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Effect of smoking in cardiovascular diseases and in diabetes

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Abstract
Smoking increases blood pressure; decreases exercise tolerance and increase the tendency for blood to clot. Smoking decreases HDL. Smokers are insulin resistance exhibit several aspects of the insulin resistance syndrome, and are at an increased risk for type - II diabetes. In diabetic patients, smoking also promotes the development and progression of diabetic macro vascular diseases, particularly *diabetic nephropathy.* Estimation of Glucose, cholesterol HDL-cholesterol, triglycerides, urea, creatinine and uric acid Hence the results of our present study clearly demonstrates that, diabetic smokers are at a higher risk of developing deleterious complications such as ischaemic heart disease and renal dysfunctions in comparison with the diabetic non-smokers.

Keywords: cholesterol, diabetes, creatinine, uric acid and insulin

Introduction
Smoking is alert an main "risk factor" for arterial hypertension and diabetes management, according to, respectively, the current guidelines of the European Society of Hypertension and the European Society of Cardiology on the management of arterial hypertension [1]. Diabetes advises a considerably improved risk of coronary heart disease (CHD), especially among women. Cigarette smoking is strongly associated with an increased risk of CHD among women with type 2 diabetes mellitus [2].
Diabetes mellitus refers to the group of diseases that the lead to high blood glucose levels due to defects in either insulin secretion or insulin action in the body [3]. Diabetes develops due to a diminished production of insulin (in type 1*)* or resistance to its effects (in type 2 and gestational) both led to hyperglycemia, which largely causes the acute signs of diabetes: excessive urine production, resulting compensatory thirst and increased fluid intake, blurred vision, unexplained weight loss [4]. In the developed world, diabetes is the most significant cause of adult blindness in the non-elderly and the leading cause of non-traumatic amputation in adults, and diabetic nephropathy is the main illness requiring renal dialysis.
The World Health Organization projects that the number of diabetics will exceed 350 million by 2030. Governments and other healthcare providers around the world are investing in health education, diagnosis and treatments for this chronic, debilitating – but controllable – disorder. The term "type 1 diabetes" has universally replaced several former terms, including childhood-onset diabetes, juvenile diabetes, and insulin-dependent diabetes (IDDM). Likewise, the term "type 2 diabetes" has replaced several former terms, including adult onset diabetes, obesity-related diabetes, and non-insulin-dependent diabetes (NIDDM) [5-11]. Beyond these two types, there is no agreed-upon standard nomenclature. Various sources have define "type 3 diabetes" as, among others, gestational diabetes, insulin-resistant type 1 diabetes (or "double diabetes"), type 2 diabetes which has progressed to require injected insulin, and latent autoimmune diabetes of adults (or LADA or "type 1.5." diabetes.) Gestational diabetes is fully treatable but requires careful medical supervision throughout the pregnancy. About 20%-50% of affected women develop type 2 diabetes later in life. Many patients with type 1 and type 2 diabetes mellitus are at risk for diabetic nephropathy, retinopathy, and neuropathy, probably via its metabolic effects in combination with increased inflammation and endothelial dysfunction. This association is strongest in type 1 diabetic patients [12, 13].

Materials and Methods
Experimental Design
Group I: Normal healthy individuals.
Group II: Non-Smokers with diabetes.
Group III: Smokers with diabetes.

Each group comprising of 10 volunteers, with the age group of 30 – 60

Biochemical studies
Glucose in the blood was estimated by GOD/POD method, estimation of cholesterol-Zak's method, estimation of HDL-cholesterol, estimation of triglycerides, estimation of urea by Diacetyl monoxime method, estimation of Creatinine by Jaffe's method and estimation of uric acid - (Phosphotungstic acid method)

Statistical Analysis
All the grouped data were significantly evaluated with SPSS/10 software. Hypothesis testing methods included one way analysis of variance (ANOVA) followed by least significant difference [LSD] test. *p* values of less than 0.05 were considered to indicate statistical significance. All the results were expressed as mean ± S.D for 10 volunteers in each group.

Results and Discussion
Blood Glucose Levels in Normal and Pathological Condition
Hyperglycemia is the commonest feature of Diabetes mellitus and hence monitoring blood glucose levels during diabetic

conditions is of primary importance. Fig.1 shows the blood glucose levels in normal (Group I), non-smokers with diabetes (Group II) and smokers with diabetes (Group III). Significantly (P<0.05) increased blood glucose levels were observed in Group II and Group III when compared to Group I subjects. Moreover, there was a markedly (P<0.05) increased blood glucose levels in Group III subjects when compared to Group II non-smokers with diabetic group.

