

Presenting Features of Diabetes Mellitus

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Introduction

Diabetes mellitus is one of the oldest known human diseases. The earliest-known record of diabetes mentioned on third-dynasty Egyptian papyrus by physician Hesy-Ra states polyuria as a symptom of the disease.⁽¹⁾ In 600–400 BC, ancient Indian scientists Charaka and Sushruta had described the morphological differences among patients passing large volume of sweet urine.⁽²⁾ History has come a long way as has scientific advancement on the diagnosis and treatment of diabetes, but only to face a population of 70 million diabetics in India by year 2025.⁽²⁾

Much has been written and spoken about treatment strategies of diabetes. However, we are still unclear about screening strategies for diabetes. Clinicians test for diabetes when confronted with classical symptoms of hyperglycemia, symptoms suggestive of chronic or acute illness related to diabetes, as part of the routine evaluation of illness not related to diabetes and as part of voluntary preventing screening. However, there is paucity of data regarding the circumstances which lead to the diagnosis of diabetes mellitus. This information may enable us to better define the screening policies for diabetes. This study was initiated to systematically observe and analyze the clinical circumstances which led to the diagnosis of diabetes.

Materials and Methods

Adult patients aged >18 years attending the outpatient

department of Sri Ramachandra Medical college and charitable screening camps conducted by Society for Development of Community Health in Tamil Nadu (SDCHT) who were newly diagnosed to have diabetes based on diagnostic criteria recommended by World Health Organization (WHO) formed the study population.⁽³⁾ The study spanned from January 2007 to September 2009. Patients were interviewed about the clinical events and circumstances which led to the diagnosis of diabetes by one of the authors. The clinical circumstances were categorized as (a) category 1, presence of one or more classical symptoms of hyperglycemia like polyuria, polydipsia, polyphagia, and loss of weight; (b) category 2, clinical suspicion or diagnosis of chronic complications of diabetes like coronary heart disease, peripheral neuropathy, retinopathy, nephropathy, peripheral arterial disease, and chronic infections; (c) category 3, suspicion or diagnosis of acute illness which may be related to diabetes like acute coronary syndrome, stroke, hyperglycemic crisis, and acute infections; (d) category 4, asymptomatic status with no health problems or diseases not associated with diabetes or nonspecific symptoms. In addition, patients were questioned regarding their educational status, urban or rural residential status, and previous knowledge about symptoms of diabetes. Patients were excluded if they were already known to have diabetes to avoid recall bias.

Statistical analysis

Continuous variables were expressed as mean \pm SD and categorical variables were expressed as number (%). Factors associated with symptoms of hyperglycemia were studied using the chi-square test or Fisher's exact test for categorical variables and the Mann-Whitney *U*-test for continuous variables. A *P*-value <0.05 was considered to be statistically significant. Analysis was carried out with SPSS version 12.

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Results

A total of 720 patients formed the study cohort. Baseline characteristics of study patients are shown in Table 1. The male:female ratio was 1.4:1. Three-fourths were of rural background and nearly half received no formal education. Only one-tenth of the study cohort had knowledge about symptoms of diabetes. A total of 72 (10%) had preexisting hypertension. A total of 290 (40%) patients had category 1 symptoms of whom 208 (29%) had additional category 2 symptoms and 2 (0.002%) had additional category 3 symptoms. The mean duration of one or more category 1 symptoms was 15 weeks (range 4 weeks to 10 months). Five hundred four (70%) had category 2 symptoms. Chronic infections were widely prevalent (53%) among the study population. Superficial dermatophytosis of the skin was present in 208 (29%), dental caries in 104 (14%), recurrent UTI in 50 (7%), and pulmonary tuberculosis in 18 (2.5%). A total of 130 (18%) had a combination of above-mentioned infections. Twenty-four had pruritis vulvae. One hundred twenty (17%) patients had either dermatophytosis or recurrent dental caries for 2 years before a diagnosis of diabetes was made. A total of 32 of them were treated without screening for diabetes while the rest never sought medical attention till the time of diagnosis. Forty-two of 50 patients with recurrent UTI were treated without screening for diabetes for more than 6 months. Category 3 had 187 patients (26%) of whom 137 (19%) had additional category 2 symptoms. Pneumonia ($n = 30$) was the most frequent acute infection followed by pyelonephritis ($n = 22$), nonhealing folliculitis ($n = 20$), and cellulitis ($n = 18$). Among 219 patients (30%) with category 4 status, 34 (4%) were free of any symptom and were diagnosed by voluntary preventive screening, 86 (12%) were diagnosed during routine blood testing for surgery-related problems, and 99 (14%) were tested during evaluation for nonspecific symptoms.

