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Correlation between body mass index and cardiac parameters in obese and non obese critically ill patients at Cairo university hospitals

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Abstract
Background : Obesity is associated with an increased risk of morbidity and mortality as well as reduced life expectancy . Association between Body Mass Index (BMI) and cardiovascular diseases has been consistently observed, but remain poorly understood possibly because of interactions with other influencing factors. One unresolved question is whether there is a linear relationship. The aim of the study was to investigate the correlation between BMI and cardiac parameters among obese and non obese critically ill patients at Cairo university hospitals. Methods: A descriptive exploratory research design was utilized in this study. a purposive sample of 115 male and 70 female obese patients with body Mass Index > 30 kg/m2 and also 98 male and 33 female non obese patients with body Mass Index of 18.50 – 24.99 kg/m2 were selected from three intensive care units which were; medical ICU , emergency ICU, and coronary ICU . Parameters such as heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure and pulse blood pressure were assessed. . Results: the mean ages of subjects were largely similar irrespective of sex (53-55 years).The study findings revealed that there is no significant correlation what so ever between cardiac parameters and body mass index in both obese and non obese males and females. In addition, there is positive correlation between age and body mass index among obese male(r=0.2, p=0.01). Moreover, there is significant statistical difference between non obese male and female as regards height, systolic pressure, and pulse pressure. However, the present study findings revealed increased frequencies of chronic diseases as hypertension, diabetes, coronary heart diseases and stroke among obese patients as compared to non obese patients. Conclusion: There is no correlation between body mass index and cardiac parameters among obese and non obese critically ill patients. Recommendation: More research is needed to evaluate the association between body mass index (BMI) and cardiovascular diseases on a large probability samples to ensure generalization of results.
Key Words: body mass index, cardiac parameters, obese and non obese.

1-Introduction

A number of clinical measurements for obesity have been used to determine susceptibility to cardiovascular diseases (Cameron et a l , 2 003). These include anthropometric indices such as body mass index (BMI), waist-hip ratio(WHR) and waist circumference (WC) (Bray and Gray , and Flier, 2005). Body Mass Index (BMI) is recognized as one of the most useful indices for obesity in adults. BMI is determined by dividing weight (wt) in kilograms by height (ht) in meters square. It is highly correlated with weight (0.8-0. 9) (Ahmed, 2007).

The relationship between excess weight and diseases has been recognized over time (Visscher and Seidell , 2001; Cameron et al , 2003). Obesity has been particularly recognized as a major independent risk factor for cardiovascular diseases (Despres, 2001), diabetes mellitus, hypertension and hypercholesterolemia (Gluckman 2004& Wilson 2002). This is because increased body fat is accompanied by profound changes in the physiological and metabolic functions of the body, which are directly dependent on the degree of excess weight and on its distribution around the body.

Cardiovascular diseases (CVDs) are one of the leading causes of death in both men and women in most Western countries (Padwal et al , 2001). From ages 35-60 years, the systolic and diastolic blood pressure increases at an average of 20/ 10 mmHg, however, the systolic blood pressure is the most consistent and significant risk factor for CVDs compared to the diastolic blood pressure. several studies showing the relationship of BMI and blood pressure to cardiovascular diseases have been carried out . However, there is a dearth of literature about the relationship between body mass index and cardiovascular parameters among critically ill patients in different age groups therefore this study was designed to investigate the relationship between body mass index and cardiac parameters among obese and non obese critically ill patients.

2. Material and Methods

2.1 Aim of the study

The aim of this study is to examine the relationship between body mass index and cardiovascular parameters among obese and non obese critically ill patients.

2.2 Research questions:

To fulfill the aim of this study the following research questions were formulated:

Q1: what is the difference between obese and non obese patients in relation to weight, height and body mass index?

Q2: what is the difference between obese and non obese patients in relation to cardiac parameters?

Q3: what is the nature of relation between body mass index and cardiac parameters among obese and non obese patients?

2.3 Subjects

A purposive sample of 115 male and 70 female obese patients with body Mass Index > 30 kg/m2 and also 98 male and 33 female non obese patients with body Mass Index of 18.50 – 24.99 kg/m2 were selected from three intensive care units regardless of their demographic characteristics which were; medical ICU , emergency ICU, and coronary ICU .

