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To Study the Effect of Age, Total Cholesterol and High Density Lipoproteins in Psoriasis Subjects

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Abstract
Lately research report reveals that the leading cause of death for people with psoriatic arthritis is cardiovascular disease. Although higher cholesterol and lower High Density Lipoprotein (HDL) levels in psoriasis patients have been found in several studies, but, there are no reported data for psoriasis patients living in Bundelkhand region. Therefore, to assess the mean values of age, total cholesterol, and HDL in patients with psoriasis and also to compare these levels with that of healthy controls (Non-Psoriatic). Age & sex matched fifty human non-psoriatic individuals were taken into healthy control group. Fifty psoriasis subjects, on treatment were included in Psoriasis group. Age, serum cholesterol, and HDL levels were estimated according to the instructions given in the methods. Pertaining to psoriasis group subjects, a positive correlation between age with total serum cholesterol was established. In the control group also we observed a positive correlation between Age with total serum cholesterol was established. The authors conclude from the study that alterations in the cholesterol and HDL in psoriasis subjects due to deficient scavenging action of HDL. Therefore, psoriatic patients with psoriasis should be evaluated for hyperlipidemia and obstructive vascular diseases because any compensation mechanism may become insufficient.

Introduction

Psoriasis is a pandemic disease, reported prevalence of the disease ranges from 0.09% to 11.4% across different countries[1]. 0.09% was found to be in United Republic of Tanzania and 11.4% was reported in Norway. According to International Federation of Psoriasis Associations (IFPA), nearly three percent of the world's population has some form psoriasis accounting to around 125 million worldwide[2-5]. In USA alone there are around 7.5 million people affected with psoriasis. Every year 150,000 new cases of psoriasis are notified in the USA[3-5]. Coming to gender distribution it is equally affects both the genders at the similar rate[2,5]. From the available studies, the prevalence of psoriasis in India ranges

from 0.44 to 2.8%[7], but in gender distribution the Indian statistics differ from the studies[2-5] as it usually affects in individuals in their third and fourth decade with males being affected two times more common than females in India[7].

Secondary complications that can arise due to the presence of psoriasis for a decent period of time in an individual are psoriatic arthritis, eye conditions, obesity, type 2 diabetes mellitus, high blood pressure, metabolic syndrome, and cardiovascular diseases[8-10]. A study observed death risk increases 1.79 times higher in a psoriasis individual when compared to individuals without psoriasis[11,12]. For example, psoriasis individuals who develop the disease when they are less than 25 years of age have a life expectancy decreased by 25 to 30 years[13]. Lately research report reveals that the leading cause of death for people with psoriatic arthritis is cardiovascular disease[8-13].

Improper clearance of cholesterol form arteries leads to the atherosclerosis, which is the initial stage for the development of cardiovascular disease and stroke[14,15]. This improper clearance of cholesterol by HDL enhances the progressive thickening of arteries leading to occlusive disorders of cardio-vascular and strokes[14,16]. Increasing coincidence of cardiovascular diseases including heart failure, myocardial infarction, cardiovascular hypertension and diabetes proved in several studies[17-19]. A study on psoriatic subjects has shown increased cholesterol levels when compared to control[20]. Another study reported an increase in the total lipids of psoriatic serum[21]. In another study[22,23] it has been shown that dyslipidemia existed in psoriasis subjects but these altered levels were significantly prominent in High Density Lipoprotein (HDL) levels when compared to control. The total cholesterol metabolism in the body is maintained by a highly coordinated balancing cycle between ingestion, synthesis, absorption, and excretion and this balancing is maintained by certain hormones in the body[16]. Any disruption in this dynamic cycle due to age[23,24], disease[25], hormonal disorders [16,26], and by oxidative stress would lead to the derangement in the levels of cholesterol[27]. Although higher cholesterol and lower HDL levels in psoriasis patients have been found in several studies, but, there are no reported data for psoriasis patients living in Bundelkhand region. Therefore, to assess the mean values of age, total cholesterol, and HDL in patients with psoriasis and also to compare these levels with that of healthy controls (Non-Psoriatic).

Materials & Methods

The study was conducted in the Department of Biochemistry, Maharani Laxmi Bai Medical college (MLBMC), Jhansi. Age & sex matched fifty human non-psoriatic individuals were taken into healthy control group. Fifty psoriasis subjects, on treatment were included in Psoriasis group. The diagnosis of psoriasis was made according to the norms laid by American Academy of Dermatology. The diagnosis of psoriasis group subjects was done by the consultants of General Medicine department of MLBMC. Exclusion criteria were severe psoriatic individuals, less than five years of known duration of psoriasis, and with known complications. Inclusion criteria for healthy controls were non-psoriatic, not taking supplementations, and having no other complications. Serum total cholesterol was estimated by using the method of Cholesterol Oxidase and Peroxidase (CHOD/POD) purchased from Transasia Biomedicals. Serum HDL was estimated by using the method polyethylene glycol (PEG) and phenol and 4-aminoantipyrine (PAP). Fasting venous blood (5ml) were drawn into plane vials, after informed written consent from all the study group subjects with a disposable syringe & needle, under all aseptic conditions. Serum was separated by centrifuging the blood at 3000 rpm for 20 minutes. Samples were stored in aliquots at -20^{o} C until assayed.