Table 1: Level of Blood Glucose in Normal and Pathological Conditions

Parameter	Group I (normal healthy individuals)	Group ii (non-smokers with diabetes) (a)	Group iii (smokers with diabetes) (ab)
Blood Glucose (mg/dl)	112	135	231
	108	143	267
	119	148	202
	122	153	186
	94	160	172
	106	186	153
	100	146	146
	107	185	241
	109	195	210
	99	214	213

Results are expressed as mean ± S.D for 10 samples in each group. Statistical significance at P<0.05 [a]Group II compared with Group I, [ab] Group III compared with Group II.

Urea, Creatinine and Uric Acid Levels in Normal and Pathological Condition

Figure1, Figure 2 and Figure 3 show the levels of urea, Creatinine and uric acid in normal and pathological conditions. There was a significant (P<0.05) increase in urea, Creatinine and uric acid levels in Group II and Group III subjects when compared to Group I. There was a significant (P<0.05) increase in urea, Creatinine and uric acid levels in Group III subjects when compared to Group II.

Diabetic patients manifest a negative nitrogen balance related to enhanced proteolysis in muscles and other tissues. Impaired balance of nitrogen coupled with lower protein synthesis leads to increased concentration of urea in the blood [5]. The hyperglycemia induced elevation of serum urea and Creatinine are considered as significant markers for renal dysfunction [2]. Uric acid is the major catabolic product from the purine nucleotides by xanthine oxidase enzyme system. The enzyme xanthine oxidase catalyzes the oxidation of xanthine to hypoxanthine and finally to uric acid, the excess of which initiates symptomatology of gout. Asayama *et al*. (1994) suggested that the serum uric acid levels were increased in diabetic conditions. Increased uric acid level is a risk factor for cardiovascular diseases [4].

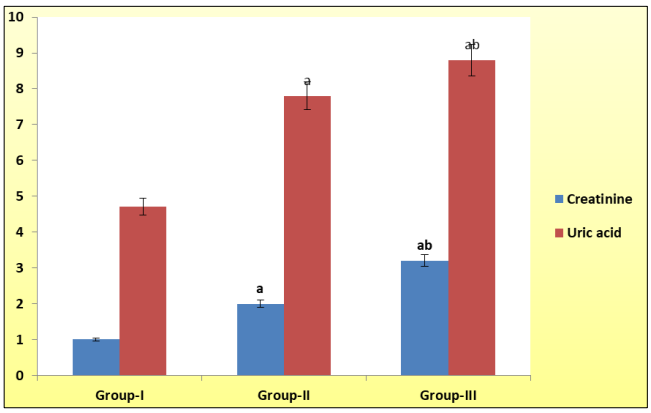

Fig 1: Level of Creatinine in Normal and Pathological Conditions

Results are expressed as mean ± S.D for 10 samples in each group. Statistical significance at P<0.05 [a] Group II compared with Group I, [ab] Group III compared with Group II.

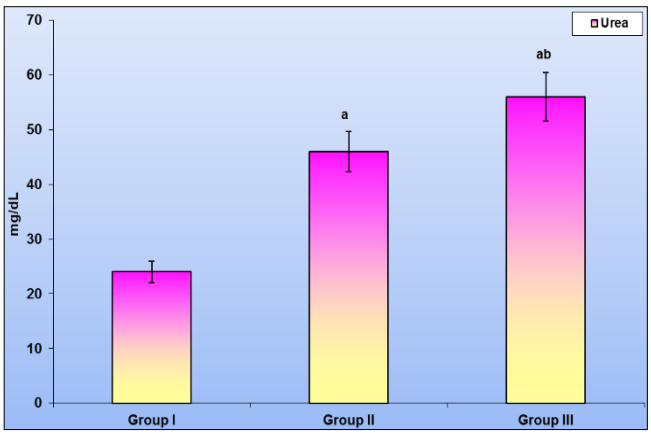

Fig 2: Level of Urea in Normal and Pathological Conditions

Results are expressed as mean ± S.D for 10 samples in each group. Statistical significance at P<0.05 [a]Group II compared with Group I, [ab]Group III compared with Group II.