2.4. Research Design:

A descriptive exploratory design was utilized in the current study. Polit & Beck, (2006) mentioned that descriptive research provides an accurate account of characteristics of a particular individual, event or group in real-life situations. Exploratory research examines the relevant factors in detail to arrive at description of the reality of the existing situation.

2.5. Setting:

The study was conducted at three critical care units (medical, coronary and emergency critical care units) at Cairo university Hospitals in Egypt.

2.6. Tools:

Tool (1): patient's demographic data: it included age, sex and educational level

Tool (2): patient's anthropometric data: it included weight, height, and body mass index (BMI) was calculated as weight in kilograms divided by squared height in meter.

Tool (3): patient's cardiovascular parameters: they included systolic blood pressure, diastolic blood pressure, mean arterial pressure, pulse rate, and pulse pressure

Tool (4): patient's medical characteristics: they included chief complaint, present health history and past history

2.6. Content validity:

Content validity for the previously mentioned tools were revised through extensive literature review and ensured by five experts opinions in critical care medicine and critical care nursing. Accordingly, the researcher developed the final validated form of the tools.

2.7. Pilot study

A pilot study was carried out on 10 patients to ensure feasibility , and , and time needed for completing the revised tools. No further alterations were needed according to participants' responses in the pilot study. The subjects included in the pilot study were included in the study sample.

3-Procedure:

Once permission was granted to proceed with the current study from authoritative parties at Cairo university hospital, the researcher initiated data collection and contacted each patient to explain the purpose and nature of the study. The researcher emphasized that participation in the study is entirely voluntary in addition to the anonymity and the confidentiality of their responses were assured. Tool (1) pertinent to socio demographic data were obtained from patients including age, occupation, educational level and smoking status. After that, health history (tool 4) is collected from patient and medical chart. Later, cardiovascular parameters were obtained including first; blood pressure that was measured on left/right arm by auscultatory method using mercury sphygmomanometer at dorsal comfortable position in bed. After getting the systolic and diastolic readings, mean arterial blood pressure was calculated by doubling the diastolic blood pressure and added the sum to the systolic blood pressure, then divided by 3. Moreover, pulse pressure was calculated by calculating the difference between the systolic and diastolic blood pressure. Second, pulse rate was measured by palpation of radial pulse. Tool (3) pertinent to anthropometric measurements were obtained including measuring body weight initially on admission or reported by patients and the height was measured by flexible tape measure marked in centimeter with the patient lying flat in supine position and making a mark at the top of the head and the bottom of the feet on the blanket. Later, BMI was calculated as weight in kilograms divided by squared height in meter. Conventional BMI cutoff points were applied to classify the study populations into normal BMI (18.5≥BMI<25

kg/m 2) and obese (BMI> 30 kg/m2). The time for collecting data by these tools lasted from February to May, 2013.

4-Ethical consideration

Permission to conduct the study was obtained from the administrative authorities. All the patients were assured that participation in the study was voluntary. Verbal consent was obtained from patients who accepted to take part in the study. In order to maintain the confidentiality of the participants, the responses were collected anonymously, data were coded, and the name of the hospital from which data were collected was not being referred to in any published work.

5-Statistical analysis

SPSS–PC 20 was used for statistical analysis .Results were reported as means and standard deviation test was used to compare data .Bivariate correlations were used in order to evaluate the relationship between body mass index and cardiovascular parameters. Pearson correlation coefficient was calculated. A p value of less than 0.05 was considered statistically significant.

6- Results:

6.1. Table (1): Shows Subjects' age and gender distribution among obese and non obese. As can be seen from the table, there are seven age groups, from 20-29 years old , 30 -39 years, 40-49 years, 50-59 years , 60-69 years ,70-79 and finally from 80 -89 years old. Out of 316 critically ill patients, 67.4 % of patients were male and 32.6 % were female. The number of obese male (n=115) is more than obese female (n=70).Also the table showed the obesity is higher in age groups 50-59 and 60-69 than other age groups in both male and female .

6.2. Table (2): shows comparison of means of age, anthropometric measurements and cardiovascular parameter among obese and non obese patients in relation to gender. It is apparent from this table that there is only significant statistical difference between obese male and female regarding body mass index , as the body mass index of obese female patients is greater (33.45) when compared to obese male (32.08). In relation to comparison of these parameters among non obese male and female, it revealed that there is only significant statistical difference as regards height, systolic pressure and pulse pressure. So, the height of male is more than the height of female .Also, the systolic blood pressure and pulse pressure readings are greater in male than female.