Statistical Analysis

IBM SPSS version 20 was used to perform statistical analysis. Unpaired ‘t’ test was performed to compare the means of variables

between two groups. Scattered diagrams were considered to understand the association between two variables. P <0.05 was considered significant.

Results

Age, serum Cholesterol, and HDL levels are shown in Table 1. Serum cholesterol (t=5.043, d=98) was significantly higher in psoriasis compared with controls subjects. In addition, HDL was significantly lower in psoriasis compared with controls subjects. No significant difference was observed in age and gender distribution in psoriasis and control subjects.

Figs 1 & 2 show the relationship of parameters in the present study group subjects. Pertaining to psoriasis group subjects, a positive correlation ($y=0.706x+156.4$ & $R^2=0.033$) between Age (x axis) with total serum cholesterol (y axis) was established as evident from the graph shown in the figure 1. In the control group also we observed a positive correlation ($y=0.556x+126.5$ & $R^2=0.042$) between Age (x axis) with total serum cholesterol (y axis) was established as evident from the graph shown in the figure 2.

Table 1: Findings in subjects of psoriasis and control groups

Variable	Psoriasis subjects (n=50)	Control subjects (n=50)	P- value
Age (years)	36.9±7.2	36±4.7	NS
TC (mg/dL)	182.5±24.2	146.6±12.2	S
HDLc (mg/dL)	42.7±4.6	48.2±3.4	S

Note: TC-Total Cholesterol, HDL-High Density Lipoprotein, S-Significant (<0.05), NS-Not Significant (>0.05)

Figure 1: Scatter diagram showing relationship between Age & Cholesterol in Psoriasis group

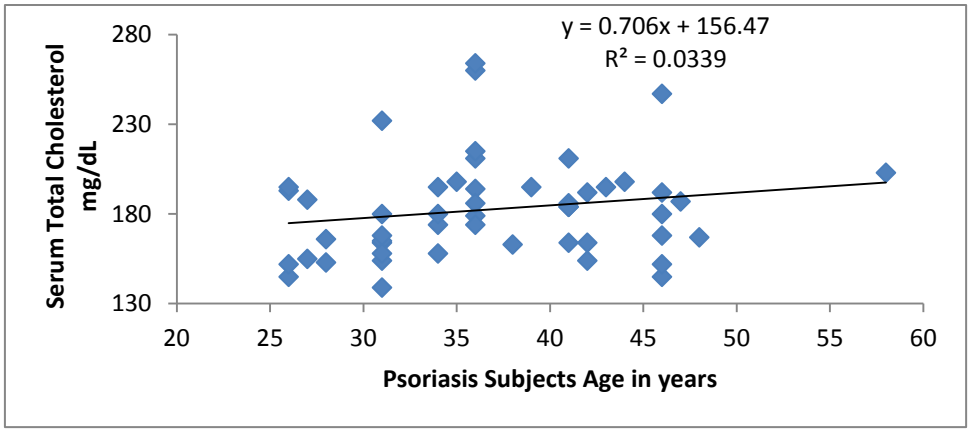
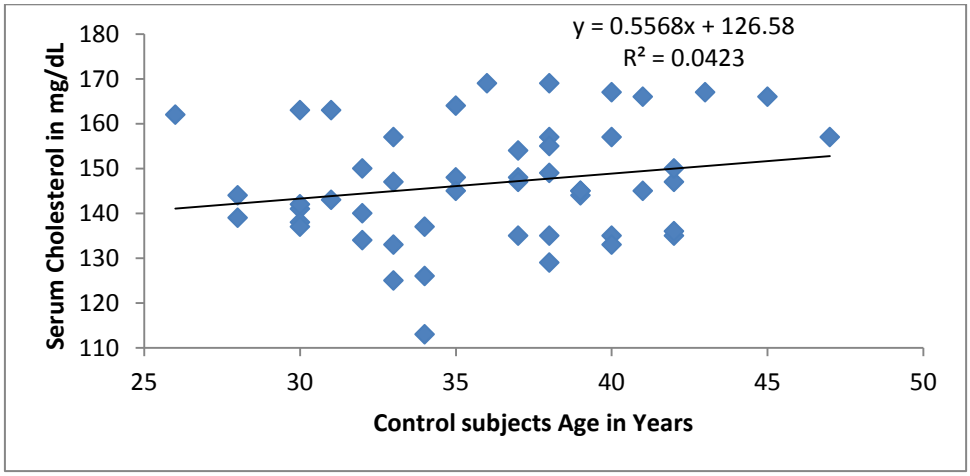


