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Prevalence of Diabetes Mellitus among Patients Scheduled for Surgery under Anaesthesia in a Tertiary Care Hospital in Puducherry, India

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Abstract

Context: Diabetes mellitus is associated with higher risk for mortality and morbidity in patients undergoing surgery. This risk is reduced if the diabetes is under control prior to the surgery. When a patient is newly detected to have diabetes during preoperative assessment a delay in controlling the blood sugar is encountered before the patient is fit for surgery. The prevalence of undetected diabetes in South India has been reported to be around 10%. *Aim:* We conducted the study to determine the magnitude of this problem in our surgical population. *Materials and Methods:* Hospital records of 529 consecutive patients who came for elective surgeries in our hospital were examined to note if they were already detected to be diabetic or were newly detected during the preanaesthetic visit. *Results:* 5.1% of the surgical patients were found to be diabetic. Among them 1.8% was newly detected to have diabetes. Prevalence of diagnosed and undiagnosed diabetes in patients above 40 years of age was 5.9% and 2.9% respectively. *Conclusions:* We conclude that the problem of undetected diabetes is not as severe as suggested by previous studies. Further studies among the general population in this geographical area is needed to know if this is due to a genuine reduction in the number of diabetics in this population.

Keywords: Undetected; Diabetes; Prevalence; Anaesthesia; Surgery; Puducherry.

Introduction

Surgery induces considerable stress response which can elevate blood glucose levels [1]. Elevated blood glucose levels predispose the patients to higher incidence of wound infection, sepsis, urinary tract infections, acute myocardial infarction and acute renal failure [2]. Besides this these patients are likely to develop diabetic ketoacidosis and hyperglycemic hyperosmolar syndrome in the perioperative period [3]. Patients having diabetes have high degree of perioperative morbidity and mortality along with increased hospital stay [3]. Several factors work together to bring about this elevated risk among diabetics. Microvascular [4] and macrovascular [5] injury caused by long term diabetes leaves the organs at less than optimal state. Lapses in identifying patients with diabetes, errors related to the administration of diabetic drugs, lack of knowledge of diabetes and its management among the health care providers and presence of hyperglycemia and hypoglycemia contribute to the final ominous outcome among diabetics [6]. On the other hand, control of blood glucose levelshave shown to minimise these complications [7].

As a result of this dismal prospective in patients with uncontrolled diabetes, various recommendations suggest stringent control of diabetes in patients undergoing surgery [6,8,9]. Elective surgery is to be postponed if glycated haemoglobin (HbA1c) is more than 8.5 to 9 %. HbA1c values greater than 8.5 is associated with four fold increase in risk of morbidity and mortality after cardiac surgery [10]. Since HbA1c is measure of the glucose control over the previous 2-

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3 months, the patient may not be fit for surgery for a similar time period.

In India, however, HbA1c testing is not easily available to majority of the patients. In this scenario, the decision to go ahead with the surgery is taken based on the blood glucose profile alone. If a patient comes for preoperative evaluation and is found to have diabetes which was not previously detected, this patient will have to wait until his blood glucose is under control. Typically, it can take about a week's time. However many such patients despite having their blood glucose levels under control, will not qualify for surgery if their HbA1c levels were measuredas the HBA1c levels will come down only after a period of 2-3 months.

If the number of patients who have undetected diabetes mellitus in the population is high, a significant number of surgeries will have to be cancelled due to inadequate blood sugar control in these patients. We designed this study to quantify the magnitude of this problem by determining the prevalence of undetected diabetes mellitus in patients coming for surgery.

Methods

Data was collected retrospectively from 529 consecutive patients aged 20 years and more who underwent elective surgery under general or regional anaesthesia at a tertiary care government hospital. The patients who underwent surgery under local anaesthesia were excluded from the study. The data was compiled by going through the pre-anaesthetic chart and hospital records. A patient was considered to have diabetes if the fasting blood glucose was more than or equal to 126mg/dl [11]. If the patient had been diagnosed with diabetes prior to the present surgery, they were assigned to Group KD (Known Diabetes).

If they were diagnosed for the first time during perioperative evaluation for the present surgery, they were included in Group ND (Newly diagnosed Diabetes). If they did not have diabetes, they were grouped under Group N(Non diabetic).The study protocol was approved by the institute ethical committee. The data was analysed usingEpiData Analysis v.2.2.2. To find the association between variables like age, gender and presence of diabetes, Chi-square test was used. Fisher's exact test was used when Chi-square was not applicable. A 'p'value less than 0.05 was considered statistically significant.

Results

The patients who underwent elective surgical procedures under the departments of general surgery, obstetrics & gynaecology, orthopaedics and ENT were included in the study. The total number of patients studied was 529. Of these, 198 (37.4% of total) were males and 331(62.6%) were females. Since, the patients above 40 years are at greater risk for developing diabetes mellitus [12], the subjects were grouped as less than or equal to 40 years and above 40 years. The distribution of these cases according to age and gender is given in Table 1.

Out of 529, 18 patients (3.4%) were found to have previously diagnosed diabetes mellitus prior to admission for the present surgery. Their distribution is mentioned in Table 2. The proportion of males with known diabetes in the study population was 4% and among females it was 3%. In the more than 40 year's age group, this was 6.2% among males and 5.6% among females whereas in the less than 40 age group it was 0% among males and 0.6% among females. There is no statistical significance in the association between gender and prevalence of diabetes. However, the prevalence of known diabetes in the more than 40 years age group is 14.2 times higher when compared with the less than or equal to 40 years age group and this is statistically significant ($p<0.001$).

