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Inflammatory Marker and Sociodemographic Profile of Type 2 Diabetes Mellitus Patients

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Abstract

Introduction with Objective: *To evaluate the inflammatory marker and sociodemographic profile of type 2 diabetes mellitus patients.* ***Methods:*** *This study was a hospital based cross sectional study conducted at the department of Biochemistry of BIRDEM academy from January 2023 to December 2023. Purposive sampling was done according to availability of patients. Ethical clearance was obtained from the appropriate authority to get permission to collect data. The collected data were entered into the computer and analyzed by using SPSS (version 20.1)* ***Results:*** *mean age of the patients was 46.2±9.38 years. In our study, most of the patients were male (n=75, 51%). 77 patients (52%) had the family history of diabetes mellitus. 52.0% of patients were smokers, and 48.7% of patients consumed alcohol. Only 25.0% of patients engaged in physical activity. The majority of patients (31%) were moderately active in our study, while 25% of patients were inactive. Ischaemic heart disease was the most commonly associated disease (57%) with DM. GGT level was 41.94±26.35 u/L and hsCRP level was 4.41±11.08 mg/L of the study population.* ***Conclusions:*** *High levels of pro-inflammatory cytokines and hs-CRP are strongly associated with chronic inflammation and oxidative stress in the pathogenesis of T2DM.*

Keywords: *Inflammatory marker, sociodemographic profile, Diabetes mellitus.*

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Introduction:

Diabetes mellitus (DM) is the most common endocrine disease in the world[1]. It is a chronic metabolic disease characterized by high sugar levels (hyperglycemia) as a result of defects in insulin secretion, insulin action or both. Poor insulin action leads to abnormalities of carbohydrate, fat and protein metabolism in target tissues[2]. It is classified into two major types- Type 1 & Type 2[3]. Approximately 5–10% of patients with diabetes have type 1 diabetes mellitus (T1DM) which occurs through the destruction of pancreatic beta-cells. The majority of patients with DM (90–95%) develop type 2 diabetes mellitus (T2DM)[4]. This type of DM arises through the gradual loss of insulin secretion which may be partly related to obesity, pancreatic beta-cell function decline and eventual hyperglycaemia[2]. It is also a chronic inflammatory disease. Low grade inflammation and immune activation are closely related to the pathogenesis and complications of DM[1]. Rapid economic development and urbanization have led to a rising burden of diabetes in many parts of the world. T2DM affects individuals' functional capacities and quality of life, leading to significant morbidity and premature mortality. The global rise in DM is referred to population growth, ageing, increasing trends towards an unhealthy diet, obesity and modern lifestyles[5]. Recent evidence indicates that risk factors can

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induce chronic inflammations, which are also related with T2DM such as adiposity, a sedentary lifestyle, and diet. Previous study revealed a positive correlation between diabetes risk and inflammation, including high intake of saturated fatty acids, sugar-sweetened beverages, and starchy food, combined with low consumption of fruits, vegetables, and whole grain. Chronic systemic inflammation has been linked to non-communicable diseases such as cancer, cardiovascular disease, and diabetes[4]. Chronic low-grade inflammation is characterized by slightly elevated blood concentrations of acute-phase proteins, cytokines, and mediators with endothelial activation capacity. CRP is a non-specific inflammation marker that may contribute to insulin resistance by increasing phosphorylation of IRS and by increasing the synthesis of cytokines like TNF and IL-6. Although the role of anti-inflammatory cytokines in T2DM has received much less attention but IL-10 levels are known to be markedly reduced in T2DM patients .There are some studies showing that IL12 P70 plays a role in pathogenesis of DM type 1 and 2 . IL-17 is an important pro-inflammatory cytokine. It increases chemokine production and organizes monocytes and neutrophils[1].

Methods:

This study was a hospital based cross sectional study conducted at the department of Biochemistry of BIRDEM academy from January 2023 to December 2023. In this study total 148 subjects were selected according to selection criteria from the outpatient department of BIRDEM general hospital. Data was collected directly in the corridor just outside the medical outpatient department. A structured questionnaire was filled up for each patient to collect data after taking verbal and informed written consent. GGT and hsCRP were measured and included in the questionnaire. Collected data were checked, processed, edited and analyzed with the help of SPSS (29). Biochemical analysis: Biochemical measurements of GGT and hsCRP were carried out at the Clinical Biochemistry Department in General Laboratory, BIRDEM General Hospital. Tests were done immediately after blood collection. If delayed, then preserved at 2-8°elcius.