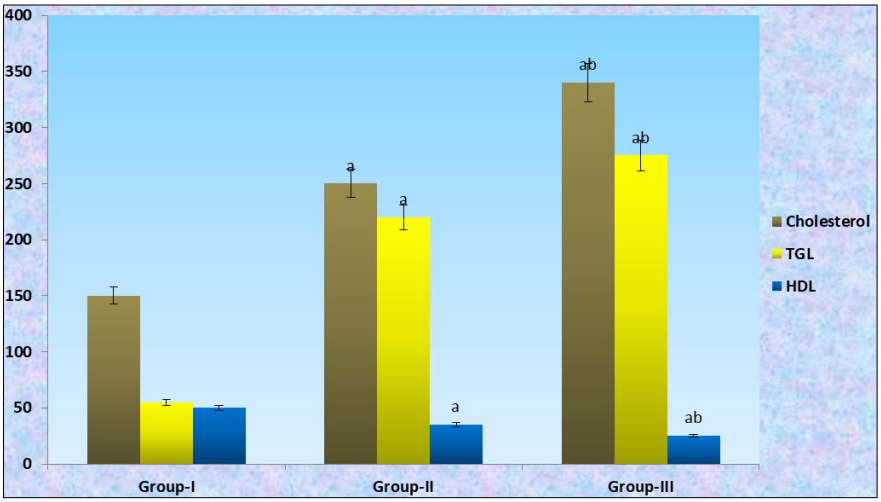

Fig 3: Level of Cholesterol in Normal and Pathological Conditions

Results are expressed as mean ± S.D for 10 samples in each group. Statistical significance at $P<0.05$ [a] Group II compared with Group I, [ab] Group III compared with Group II.

Table 2: Level of Triglycerides in Normal and Pathological Conditions

Parameter	Group I (normal healthy individuals)	Group ii (non-smokers with diabetes)	Group iii (smokers with diabetes)
triglycerides (mg/dl)	55.0	211.3	275.2
	56.2	201.7	266.3
	62.2	198.9	271.4
	67.1	232.2	228.5
	56.8	229.0	263.2
	65.2	198.0	269.9
	52.8	217.0	255.0
	53.1	198.2	268.0
	62.9	197.7	276.4
	71.0	225.2	276.2

Lipid Status in Normal and Pathological Conditions

Figure III represent the level of serum cholesterol, triglycerides and HDL in the normal and pathological conditions. The level of cholesterol and triglyceride was found to be markedly ($P<0.05$) elevated in Group II and Group III subjects when compared to normal subjects (Group I). The level of HDL was significantly ($P<0.05$) reduced in Group II and Group III subjects when compared to normal subjects of Group I. Diabetes is associated with profound alterations in the plasma lipid and lipoprotein profile as well as increased risk of premature atherosclerosis, coronary insufficiency and myocardial infarction [7]. The most common abnormalities in diabetes are hyperlipidemia, hypertriglyceridemia and hypercholesterolemia [15]. Liver and other extra hepatic tissues participate in the uptake, oxidation and metabolic conversion of free fatty acids, synthesis of cholesterol and phospholipids and secretion of specific classes of plasma lipoproteins.

The increased level of serum lipids in diabetic subjects is mainly due to the increased mobilization of free fatty acids from peripheral deposits, since insulin inhibits the hormone sensitive lipase [4].

On the other hand glucagons, catecholamines and other hormones enhance lipolysis. The marked hyperlipidemia that characterizes diabetic state may therefore be regarded as a consequence of uninhibited actions of lipolytic hormones on the fat depots [13]. Hypercholesterolemia is a common occurrence in diabetes [9]. Diabetes is also known to be associated with an increase in the synthesis of cholesterol, which may be due to the increased activity of HMG CoA reeducates [13].

Hypertriglyceridemia is a common finding in patients with diabetes mellitus, a particularly in those who have vascular complications. Bruan and Severson (1992) reported a deficiency of lipoprotein lipase (LPL) activity might contribute significantly to the elevation of triglycerides in diabetes. A number of observations indicate that plasma HDL that is low in diabetics [11, 16]. HDL cholesterol levels are inversely related to cardiovascular disease where LDL is positively associated. Increased level of LDL-cholesterol may arise from glycosylation of lysyl residues of APO protein B as well as from decreasing affinity for LDL receptor and hence, decreased metabolism [12, 17].

Conclusion

Thus diabetic patients who avoid smoking are more likely to extend their lifespan in order to lead a healthy living.

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Competing Interests

Authors have declared that no competing interests exist.

Authors' Contributions

All the Authors have equal contributions in designing, executing and preparation of manuscript

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