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Impact of Hypothyroidism and Lipid Profile on Obesity

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Abstract

Aims of the Study: The current study aims to determine association of obesity with hypothyroidism, lipid profile and thyroid hormones.

Methods and Materials: Total of 150 samples was collected from obese participants of > 30 BMI. For thyroid profile samples were run on (cobas e411) principle of the Electrogenerated chemiluminescence (ECL) and lipid profile on COBAS c311 on the principle of photometric assays and ion-selective electrode measurements and uses serum/plasma.

Results: Among study participant 104 (69.3%) were females and 46 (30.7%) were males. The higher prevalence of obesity in female is the indicative risk. Result of chi square test predict; obesity and hypothyroidism P value 0.817, obesity and triglyceride 0.144, obesity and HDL 0.565, obesity and cholesterol 0.204 and obesity and LDL 0.004.

Conclusion: Crystal significant association between obesity and LDL was founded (P-value ≥0.005). No association was observed for other study variables.

Keywords: Obesity; Hypothyroidism; TSH; LDL; HDL; TG; Cholesterol

Introduction

Obesity is one of the most salient healths Risk of all time. The prevalence of obesity has increased worldwide since the mid-1970s. According to the report of National Health and Nutrition Examination Survey, obesity affected 32.2% of adults in 2003–2004. Obesity is associated with an increased risk of diabetes, dyslipidemia, kidney disease, cardiovascular disease, all-cause mortality, and cancer [1,2].

A BMI of at least 30 is currently generally acknowledged as obesity. Overweight denotes the presence of extra body weight. Obesity denotes the presence of extra deposited fats. Every single obese individual is overweight; however, all overweight people are not obese as overabundant body weight may emerge from muscles [3]. The mechanisms regulating body weight are complex, stimulated by various factors: physiological, societal, environmental, genetic and behavioral. None of those is understood at the individual degree, dietary, metabolic, hormonal and neuronal alerts are incorporated inside the brain to produce modifications in behavior (eating, physical activity) and body metabolism [4-7].

Obesity, particularly central obesity, is related to many endocrine abnormalities, such as thyroid disorder [8].

Thyroid disorder is associated with modifications in body weight and composition, body temperature, and total resting energy expenditure independently of physical hobby. Both subclinical and overt hypothyroidism are often related to weight gain [9,10].

Hypothyroidism is associated with reduced thermogenesis, decreased metabolic rate, and has additionally been shown to correlate with a higher body mass index (BMI). There is medical evidence suggesting that even slight thyroid disorder is linked to considerable modifications in body weight and represents a hazardous aspect for overweight and obesity [11]. An Indian study having sample size of 450 showed that among the obese, 33% had overt, and 11% had subclinical hypothyroidism [12,13].

Fat cells active endocrine organs because they produce leptin. The correlation among TSH and BMI might be mediated through leptin. Energy homeostasis is regulated by leptin through informing the brain about fat reserves.

Leptin is likewise a crucial neuroendocrine regulator of the hypothalamic-pituitary-thyroid axis through regulation of TRH gene expression within the paraventricular nucleus, and TSH in turn will stimulate leptin secretion through human adipose tissue. Leptin additionally influences thyroid deiodinase activities with activation of T4 to T3 [14].

Extreme obesity is related to thyroid disorder because of HPTA anomaly inflicting elevated TSH. Body weight and serum TSH are linked by signals from adipose tissues. TRH is immediately released in the paraventricular nucleus of neurons by stimulation of leptin produced by adipose tissues thus increasing TSH level [15]. The negative feedback among TSH and TRH is decreased in obesity due to reduced T3 receptors [16-18].

Thyroid hormones drastically affects lipoprotein metabolism and risk factors of CVD, thus enhancing overall CVD risk [19,20]. Even with the slight increase in TSH levels a linear increase in Cholesterol, LDL, TG, and decrease in HDL have been observed [21].

