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Factors Influence Diabetic Type I Complications, Retrospective Study In Zlitan Diabetic Center

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ABSTRACT

Background: The aim of this study was to determine percentage of type I diabetic patients (T1DM) from total diabetic clinical visits to Zlitan Diabetic Center (ZDC) during the period between January and May 2014, and determine the incidence of long-term diabetic complications according to recorded HbA1c level and disease duration.

Methods: This was a retrospective study. Data was obtained from Zlitan Diabetic Center from Jan 2014 to May 2014. Only 91 patients out of total 1275 diabetic patients were diagnosed as T1DM. Patients were categorized first according to age of diagnosis second according to their diabetic care through HbA1c level and finally in base of disease duration then patients were categorized according to the relation between HbA1c level and disease duration and the incidences of long-term diabetic complication.

Results: About of 45.05% of patients were diagnosed with disease at age less than 18 year's old, our sample showed in poor health diabetic care, where only 4.40% showed acceptable diabetic care (HbA1c <7) and only 21.98 at the border lines (HbA1c 7-9) while the reset of patients recorded with bad records where HbA1c recorded as more than 9. On the other hand, this sample indicated high prevalences of long-term diabetic complication, where 12.09% of patients were diagnosed with Retinopathy, moreover 17.58% of patients suffered from a Neuropathy state, while the Angiopathy state were observed only in 3.30% of patients, also 8.79% of patients were recorded with the Nephropathy complication. Finally, only three patients were diagnosed with Angiopathy state, two of them the level of HbA1c was not recorded and all of them diagnosed with this state within the first five years of diabetic diagnosis.

Conclusion: In this group of T1DM patients, the onset of disease was high at age more than 18 year's old. The present study showed that more younger patients present to the hospital in a state of diabetic complications in early years of disease diagnosis. Efforts should be directed at improving the knowledge and skills of the primary health care personnel to be able to diagnose and refer these cases earlier.

KEYWORDS: Diabetes complications, Diabetes mellitus, type 1, Diabetic nephropathies, Retinopathy, Neuropathy, angiopathy

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INTRODUCTION

The global variation in the incidence of type I diabetic patients (T1DM) among patients has been confirmed to be large. Geographical variations in this incidence appears to reflect the global distribution of major ethnic populations, which demonstrates a different degree of genetic susceptibility to diabetes among populations. Although genetic susceptibility is necessary for the development of T1DM. The etiology of this disease is a multifactorial one. The wide global variation in the incidence of T1DM between and within major ethnic groups suggests that environmental factors are significant in the etiology of T1DM. It is typically considered a disease of childhood and adolescence, but can occur at any age. For example, one-fourth of all cases are diagnosed after adulthood. This type of diabetes accounts for approximately two-thirds of the newly diagnosed cases in patients ≥19 years of age. [1-3] In an earlier systematic review[4] investigators reported on the epidemiology of T1DM incidence in young adults (age >15 years) as compared with childhood-onset T1DM (age <15 years). The key findings of that review included the following: 1) there is a general paucity of data on adult-onset T1DM incidence; 2) country-to-country variations in incidence in those aged >15 years paralleled to those of children. Recent data suggest a further shift in our thinking, with the recognition that more than half of all new cases of T1DM occur in adults. However, many adults may not require insulin at diagnosis of T1DM and have a more gradual onset of hyperglycemia, often leading to misclassification and inappropriate care. Indeed, misdiagnosis occurs in nearly 40% of adults with new T1DM, with the risk of error increasing with age [5, 6].

This disease is fatal if it is left untreated. The optimal treatment of T1DM includes basal and multiple doses of insulin using injections or an insulin pump, frequent checking of blood glucose concentrations, and adjusting insulin doses for carbohydrate intake and physical activity. Individuals with T1DM are at risk of acute complications (e.g., severe hypoglycemia, diabetic ketoacidosis) and chronic complications, including both macrovascular and microvascular diseases, and may experience a shorter life expectancy than the general population [7]. Adulthood-onset T1DM is more common than childhood-onset type 1 diabetes, as shown from epidemiological data from both high-risk areas such as Northern Europe and low-risk areas such as China [4, 8-10].