Nine patients (1.8% of the total) were newly detected to have diabetes mellitus. Among males it was 1.6% and females 1.9%. Their distribution is given in Table 3.The proportion of undiagnosed diabetes among males and females who are 41 years old and more is 2.5% and 3.3% respectively. In the less than or equal to 40 years age group it was 0% among males and 0.6% among females. Therefore undiagnosed diabetes is 7.3 times more among those who are more than 40 years when compared with those who are less than or equal to 40 years of age. This is statistically significant ($p<0.05$) using Fishers exact test.

The prevalence of diabetes in the study population is the sum of the numbers of known diabetes and newly detected diabetes. These values are given in Table 4. The prevalence of diabetes among the study population is 5.1% [95% CI (3.5-7.3%)]. Among males it is 5.6% while in females it is 4.8%. The prevalence of diabetes among those who are more than 40 years is 10.3 times more than those who are less than or equal to 40 years and this is statistically significant ($p<0.001$) using chi square test. However, there is no statistical significance in the association between gender and prevalence of diabetes.

Table 1: Age and gender distribution of study population

Total number of Patients 529 M=198(37.4%) F=331(62.6%)	≤40 years		>40 years	
	M	**F**	**M**	**F**
	69(28.7%)	171(71.3%)	129(44.6%)	160(55.4%)
	Total 240(45.4%)		Total 289(54.6%)	

Table 2: Age and gender distribution of known diabetes

Known Diabetes Total 18 (3.4%) M= 8(4%) F= 10(3%)	≤ 40 years		>40 years	
	M (n=69)	**F(n=171)**	**M (n=129)**	**F(n=160)**
	0(0.00%)	1(0.58%)	8(6.2%)	9(5.6%)
	Total 1(0.42%)		Total 17(5.9%)	

Table 3: Age and gender distribution of newly detected diabetes

Newly detected Diabetes Total 9/511(1.8%) M=3/190 (1.6%) F=6/321(1.9%)	≤ 40 years		>40 years	
	M (n=69)	**F(n=170)**	**M (n=121)**	**F(n=151)**
	0(0.00%)	1(0.58%)	3(2.5%)	5(3.3%)
	Total 1(0.42%)		Total 8(2.9%)	

Table 4: Age and gender distribution of total number of diabetes patients in the study population

Total number of Diabetes Patients 27 (5.1%) M=11 (5.6%) F=16 (4.8%)	≤ 40 years		>40 years	
	M (n=69)	**F(n=171)**	**M (n=129)**	**F(n=160)**
	0(0.00%)	2(1.2%)	11(8.5%)	14(8.8%)
	Total 2(0.83%)		Total 25(8.7%)	

Discussion

WHO estimated the prevalence of diabetes among all age groups all over the world to be 2.8% (171 million) in 2000 and was projected to nearly double to 4.4% (366 million) by 2030 [13]. However by the year 2011 the number of diabetics all over the world had already reached 366 million and the fresh estimate for 2030 was set at 552 million [14]. For India, the estimated numbers were 70 million for 2011 and 101 million for 2030 [14].

With this exponential growth, burden on the anaesthesiologists to manage diabetic patients during perioperative period is also going to increase. This is especially true if the patient has undiagnosed diabetes mellitusat the time of admission for surgery. Such patients will have to wait to get their blood glucose under control before they can undergo surgery. If the Western guidelines, as described previously, are to be strictly followed, the delay can be as much as three months which is the time for the HbA1c to come down. This delay can be avoided in many patients if they were previously diagnosed to have diabetes mellitus. A person, aware that he or she is diabetic will take appropriate measures to have the blood glucose under control. In India, however, a fairly large section of the diabetic population remains undetected.The prevalence of undiagnosed diabetes among patients older than 20 years in two South Indian states were 11.1% [15] and 10.5% [16]. This is more than the previously reported figure of 7.3% for the prevalence of diabetes among Indians [17]. Our attempt was to quantify the magnitude of this problem at our perioperative set up.

We found that 5.1% of our patients coming for surgery are diabetic. Our finding is slightly less than the previously reported prevalence of 8.4% in Puducherry among the general population [18]. World population prevalence reported in 2010 was 7.7% and the prevalence in India was 7.3%[17]. 1.8% of our patients weredetected to have diabetes first time when they came for the present surgery. This is less than what we had expected based on the previous reports of undetected diabetes at 10-11 % in the general population [15,16]. But our finding is similar to that found in a North Indian state where the prevalence of undetected diabetes mellitus was 2.2% in the general population [16]. They also had found that 6.05% of their population was diabetic.

Individuals above 40 years of age are at higher risk for developing diabetes with as much as 84% of the total diabetes patients being in this age group [12]. The prevalence in this age group is 8.7% in our study. This is 10.3 times more than the prevalence among those less than 40 years. Prevalence of undiagnosed

diabetes among this age group in our study is 2.9%. There was no statistically significance difference between male and female population in our study group.

Conclusions

Prevalence of diabetes among our surgical population was less than that was reported in other studies among general population. We conclude that the problem of undetected diabetes among our surgical patients is not as severe as suggested by the previous studies done on general population. Whether this is really due to a low incidence of diabetes among our general population is not sure. Therefore a study on the general population to know about the prevalence of diagnosed and undiagnosed diabetes is warranted in our geographical area.

One limitation of the study was that we did not measure the delay in surgery caused due to uncontrolled blood glucose levels in both known diabetic and newly diagnosed diabetic patients. Also the percentage of known diabetics with uncontrolled blood glucose at the time of admission for surgery could have been studied.

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