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Correlation Of Obesity And Hypothyroidism Affecting Outcomes In Non-Bariatric Surgery.

MS Senthil Kumar[1]*, E Prabhu[2]*, P Paranthaman[3], and Santhaseelan[4].

[1]Assistant Professor, Department Of Endocrine Surgery, Madras Medical College& Rajiv Gandhi Government General Hospital, Chennai, Tamil Nadu, India.
[2]Assistant Professor, Department Of Nuclear Medicine, Tamilnadu Multi Super Speciality Hospital, Chennai, Tamil Nadu, India.
[3]Former Professor, Department of Internal Medicine.Kilpauk Medical College & Government Royapettah Hospital, Chennai, Tamil Nadu, India.
[4]Former Professor, Department Of Surgery, Kilpauk Medical College& Government Royapettah Hospital ,Chennai, Tamil nadu, India , Chennai, Tamil Nadu, India.

ABSTRACT

Obesity is a risk factor for many diseases, such as diabetes mellitus, hypertension, stroke, and heart and renal disease. Despite this relationship, obese people with these diseases live longer than their normal-weight counterparts. This conundrum has been called the "obesity paradox. This study sets out to analyze the prevalence of hypothyroidism in Obesity patients and attempts to explore whether there is any correlation. To describe the relationship between body mass index (BMI) with postoperative complications. To study the prevalence of hypothyroidism as a factor influencing obesity and wound healing. A multi-institutional prospective study was conducted in Tertiary care hospitals, a risk-adjusted cohort study of 1064 patients undergoing Non-Bariatric general surgery at Madras Medical College, Chennai. The data relating to the impact of obesity on postoperative morbidity and mortality are contradictory. Mean LDL concentration among cases was 154 ± 39.2(mg/dl) as the control group had a mean LDL concentration of 95.56 ± 34.2(mg/dl), which was statistically significant (p-value < 0.05). Wound infection percentage was 3.38 percent and 8.48 percent respectively in both groups. Wound infection percentage was 3.38 percent and 8.48 percent respectively in both groups. In contrast, underweight patients were at increased risk for morbidity score rate.

Keywords: Obese, Phenotypically Obese-Metabolically Normal, Phenotypically Normal, and Metabolically Obese.

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Corresponding author

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INTRODUCTION

Obesity and hypothyroidism are two common clinical conditions that have been linked together closely. The link has become more relevant in the context of an unprecedented rise in the prevalence of obesity worldwide [1]. Obesity is generally regarded by patients as being secondary to thyroid dysfunction. The current view indicates that changes in thyroid-stimulating hormone (TSH) could well be secondary to obesity [2]. Recent data have also disclosed a relationship between obesity and thyroid autoimmunity with the adipocyte hormone leptin appearing to be the key factor linking these two conditions [3]. In this article, we will review the intriguing relationship between obesity and hypothyroidism and the consequent clinical implications [4]. Hypothyroidism is associated with decreased thermogenesis, and decreased metabolic rate, and has also been shown to correlate with a higher body mass index (BMI) and a higher prevalence of obesity [5]. There is clinical evidence suggesting that even mild thyroid dysfunction in the form of subclinical hypothyroidism is linked to significant changes in body weight and represents a risk factor for overweight and obesity; however, this remains a grey area [6]. It has been further noted that small variations in serum TSH caused by minimal changes in L-T4 dosage during replacement therapy are associated with significantly altered weight gain in hypothyroid patients. However, there is a paucity of data regarding the actual extent of weight gain and weight loss with L-T4 treatment in hypothyroidism [7]. TSH levels are at the upper limit of the normal range or slightly increased in obese children, adolescents, and adults and are positively correlated with BMI. Low fT4 with a moderate increase in T3 or free T3 (fT3) levels have been reported in obese subjects [8]. Progressive fat accumulation was associated with a parallel increase in TSH, and fT3 levels irrespective of insulin sensitivity and metabolic parameters, and a positive association has been reported between the fT3 to fT4 ratio and both waist circumference and BMI in obese patients [9]. Although the typical picture of high TSH, low fT4, and high fT3 is the most common, various studies on adult obese individuals report thyroid hormone and TSH concentrations as normal, elevated, or reduced. In obese children, the most common abnormality is hyperthyrotropinemia [10]. Recently, it has also been shown that obese pediatric patients frequently have an ultrasound pattern of the thyroid which is highly suggestive of Hashimoto's thyroiditis. High levels of leptin, found in obese subjects, is another potential cause. The main action of leptin is to report centrally the amount of fat, leading to a decrease in appetite and food intake. Leptin has also been shown to stimulate centrally the transcription of pro-thyrotropin-releasing hormone (TRH) and consequently also that of TRH and TSH [11]. Leptin also enhances the activity of deiodinases. Further explanation is that inflammatory cytokines secreted from adipose tissue such as tumor necrosis factor-alpha, interleukin (IL)-1, and IL-6, inhibit sodium iodine symporter mRNA expression and iodine uptake activity [12].