Figure 2: Scatter diagram showing relationship between Age & Cholesterol in Control group



Discussion

Factors that affect blood lipids are age, obesity, sex, weight, diet, alcohol, and hormone levels in an individual. In the present study, age and sex of psoriasis and control subjects were analyzed and there was no significant difference observed. None of the study subjects used alcohol and cigarette as these were excluded. In studies, it was reported that psoriasis can affect anyone irrespective of age, but it is most likely to appear between 15 to 35 years of age[4,5]. The reports also reported that psoriasis disease affects both the genders at the similar rate[2-7].

Cholesterol in the body is transported with the help of lipoproteins. One of the lipoprotein that is high density lipoprotein which is in short form called as HDL plays a vital role. HDL carries the extra-hepatic cholesterol to the liver and also mutual exchanges the cholesterol between other lipoproteins through cholesterol esterase transfer protein[16]. In diseases where the causative factor is immunity including diabetes mellitus, psoriasis, and human immunodeficiency virus are bound to exhibit higher levels of serum cholesterol in body. A study on psoriatic subjects has shown increased cholesterol levels when compared to control[20]. Another study reported an increase in the total lipids of psoriatic serum[21]. In another study[22] it has been shown that dyslipidemia existed in psoriasis subjects but these altered levels were significantly prominent in HDL levels when compared to control. Takeda et al., 2002[28], demonstrated serum cholesterol levels of control subjects were significantly lower than the psoriasis patients. This present study findings also showed significantly higher cholesterol and lower HDL levels in psoriasis subjects when compared to healthy control subjects of the study. However, a study[29] could find no significant differences in serum cholesterol levels between psoriatic and normal individuals. Another study[30] likewise found no evidence for a disturbance of lipid metabolism accompanying psoriasis.

Varied theories have been proposed for the higher cholesterol levels in psoriasis[19-23]. Toker et al[31], observed altering levels of paraoxanase and arylesterase as the contributing causes for the increases cholesterol levels in subjects affected with psoriasis. Pietrzak et al[32] demonstrated statistically significant increase in lipase levels which were attributed to the increased cholesterol levels in psoriasis patients. Res et al[33] reported that over-expression of interleukin-17 and interleukin-22 in the affected skin was the cause for altered cholesterol levels in psoriasis individuals. Some studies[28,34] highlighted the influence of cytokines produced by the host immune system during disease release large concentrations of tumor necrosis factor (TNF) - alpha and IL-1β responsible for chronic inflammation which is thought to be responsible for increased cholesterol levels.

But, we infer from the available data from the present study that improper transport of cholesterol to the liver from extra-hepatic tissues led to the significant increase in the levels in the subjects of psoriasis in the present study. Lately, studies[35-37] have demonstrated altered functioning of HDL lipoprotein in the chronic inflammatory disorders including psoriasis and atherosclerosis.

The physiological functions of cholesterol are it is a precursor of steroid hormones and bile acids, and also providing structure to cell membranes [16]. The total cholesterol metabolism in the body is maintained by a highly coordinated balancing cycle between ingestion, synthesis, absorption, and excretion and this balancing is maintained by certain hormones in the body[16]. Any disruption in this dynamic cycle due to age[24,38], disease [25], hormonal disorders[16,26], and by oxidative stress would lead to the derangement in the levels of cholesterol[27]. We observed positive relation between age and cholesterol in control subjects. Similar positive relationship was observed between age and cholesterol in psoriasis subjects group. At first it seems contradictory but possible explanation could be that the increase in cholesterol levels is compensatory to the increase in age[16,25-27,38]. More importantly the literature

reports ageing is a degenerative process in any mortal beings and ageing hastens the oxidative stress and vice versa. Therefore the relationship observed in psoriasis and control subjects can be attributed to the factors reported in the studies.

Conclusion

The authors conclude from the study that alterations in the cholesterol and HDL in psoriasis subjects due to deficient scavenging action of HDL. Therefore, psoriatic patients with psoriasis should be evaluated for hyperlipidemia and obstructive vascular diseases because any compensation mechanism may become insufficient. Therefore, further studies are extensively needed on a multicountric, multicentric which should include all ethnic population to understand the mechanisms involved between serum cholesterol and HDL.

Conflict of Interest: None declared.

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