6.3. Table (3): Shows Comparison of cardiac parameters between all obese and non- obese patients. It is apparent from the table there is only significant statistical difference between obese and non obese as regards heart rate (t=2.13;p=0.03) but not significant clinically as the average heart rate in none obese (88 b/m) is slightly greater than obese (84 b/m).

6.4.Table (4): Shows Correlation of Body Mass Index with age and cardiac parameters among obese and non obese male and female patients. It revealed that there is no correlation what so ever between body mass index and cardiac parameters and there is positive correlation between age and body mass index in obese male only (r= 0.2 .p=0.01).

6.5 .Table (5): presents Frequency distribution of medical characteristics among obese and non obese critically ill patient. it is apparent from the table that hypertension ,diabetes , coronary heart diseases , dysrhythmias, stroke and cerebral hemorrhage ,chronic obstructive pulmonary diseases and respiratory failure are more prevalent among obese male when compared to the non obese male. on the other hand , hypertension, diabetes , coronary heart diseases, stroke are more prevalent in obese female as compared to non obese female.

7-Discussion

This study assessed the correlation between body mass index and cardiacParameters among obese and non obese critically ill patients. The current study revealed increased mean body mass index in older ages in both male and female. The proportion of obese patients increased across age groups and peaked at 50–79 years among female (68.57%) and female (63.47%). Moreover the study revealed a positive correlation between age and body mass index among male patients (R= 0.2, P=0.01). The results of this study about increasing BMI with age is consistent with Ataei (2004) who studied 5 to 15 years old and adolescents and showed that BMI increases with age .

Also, these results in accordance with with Chathuranga & Prasanna (2013) who investigated relationship between Body mass index (BMI) and body fat percentage, estimated by impedance, in a group of Srilankan adults revealed regression line found to be curvilinear in nature at higher BMI values where females ($p < 0.0001$) having a better fit of the curve compared to males ($p < 0.05$). In both genders, with increase of age, BMI seemed to increase in curvilinear fashion. On the other hand , the results of the current study contradicted with Lumachi & Marzano (2010) who studied the relationship between body mass index, age and hypoxemia in patients with extremely severe obesity undergoing bariatric surgery and

revealed no relationship between BMI and age (R= -0.24, p =0.44).

Our study compared the anthropometric measurements and cardiovascular parameters among obese and non obese patients in relation to gender and revealed that there is only significant statistical difference between obese male and female regarding body mass index and systolic blood pressure. So the mean body mass index of obese female patients is greater (33.45 + 4.11) than obese male (32.08 + 2.81). The results of this study is consistent with Bakari (2006) who studied the correlation between body mass index and blood glucose levels among some nigerian undergraduates which involved 317 subjects and showed that BMI is significantly higher in females than in male .The current study results may be interpreted in the light of explanation by Jose &, Ana (2010) who mentioned that postmenopausal population BMI significantly increased with age as time since menopause and parity displaying significant correlations with hormonal and metabolic parameters notably the majority of obese female participated in the current study (71.42%) are over 50 years old .On the other hand , the findings are inconsistent with AIHW (2002) who reported that Men (67%) were more likely to be overweight or obese than women (52%). The proportion of overweight or obese people increased across age groups and peaked at 55–74 years for men (74%) and 65–74 years for women (71%).

In relation to the comparison of systolic blood pressure among obese and non obese male and female patients, the findings revealed that there is significant statistical difference between obese male and female, so systolic blood pressure is slightly higher in male than female. This finding is consistent with Alireza (2011), Bose (2005) & Burke (2004) that revealed the systolic reading was more significant in the males 21.5% vs. 3.5% in females with BMI over 25kg/m2 and In case of diastolic blood pressure, the differences were not meaningful . the current study findings are interpreted in the light of explanation done by Nwachukwu(2010), Paradis (2004), Babu(1998) &Taittonen (1996) who stated that the relationship between BMI and isolated systolic blood pressure may be attributed to conditions found in overweight individuals, including disorder in the autonomic (sympathetic) system, insulin resistance and high fasting insulin level.