Hemoglobin A1c (HbA1c) is one of the most used biomarkers to monitor blood glucose levels, as it is reliable, relatively easy, and cheap to obtain. Thus, HbA1c is generally accepted as the gold standard to assess blood glucose control [11]. It is well-established that HbA1c levels are associated with the development of complications of diabetes [2, 4, 5]. However, HbA1c has several limitations in clinical practice [11]. First, HbA1c reflects the glycemia of the last 2–3 months and, as such, does not provide continuous feedback for the optimization of glycemic control [11]. Second, HbA1c is not accurate in

several conditions including in patients with anemia, iron deficiency, hemoglobinopathies, or chronic kidney diseases [11].

It is well known that duration of diabetes, age and, as recently shown, age at diagnosis are important determinants of morbidity and mortality. One study has shown that the effect of diabetic kidney disease on mortality depends marginally on duration [12] and in the general population cardiovascular disease (CVD) raises mortality immediately after an event [13, 14]. Diabetic retinopathy (DR) remains an important cause of vision loss and preventable blindness in adults, particularly in middle and high-income countries [15]. DR is responsible for 2.6% of global blindness [16]. Long-term complications of T1DM include microvascular complications and macrovascular disease. Despite the important advances in the treatment of T1DM during the last decades, these complications still represent the leading cause of morbidity and mortality in patients with T1DM. Extensive evidence indicates that structural and functional alterations of the kidney, retina, nerves and large arteries occur already in the first years after the onset of diabetes [17]. The objective of this study was to determine the complications of T1DM and the factors that influence them.

METHODS AND RESEARCH DESIGN

Patients at different ages with T1DM admitted to the Zlitan diabetic center, from January 01,2014 to May 31, 2014 were included in the study. Their files were analyzed to collect the following data: age, sex, file number, clinical presentation at the time of admission to the center. Height, weight, were determined. Also, long term complications states were recorded according to each diagnosis's criterion.

RESULTS

A total of 1275 patients with diabetic visited Zlitan Diabetic Center (ZDC) during 2014. Our data is presented according to the age at the first diagnosis of disease. Only 9.64% of the patients were diagnosed with type I and 90.36% were type 2 diabetic patients (Figure.1A). Among those with T1DM, 54.95% were diagnosed at age 18 year's old or older (Figure.1B) 28.75% of them diagnosed at age between 18-24 while 26.37% of them were diagnosed at age more than 24 year's old (Figure. 2C).

