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IMPACT OF BODY MASS INDEX ON GLYCEMIC CONTROL AND THYROID FUNCTION

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Abstract

Background: Diabetes mellitus and thyroid dysfunction are both endocrine dysfunction, both of the complementing each other in one way or another with increase in BMI affecting them both.[1]

Objective: To assess the effect of BMI on glycemic control and thyroid function

Materials And Methods: This cross sectional study was conducted at almost all the major tertiary care hospitals of Peshawar from January 2017 to April 2017. This was preceded by fulfilling the ethical dilemmas in the form of approval from ethical board of Khyber Medical University Peshawar and obtaining institutional consent**.** A total of 358 individualswere taken using non probability consecutive sampling. 179 of them were type 2 Diabetics and 179 were healthy non diabetic subjects and then comparison was made between two groups to see the correlation between them in terms of thyroid dysfunction and glycemic control. Mean and SD were applied for quantitative variables and frequency and percentages were applied for qualitative ones. Pearson correlation was used to see effect of BMI on glycaemic control and thyroid function and their mutual correlation with a p value of 0.05 or less as significant.

Results: The mean age of cases and controls was 54.35 ± 9.38 years and 42.66 ± 9.20 years; on comparing their median (as data was not normal) we found higher median age of cases when cases and controls were compared, p-value < 0.0001.p-value = 0.002
In cases there were 6(3.4%) underweight, 90(50.3%) had normal weight, 51(28.5%) were overweight and 32(17.9%) cases were obese. There was significant correlation BMI and TFTS and HBA1c as reflected by a p value of 0.02 .

Conclusion: Increase in BMI had a significant impact on both HBA1C and thyroid function tests which emphasizes the need for screening such patients.

Keywords: Diabetes, Bmi

INTRODUCTION:

Obesity is a global health problem affecting billion of population world wide. It has a huge impact on health and strained the health systems of different countries .This is true as obesity by itself is a root cause for many complications like diabetes mellitus, hypertension, hypercholesterolemia, ischemic heart disease, stroke and even modernized diseases such as non alcoholic fatty liver disease which is in fact a prerequisite for end stage liver disease.[2]

Diabetes mellitus has been the lynchpin for most of the chronic diseases such as chronic kidney disease, diabetic nephropathy, atherosclerosis and impairment of nerves function. Its symptoms are masked for years before patients starts to have frequency of micturation, drastic weight loss and sometimes pins and needles sensation along with puffiness of eyes which are more common in advanced diabetes.[3] Its quite rare to get tested for diabetes before patients starts to have symptoms and that's the reason that the prevalence of diabetes in our country is quite alarming with poor screening and reluctance of the people to get tested being the major culprits .[4]This along with the poor socioeconomic status have added to the misery of common men.[5]

Thyroid dysfunction in addition to be caused by known factors like graves' disease, thyroid adenoma, thyroid carcinoma, lithium, autoimmune thyroiditis, hashimoto's thyroiditis and diabetes mellitus have a strong link with BMI .[6] It has been noticed that obesity has led to derangement of thyroid function, not to forget that hypothyroidism itself can lead to weight gain despite of having a low or normal appetite which sometimes mask the underlying diagnosis .[7]

Since it is an established fact that increase or decrease in BMI can lead to variety of diseases and there is a large population of Pakistan having increased weight or are overweight, it will be imperative to see the correlation between BMI and thyroid function as well as glycemic control.[8]

MATERIALS AND METHODS:

This cross sectional study was conducted at almost all the major hospitals of Peshawar and did involve patients presenting to medical and endocrinology departments of tertiary care hospitals of Peshawar. This was preceded by ethical approval from advanced study and research board of Khyber Medical University Peshawar. Institutional consent was obtained from the heads of the institutions. Anthropometric measurements were taken (height, weight, BMI) . The sample size of 358 (314 plus estimated drop out of 44) patients is estimated by using 95% confidence level, 5% margin of error with expected %age of thyroid dysfunction among type 2 diabetics as 28.5%.[7] (179 patients of type II diabetes and 179 controls) were included. For laboratory investigations(glycosylated Hb and thyroid profile),5ml blood sample was taken .Serum T3, T4, TSH were performed by ELISA method HBA1C was estimated as marker of 3 months glycaemia control .All information was entered in especially designed proforma. Te data was analyzed by SPSS latest version Quantitative variables like age, height, weight,BMI,duration of diabetes , serum thyroid function tests Hba1C were presented as mean ± S.D. While Qualitative variables like gender, hypothyroidism, hyperthyroidism was presented as frequency and percentages. P- Value less than or equal to0.05 were taken significant. Pearson rank correlation was applied to see the correlation between BMI, and TFTS and glycaemia control

