, as well as a variety of malignancies. Orthopedic problems are common and account for a large portion of worldwide medical spending¹.

Obesity has been linked to worse surgical results in patients undergoing orthopedic surgery, including longer operative hours, a greater amount of blood loss during the operation, and an increased likelihood of requiring revision²⁻⁴.

Obesity's detrimental effects, such as increased morbidity and mortality after total joint arthroplasty, have been widely reported in the literature. However, it's unclear whether specific BMIs may be used as cut-offs to determine which individuals are more likely to have a bad postoperative outcome. We looked at how different levels of obesity, as defined by BMI, affected implant survival, Knee Society scores, complications, and radiological results⁵.

Objectives:

1. To identify the influence of body mass index on the time of orthopedic surgeries.

2. To find out the relationship between body mass index with age, gender, time of operation.

Material and the Methods:

A case-control study design for a period extended from 1st November 2021 to 2nd October 2022, a total of 100 obese and 100 non-obese orthopedic patients were selected according to the inclusion and exclusion criteria from the (Mosul General Hospital, Al-Salam Teaching Hospital, and Al-Jumhuri Teaching Hospital) by non-probability sampling at Mosul city in the north of Iraq. Inclusion criteria are as follows: Male and female obese and non-obese patients diagnosed with orthopedic problems. The exclusion criteria are underweight, overweight patients and pregnant woman diagnosed with orthopedic problems.

Agreement and accomplishment are from the Department of Training Center & Human Development / Nineveh Health Directorate, in order to access and collect data from patients' admission to the orthopedic wards. The researcher explained the objectives and procedures to the patients and then took consent from the patient prior to data collection. The patients have the right to quit from the study was guaranteed to all of them.

A questionnaire was constructed for research by reviewing previously published researchers related to the effect of obesity on orthopaedic surgery. The instruments of the study were a structured interviewing questionnaire, and is composed of (2) parts in which data were collected by personal interview, and included.

Information about demographic data which include: (Age, Gender, Occupation, Marital Status, Personal Habits).

(Weight, Height, Body Mass Index, Type of surgery and Information about the time taken to perform the operation).

By using SPSS version 26, the data was compiled and analyzed by using frequency, percentages, the mean, standard deviation, chi-square and t-tests. A cutoff of P values of 0.05 was used to figure out how important the statistical test was.

Results:

Table (1): Sociodemo-graphic characteristic of the study samples.

Variables		Obese		Non-obese	
		F	%	F	%
Age group	Less than 20years.	6	6.0	8	8.0
	21-30	20	20.0	19	19.0
	31-40	22	22.0	28	28.0
	41-50	18	18.0	13	13.0
	51-60	19	19.0	20	20.0
	61-70	15	15.0	12	12.0
Gender	Male	52	52.0	47	47.0
	Female	48	48.0	53	53.0
Occupation	Student	10	10.0	27	27.0
	Employed	13	13.0	9	9.0
	Unemployed	67	67.0	51	51.0
	Retired	10	10.0	13	13.0
Marital Status	Single	14	14.0	12	12.0
	Married	75	75.0	49	49.0
	Divorced	3	3.0	4	4.0
	Widow	8	8.0	35	35.0

Personal Habits	Smoker	50	50.0	42	42.0
	x-smoker	2	2.0	40	40.0
	No -Smoker	48	28.0	18	18.0

F= frequency, %=percentage, χ^2 =chi-square G. A=general anesthesia S.A. = spinal anesthesia L.A = local anesthesia E.A. = epidural anesthesia

characteristics are as shown in table (1). 200 patients were enrolled in the study, with 100 diagnosed as obese patients and 100 as normal patients. 101 Patients. was female, 99 Patients was male, the highest Percentage of Patients 25 %, fall in age group (31-40 years). most patients are unemployed (67%). (75) of them were married, some of them smokers (50%). The highest percentage of fracture types were compound (40%) and general anesthesia (88%) of general anesthesia. of them smoker (50%), the highest percentage of type of fracture were compound (40%) and (88%) of general anesthesia.

Table (2): standard deviation and mean of age, height, weight and body mass index.

Variables	Obese	Non-obese	t-test	P. Value
	$\bar{x} \pm SD$	$\bar{x} \pm SD$		
Age	38.10 \pm 12.30	37.20 \pm 13	0.503	0.615
Weight	103 \pm 9.70	66.70 \pm 6.10	31.735	0.000**
Height	164.50 \pm 6.0	169.50 \pm 6.20	-5.796	0.000**
BMI	39.80 \pm 5.30	23.20 \pm 0.90	30.637	0.000**

Note: \bar{x} : mean, SD: standard deviation, and BMI: body mass index.

Table (2) shows the mean and standard deviation of the weight of obese patients (103 9.70) and non-obese patients (66.70 6.10), and the height of obese patients (164.50 6.0) and non-obese patients (169.50 6.20), and the body mass index of obese patients (39.80 5.30) and body mass index of non-obese patients (23.20 0.90) at p-value (0.000**)

Table (3): Comparison the time of operation between obese and non-obese patients according to the type of surgery.