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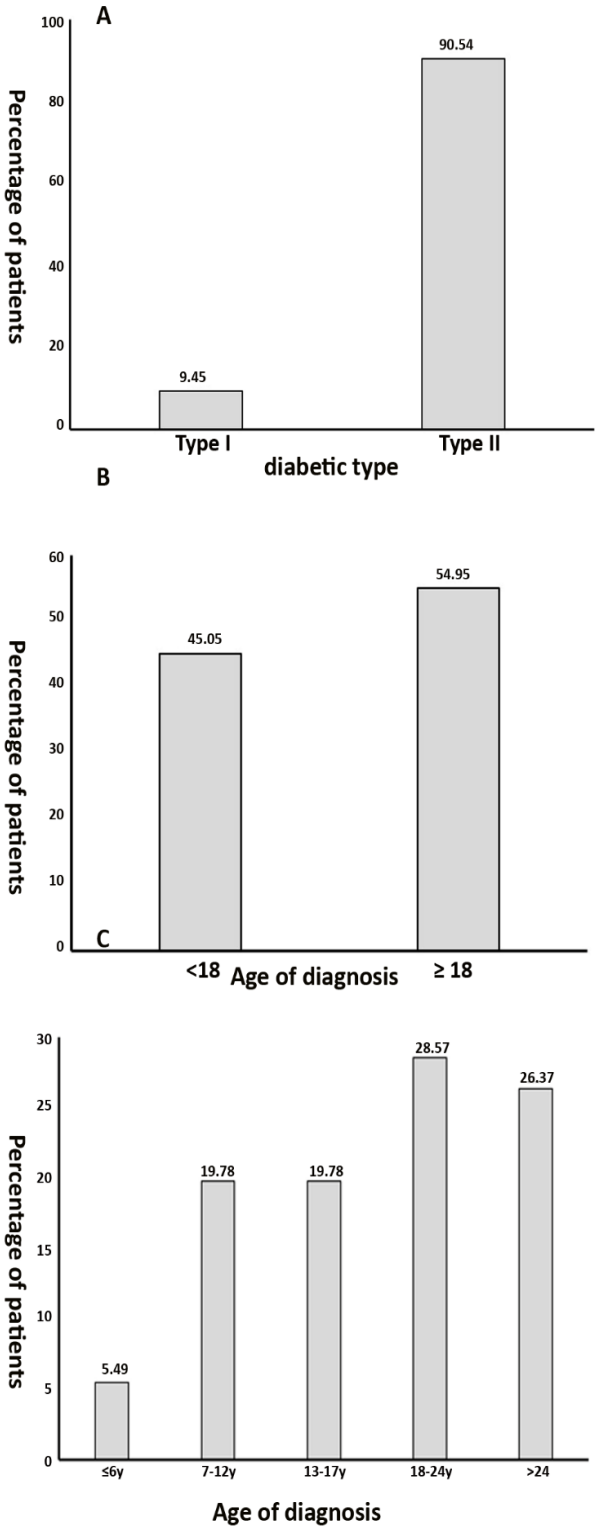

Figure.1: A. Percentage of Type I diabetic patients. **B.** Distribution of Type I diabetic patients according to age of diagnosis. **C.** Distribution of Type I diabetic patients according to age of diagnosis in details.

Glycemic control based on HbA1C results was as follows: only 4.4% of patient showed good diabetic control (HbA1c ≤ 7), 21.98% were at the border line (HbA1c 7 -9) and 53.85% showed very bad control (HbA1C >9). More than 23% of patients had HbA1c within >9-11, 17.58% in the HbA1c range of >11-13 and 13.19% had HbA1c >13. On the other hand, 19.78% of patients did not show any record of HbA1c (Figure.2A). Neuropathy, retinopathy, angiopathy, and nephropathy were the most long-term diabetic complications. Neuropathy was diagnosed in 17.58% of the patients, retinopathy was recorded in 12.09%, angiopathy was detected in only 3.30% of patients. Finally, 8.70% of the patients recorded with nephropathy (Figure.2B).

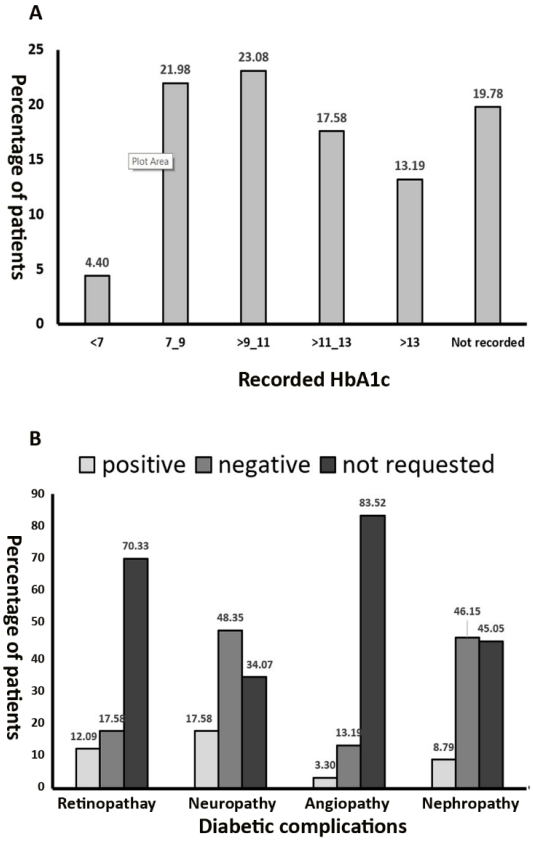

Figure.2: A. Distribution of Type I diabetic patients according to HbA1c records. **B.** Distribution of patients according to the incidence of the common long-term complications

