Screening for diabetes in a local population of Patan, Nepal

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ABSTRACT

Introduction: Diabetes is increasing worldwide. Earlier detection and treatment of the diabetes slowed the complications associated with diabetes. Unfortunately, 30-50% of diabetes remains undiagnosed. This study is designed to estimate the prevalence of diabetes and diabetes risk group i.e. person with impaired fasting glucose (IFG) in the Patan.

Methods: We, therefore, carried out a community based cross-sectional study for the diabetes screening using fasting plasma glucose.

Results: The result showed 3.3% screen-detected and overall prevalence of 16% diabetes showing alarming picture of diabetes status in the study population. It showed significant correlation between waist circumference (WC) and Waist-Hip Ratio (WHR) with fasting plasma glucose (FPG) and mean arterial pressure (MAP).

Conclusion: It pointed out the need of health education and promotion to the patients for prevention and progression of the disease.

Key words: *Diabetes, Fasting plasma glucose, Screening, Waist circumference.*

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INTRODUCTION

Diabetes is rapidly increasing worldwide. According to the World Health Organization, estimated cases of type 2 diabetes for 2000 was 171 million and is projected to increase to 366 million by the year 2030.[1] In Nepal, the prevalence was 4,36,000 in year 2000 and projected figure for year 2030 is 13,28,000.[2]

Diabetes mellitus type 2 often goes undiagnosed for many years because hyperglycemia develops gradually and may not produce symptoms.[3] Around 30–50% of people with diabetes remain undiagnosed,[4] and when patients are diagnosed, around 20–30% have evidence of diabetic complications.[5]

Persons with diabetes are at increased risk for microvascular and macrovascular complications, and duration of diabetes and degree of hyperglycemia are associated with an increased risk for microvascular complication.[6-7] The prevalence of macrovascular complication is elevated in persons with prediabetes and in persons with newly diagnosed diabetes.[8-9] Studies have clearly demonstrated that lowering blood glucose delayed the onset and slowed the progression of microvascular complications in diabetes type 2.[10] Therefore, we carried out community based diabetes screening program at Patan in aim to make the earlier detection and treatment of diabetes.

METHODS

The study was designed to estimate the prevalence of diabetes and diabetes risk group i.e. person with impaired fasting glucose (IFG) in the Patan. The study design was community based cross-sectional study. With the prior diabetes awareness program, we carried out the screening program for three consecutive days where 229 people participated. However 214 people who were in inclusion criteria were included for the study. Screen-detected diabetes mellitus (SDM) patients were advised to repeat the FPG and consult the physician.

Inclusion criteria included subjects with age >30 years. Informed consent was taken from each of them. We measured weight, height, waist circumference (WC), hip circumference and blood pressure of the subject. Detail family history and personal history were also taken.

Auscultatory method of Blood Pressure (BP) measurement was obtained with properly calibrated and validated instruments. Patients seated quietly for at least 5 minutes in a chair prior BP measurement. Waist circumference was taken as the minimum circumference between the umbilicus and the xiphoid process. Hip circumference were taken as the maximum circumference around the buttocks posteriorly and the symphysis pubis anteriorly. Waist hip ratio (WHR) was then calculated.

Overnight fasting blood sample was collected for the blood glucose estimation. About 2 ml of blood was taken and transferred into a vial containing fluoride oxalate anticoagulant. Blood was then centrifuged to measure fasting plasma glucose. We took FPG (Fasting Plasma Glucose) as diagnostic criteria for diabetes as per American Diabetic Association (ADA) recommendation. FPG ≥126 mg/dl is diabetic, 110-125 mg/dl is IFG and FPG <110 mg/dl is normal.[11]

The anonymous data was entered, cleaned and analyzed using SPSS® 15 software on principle investigator's laptop.

RESULTS

Among the participants, 27 (12.6%) subjects were with known diabetes, 7 (3.3%) subjects were SDM, 1 (0.5%) was with the IFG and 179 (83.6%) subjects were normal (Figure 1). The overall prevalence of diabetes was 16%. Prevalence of diabetes is maximum in the age group between 41-50 years followed by age group 51-60 years (Figure 2).

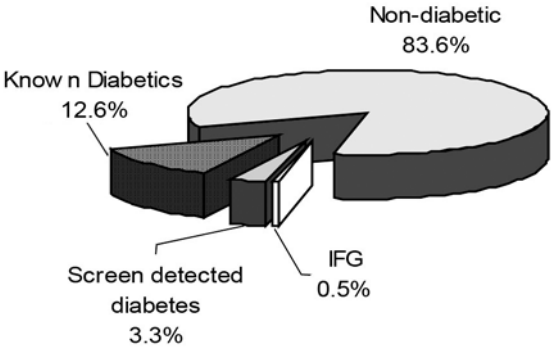

Figure 1: Distribution of diabetes in the population (N=214)