The present study examined the comparison of cardiac parameters between all studied obese and non- Obese patients and revealed that there is no significant statistical difference among obese and non obese as regards systolic , diastolic , mean arterial pressure and pulse pressure parameters .The current findings are inconsistent with Arıkan & Güldiken (2004)) who studied the effects of body mass index on the cardiovascular risk factors in the Patients with essential hypertension and revealed that there were significant relationships between obesity and blood pressure, pulse pressure with BMI >30 kg / m2 . However the authors returned back their conclusion that much of their knowledge is based on correlations between body weight and various factors thought to increase BP and the basic physiological mechanism that link body weight and BP are not yet fully understood. While Mark et al (1999) suggested that the genetic-neurobiological mechanism of obesity may critically influence the effect of obesity on BP. In relation to comparison of heart rate among obese and non obese, the study findings revealed that the heart rate is slightly increased in non obese than obese patients . This finding contradicted with Shekharappa (2011) who revealed that there was a statistically significant increase in heart rate, systolic blood pressure and diastolic blood pressure in obese subjects when compared to non-obese in all age group and added that there was a positive correlation between body mass index and heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure and pulse blood pressure. correlation of body mass index with cardiac parameters among obese and non obese male and female patients were studied and revealed that there were no correlations what so ever between body mass index and cardiac Parameters (table 4). These findings are not agreed with Ravisankar (2005) who reported a positive correlation was observed between BMI and rate-pressures product in overweight females and their observations indicated that there are gender differences in the correlation between BMI and BP indices that may be due to differences in autonomic function and or energy metabolism.

Finally, our study examined the Frequency distribution of medical characteristics among obese and non obese critically ill patient and demonstrated that chronic diseases as hypertension ,diabetes , coronary heart diseases , dysrhythmias, stroke and cerebral hemorrhage ,chronic obstructive pulmonary diseases and respiratory failure are more prevalent among obese male when compared to the non obese male. On the other hand, hypertension, diabetes, coronary heart diseases, strokes are more prevalent in obese female as compared to non obese female. These findings are consistent with Bethesda (2004)& Ahmed (2007) who mentioned that the relationship between obesity and BP appears to be linear and exists throughout the non-obese range. But the strength of the association of obesity with hypertension varies among different racial and ethnic groups. Generally, risk estimates suggest that approximately 75 and 65 percent of the cases of hypertension in men and women, respectively, are directly attributable to an overweight condition and obesity.

This finding is supported and evidenced by Aneja (2004) who stated that obesity is a common problem in much of the western world today in that is linked directly with several disease processes, notably, hypertension.

It is becoming clear that the adipocyte is not merely an inert organ for storage of energy but that it also secretes a host of factors that interact with each other and may result in elevated blood pressure. Of particular importance is the putative role of leptin in the causation of hypertension via an activation of the sympathetic nervous system and a direct effect on the kidneys, resulting in increased sodium reabsorption leading to hypertension.

More over Liu (2013) & Jicy, (2009) added that More than 300 million adults are classified as obese and the global number is predicted to reach 700 million by 2015. In the past, obesity was not a common condition among the population of China; however, this is no longer the case. Obesity and diabetes have become a growing challenge, and one million new diabetic cases are reported in China every year. Increasing evidence suggests that obesity is a risk factor for diabetes and chronic kidney diseases. As a marker of obesity, high body mass index (BMI) has been reported to be related with diabetic nephropathy (DN) and end-stage renal disease (ESRD).

Much of the literature linking obesity to specific cardiovascular diseases (CVDs) focuses on coronary heart diseases (CHD). In 1998 the American Heart Association added obesity to its list of major risk factors for CHD (Eckel & Krauss 1998). Rao et al. (2001) examined the evidence supporting this addition. They concluded that the available evidence indicates that both a high BMI (defined in one study as a BMI > 29 among women) is independent risk factors for CHD and mortality irrespective of the presence of other coronary risk factors. There are numerous past studies supporting this conclusion (Harris et al. 1993; Manson et al. 1995; Rimm et al. 1995; Willett et al. 1995; Jousilahti et al. 1996; Rexrode et al. 1998; Field et al. 2001; Rashid et al.2003).

The present study finding revealed increased incidence of stroke among obese female as compared to obese male. This finding is agreed with Field et al. (2001) that mentioned that ischemic stroke was 75% in women aged 30–55 with higher body mass index > 27. While Rexrode et al. (1997) mentioned 137% higher in those with a BMI > 32, compared with women who had a BMI < 21.