Variables		Obese		Non-obese		t-test	P. Value
		$\bar{x} \pm SD$	F	$\bar{x} \pm SD$	F		
Type of surgery	Emergency	71.20 \pm 5	30	51.0 \pm 1.40	27	5.604	0.000**
	Elective	100.90 \pm 10.60	35	54.25 \pm 8.60	33	23.193	0.000**
	Planned	113.60 \pm 19.70	35	84.0 \pm 20.20	40	6.400	0.000**

\bar{x} =mean, SD=standard deviation, F=frequency

The table (3) Shows that obesity has a highest impact on the time of Orthopedic Surgery at Significant level (0.000).

Table (4): The correlation between the body mass index with age and gender, as well as the time taken to perform orthopedic operations.

Variables	Body mass index	
	Pearson correlation (r)	P. Value
Age	0.659	0.000**
Gender	0.438	0.000**
Time for operation	0.461	0.000**

Table (4-9) shows that there is a significant correlation between the BMI and each of the age, gender, time taken to perform the surgical intervention and the time taken to recover the patient with a level of significance (0.000**).

Discussion:

Table (1) shows that most patients were in the age group (31-40 years), which is the highest percentage of patients who underwent orthopedic surgeries in Mosul city hospitals, because most of the injuries were the result of traffic accidents and this age group had active lifestyle.

In the United States, comparison research has been done. The age range for patients who underwent orthopedic surgery was (41-50 years) for non-obese patients and (21-30 years) for the majority of obese patients ⁶. Age was a strong predictor of shorter operating times, with patients 65 years or older needing just 32.75 minutes on average compared to patients under the age of 25 ⁷.

The study results shows that the percentage of female was less than male, as the percentage of female reached (40.5%) of the total sample.

There are studies that contradict the findings; for example, among the obese patients, (73.6) percent of the sample were female, compared to (26.4) percent of the male population ⁸.

Regarding occupation the highest percentage of patients were unemployed (67.0%) and this result confirm that most patients were workers so it explains the reason of orthopedic problems.

Numerous forms of fractures are confirmed to occur in a variety of vocations, according to research. Bone fractures are most frequently caused by the following mishaps: Slips and falls: One of the most frequent workplace mishaps, slips and falls frequently result in broken bones. Vehicle Mishaps: Workers in the delivery and transportation industries who are involved in mishaps may get shattered bones. Impacts of Falling Objects: Construction sites frequently experience the risk of falling objects. Bone fractures can be brought on by even relatively small things, such as a hammer. Breaking a bone at work can be caused by defective equipment or human error when it comes to large or swiftly moving gear ⁹.

The majority of the study sample's male participants are unemployed and work outdoors, whereas the majority of women in our culture are housewives with lower accident risks.

The finding of our results shows that the majority of obese patients are married, and their percentage was (75%) and (14%) of them were single, (8%) widowed, and (3%) divorced, while the percentage of married people in non-obese patients was (49%), the percentage of widows (35%), the percentage of singles (12%) and divorced women (3%).

A research with 389 patients who had primary THA and 193 who had primary TKA was conducted. Patients in the THA cohort were married in 66 percent of cases, while unmarried patients made up 34%. In the TKA cohort, there were 117 married patients (61%) and 117 unmarried individuals (39%) ¹⁰.

There is a correlation between the marital status and psychological support for patients, as well as the care provided to them and the commitment to take treatment, which helps to reduce the time of hospitalization and thus speeds up the healing process.

The result of study agreement with that smoking affect all body systems specifically cardiovascular and respiratory systems.

The information on smoking status and the risk of sudden cardiac death is being compiled for the first time in a meta-analysis. Current smokers had a threefold increased risk of sudden cardiac death, former smokers had a 38 percent relative risk increase, and smokers had a twofold increased risk when compared to individuals who did not smoke ¹¹.

In a study, 1202 individuals who underwent common orthopedic and neurosurgical procedures were included. A comprehensive extraction of medical record data was used to identify postoperative pulmonary problems. Smokers who were now smoking (22.0%), smokers who had previously smoked (12.8%), and never smokers (4.9%) all experienced postoperative pulmonary problems. For those who now smoke compared to those who have never smoked, the odds ratio (OR) was 5.5 (95 percent confidence interval [CI], 1.9 to 16.2) and 4.2, respectively (95 percent CI, 1.2 to 14.8) ¹².

The study findings shows that the mean weight for obese patients (103 ± 9.70) while for non-obese patients is (66.70 ± 6.10), also the mean of height for obese patients is (164.50 ± 6.0) and for non-obese patients is (169.50 ± 6.20), as for the body mass index, it was the deviation The norm and mean for obese patients is (39.80 ± 5.30) while non-obese patients is (23.20 ± 0.90) at significant level (0.000**).

The typical French person's weight climbed by 3.6 kg but their height only rose by 0.7 cm. The average BMI increased by 1.1 kg/m² in 15 years. In 2012, there were more obese women (15,7%) than men (14.3%)¹³.