RESULTS:

The mean age of cases and controls was 54.35 ± 9.38 years and 42.66 ± 9.20 years; on comparing their median (as data was not normal) we found higher median age of cases when cases and controls were compared, p-value < 0.0001. p-value = 0.002 .The mean BMI together in cases and controls was 25.73 ± 5.34 and 23.60 ± 5 respectively. The median weight and height was significantly lesser in cases while the mean BMI was greater in cases than controls, p-value < 0.05

In cases there were 6(3.4%) underweight, 90(50.3%) had normal weight, 51(28.5%) were overweight and 32(17.9%) cases were obese. In controls there 21(11.7%) underweight, 102(57%) had normal

weight, 39(21.8%) were overweight and 17(9.5%) were obese. The BMI status was significantly different in both study groups, p-value = 0.002.

Comparison of T3, T4, TSH and Glycosylated Hb in both study groups

	Study group	Mean ± S.D	Median ± IQR	p-value
T3	**Cases (n=179)**	2.32±5.02	1.11±0.49	<0.0001
	Control (n=179)	1.07±0.44	1.01±0.2	
T4	**Cases (n=179)**	9.24±3.98	8.63±3.94	<0.0001
	Control (n=179)	7.01±1.59	6.8±1.4	
TSH	**Cases (n=179)**	1.24±1.48	0.900±1.19	<0.0001
	Control (n=179)	2.33±1.02	2.3±1.23	
Glycosylated Hb	**Cases (n=179)**	6.44±2.81	6±3.7	<0.0001
	Control (n=179)	5.28±2.87	4±0.9	

The mean T3 in cases and controls was 2.32 ± 5.02 and 1.07 ± 0.44, the mean T4 in cases and controls was 9.24 ± 3.98 and 7.01 ± 1.59, the mean TSH in cases and controls was 1.24 ± 1.48 and 2.33 ± 1.02 respectively. The median T3 and T4 was significantly higher in cases and median TSH was sufficiently lower in cases when compared to controls, p-value < 0.0001. The mean Glycosylated Hb was in cases and controls was 6.44 ± 2.81 and 5.28 ± 2.87 respectively with significantly higher levels in cases compared to controls, p-value < 0.0001.

DISCUSSIONS:

Our study results did show there is significant correlation between increase in BMI in cases and thyroid function tests as well as HBA1c.[9] This is quite important as obesity is an important component of metabolic syndrome and this can provide a road map to explore the correlation between components of metabolic syndrome and chronic diseases like diabetes and thyroid abnormalities.[10] A Similar study done by Soumaya in 2p13 who recruited 108 patients in total and all of them gas their thyroid function tests, blood glucose level and body weight estimated did find that there were rapid derangement of T3 and T 4 as well as blood sugar level in overweight individuals as reflected by a p value of less than 0.05.But these results may have been affected by metformin treatment which is known fluctuate weight and thyroid dysfunction and that was one of the limitations.[11]

One of the very recent studies published in reputable journals for assessing the impact of sleeve gastrectomy on thyroid function in Egyptian with obesity .The study did include 106 patients showed a significant improvement in thyroid profile of enrolled patients as reflected by 12 months HBA1c (p <0.001) being highly significant and 12 month LDL (p=0.049) ,both of being significant marker for thyroid function.[12] The improvement was in turn affected by the amount of weight loss after surgery Another study to find the association between high normal ASH and obesity in women showed a positive correlation between TSH and BMI in women and positive autoimmune thyroid auto antibodies .[13]

So it is an established fact that increase or decrease in BMI can leaf to variety of diseases and there is a large population of Pakistan having increased weight or are overweight , it will be imperative to see the correlation between BMI and thyroid function as well as glycaemic control in future studies as well.[14]

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