7-Conclusion

The present paper studied the correlation between body mass index and cardiovascular parameters among obese and non obese critically ill patients and the findings concluded the following points; the mean body mass index is greater in obese male than obese female, body mass index is increased in higher age groups in both male and female, comparing anthropometric measurements among obese male and female revealed that there is only significant statistical difference between them as regards body mass index. While comparing anthropometric measurements among non obese male and female showed that there is only significant statistical difference between them as regards height. There is no significant statistical difference between obese male and female as regards cardiovascular parameters. While there is significant statistical difference among non obese male and female as regards systolic pressure and pulse pressure. Moreover, there is no correlation what so ever between cardiovascular parameters and body mass index in both obese and non obese male and female. Finally, the current study showed increased history of hypertension, coronary heart diseases, diabetes, dysrhthmias, stroke, cerebral hemorrhage and chronic obstructive pulmonary diseases among obese male and female as compared to non obese patients.

8-Recommendation

Further research is recommended to understand how genes and gene-environment interaction leads to obesity. A better understanding of ethnic/racial differences in the development and progression of obesity is needed. Research is needed on the impact of overweight/obesity on cardiovascular parameters on a larger probability of samples.

9-Limitations

A main weakness of our study is the relatively small number of participants, most patients' demographic data were not missed and the study limits our interpretation of further associations. Larger studies with better follow up are needed to confirm these observations.

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Table (1): Age and gender distribution of obese and non obese patients.(n=316).

Variable	Age group	gender		Total
		Male N (%)	Female N (%)	
obese	20 - 29	7 (6.08)	8(11.43)	15 (8.11)
	30 - 39	10(8.70)	5(7.16)	15 (8.11)
	40 - 49	15(13.04)	7(10)	22 (11.90)
	50 - 59	24(20.86)	20(28.58)	44 (23.78)
	60 - 69	28(24.35)	24(34.28)	52 (28.11)
	70 – 79	21(18.27)	4(5.71)	25 (13.51)
	80 – 89	10(8.70)	2(2.84)	12 (6.48)
Total obese		**115**	**70**	**185**
Non obese	20 - 29	30(30.62)	7(21)	37 (28.24)
	30 - 39	13(13.26)	3(9)	16 (12.22)
	40 - 49	9(9.18)	4(12)	13 (9.93)
	50 - 59	`12(12.24)	3(9)	15 (11.45)
	60 - 69	20(20.41)	12(37)	32 (24.43)
	70 – 79	11(11.23)	2(6)	13 (9.92)
	80 – 89	3(3.06)	2(6)	5 (3.81)
Total non obese		**98**	**33**	**131**

Table (2) comparison of means of age, anthropometric measurements and cardiovascular parameter among obese and non obese patients in relation to gender.

	Obese patients N=185			Non Obese patients N=131		
parameter	Male M (± SD)	Female M (±SD)	T value (p value)	Male M (±SD)	Female M (±SD)	T value (p value)
Age	56.98 (16.44)	55.25(14.92)	0.7 (n.s)	52.60 (20.76)	52.6 (20.76)	T=0 (n.s)
weight	84.59 (10.64)	87.72 (11.30)	1.89 (n.s)	67.89 (11.11)	64.15 (9.73)	1.72 (n.s)
height	1.623 (0.10)	1.625 (0.09)	0.1 (n.s)	1.71 (0.12)	1.66 (0.08)	2.22 (0.02) *
BMI	32.08 (2.81)	33.45 (4.11)	2.68 (0.001*)	22.78 (1.93)	23.12 (1.99)	0.86 (n.s)
Heart rate	83.50 (13.99)	87.02(16.96)	1.52 (n.s)	87.32 (17.14)	93 (17.04)	1.64 (n.s)
Systolic pressure	126.61 (23.15)	122.92 (22.12)	1.06 (n.s)	127.31 (21.74)	118.03 (22)	2.11 (0.03*)
Diastolic pressure	76.07 (18.66)	74.57 (13.15)	0.5 (n.s)	76.96 (18.66)	79.09 (13.37)	0.60 (n.s)
Pulse pressure	50.80 (17.54)	47.14 (14.48)	1.46 (n.s)	50.39 (17.77)	40.75(14.79)	2.80(0.005*)
Mean arterial pressure	93.09 (18.89)	90.14 (13.68)	1.13 (n.s)	93.7 (15.32)	92.67 (15.27)	0.33 (n.s)

Table 3: Comparison of cardiac parameters between overall obese and non-obese patients