Comparison between those patients who did not have any HbA1c records and those who had records show similar pattern between these the two groups. For example, there were 16 patients who were diagnosed with neuropathy, there were eight patients (50%) were with HbA1c records and other eight patients were without any records. Similar

results were shown in case of retinopathy where 54.55% were without HbA1c records and the rest were with records. Regarding angiopathy, there were only three patients, 66.67% were without records. On the other hand, 75% of total cases of nephropathy were among those with HbA1C records (Table.1).

	Retinopathy	Neuropathy	Angiopathy	Nephropathy	Total
Total number of patients(with and without records)	11.00	16.00	3.00	8.00	38
% of patients	12.09%	17.58%	3.30%	8.79%	
HbA1c <7	1.00	1.00		1.00	
HbA1c 7_9	1.00	1.00		2.00	
HbA1c >9_11	1.00	4.00		1.00	
HbA1c >11_13	1.00	2.00	1.00	1.00	
HbA1c >13	1.00			1.00	
Number of patients without HbA1c recorded	6.00	8.00	2.00	2.00	18
% of patients without HbA1c recorded	54.55%	50.00%	66.67%	25%	

As mentioned above (see Figure.1), in the study type I diabetes meanly common on patients at age of more than 18 year's old. Normally the long-term disease duration should be the main long term complication risk factor, according to that patient were categorized according to disease duration as the following 56.18% of patients are newly diagnosed patient with disease duration equal to or less than five years, also 25.84% of patients were at duration between 6-10 years duration while only 17.89% of patients were suffering from this at more than ten years (Figure.3A). By connecting the disease duration with the long-term disease complication, it is expected to notice these complications with the patients who categorized with long disease duration group. This was acceptable in case of Retinopathy were 63.64% of patients within the category of patients with more than 10 years disease duration while 21.43% and 9.09% of patients were at duration of 1-5 years and 6-10 years respectively (Figure.3B). in less extend the same were recorded with the neuropathy state were 50% of patients were recorded with patients of more than 10 years disease duration and 21.43 and 28.75 were at duration of 1-5 years and 6-10 years respectively (Figure.3B). while 50% 0f patients diagnosed with Nephropathy state were 6-10 years and 33.33% of patients were at duration of 1-5 years, but only 16.67% of patients were categorized at duration of more than 10 years (Figure.3B). Unfortunately, in case of Angiopathy all diagnosed patients were categorized on the group of 1-5 years disease duration (Figure.3B).