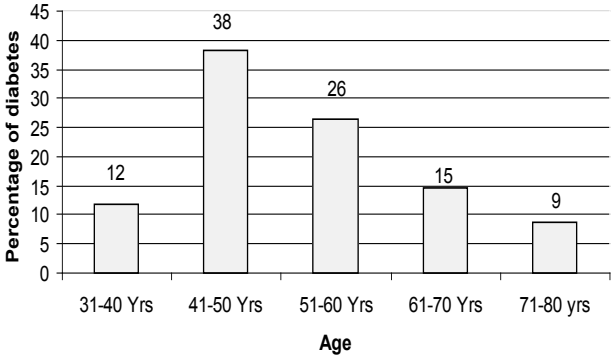

Figure 2: Diabetes in different age groups (N=34)

The mean fasting glucose of non diabetes patient is 82±10 mg/dl and diabetes patients is 146±47 mg/dl. MAP, WC, WHR and body mass index (BMI) are comparable between non diabetes and diabetes (Table 1). However there is significant correlation between MAP and WC in both non diabetes and diabetes (Table 2). There is also a significant correlation between FPG and WC, WHR and BMI in non diabetes (Table 2). Diabetes patients showed strong association with family history where 31% of the people with known family history of diabetes were found to have the disease (Table 3).

Parameters	Non Diabetic (N=179)	Diabetic (N=34)
Age (Years)	51±12	51±12
FPG (mg/dl)	82±10	146±47 [a]
MAP (mm of Hg)	98±11	99±11
Waist (cm)	85±11	87±10
W/H (Ratio)	0.91±0.14	0.92±0.07
BMI (kg/m^2)	24.80±4.34	24.15±3.21

T test, P-value < 0.001=a, P-value <0.01=b and P-value <0.05=c

Table 1 : Comparison of different parameters between non diabetes and diabetes population

	FPG		MAP	
	Non Diabetes (179)	Diabetes (34)	Non Diabetes (179)	Diabetes (34)
WC	0.28[a]	0.13	0.22[b]	0.39[c]
WHR	0.22[b]	0.30	0.18[c]	0.32
BMI	0.14[c]	-0.12	0.05	0.29
Age	0.13	-0.07	0.28[a]	0.13
MAP	0.10	0.24		

Pearson correlation coefficient, p-value < 0.001=a, p-value <0.01=b and p-value <0.05=c

Table 2: Correlation Coefficient of FPG and MAP with potential risk factors

Diabetes Status	Family History		Total
	Yes	No	
Non diabetic	69.4%	90.1%	84.0%
Diabetic	30.6%	9.9%	16.0%
Total	100.0%	100.0%	100.0%

Chi-square value 14.05 and p-value= 0.000

Table 3: Association of diabetes with known family history

DISCUSSION

A 3.3% SDM with 16% overall prevalence of diabetes indicated alarming picture of diabetes status in the study population. The overall prevalence of diabetes in our study is a bit higher to the finding of study done by Ramachandran A et al[12] which is 12.1%. However there is markedly lower prevalence of IFG in our study which could be because of smaller sample size or the use of fasting plasma glucose as criteria for the screening. According to Nakagami T et al,[13] ADA criteria i.e. the use of fasting plasma glucose is specific but not so sensitive compared to the WHO criteria i.e. the use of oral glucose tolerance test (OGTT).

Since this is an epidemiological study for the screening diabetes in the population, we used ADA criteria for the screening rather than using OGTT which would be

expensive and time consuming. Therefore, there would be further increase the SDM in our population if OGTT is used. The study done by Nakagami T et al[13] showed higher SDM using OGTT (6%) compared to FPG (4%).

Family history of diabetes also predicts high risk of having disease in the offsprings.[14-16] In our study also, there was strong association between family history of diabetes and diabetes in the patients. Likewise, the maximum number of the diabetes was in age 41-60 years. It is comparable to study done by Ramachandran A et al.[12]

Abdominal obesity has been shown to be a predictor of cardiovascular disease and diabetes.[17-19] We have used BMI, WC and WHR measuring central obesity. Our study did not show any significant difference in these parameters between non diabetes and diabetes. However, significant correlation was observed between FPG and WC, WHR and BMI in non diabetes. A significant correlation of MAP with WC is observed in both diabetes and non diabetes. The study done by Chan JM et al[20] has shown that WC may be a better indicator than WHR for the relationship between abdominal adiposity and risk of diabetes. Moreover Shah et al also found WC and WHR as important risk factors for the diabetes in Nepalese population.[21] Therefore in our population also WC would be better predictor of diabetes and cardiovascular disease as the association between FPG and WC was stronger compared to WHR, however further longitudinal prospective study in larger sample is necessary to establish this relationship.

CONCLUSION

There is alarming picture of diabetes status in the population. Earlier detection would help to slow the progression of disease through promotive, preventive as well as curative measures if required. Waist Circumference and Waist-Hip Ratio are found to be the important risk factor for diabetes and cardiovascular disease in our population. This warrants the changes in the health education and promotion from health practitioners and policy makers and internalization and practices from the patients as well.

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