The literature is still deficient that either a correlation exits among hypothyroidism and obesity. Further, there is clear study conducted yet to find association between lipid profile and thyroid hormones in obese patients. Therefore, this study is conducted to determine the association of obesity with hypothyroidism and lipid profile.

Materials and Methods

Study design and Study sites

Cross-sectional Analytical study was conducted in khyber medical university Peshawar. A total of 150 patients with >30BMI and no CVD were included in the study. The Study was carried out in Multi Healthcare center (Lady Reading Hospital, Khyber Teaching Hospital and Hayatabad Medical Complex) in Peshawar.

The study was approved from the institutional review board of Institute of Paramedical Sciences, Khyber Medical University.

Sampling Technique and procedure

Blood samples were collected in a yellow top Gel Tube (Clot activator) from B.D Company from the patients of multi health care centers Peshawar through convenient sampling. The samples were labeled with Medical record numbers of concern hospitals. Serum Samples of thyroid profile were run on COBAS e411 of Electro generated chemiluminescence (ECL) principal

and for lipid profile samples were run on the COBAS c311 of photometric assays and ion-selective electrode measurements principle and uses serum/plasma.

The data was analyzed using SPSS. For descriptive statistics cross tabulation was done between different variables and for inferential statistics Chi-square test was performed.

Results

150 Obese participants were screened for our key variables i.e thyroid profile & lipid profile. These result show the high number of female obese participant which may be due to their home life style of that particular regions.

Age and GENDER wise distribution of Participants

150 patients having 104 (69.3%) females and 46 (30.7%) males. The most prevalent age group is 31-41years.which need further assessment. Age groups 10-20 years were the more prevalent group among obese study participants.

Following Table 1 and Figure 1 shows the frequency and percentage of the said variables.

Following Table 1 and Figure 2 shows the frequency and percentage of said variables.

Weight wise distribution

71-80 kg was observed among 41 (27.3%) study subjects. The lowest Wight of obesity is 60-70 which indicate alternative reason that small height participant have low chance of obesity. Following Table 1 and Figure 3 shows the frequency and percentage of said variables.

Obese class distribution

Obese class 1 is the main obesity found in our study 136 (90.7%) while other classes of obesity have low prevalence (Table 1 and Figure 4).

Variables	*Frequency (%)*
Age	
10-20	31 (20.7%)
21-30	20 (13.3%)
31-40	38 (25.3%)
41-50	27 (18.0%)
51-60	19 (12.7%)
61-70	12 (8.0%)
71-80	2 (1.3%)
81-90	1 (0.7%)
Sex	
Male	46 (30.7%)
Female	104 (69.3%)
Weight	
60-70	6 (4%)
71-80	41 (27.3%)
81-90	70 (46.7)
91-100	31 (20.7)
101-110	2 (1.3%)
Obese Class	
Over-Weight	4 (2.7%)
Obese Class I	136 (90.7%)
Obese Class II	10 (6.7%)

Table 1: Baseline characteristic of study participants (n=150)

