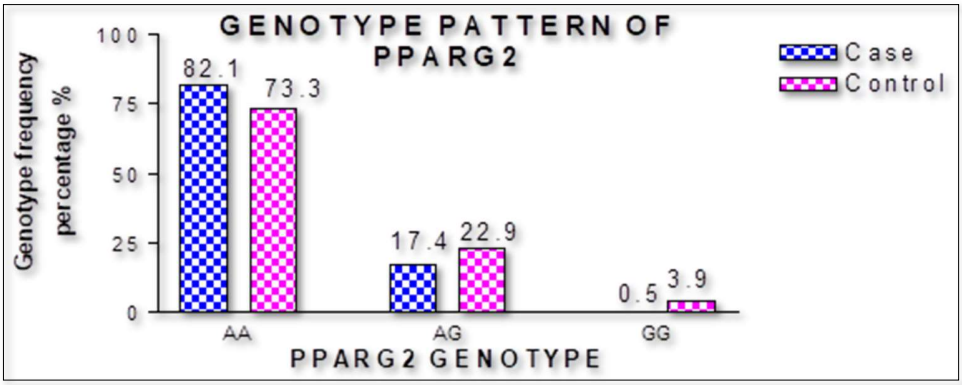
Table 4. Fisher Exact Test values of PPARG2 P12A polymorphism.

PPARG2 Genotype	Case		Control		P Value	Odds Ratio and CI
	N=190	N %	N=210	N%		
AA	156.0	82.11	154.0	73.3	0.0415*	1.668 (1.031 to 2.699)
AG	33.0	17.37	48.0	22.9	0.2127	0.7094 (0.4326 to 1.163)
GG	1.0	0.52	8.0	3.9	0.0390*	0.1336 (0.01654 - 1.079)
Alleles						
A	345	90.79	356	84.5	0.01**	1.772, (1.144 - 2.746)
G	35	09.21	64	15.5		0.5643, (0.3642-0.8744)
Carrige Rate						
A	189	99.4%	202	96.2	0.0789	1.541 (0.9630 - 2.466)
G	34	17.89	56	26.7		0.6489, (0.4055 - 1.038)

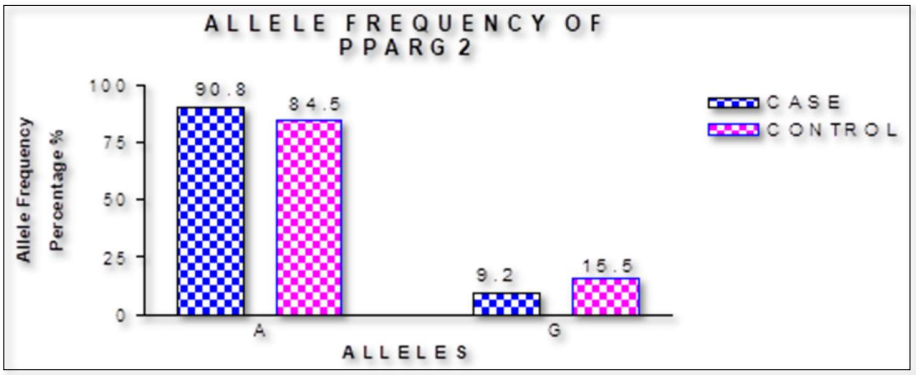
**Denotes the level of significant association between case and control*

N-Number of individuals in study group

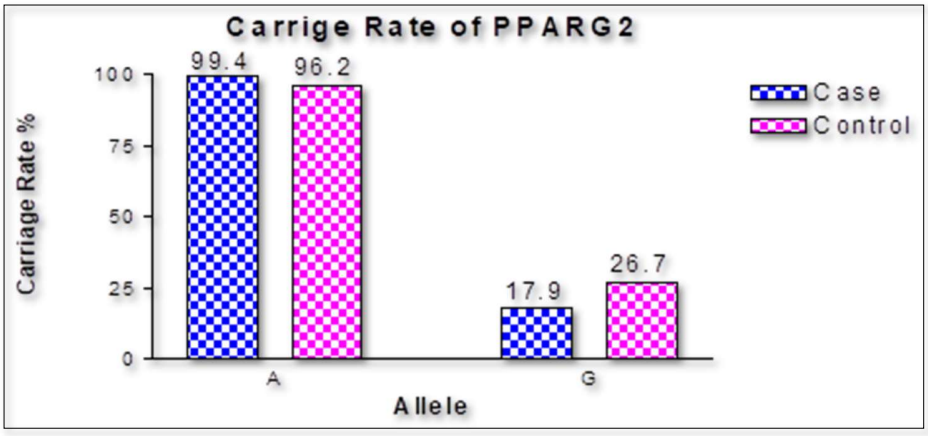
%-Genotype allele frequency and carriage rate expressed in percentage