Symptoms of hyperglycemia were associated with the presence of chronic infection ($P < 0.001$) and peripheral neuropathy ($P = 0.014$), while age ($P = 0.35$), sex ($P = 0.9$), chronic stable angina ($P = 0.9$), nephropathy ($P = 0.92$), acute coronary syndrome ($P = 0.66$), stroke ($P = 0.31$), and acute infection ($P = 0.11$) were not associated with symptoms of hyperglycemia.

Discussion

Our observation that 89% of the study participants were unaware of the classical symptoms of hyperglycemia reflects the current status of our health education strategies for early diagnosis of diabetes mellitus. Community knowledge of characteristic symptoms of diabetes is an important prerequisite while evolving screening strategies.

Table 1: Characteristics of the study population ($n = 720$)

Variable	No. (%)* or mean \pm SD
Age in years	50.5 \pm 12.5
Sex	
Male	418 (58)
Female	302 (42)
Educational status	
Uneducated	309 (43)
Elementary school	150 (21)
High school	163 (23)
Graduate	98 (13)
Residential status	
Urban	185 (26)
Rural	535 (74)
Knowledge about diabetes	
Yes	81 (11)
No	639 (89)
Category 1**	290 (40)
Two or more symptoms of hyperglycemia	204 (28)
Category 2***	504 (70)
Chronic stable angina	80 (11)
Peripheral neuropathy	86 (12)
Nephropathy	14 (2)
Chronic infections	380 (53)
Category 3	187 (26)
Acute coronary syndrome	60 (9)
Stroke or transient ischemia	32 (4)
Hyperglycemic crisis	5 (0.5)
Acute infection	90 (12.5)
Category 4	219 (30)
Asymptomatic status	34 (4)
Surgical problems	86 (12)
Nonspecific symptoms	99 (14)

*Percentage rounded to nearest whole number except category 3 in which one variable is less than $n = 8$. **A total of 208 patients had additional category 2 symptoms and 2 patients had additional category 3 symptoms. ***A total of 135 patients had additional category 3 symptoms. Figures in parentheses are in percentage

The prevalence of symptomatic hyperglycemia (40%) observed in our study is consistent with the prevalence observed in western countries. In the United Kingdom Prospective Diabetes Study (UKPDS), 50% of patients diagnosed with diabetes had symptomatic hyperglycemia and 16% had infections while a similar study observing the circumstances leading to a diagnosis of diabetes identified a prevalence of symptomatic hyperglycemia to be 32.6%.^(4,5) The high prevalence of symptomatic hyperglycemia observed in the present and previous studies also indicate that the disease has been left undetected till the development of symptoms of hyperglycemia. A lower incidence of classical symptoms is expected only if an early diagnosis is made. The observation of a very high prevalence of category 2 symptoms in our study makes us to have a relook at the current screening recommendations for diabetes. Though our study has not compared the observation with the prevalence of category 2 symptoms among the age- and sex-matched nondiabetic population, the prevalence of 70%, indicating two in every three

patients with undiagnosed diabetes, has a probable clue to the presence of disease other than the frequently sought after symptoms of diabetes. Studies which have specifically looked at the prevalence of superficial dermatophytosis in patients with diabetes have reported a prevalence of 15.5%.⁽⁶⁾ The fact that nearly two-thirds of our study cohort had superficial dermatophytosis prompts us to have a closer analysis of its association especially at the time of diagnosis using a case-control approach since it has the potential to evolve as a disease marker. Current recommendations do not advise screening tests for diabetes among asymptomatic patients aged less than 45 years with a normal weight and no additional risk factors.^(1,7) Given the importance of early diagnosis of diabetes, it may be prudent to expand the screening recommendations to patients with category 2 symptoms after confirming our observation in populations of different ethnicity. From a country like India witnessing an explosion in the incidence of diabetes, it may be argued that a wider recommendation on testing patients for diabetes is probably more beneficial than missing the millions with silent disease. More studies are required to help improve our screening recommendations for diabetes

among patients who are yet to develop the symptoms of hyperglycemia.

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