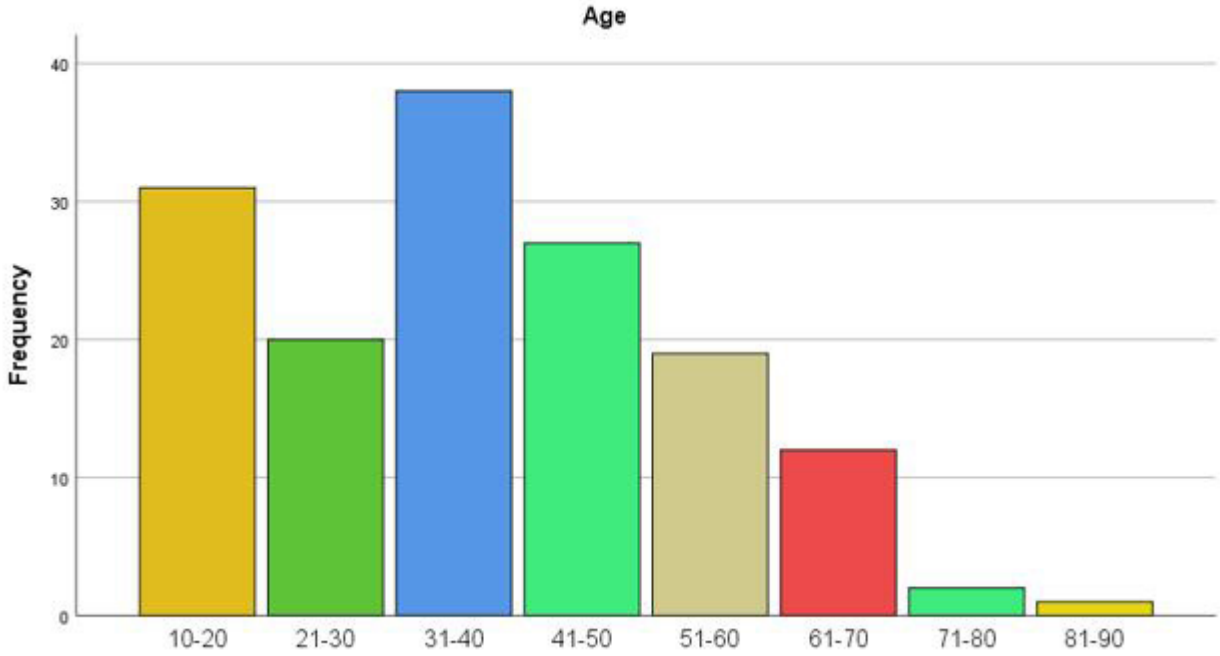

Figure 1: Age wise distribution of study participants

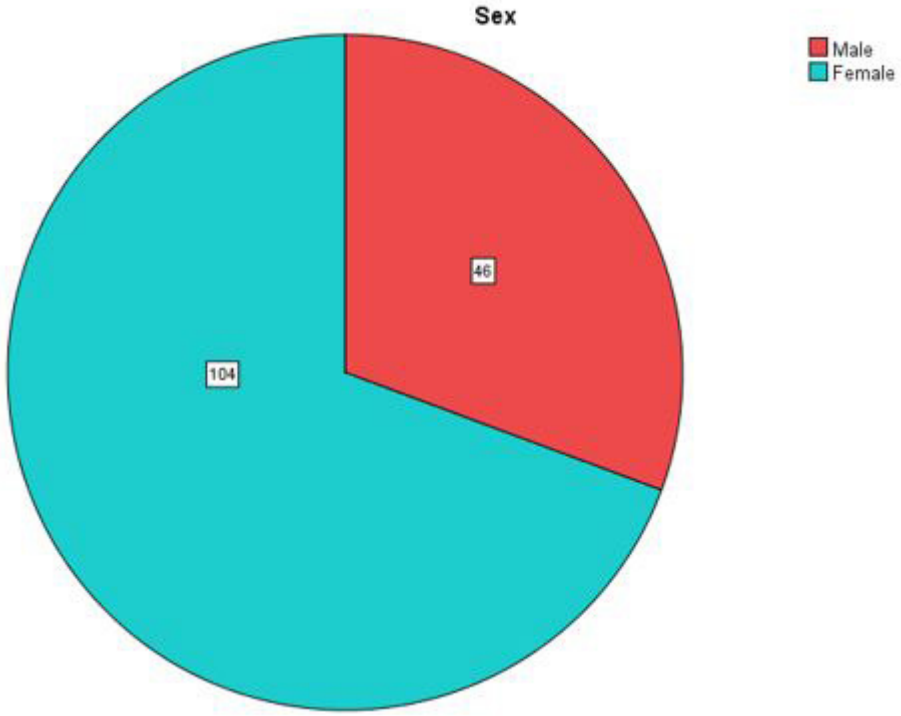

Figure 2: Gender wise distribution of study participants

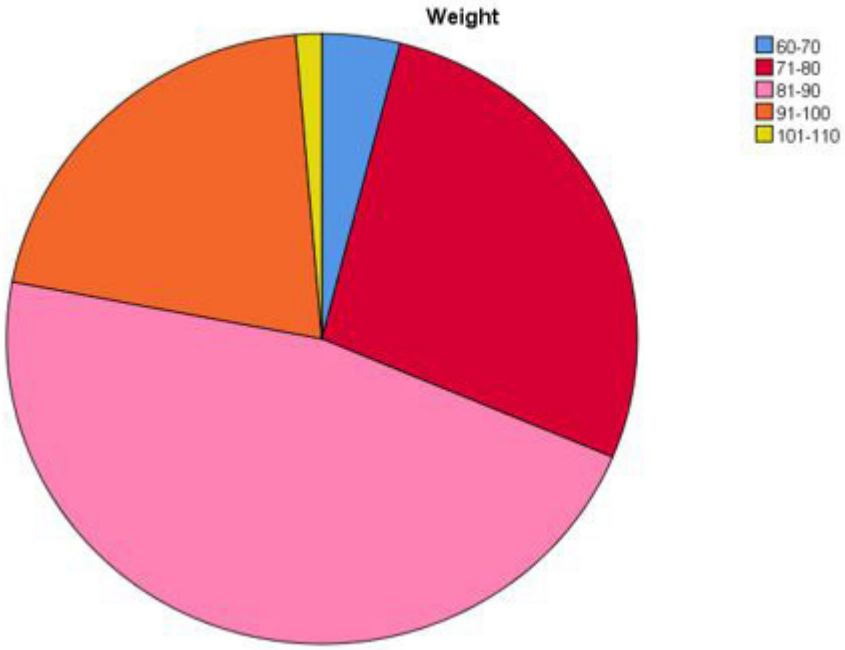

Figure 3: Weight difference among study participants

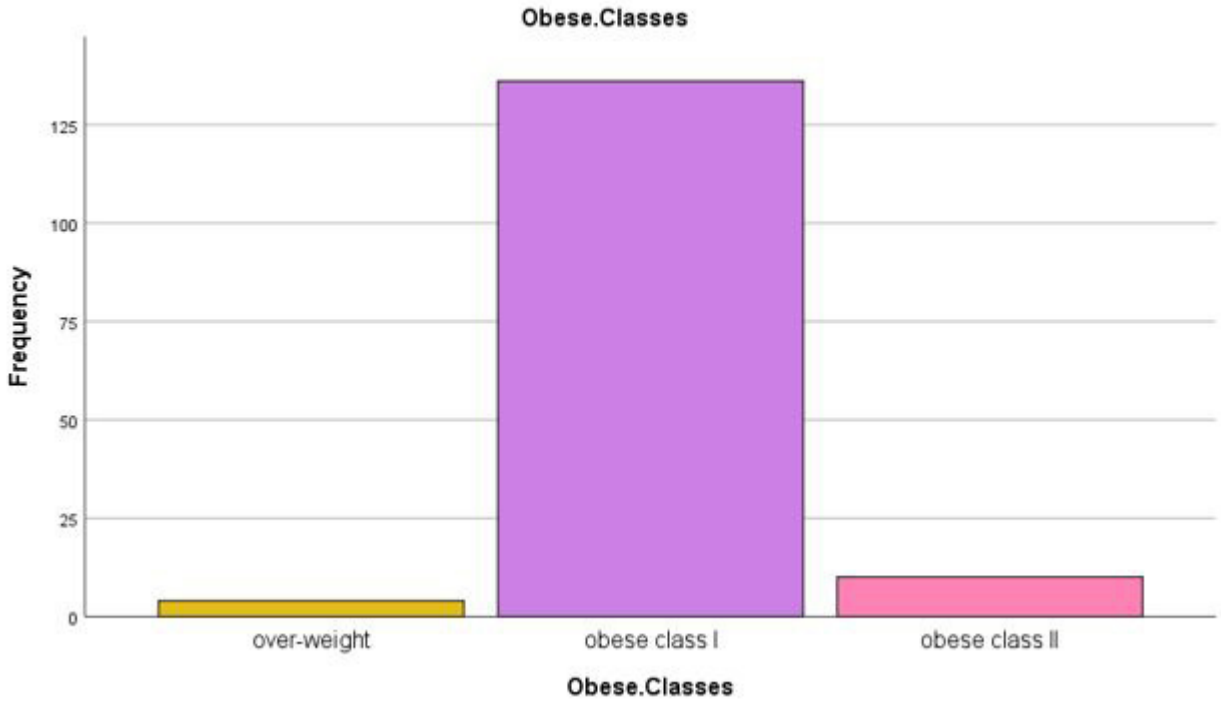

Figure 4: Classification of obese participants

Obese class and fast food consumption

It was seen that the fast food consumption among obese classes was high in class 1 obese which is the man age where people want go outside and eat as shown in Table 2a.

Obese class and rice consumption

It was seen that rice consumption have association with obesity. So proper intake of rice should be preferred in obese person Table 2b.

Obese Classes	Fast Food					Total
	Zinger	Pizza	Chinese soup	Others	No	
over-weight	1	0	0	0	3	4
obese class I	24	20	6	1	85	136
obese class II	1	0	0	0	9	10
Total	26	20	6	1	97	150

Table 2a: Use of fast food by different obese participants

Obese Classes	Rice consumption					Total
	1-2 times a week	2-3 times a week	4-5 times a week	4-8 times a month	No	
over-weight	1	1	1	0	1	4
obese class I	47	47	14	7	21	136
obese class II	5	3	1	0	1	10
Total	53	51	16	7	23	150

Table 2b: Rice consumption by different obese class participants

Obese class and Diet

