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**ALTERATION IN LIPID PROFILE LEVELS IN HYPOTHYROID FEMALES OF  
PUNJAB**

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**ABSTRACT**

The present case control study was conducted on 210 female subjects (135 hypothyroid cases and 75 controls) in the age range of 25-55 years of Mansa district of Punjab from July 2013 to March, 2014. The objective of the study was to check the alteration in lipid profile levels in hypothyroid females of Punjab. In the present study, the subjects were divided into three groups includes 25-35, 35-45 and 45-55 years. Lipid profile parameters (total cholesterol, high density lipoprotein, triglyceride and low density lipoprotein) were checked with the appropriate lipid profile kits by using the Biochemical Autoanalyzer. It was observed that the level of total cholesterol, high density lipoprotein, triglyceride and low density lipoprotein were significantly higher in hypothyroid females as compared to control females at all age groups. According to age groups, the levels of all lipid profile parameters were higher in 45 to 55 age groups than other two age groups except low density lipoprotein. It was concluded that the levels of lipid profile parameters were increased with age in females and the elevated level of lipid profile in hypothyroid female can be a risk factor for development of cardiovascular disease.

**Keywords: Hypothyroidism, Lipid profile, Cases, Controls, Females**

**INTRODUCTION**

Hypothyroid disorder is defined as a deficiency of triiodothyronine and thyroxine hormone that leads to hyper secretion of pituitary thyroid stimulating hormone (Prakash and Lal, 2006). The synthesis of thyroid hormone begins in hypothalamus.

The secretion of thyroid hormonal from the thyroid gland is regulated by thyroid-stimulating hormone (TSH) which is released by the anterior pituitary. The anterior pituitary itself is stimulated by thyrotropin-releasing hormone (TRH) which is released by the hypothalamus. The typical symptoms of hypothyroid disorders are depression, constipation, fatigue, weight gain and sluggishness.

Hypothyroidism is a metabolic disorder which affects many other metabolic disorders and thyroid hormones helps in synthesis, mobilization and metabolism of lipids (Cappola *et al.*, 2003). The hypothyroid disease constitutes as secondary causes of dyslipidemia (Tsimihodimos *et al.*, 1999; Stone, 1994) due to the levels of total cholesterol and low density lipoprotein increases as thyroid function decline (Canaris *et al.*, 2000). The triglycerides and very low density lipoprotein are also increasing in hypothyroid patients (Abrams *et al.*, 1981). There are several studies reported that the increased level of total cholesterol and low density lipoprotein (LDL) can significantly improve with the help of thyroxine replacement therapy in hypothyroid patients (Tzotzas *et al.*, 2000; Teixeira *et al.*, 2008; Becerra *et al.*, 1999; Ito *et al.*, 2007; Paoli *et al.*, 1998). The level of triglyceride might be

normal or unchanged after treatment in hypothyroid patients (Tzotzas *et al.*, 2000; Ito 2007; Paoli *et al.*, 1998; Pazos *et al.*, 1995; Martanez-Triguero *et al.*, 1998; O'Brien *et al.*, 1997; Arem *et al.*, 1995).

The prevalence of hypothyroid disorder is 25% in India (Riaz *et al.*, 2009). It was found that the prevalence of thyroid disease on age, sex, ethnic, environmental factor and iodine intake (Delang, 1994). The prevalence of hypothyroid disorder is more women as compared to men, especially in older age groups (Laurberg *et al.*, 1998). At 20 years follow up study of the Whickham showed the mean incidence of hyperthyroidism was 0.8/1000 and hypothyroidism 4.1/1000 per year in women, whereas in man, incidence was negligible 0.6/1000 per year (Vanderpump *et al.*, 1995). A large cohort study of thyroid patients in Colorado revealed the prevalence of increased TSH was 9.5% and decreased TSH was 2.2% (Canaris *et al.*, 2000).

Furthermore, a study in Scotland showed the prevalence of overt and subclinical hypothyroidism was more in the patients with cholesterol levels greater than 310 mg/dl than others (Series *et al.*, 1988) so it was found that a reduction in the level of thyroid stimulating hormone (TSH) level reduced the level of cholesterol.

The present case-control study was carried out to check the alteration in lipid profile levels in hypothyroid females of Punjab.

### MATERIAL AND METHODS

In the present study, the data on 210 females subject (135 hypothyroid and 75 controls), belonging to age groups from 25 to 55 years were collected from the Mansa District of Punjab during the period of July, 2013 to March, 2014. The decimal age of each subject was calculated and further divided into three age groups (25-35, 35-45 and 45-55 years). Lipid profile, including total cholesterol was checked by CHOD-PAP method (Allain *et al.*, 1974), high density lipoprotein by Phosphotungstate method (Allain *et al.*, 1974), triglyceride by GPO-POD method (Jacobe *et al.*, 1960). All biochemical tests were performed by using the Biochemical Autoanalyzer. Low density lipoprotein was assessed by using the formula given by Friedewald *et al.*, (1972). The student t-test was applied for comparison between case and control groups and statistically significant level was measured at  $p < 0.05$ .

### RESULTS

In the present study, out of total 134 hypothyroid patients, 57 (42.22%) were found in 25 to 35 age group, 54 (40%) in 35 to 45 age group and 24 (24%) in 45 to 55 age

group (Table 1). The prevalence of hypothyroid disorder was higher in the age group of 25 to 35 years as compared to their other age groups.