METHODS

A prospective multi-institutional study was conducted in a Tertiary care hospital, a risk-adjusted cohort study of 1064 patients undergoing Non-Bariatric general surgery at Madras Medical College, Chennai. The association of risk factors for surgery such as hypertension and hypercholesterolemia with obesity as well as sometimes subjective-intra- and postoperative difficulties in obese patients most likely contribute to these perceptions. The data relating to the impact of obesity on postoperative morbidity and mortality are contradictory: many studies showed no significant correlation between increased BMI and mortality other studies obesity was associated with postoperative infection. We set out to define overweight and obesity precisely and to explore the possibility of a relationship between elevated TSH titers in increased BMI, The setting was an urban teaching hospital. A preoperative history, physical, electrocardiogram (ECG), and chart review were performed. Preoperative thyroid function tests, lipid profile, and other parameters for assessment under General anaesthesia which were carried out were scrutinized and plotted with variables and categorized according to BMI by a senior faculty from the Department of Internal Medicine and Anaesthesiology. Postoperative complications were detected by wound infection rate and morbidity score obtained from the hospital's computerized database uploaded systematically by Insurance personnel as a mandatory measure. Patients were followed up for 18 months for morbidity scores.

Statistical Analysis

Outcomes and risk variables were compared using ANOVA-analysis of variance, Bonferroni multiple comparisons of means tests, and multivariable. Logistic regression. Further, the patients were divided into 4 groups each with an increase in BMI as a categorical variable. The calculations of odds

ratios (ORs) for re-intubation, infection, re-exploration, and prolonged stay (>4 days) were adjusted for age, gender, and type of surgery.

RESULTS

The index cases were 1064 Female patients of 28 years or older(mean age 36 (+/_)7 undergoing elective Non-Bariatric surgery with an expected length of stay ≥2 days. They were enrolled in a prospective study to measure major post-complications, wound infection, length of stay, and morbidity score.

Table 1: Wound Infection Percentage.

Composite risk index	Number of index cases n=1064	Number of wound infections	Percentage of wound infections
0	414	14	3.38
1	412	35	8.49
2	202	54	26.73
3	36	23	63.88

Table 1 shows Phenotypically obese metabolically normal women were at lower risk for hypothyroidism at 3.64(+/-)3.6 and obese patients at increased risk at 22.14(+/-) 9. The Low BMI group had a TSH of 2.63(+/-)1.36 which was almost always near normal. (95% confidence interval [CI], 0.82-0.94, and 95% CI, 0.74-0.89, respectively), compared with patients at Low Normal weight but metabolically active. Wound infection percentage was 3.38 percent and 8.48 percent respectively in both groups. After multivariable adjustment. In contrast, underweight patients were at increased risk for morbidity score rate (95% CI, 0.92-1.56).

Table 2: Analysis Of Variation-Anova Among High-BMI Group, Low-BMI Group, And Controls.

Parameter	High BMI	Low-BMI	Control	p-value
T3	1.26(+/-)0 36(	1.17(+/-)0.35	0.98(+/-)0.34	<.05
T4	6.27(+/-)2.2	8.48(+/-)1.54	8.96(+/-)3.2	<0.001
TSH	22.14(+/-)9	2.63(+/-)1.36	3-64(+/-)3.6	<0.001
Total Cholesterol	231.8(+/-)38.6	136(+/-)22.6	163(+/-)31.4	<0.001
LDL	154(+/-)39.2	81(+/-)14.2	95.56(+/-)34.2	<0.001
Age	45.43(+/-)12.5	43.52(+/-)12	44.2(+/-)12	<.05