Graph 1. *Genotype distribution of PPARG2.*



Graph 2. *Allele Frequency of PPARG2.*



Graph 3. *Carriage Rate of PPARG2.*

DISCUSSION

Weight gain has always been known to man to be a sign of good health and prosperity. Surplus energy stored as adipose tissue in the body depots has proved to be an efficient and practical way of making energy available for utilization by the body whenever it is needed [16,19]. Today, however, profound changes have occurred in our lives in association with improved living standards that have led to a markedly reduced need for utilization of stored energy and even for moderate levels of activity [23-26]. Consequently, the prevalence of weight gain and obesity are also rising and becoming a major public health problem in many countries of the world [27]. Table summarizes data on the prevalence of obesity in some developed and developing countries. The countries that have also been affected by these changes are the countries of the Middle Eastern Region. Within the last thirty years, most countries of the Middle East have experienced marked demographic, socio-economic, and life style changes. Traditional dietary habits have been modified due to the combined effect of westernized diets and population mixture, as well as the changes in lifestyle that encourage sedentary habits [28-32]. These changes have led to a profound alteration in the health and nutritional status of the concerned populations. Morbidity and mortality rates from infectious diseases and under-nutrition have decreased, to be replaced by rapidly rising rates of chronic non-communicable diseases such as NIDDM, CHD, and cancer. Furthermore, the sedentary life that has resulted from this improved socio-economic status, has led to an increase in the prevalence of overweight and obesity among populations in the Middle East [33-36]. In our results we found that rare ala allele 'G' was found to be in significantly low frequency in disease group as compared to Control group, whereas wild type allele 'A' was present in significantly high frequency in the disease group. These finding suggests that G allele may have a protective effect against pathophysiology of diabetes type 2. This study was done in small sample size but despite the sample size we found a strong relation with protection against diabetes type 2. Our study started from biochemical parameters related to obesity. We found BMI in female (0.0388*) and WHR (P<0.0001***) having strong correlation to obesity. Biochemical parameter FPG (mg/dL) (P<0.0001***), Post-Prandial Glucose (mg/Dl) (P<0.0001***) were significantly associated to obesity. Gene PPARG2 having G and A alleles. The genotypic distribution of AA, AG is more than AA where p value is 7.253, (0.0266*). The allelic frequency of A is high in comparison to G alleles where p value is 6.684, (0.0097**) thus the carriage rate of A allele is high in comparison to G allele. In our study the ala allele is found significantly protective and was in healthy control in higher percentage as compared to Case (15.2 Vs 9.21%).

The PPARG2 gene abundantly expressed in adipose tissue has several variants, one of the most common (minor allele frequency of 10% in Caucasians) is the Pro12Ala substitution at codon 12 in PPARG2. This polymorphism has been shown to be associated with reduced ability to Trans-activate responsive promoters and thus with lower PPARG2 transcriptional activity [31-35]. The importance of PPARG2 in lipid, glucose and energy metabolism is well established. Since PPARG2 promotes adipocyte differentiation, it is an attractive candidate gene for states of altered triglyceride storage, such as obesity or conditions associated with underweight. Since the Pro12 allele is present in at least 80% of humans, the population attributable to risk of type 2 diabetes associated with this polymorphism is as high as 25% [6,13]. More consistently, the Pro12Ala polymorphism has been associated with a lower risk of type 2 diabetes in a meta-analysis of genome-wide association studies [33]. This gene is a confirmed type 2 diabetes susceptibility locus and is one of most 20 type 2 diabetes susceptibility loci identified over the last few years [32,36].

In our study population, odds ratio of mutant AA genotype was 0.13 and heterozygous AG was 0.70 these results suggest that PPARG2 Pro 12 Ala polymorphism could be protective against Obesity. The overall Odds ratio of less common 'A' allele was 0.56 which clearly indicates the possible protective role of PPARG2 Ala Allele.

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