It was seen that both Veg and Non-Veg was the major meal plan among obese classes. But these results are against the natural and need to be verifying by the comparison of other food in relevant to vegan (Table 3).

Obese class and Routine daily

ExerciseMild exercise was observed among obese classes Mild exercise is not enough to overcome the obesity so you need to be more active to be non-obese (Table 4).

Obese Classes	Diet			Total
	Veg	Non-Veg	Both	
over-weight	1	0	3	4
obese class I	12	3	121	136
obese class II	0	0	10	10
Total	13	3	134	150

Table 3: Diet use among different obese class participants

Obese Classes	Routine daily exercise				Total
	walk / running	home workouts	strenuous activities	No	
over-weight	0	1	1	2	4
obese class I	36	18	3	78	136
obese class II	1	2	0	7	10
Total	37	21	4	87	150

Table 4: Routine daily exercise by different obese class participants

Obese class and Other Complications

Arthritis, back pain, and other complications such as weak eye sight, generalized weakness, were seen among obese classes which indicate obesity is related with other health risk factor and outcome (Table 5).

Obese class and Education

It was observed that most of the obese participants were illiterate which indicate our society need obesity related social work about their harmful impact on health (Table 6).

Obese class and Hypothyroidism

It was observed in our study that there was no association between obesity and hypothyroidism, P value **0. 817** (Table 7).

Obese class and Triglyceride

It was observed in our study that there was no association between obesity and Triglyceride P value **0.144** (Table 8).

Obese Classes	Other complications					Total
	Frequent infection	arthritis	back pain	others	No	
over-weight	0	2	0	0	2	4
obese class I	10	21	27	17	61	136
obese class II	1	5	2	0	2	10
Total	11	28	29	17	65	150

Table 5: Complication associated with obese class participants

Obese Classes	Education					Total
	Illiterate	SSC	F. Sc	Bachelor	M.Phil./ PhD	
over-weight	3	1	0	0	0	4
obese class I	77	23	24	8	4	136
obese class II	8	1	1	0	0	10
Total	88	25	25	8	4	150

Table 6: Education level of obese class participants

Obese Classes	Hypothyroidism		Total	P.Value
	Yes	No		
over-weight	0	4	4	.817
obese class I	11	125	136	
obese class II	1	9	10	
Total	12	138	150	

Table 7: Hypothyroidism among obese class participants

Obese Classes	Triglyceride			Total	P. Value
	100-150	151-200	201-250		
over-weight	0	4	0	4	.144
obese class I	17	91	28	136	
obese class II	1	4	5	10	
Total	18	99	33	150	

Table 8: Triglyceride among obese class participants

Obese class and Cholesterol:

It was observed in our study that there was no association between obesity and Cholesterol P value **0.204** (Table 9).