Results:

According to table I, mean age of the patients was 46.2 9.38 years. In our study, most of the patients were male (n=75, 51%). 77 patients (52%) had the family history of diabetes mellitus.

Table I: Demographic characteristics of the study population (N=148)

Parameter	Frequencies	Percentage
Gender		
Male	75	51.0%
Female	73	49.0%
Age		
(Mean±SD) years	46.2±9.38	
Median (Range)	47.0 (30.0-60.0)	
Family History of DM		
positive	77	52.0%
Negative	71	48%

*Values are expressed as mean± SD

According to Table II, 52.0% of patients were smokers, and 48.7% of patients consumed alcohol. Only 25.0% of patients engaged in physical activity. The majority of patients (31%) were moderately active in our study, while 25% of patients were inactive.

Table II: Lifestyle factors associated with Diabetes Mellitus (N=148)

Parameter	Frequencies	Percentage
Smoking	77	52%
Alcohol	72	48.7%
Physical activity		
Active	37	25.0%
Inactive	37	25.0%
Moderately Active	46	31.0%
Moderately Inactive	28	19.0%

According to table III, A very high percentage of diabetes patients were found to be co-morbid with different types of diseases that included hypertension (50%), Ischaemic heart disease (57%), Asthma or COPD (45%), Cerebrovacular disease (53%), CKD (49%). Ischaemic heart disease was the most commonly associated disease (57%) with DM

Table III: Common co-morbid conditions associated with Diabetes mellitus (N=148)

Co-morbidities	Number	Percentage
Hypertension	74	50
Ischaemic heart disease	84	57
Cerebrovacular disease	78	53
Asthma or COPD	67	45
CKD	72	49

According to table IV, GGT level was 41.94±26.35 u/L and hsCRP level was 4.41±11.08 mg/L of the study population.

Table IV: Inflammatory markers of the diabetes mellitus patients (N=148)

Parameters with unit	Level mean±SD
Gamma-glutamyl transferase(u/L)	41.94±26.35
hsCRP (mg/L)	4.41±11.08

* Values are expressed as mean± SD

Discussion:

The etiology of DM is believed to be multifactorial. Many individual level nonmodifiable risk factorsincluding population ageing, genetic, ethnicity, and family history have been prospectively associated with T2DM[6].The prevalence of T2DM and comorbidities differed by demographic factors, such as sex, ethnicity and age[7]. In this study,The mean age of the patients was 46.2"± 9.38" years, with the median age being year 47.0 (range:(30.0-60.0).The International Diabetes Federation (IDF) estimated that 1 in 11 adults aged 20–79 years (415 million adults) had DM globally in 2015[8]. In our study, majority of the patients were male accounting for 51% of the total, which differ from previous studies,showed that there were significantly more female patients (3072)

compared to male patients (1050) with a mean age of 59.21 years. Our data revealed a slightly higher prevalence of T2DM amongst male patients in contrast to female patients. This may be associated with sociocultural factors such as varying behavioural patterns between male patients and female patients which influences their nutritional patterns, lifestyle and attitudes towards treatment and prevention. A very high percentage of DM patients were found to be co-morbid with different types of diseases that included hypertension (50%), Ischaemic heart disease (57%), Asthma or COPD (45%), Cerebrovacular disease (53%), CKD (49%). Ischaemic heart disease was the most commonly associated disease (57%) with DM. From previous study, it was evident that, among patients with T2DM,cardiovascular complications are the leading cause of morbidity and mortality, and kidney complications are highly prevalent in patients in Asia with diabetes mellitus[7]. This study revealed that GGT level was 41.94±26.35 u/L and hsCRP level was 4.41±11.08 mg/L of the study population. A number of studies have reported that elevated baseline GGT levels, even within the normal range, are strongly associated with increased risk of T2DM .A positive curvilinear association between GGT and incident diabetes mellitus was present, with a saturation effect predicted at 24 IU/L of serum GGT levels. Risk of diabetes mellitus increases by 4% for every 1 IU/L increase in GGT when GGT is less than 24 IU/L[9].C-reactive protein (CRP) is a marker for systemic inflammation, has a significant role in the pathogenesis of atherosclerotic lesions and may predict T2DM development and its cardiovascular complications[10].

Conclusion:

According to our research, T2DM is more common in men and rises with age. Diabetes prevalence in adults was found to be significantly predicted by family history of the disease. According to this study, inflammatory biomarkers have the ability to predict the disease and provide direction for future treatment approaches.

Conflict of Interest: None.

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