Results of our study shows that the time of planned surgery was more than the time of other types of surgery in both obese and nonobese patients. And the operation time in all surgery types in obese patients were more than the operation time in nonobese patients' surgery. This result may be explained as great percentage of planned surgery are joint replacement so it takes more time than the other types like emergency and elective surgeries, by analyzing the data patients who have a body mass index of more than 30 kg / m² need a longer time for Orthopedic surgeries compared to patients with a body mass index ranging between 18.5 kg / m² and 24.9kg/m².

Orthopedic doctors face a huge hurdle as a result of the American study. Both elective and nonelective orthopedic operations have demonstrated that patients with obesity had longer recovery times and more problems, an analysis of patients treated between 2010 and 2018 at metropolitan level one trauma centers for isolated surgical stabilization of a peritrochanteric femur fracture. Time to surgery, operative time, total OR time, anesthetic time, and fluoroscopy time were all captured as operational timing variables. Treatment of peritrochanteric femur fractures in obese patients is linked with a considerably ($p = 0.002$) longer operating time. Obesity is associated with a significantly longer operative duration¹⁴ and these results agree with our results.

Numerous studies have supported our finding. There are 9,000 patients in the trial who receive ACLR. The overall readmission rate in the readmission analysis was 70%. A body mass index (BMI) of 40 or higher was found to be substantially linked with an elevated risk of 30-day readmission following multivariate analysis (odds ratio, 3.06; 95 percent confidence interval, 1.09-8.57). A lower risk of readmission was linked to operations lasting less 80 minutes (odds ratio, 0.40, 95 percent confidence interval, 0.18-0.92). The mean operative time in the operative-time analysis was 100.7 minutes. Following multivariate analysis, class II obesity (BMI of 35 to 39.9) and class III obesity (BMI 40) predicted increases of 7.11 and 8.70 minutes, respectively, in comparison to normal weight (BMI of 18.5-24.9)⁷

Conclusion: The of time required to execute orthopedic operations can be affected by obesity, as well as body mass index positively correlated with age, gender, and time of operation. Body mass index is positively correlated with age, gender, operation time.

Recommendations:

The need for constructing a specialized centers for treating obesity, with duties of research and studies, and offer programs, treatments, and instructions for patients, increasing health awareness to understand the risks of obesity and how to prevent it in order to reduce its impact on the body in general and orthopedic surgery in particular.

References

1. Farpour-Lambert, N.J., et al., Childhood obesity is a chronic disease demanding specific health care-a position statement from the Childhood Obesity Task Force (COTF) of the European Association for the Study of Obesity (EASO). *Obesity facts*, **2015**. 8(5): p. 342-349.
2. Jiang, G., J. Keller, and P.L. Bond, Determining the long-term effects of H₂S concentration, relative humidity and air temperature on concrete sewer corrosion. *Water research*, **2014**. 65: p. 157-169.
3. Hayfaa, A.A., A.S.A. Khulood, and H.A.Y. AlMashhadani. Study the Effect of Cyperus Rotundus Extracted as Mouthwash on the Corrosion of Dental Amalgam. in *IOP Conf. Series: Materials Science and Engineering*. 2019.
4. Al-Mashhadani, H.A., et al. Anti-Corrosive Substance as Green Inhibitor for Carbon Steel in Saline and Acidic Media. in *Journal of Physics: Conference Series*. 2021. IOP Publishing.
5. Chen, M.-C., Y.-C. Sun, and Y.-H. Chen, Electrically conductive nanofibers with highly oriented structures and their potential application in skeletal muscle tissue engineering. *Acta biomaterialia*, **2013**. 9(3): p. 5562-5572.
6. Ahmad, J., S.H. Ahmad, and K. Jones, Treatment of plantar fasciitis with botulinum toxin: a randomized, controlled study. *Foot & Ankle International*, **2017**. 38(1): p. 1-7.
7. Cooper, J.D., et al., The effect of obesity on operative times and 30-day readmissions after anterior cruciate ligament reconstruction. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*, **2019**. 35(1): p. 121-129.

8. King, T., et al., Food safety for food security: Relationship between global megatrends and developments in food safety. *Trends in Food Science & Technology*, **2017**. 68: p. 160-175.
9. Wedel, V.L. and A. Galloway, Broken bones: anthropological analysis of blunt force trauma. 2013: Charles C Thomas Publisher.
10. Singh, V., et al., Effect of Marital Status on Outcomes Following Total Joint Arthroplasty. *Arch Orthop Trauma Surg*, **2021**.
11. Aune, D., et al., Tobacco smoking and the risk of sudden cardiac death: a systematic review and meta-analysis of prospective studies. *Eur J Epidemiol*, **2018**. 33(6): p. 509-521.
12. Lugg, S.T., et al., Smoking and timing of cessation on postoperative pulmonary complications after curative-intent lung cancer surgery. *Journal of cardiothoracic surgery*, **2017**. 12(1): p. 1-8.
13. Parratte, S., S. Pesenti, and J.-N. Argenson, Obesity in orthopedics and trauma surgery. *Orthopaedics & Traumatology: Surgery & Research*, **2014**. 100(1): p. S91-S97.
14. La-Vu, M., et al., To approach or avoid: an introductory overview of the study of anxiety using rodent assays. *Frontiers in behavioral neuroscience*, **2020**. 14: p. 145.