Obese class and LDL

It was observed in our study that there was an clear association between obesity and LDL. P value **0.004.** There was an increase in serum LDL among obese classes (Table 10).

Obese class and HDL

It was observed in our study that there was no association between obesity and HDL. P value **0.565** (Table 11).

Obese Classes	Cholesterol			Total	P. Value
	151-200	201-250	251-300		
over-weight	0	2	2	4	.204
obese class I	11	76	49	136	
obese class II	3	4	3	10	
Total	14	82	54	150	

Table 9: Cholesterol level among obese class participants

Obese Classes	LDL			Total	P. Value
	50-100	101-150	151-200		
over-weight	3	0	1	4	0.004
obese class I	100	34	2	136	
obese class II	10	0	0	10	
Total	113	34	3	150	

Table 10: LDL level among obese class participants

Obese Classes	HDL				Total	P. Value
	20-30	31-50	51-70	71-90		
over-weight	1	3	0	0	4	.565
obese class I	16	68	46	6	136	
obese class II	1	3	5	1	10	
Total	18	74	51	7	150	

Table 11: HDL level among obese class participants

Discussions

Very limited literature exists on the association of obesity with hypothyroidism and lipid profile, especially in Pakistan and specifically in Khyber Pakhtunkhwa, therefore this study is aimed to determine the association between obesity and hypothyroidism with lipid profile.

There was a clear association between obesity and LDL P value **0.004**, as LDL was increased in participants In our study it was observed that there was no association between obesity and hypothyroidism P value **0.817** furthermore it was observed there was no association between obesity and Triglyceride, HDL, and cholesterol, P value **0.144,0.565, 0. 204.**. The higher prevalence of obesity in females is indicative risk and reason behind their obesity.

In a study by Abhyuday Verma, MD, Muthu Krishnan Jayaramanit was shown that there is an association between obesity and hypot*hyroidism p value **0.02**. Their sample size was 1075 individuals and had a control group of 450individuals. In their study the group 1 had625 individuals in which 44% had BMI of >25. They observed that in obese individuals there was a high prevalence of hypothyroidism 33% and 11% had subclinical hypothyroidism.Detail studies are required to assess the cause and effect relationship between obesity and hypothyroidism [13].

In a study by Okan et al, it was shown that there was no association between obesity and hypothyroidism. Their sample size was 947 and had a control group of 50 individuals [22-25]. They had 4 groups which were based on circumference and BMI and showed a positive relation between BMI, circumference and body fat percentage P value 0.001 [26-28]. They compared all the 4 groups with the control group for serum TSH levels and found no significance in the control group and the other 4 groups P value 0.34, 0.69 0.12 and 0.47 respectively [29,30].

In a study by Debmalya Sanyal and Moutusi Raychaudhuri showed no clear association between obesity and Hypothyroidism and stated that further research is necessary to determine whether hypothyroidism is one of the cause of obesity [12].

The difference in results of our study and other study is because most of the studies had a wide sample size average 900+ as compared to our study it was 150 individuals. Most importantly these studies had a control group where as in our study there was no control group due to limited resources. These studies were conducted mostly in the Endocrinology Department of Hospitals therefore they had referral biasedness in their results. These studies had advance equipment's that can detect free thyroid hormones while we had no such facilities to do so. These studies were conducted for a long duration such as 2-3 years while our study was conducted for 2 months only. These studies were mostly retrospective while our study was cross sectional [31-35].

Conclusion

Association between obesity and LDL P value **0.004** is the outcome of the study and need an point eye on the food which is the main reason of LDL in food intake of daily life.

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