

Diabetes mellitus related complications in out- patient clinic of tertiary care hospital

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Abstract

We tried to explore the demographic profile and complications of the out patients suffering with Diabetes Mellitus (DM). It was hospital based descriptive study conducted among the 100 diabetic out-patients of B.P.Koirala Institute of Health Sciences, Dharan, Nepal during the period of 1-1-2010 to 29-2-2010. Patients above 14 years diagnosed as per ADA guidelines 2009 giving written informed consent were taken. The number of common diabetes related complications were searched and diagnosed clinically with the use of relevant investigations which included macro-vascular complications like ischemic heart disease, peripheral vascular disease, and micro-vascular complications like diabetic retinopathy, diabetic neuropathy, and diabetic nephropathy. Among 100 confirmed cases of diabetes mellitus (51 male and 49 female). Of all diabetes, 99% were type 2, 1% were type 1. About 42% subjects were of age group between 40-60 yr. When BMI ≥ 23 kg/m² (as recommended for Asians) is taken as the determining factor for overweight, 29% of patients were overweight, 56% obese and 6% morbid obese. About 83% of subjects were on OHA, 9% on Insulin and 8% on OHA and insulin both. The most common and frequent chronic complications were neuropathy (44.4%) followed by cardiovascular and retinopathy (27.7%), nephropathy (16.6%) and others (11.3%). About 25 % of subjects had hypertension (stage 1 hypertension-17%, and stage 2 hypertension 8%). As most of the patients are overweight with more neurological and cardiovascular complications so the lifestyle changes are required with regular antidiabetics and dietary restriction.

Keywords: Diabetes mellitus, complications, outpatients.

Introduction

Diabetes Mellitus (DM) is one of the most common chronic diseases, with an overall prevalence of approximately 2%.¹ International Diabetes Federation (IDF) has estimated 200 million people around world have diabetes and by 2025 it is expected to increase to 333 million and double by

2030.² In US, Type 1 DM approximately account for 10% and type 2 85-90% of all known cases of DM.³ Untreated DM causes much morbidity and mortality due to its devastating late complications involving micro-vascular and macro-vascular structures.⁴

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Nepal has highest prevalence of prediabetes and among SAARC countries.⁵ Current population census 2001 of Nepal 14.2% total 23.2 million populations lived in urban. ⁶DM prevalence among urban subjects are higher than rural ones (urban 25.9% vs rural 3.1%) in Nepal.⁷

The prevalence of diabetes is around 15% among people aged more than 20 years and 19% among people aged 40 years and above.⁷ One in ten Nepalese are found to have DM. In a hospital based study done by *Karki P et al* in BPKIHS, reported DM in 6.3%.⁸ The main reasons for the diabetes epidemic in Urban Nepal are obviously increased body weight due to high intake of fatty and other food and low physical activity.⁹ Recently Western Health Organisation (WHO) has recommended BMI of 23 as overweight in people of Asian origin, and 25 or above as obese.¹⁰ The problem of diabetes is reflected by its increasing complications. DM is reported to be leading cause of chronic renal failure in Nepal.¹¹

In hospital based exploratory study conducted among the admitted DM patients during the period of 1-3-2003 to 29-2-2004 in medical units in BPKIHS, Nepal. About 50% of subjects were on Insulin. About 60.7 % subject had hypertension, 39.3 % had ocular problem, and 25 % had renal problems.¹² It is really time to act by everyone concerned to control the epidemic of diabetes in urban Nepal.

Materials and methods

It was hospital based descriptive study conducted among the 100 diabetic out-patients during the period of 1-1-2010 to 29-2-2010 at B P Koirala

Institute of Health Sciences, a tertiary referral center in eastern region of Nepal, after getting an approval from the ethical committee.

Patients above 14 years diagnosed as per ADA guidelines 2009 giving written informed consent were enrolled. A thorough physical examination and blood investigations was done to fulfill ADA criteria for DM in all subjects. Socio-demographic profile, information and clinical findings (e.g BMI) about diabetes mellitus and other physical problems was collected and recorded in a semi-structured performa designed for the particular purpose. Height and weight were recorded for body mass index (BMI-weight in kg / height in m²). BMI between 18.5 and 22.9 was considered normal, 23.-24.9 as overweight and > 25 as obese. Hypertension was defined as the presence of systolic BP >140 mm Hg and diastolic BP of >90 mmHg or a known hypertensive on treatment. Femoral, popliteal, tibialis posterior and dorsalis pedis arteries were palpated and noted as normal, diminished, absent or leg amputated. Subjects with urinary tract infection, detected by dipstick (multistix), pregnant diabetic women, individuals with a protuberant belly or umbilical hernia and those who did not consent to participate, were excluded.

