

HEMATOLOGICAL CHANGES IN TOBACCO USING TYPE 2 DIABETIC PATIENTS

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ABSTRACT

Background: Hematological parameters are influenced by the use of tobacco. This study aimed to evaluate the effect of tobacco on different hematological parameters in type 2 diabetics.

Material & Methods: This experimental study was carried out in Department of Pathology, Gomal Medical College D.I.Khan, Pakistan. One hundred type 2 diabetic adult patients were requested to volunteer their biodata on a given proforma. Blood samples were collected from these patients for hematological parameters. The subjects were divided into four groups: Non-tobacco using diabetics (control group), Smoking diabetics, Snuff using diabetics, and Both smoking & snuff using diabetics.

Results: Among 100 diabetic patients 25 were non-tobacco using, 25 smokers, 25 snuff using and 25 both. Mean hemoglobin level of smoking diabetic group was significantly higher (16.26 ± 1.960) as compared to (14.652 ± 1.486) of diabetic control group. Similarly mean hemoglobin level of both smoking and snuff using diabetic group was also significantly higher (16.388 ± 1.436). Mean eosinophil count of smoking diabetic group as well as snuff using diabetic group was significantly lower as compared to control group, (0.44 ± 0.917) and (1.44 ± 1.85) respectively.

Conclusion: The hemoglobin level of smoking and both smoking & snuff using diabetic subjects is significantly higher as compared to non-tobacco using diabetic subjects. Similarly eosinophil count is significantly lower in smoking and snuff using diabetic subjects. The rest of the parameters are non-significantly changed.

Key words: Diabetes, Tobacco, Blood, Smoking, Snuff.

INTRODUCTION

World Health Organization (WHO) defines Diabetes mellitus (DM) as a chronic disease that occurs when the pancreas does not produce enough insulin, or alternatively, when the body cannot effectively use insulin it produces. Hyperglycemia is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially, the nerves and blood vessels.¹ Diabetes is a leading cause of end stage renal disease, adult-onset blindness and non-traumatic lower extremity amputations in the United States.²

DM is associated with insulin deficiency a relative impairment in pancreatic insulin secretion with varying degrees of peripheral resistance to the action of insulin.³ Its long term complications include development of neuropathy, retinopathy, and nephropathy, generalized degenerative changes in large and small blood vessels and increased susceptibility to infection.⁴

DM is major global health problem. According to estimates of the WHO there were more than

135 million adults suffering from diabetes worldwide in 1995. The prevalence of all types of diagnosed diabetes in most western societies is 3-7%. Countries with the highest absolute number of diabetics are India (19 million), China (16 million), and the United States (14 million).⁵

Smoking is the leading cause of avoidable death globally. A number of primary studies have assessed the association between smoking and incidence of glucose abnormalities, suggesting that active smoking could be independently associated with glucose intolerance, impaired fasting glucose, and type 2 diabetes; smoking may therefore be a modifiable risk factor for type 2 diabetes. However, the quality of existing studies has not been systematically assessed and the clinical features of these studies have not been fully assessed to further characterize this potential association and its determinants.⁶

Although cigarette smoking has been established as a risk factor for cardiovascular disease, its association with type-2 diabetes is less clear.⁷ The epidemiological evidence linking smoking with insulin resistance is considerable. This evidence is

even more convincing because there is a dose response relationship between smoking and the risk of type 2 diabetes. Similarly, there is a time-dependent decrease in risk of type 2 DM for those who quit smoking. Insulin resistance may precede the development of type 2 DM.⁸

Prospectively, the increased risk for diabetes in smoking men and women is around 50%. Many patients with type 1 and type 2 DM are at risk for micro and macrovascular complications.⁹

Several epidemiological studies have already noted a relationship between some components of metabolic syndrome and leukocytes. Leukocyte count has been positively associated with elevated cardiovascular mortality, mainly due to coronary heart disease and ischemic stroke, and it has been considered to be a marker of inflammation associated with the initiation and development of atherosclerosis. If the leukocyte count is an independent risk factor of metabolic syndrome, then it is important to consider the role of the constituent cell types involved. However, few systemic evaluations have investigated the relation between metabolic syndrome and differential leukocyte counts.¹⁰

In contrast, the impact of inflammation on microangiopathy is less well established. More importantly, there has been little research on the relation between white blood cell (WBC) count and vascular complications of diabetes, although a recent report did suggest an association between WBC count and albuminuria in type-2 diabetes.¹¹

Activation of the immune system and inflammation may be detected by an increase in a number of markers, including WBC count and cytokine and plasminogen activator inhibitor-1 (PAI-1) concentrations. Because of the cross-sectional relationship between markers of inflammation and insulin resistance and/or type 2 diabetes, it has been suggested that a chronic low-grade activation of the immune system may play a role in the pathogenesis of type 2 diabetes. There is some evidence from prospective studies in Pima Indians and other populations to support the hypothesis that changed markers of inflammation, such as a high WBC count, plasma fibrinogen, PAI-1, gamma globulin, and lower albumin concentrations, are associated with the later development of type 2 diabetes.¹² In a study of comparison between smokers and non-smokers platelet count and hemoglobin levels were not significantly different between the two groups, but WBC count was higher in smokers than non-smokers.¹³

This study aimed to evaluate the effect of tobacco on different hematological parameters in type 2 diabetics.

MATERIAL AND METHODS

This experimental study was conducted at Department of Pathology, Gomal Medical College D.I.Khan, Pakistan. One hundred type 2 diabetic patients of different age and sex with no tobacco use or/with tobacco use were requested to volunteer their biodata on a given Performa.