In both hypothyroid and control females, the total cholesterol was more in the age group of 45 to 55 age group as compared to their 25 to 35 years and 35 to 45 year age groups (Table 2). The level of total cholesterol was higher in hypothyroid female than their counterpart controls in all age groups. The differences were statistically significant between hypothyroid and control female groups of all age groups.

The mean high density lipoprotein was more in the age group of 45 to 55 years as compared to their 25 to 35 and 35 to 45 year age groups in both hypothyroid and control females (Table 4). High density lipoprotein was higher in the hypothyroid female group than their control females in all age groups and the differences were statistically significant for high density lipoprotein between the both female groups of all age groups.

At all age groups, the mean triglyceride was more in the age group of 45 to 55 years as compared to their 25 to 35 and 35 to 45 year age groups in both hypothyroid and control females (Table 5). In hypothyroid females,

the level of high density lipoprotein was higher as compared to their counterpart control ones in all age groups and the differences were statistically significant for between the both female groups of all age groups.

The mean low density lipoprotein level was more in the age group of 25 to 35 age groups in hypothyroid females as compared to their

35 to 45 years and 45 to 55 year age groups while in control females, the level was higher in 45 to 55 years age group (Table 3). As compared to control females, the level of low density lipoprotein was higher in hypothyroid female in all age groups. The differences were statistically significant between the two female groups of all age levels.

Table 1: Age-wise distribution of hypothyroid females

Age groups	Distribution (%) of hypothyroid female patients (n=134)
25-35	57 (42.22%)
35-45	54 (40%)
45-55	24 (17.78%)

Table 2: Comparison of total cholesterol (mg/dl) between hypothyroid and control female groups

Age groups	Total cholesterol (mg/dl)		t-values
	Hypothyroid females (n=135)	Healthy control females (n=75)	
	Mean $\pm$ S.D.	Mean $\pm$ S.D.	
25-35	209.28 $\pm$ 35.54	164.94 $\pm$ 15.85	12.44***
35-45	202.33 $\pm$ 32.35	165.73 $\pm$ 14.71	11.23***
45-55	217.37 $\pm$ 36.96	178.27 $\pm$ 17.50	10.37***

Statistically significant at \*\*\*P<0.001

Table 3: Comparison of high density lipoprotein (mg/dl) between hypothyroid and control female groups.

Age groups	High density lipoprotein (mg/dl)		t-values
	Hypothyroid females (n=135)	Healthy control females (n=75)	
	Mean $\pm$ S.D.	Mean $\pm$ S.D.	
25-35	43.37 $\pm$ 3.35	40.35 $\pm$ 3.60	11.59***
35-45	42.81 $\pm$ 3.31	41.38 $\pm$ 3.57	2.88**
45-55	45.21 $\pm$ 7.98	42.53 $\pm$ 2.70	3.54***

Statistically significant at \*\*p<0.01, \*\*\*P<0.001

Table 4: Comparison of triglyceride level (mg/dl) between hypothyroid and control female groups.

Age groups	Triglyceride (mg/dl)		t-values
	Hypothyroid females (n=135)	Healthy control females (n=75)	
	Mean $\pm$ S.D.	Mean $\pm$ S.D.	
25-35	207.79 $\pm$ 67.05	171.41 $\pm$ 11.37	6.15***
35-45	206.98 $\pm$ 56.54	172.88 $\pm$ 11.12	6.77***
45-55	244.71 $\pm$ 74.82	179.53 $\pm$ 16.87	9.69***

Statistically significant at \*\*\*P<0.001

Table 5: Comparison of low density lipoprotein (mg/dl) between hypothyroid and control female groups.

Age groups	Low density lipoprotein (mg/dl)		t-values
	Hypothyroid females (n=135)	Healthy control females (n=75)	
	Mean $\pm$ S.D.	Mean $\pm$ S.D.	
25-35	124.35 $\pm$ 29.90	90.31 $\pm$ 12.78	12.07***
35-45	118.12 $\pm$ 28.60	89.77 $\pm$ 11.71	10.10***
45-55	123.22 $\pm$ 26.84	99.83 $\pm$ 14.25	8.26***

Statistically significant at \*\*\*P<0.001

## DISCUSSION

In the present study, it was found that the large number of hypothyroid patients was found at advancing (25-35 years) age group. Unlike the present study, the hypothyroid patients were found higher at 41-50 years age group in the population of Western Nepal (Kumar *et al.*, 2013). But similar results were found in other populations (Tunbridge *et al.*, 1977)

In the present study, the levels of total cholesterol, triglyceride and low density lipoprotein were greater in hypothyroid patients as compared to controls. Similar results were found in the population of Bangalore (Shilpashree *et al.*, 2014). A study conducted by Staub *et al.* (1992) showed that the total cholesterol and low density lipoprotein were higher in overt hypothyroid patients. Some studies reported a moderate elevation of triglycerides in hypothyroid patients (Furman *et al.*, 2013). High density lipoprotein was also greater in hypothyroid patients than controls in the present study. Like the present study, the level of high density lipoprotein was also greater in hypothyroid patients of other population (Pearce *et al.*, 2008). In contrast to the present study, the level of high density lipoprotein was lesser in hypothyroid patients

of some other population (Shilpashree *et al.*, 2014).

It was concluded that the level of lipid profile was higher in hypothyroid patients as compared to controls at all age groups. With ageing, total cholesterol, high density lipoprotein and triglyceride were increased in patients. The higher level of lipid profile may attribute for development of any heart diseases in hypothyroid females.

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