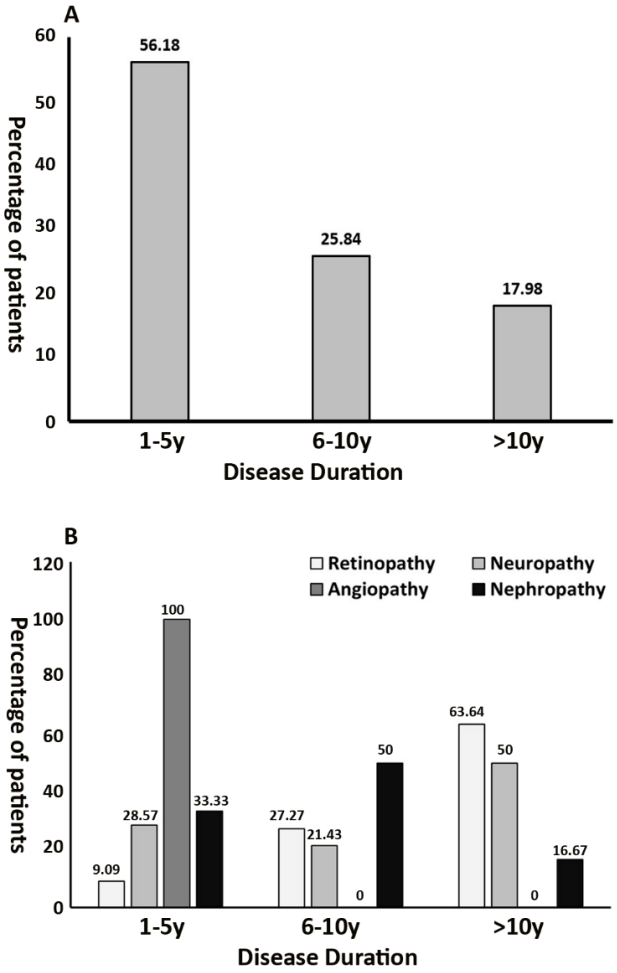

Figure.3. A. Distribution of patients according to disease duration. **B.** Distribution of long-term diabetic complication according to duration of disease

DISCUSSION

Type 1 diabetes accounts for 5–10% of the total cases of diabetes worldwide [18]. In specific study ranging from less than 1% of the total cases in certain Pacific countries to more than 15% of the total cases in Northern European populations in 2017 [19]. Consistent with prevalence of Type I diabetic worldwide, our data was 9.64% (Figure.1A). Interestingly recent study included specific population from sub-Saharan Africa indicated that the peak age of onset of type 1 diabetes seems to occur after 18-20 years [20]. Consistence with sub-Saharan Africa study, our results indicated that 54.95% of patients were diagnosed at age of ≥18 year's old (Figure.1A) and 19.78% of the other patients who diagnosed at age less than 18 year's old were diagnosed as younger children (Age of 13-17year's old, Figure1C). On the other hand a another retrospective study was conducted on Libyan children aged 0-14 years reported

that the incidence of T1D in Libyan children in the West, South, and Tripoli regions appears to be rising, with a higher rate in the 0-4 and 5-9 year age groups, but this because they include only children less than 14 years on their study.[21]

Records of HbA1c level of our type I diabetic sample showed a big question mark about glycemic control, where only 4.4% of patients showed accepted glycemic managements (HbA1c≤ 7%, Figure.2A). It was established that, the incidence of proliferative retinopathy and persistent macroalbuminuria increased sharply and occurred earlier with increasing long-term mean HbA1c [22, 23]. Data from table.1 including 91 persons with Type I diabetes shows that renal complications are still common in persons with Type I diabetes. 11 patients (12.09% of total patients) had already developed neuropathy state, interestingly 6 of them did not have any HbA1c level recorded. Also 50% of patients diagnosed with a state of retinopathy (8 out of 16 patients) did not show any HbA1c level record. Moreover, two of three patients who, diagnosed with angiopathy also did not display any record too. This could explained as a state of patient incompliance as mentioned before on a study conducted 2946 patients with type 1 diabetes, where, (29.4%) had a record of either appointment non-attendance or medication non-compliance in the 30 month compliance assessment period [24]. The weak health care system on Libya is the main cause of poor glycemic control and the high level of incidence of diabetic complication. Also, this could explain the unbelievable results about the incidence of the state of Angiopathy with patients diagnosed with the type I diabetic disease within only the first five year of disease duration (Figure.3B). Not only, a huge wandering about Angiopathy incidence but also it includes the incidence of Nephropathy within the first five years of disease where it represented 33.33% of diagnosed patients. Since hyperglycemia is a prerequisite for development of early signs of diabetic angiopathy and nephropathy, it is possible that patients in our sample have had much higher historical glucose levels [25].

CONCLUSION

In conclusion, in this cross-sectional analysis of patients with Type I Diabetic using HbA1c and disease duration were associated with complications of diabetes. Research on risk factors for Type I Diabetic is an active area of research to identify genetic and environmental triggers that could potentially be targeted for intervention. While significant advances have been made worldwide in the clinical care of Type I Diabetic with resultant improvements in quality of life and clinical outcomes, much more needs to be done locally to improve care of, and ultimately find a cure for Type I Diabetic. A wide variety of epidemiologic studies should be done. Because they have an important on-going role to investigate the complex causes, clinical care, prevention, and cure of Type I Diabetic.

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