Table 2 High BMI cases of 414 were studied. Two cases dropped out in the subsequent 18 months of follow-up and their details of follow-up could not be relied upon and hence were deleted from the list of 414 to make it 412 index cases in one group. The mean age of both the study groups was 36 (+/-)7. All the patients in the cases studied were females of which the majority were married with children and constituted 86 %. In the present study, the duration of illness ranged from 2-6 years with the majority belonging to the 2-4 years range. In our study, overweight was the major risk factor. A separate group with normal BMI was analyzed with comparative variables. Phenotypically obese metabolically normal women were at lower risk for hypothyroidism 3.64(+/-)3.6 and obese patients at increased risk 22.14(+/-)9. The Low BMI group had a TSH of 2.63(+/-)1.36 which was almost always near normal. (95% confidence interval [CI], 0.82-0.94, and 95% CI, 0.74-0.89, respectively), compared with patients at Low Normal weight but metabolically active. Mean LDL concentration among cases was 154 ± 39.2(mg/dl) as the control group had a mean LDL concentration of 95.56 ± 34.2(mg/dl), which was statistically significant (p-value < 0.05).

DISCUSSION

Obesity, energy regulation, and thyroid function. Controversy exists as to whether borderline elevated TSH-level itself is the cause or results as a secondary phenomenon of obesity [13]. Thyroid function in humans with morbid obesity depends on the thyroid hormones stimulate the utilization of the lipid substrates, owing to increased mobilization of the triglycerides which are stored in the adipose tissue [14. Hypothyroidism is associated with dyslipidemia, thus contributing to the development of atherosclerosis. Its signs and symptoms are reversible on treatment with levothyroxine. T3 is formed from

T4 by peripheral deiodination in tissues outside the thyroid gland, particularly the liver, kidney, and skeletal muscle. Only a fraction of T3 gets diffused outside the cell. Thus, the T3 levels may be low despite the replacement therapy [15]. Thyroid dysfunction is relatively a common disease that affects people, irrespective of their age and gender. Hypothyroidism is a clinical syndrome that is caused due to the deficiency of thyroid hormones, resulting in a generalized slowing down of the metabolic process [16]. The incidence of hypothyroidism varies, depending on geographical and environmental factors such as dietary iodide, goitrogen intake, the genetic characteristic of the population and the age distribution of the population. After childbirth, about 5 % of women may suffer from a condition called postpartum thyroiditis, which primarily starts as hyperthyroidism and progresses to a hypothyroid state [17]. The most widespread cause of hypothyroidism is the presence of an often-hereditary condition known as Hashimoto's thyroiditis. First discovered by Japanese physicist Hakaru Hashimoto, in 1912 when he observed that the body in this condition has a deficiency in making thyroid hormones [18]. This is an auto-immune disease wherein the body's antibodies attack the thyroid tissue. Given the genetic nature of this condition, Hashimoto's thyroiditis can run in entire families. Women are observed to be more susceptible to this than men. Another cause for hypothyroidism is a sporadic inheritance [19]. We hypothesized that a more precise division of patients concerning BMI would identify patients with optimal BMI and BMI at risk for adverse outcomes (wound infection and morbidity score). Patients with BMI between 29 and 35kg/m^2 were not at elevated risk for any of the investigated endpoints, except for infection [20]. Almost all obese patients had dyslipidemia. Further, the underweight patients presented significantly more comorbidity. Overweight (odds ratio, 0.85; 95% CI, 0.75-0.99) and moderately obese (Odds Ratio, 0.73; 95% CI, 0.57-0.94) patients had a significantly smaller risk of Wound infection than underweight patients [21]. Wound infection was diagnosed if any one of the following criteria were fulfilled: serous or non-purulent discharge from the wound, pus discharge from the wound, serious or non-purulent discharge from the wound with signs of inflammation (edema, redness, warmth, raised local temperature, fever > 38°C, tenderness, induration) and wound deliberately opened up by the surgeon due to localized collection (serious/purulent). Stitch abscesses were excluded from this study [22-25].

CONCLUSIONS

The overweight and obese did not significantly pose an increased risk of developing an infection. This was attributed to nutritional status and social background. The underweight patients presented significantly more comorbidity. Apart from the prevalence of obesity/overweight/normal weight/underweight according to WHO definitions, the phenotypically obese but metabolically normal category exists among south Indian women and phenotypically normal but metabolic obese patients which is an interesting result of the study. Phenotypically obese metabolically normal women were at lower risk for hypothyroidism 3. The Low BMI group had a TSH of 2.63(+/-)1.36 which was almost always near normal compared with patients at Low Normal weight but metabolically active. Wound infection percentage was 3.38 percent and 8.48 percent respectively in both groups. In contrast, underweight patients were at increased risk for morbidity score rate Understanding the mechanisms and impact of the "obesity paradox" in inpatients who underwent surgery needs a more detailed analysis.

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