Groups	HR beats/min		SBP (mm of Hg)		DBP (mm of Hg)		MAP (mm of Hg)		PP (mm of Hg)	
Non obese	range	M SD	range	M SD	range	M SD	range	M SD	range	M SD
BMI 18.50-24.99	55-136	88.75 ± 17.23	50-200	124.97 ± 22.10	40-140	77..50 ± 14.02	43-160	93.44 ±15.25	10-100	47.96 ±17.52
Obese BMI > 30	52-126	84.83 ± 15.23	70-210	125.22 ±22.78	35-160	75..5 ± 16.76	50-176	92.05 ±17.14	10-120	49.41 ±16.50
Mean difference	3.92		0.25		2		1.39		1.45	
t value	2.13		0.097		1.11		0.74		0.75	
Significance	0.033*		0.92 (ns)		0.26 (ns)		0.457 (ns)		0.453 (ns)	

Table (4)Correlation of Body Mass Index with age and cardiac parameters among obese and non obese male and female patients.

Items of correlates	Male				female			
	obese		Non obese		Obese		Non obese	
	R value	P value	R value	P value	R value	P value	R value	P value
BMI & age	0.2	0.01*	0.1	0.2 (ns)	0.03	0.7 (ns)	-0.01	0.4 (ns)
BMI &HR	-0.1	0.2 (ns)	-0.04	0.6 (ns)	0.09	0.4 (ns)	-0.04	0.8 (ns)
BMI &SBP	-0.07	0.4 (ns)	0.009	0.9 (ns)	0.002	0.9 (ns)	0.09	0.6 (ns)
BMI & DBP	-0.1	0.19(ns)	-0.01	0.9 (ns)	0.04	0.69(ns)	0.1	0.4 (ns)
BMI& MAP	-0.1	0.1(ns)	-0.035	0.7 (ns)	0.05	0.67(ns)	0.1	0.5 (ns)
BMI &PP	-0.02	0.7(ns)	-0.06	0.52	-0.02	0.87(ns)	-0.02	0.9 (ns)

Table (5): Frequency distribution of medical characteristics among obese and non obese critically ill patients (n=316)

Disease	Male		Female	
	N on obese N (%)	Obese N (%)	N on obese N (%0	Obese N(%)
Diabetes	19(19.38)	16 (13.91)	8 (24.24)	26(37.14)
Coronary Heart Disease	9 (9.18)	31 (26.95)	5 (15.15)	11(15.71)
Hypertension	26(26.53)	31 (26.95)	9 (27.27)	26 (37.14)
Rheumatic heart di sease	1 (1.02)	2 (1.73)	1 (3.03)	2 (2.85)
dysrhythmias	3 (3.06)	12 (10.43)	2 (6.06)	5 (7.14)
Heart failure	6 (6.12)	12 (10.43)	3(9.09)	4 (5.71)
anemia	1 (1.02)	0.000	0.000	2 (2.85)
stroke	9 (9.18)	10 (8.69)	2 (6.06)	13(18.57)
Cerebral hemorrhage	12 (12.24)	15(13.04)	2 (6.06)	1 (1.42)
dyslipidemia	1 (1.02)	2 (1.73)	1(3.03)	1 (1.42)
Hepatic coma	2 (2.04)	1 (0.86)	1(3.03)	0.000
Liver cirrhosis	3 (3.06)	5(4.34)	1(3.03)	1(1.42)
pneumonia	4 (4.08)	5(4.34)	1(3.03)	0.000
Respiratory failure	1 (1.02)	7(6.08)	1(3.03)	1(1.42)
Bronchial asthma	0.00	1 (0.86)	0.00	3 (4.28)
Pulmonary embolism	1(1.02)	2 (1.73)	1(3.03)	1(1.42)
Pulmonary odema	0.00	2 (1.73)	1(3.03)	2(2.85)
Chronic obstructive pulmonary disease	2(2.04)	9 (7.82)	0.000	0.000
Renal impairment	2 (2.04)	2 (1.73)	0.000	1(1.42)
Renal failure	3 (3.06)	8(6.95)	0.000	6 (8.57)
hypothyroidism	0.00	3(2.60)	0.000	1 (1.42)
DVT	0.00	1 (0.86)	1(3.03)	2(2.85)
Lower limb ischemia	0.00	2 (1.73)	0.000	0.000