The subjects were divided into four groups:

- i) Non-tobacco using diabetics (control group)
- ii) Smoking diabetics
- iii) Snuff using diabetics
- iv) Both smoking and snuff using diabetics

Participants were evaluated with a home interview to determine family medical history, current medical conditions and medication use.

Blood samples were collected from the patients of D.I.Khan District, Khyber Pakhtun Khwa, Pakistan. In each case 5.0 ml blood sample was collected.

Determination of hemoglobin, WBC count, differential leukocyte count, mean corpuscular volume, mean corpuscular hemoglobin and platelets count using Automatic Hematology Analyzer (NIHON KOHDEN).

Type 2 diabetic patients diagnosed for ≥ 5 years type 2 diabetic patients were included in the study.

Type 1 diabetics and patients below the age of 30 years were excluded.

The outcome variables of interest were the change in hemoglobin, TLC, DLC, MCV, MCH and platelets count.

The data was analyzed using SPSS and the results of non-tobacco using type 2 diabetics were compared with the results of smoking, snuff using and both using type 2 diabetics.

The purpose of this study was to assess the hematological parameters among smoking, snuff and both smoking and snuff using type 2 diabetic patients.

RESULTS

A total of 100 diabetic patients were taken for this study, which included 25 non-tobacco using, 25 smoking, 25 snuff using and 25 both smoking and snuff using type 2 diabetic patients. The non-tobacco using group was diabetic control group. The results of hemoglobin, total leukocyte count (TLC), differential leukocyte count (DLC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and platelets count are

Table : Results of Blood Complete Picture in Control and Tobacco user diabetics. (n= 25)

Parameter	Normal Values	Control Group	Smoker group	Snuff using group	Smoking + Snuff using group
Hb g/dl	13 to 17	14.65±1.48	16.26±1.96	15.24±1.76	16.38±1.43
TLC /mm ³	4,000-11,000	9228±3055	8044±1740	8895±2859	8480±1545
Neutrophils%	40-80	59±8.62	56.44±8.17	61.41±10.58	57.32±5.94
Lymphocytes%	20-40	35.6±8.18	39.4±8.10	34.70±9.97	37.72±5.85
Monocytes%	2-10	3.92±1.41	3.72±1.51	3.09±1.9	4.04±1.67
Eosinophils%	1-6	1.44±1.85	0.44±0.91	0.52±1.21	1.52±2.00
Basophils%	0-2	0.04±0.2	0	0.04±0.20	0
MCV fl	76-96	84.7±7.74	85.68± 7.76	85.16±8.03	86.96±4.07
MCH pg	27-35	30.00±3.18	30.62± 3.60	31.40±4.25	29.94±3.87
Platelets /mm ³	150,000-400,000	246,160±80,395	229,240±67,054	243,400±68,033	244,120±43,821

Results are shown as Mean ± SD

given in table. T-tests were conducted to evaluate the data by comparing each tobacco using group with non- tobacco using control group. Mean hemoglobin level of smoking diabetic group was significantly higher (16.26±1.960) as compared to (14.652±1.486) of diabetic control group with p-value 0.007. Similarly mean hemoglobin level of both smoking and snuff using diabetic group was also significantly higher (16.388±1.436) with p-value 0.001. Mean eosinophil count of smoking diabetic group was significantly lower (0.44±0.917) as compared to control group (1.44±1.850) with p-value 0.03. Mean eosinophil count of snuff using diabetic group was significantly lower (0.5200±1.215) as compared to control group (1.44±1.850) with p-value 0.04. The other parameters were non-significantly changed with p-value >0.05.

DISCUSSION

Current smoking is associated with increase in WBC count and Hb levels in total blood, the former relationship recognized in subjects who have stopped smoking for 5-9.9 years. Obesity and aging are inversely related with Hb level in blood.¹⁴

In another study it was reported that smokers had significantly higher Hb levels than non-smokers. Hemoglobin levels were higher in women over the age of 50 than in younger women but

there was no significant linear relationship of Hb levels with age in men.¹⁵

In our study the mean hemoglobin level was significantly higher in smoking and both smoking & snuff using type 2 diabetic patients but there was no significant difference observed in snuff using type 2 diabetic subjects.

The hemoglobin level in snuff using diabetics was also found to be higher than non-tobacco using subjects but the increase was not significant. Hence tobacco has an effect on hemoglobin level in type 2 diabetic patients.

It was reported that WBC count remains higher in diabetic patients when compared to non-diabetics with genetic predisposition to type 2 diabetes.¹⁷ In another study it was concluded that WBC count is associated with current smoking but not with age, sex, hypertension, diabetes mellitus or hypercholesterolemia which is more in smokers as compared to non-smoker.¹⁷

In our study there was no significant difference in the TLC level of smoking, snuff using and both smoking & snuff using type 2 diabetic subjects but in the DLC count eosinophil count was significantly lower in smoking and snuff using type 2 diabetic subjects.

In fact, the metabolite levels were similar in smokeless tobacco users and nonusers, suggest-

ing that, unlike cigarette smoking, snuff use did not lead to an increased interaction of platelets and vessel walls or cause platelet activation.¹⁸

In our study no significant difference was found in platelets count, MCV and MCH levels of smoking, snuff using and both smoking and snuff using type 2 diabetic subjects as compared to non-tobacco using subjects.

CONCLUSION

The hemoglobin level of smoking and both smoking & snuff using diabetic subjects was significantly higher as compared to non-tobacco using diabetic subjects. Similarly eosinophil count was significantly lower in smoking and snuff using diabetic subjects. The rest of the parameters were non-significantly changed.

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