Diabetes mellitus was diagnosed if survey participants have ever been diagnosed with the condition according to recent ADA guideline 2009. According to the expert committee on the diagnosis and classification of diabetes mellitus 2003¹³, diabetes mellitus is diagnosed clinically when a person has:

1. Fasting Plasma Glucose (FPG) \geq 126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 h.

OR

2. Symptoms of hyperglycemia and a casual (random) plasma glucose (RBS) \geq 200 mg/ dl (11.1 mmol/l). Casual (random) is defined as any time of day without regard to time since last meal. The classic symptoms of hyperglycemia include polyuria, polydipsia, and unexplained weight loss.

OR

3. 2-h plasma glucose (post-prandial plasma glucose PP) \geq 200 mg/dl (11.1 mmol/l) during an oral glucose tolerance test (OGTT). The test should be performed as described by the World Health Organization using a glucose load containing the equivalent of 75-g anhydrous glucose dissolved in water.*

**In the absence of unequivocal hyperglycemia, these criteria should be confirmed by repeat testing on a different day.*

Every patient blood sample was collected for measurement following standard package of diabetes investigations, including: RBS, FPS, PP, serum urea and creatinine, routine urine examination, lipid profile (Total cholesterol, HDL, Triglycerides, LDL, VLDL), serum sodium and potassium, Electrocardiography (ECG), Chest X-ray. A blood sample will be collected for measurement of clinical parameters. Glycosalted Hemoglobin (HbA1c) is evaluated using Immunochromatography method with NYCO CARD READER II fully automated HbA1c analyzer system.

The number of common diabetes related complications were searched and diagnosed clinically with the use of relevant investigations which included macro-vascular complications like ischemic heart disease, peripheral vascular disease, and microvascular complications like diabetic retinopathy, diabetic neuropathy, and diabetic nephropathy. Sensation was examined using a 10-gram Semmes- Weinstein monofilament on the ten recommended sites on plantar and dorsal aspects of feet. The results were documented as normal, diminished, absent or leg amputated. Subjects with diminished or absent sensation were labelled as neuropathic. The knee and ankle reflexes were elicited and noted as normal, diminished, absent or leg amputated. Subjects with diminished or absent knee or ankle reflex or amputation on either limb were labelled as neuropathic. Feet were examined for the presence of callus, healed ulcer or active ulcer. All patients were sent to Ophthalmology OPD for fundus evaluation. Fundal examination was performed by indirect ophthalmoscopy. Microdots, blot haemorrhages and hard and soft exudates were considered as background retinopathy. The presence of new vessels was taken as proliferative retinopathy. Macrovascular complications were defined as history positive for one or more of three conditions: angina, heart attack or stroke. Nephropathy was defined as presence of protein either macroalbumin or microalbumin and absence of pus cells in urine. The creatinine level $<$ 1.2 mg/dl was taken as normal.

Statistical analysis

The data was analyzed using Excel and SPSS programme.

Results

Fig.1

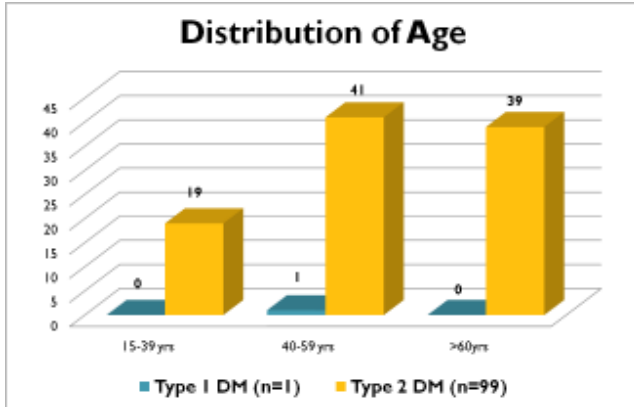
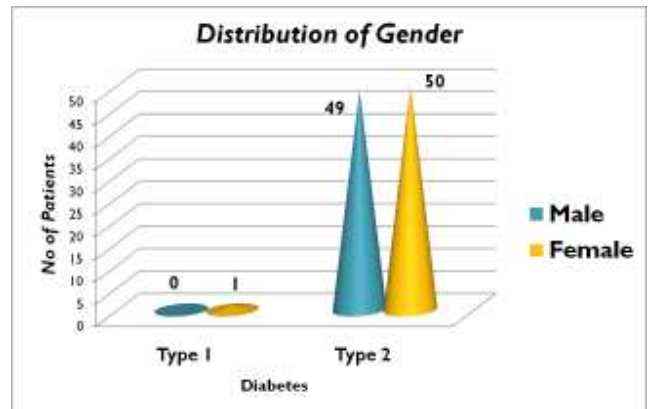
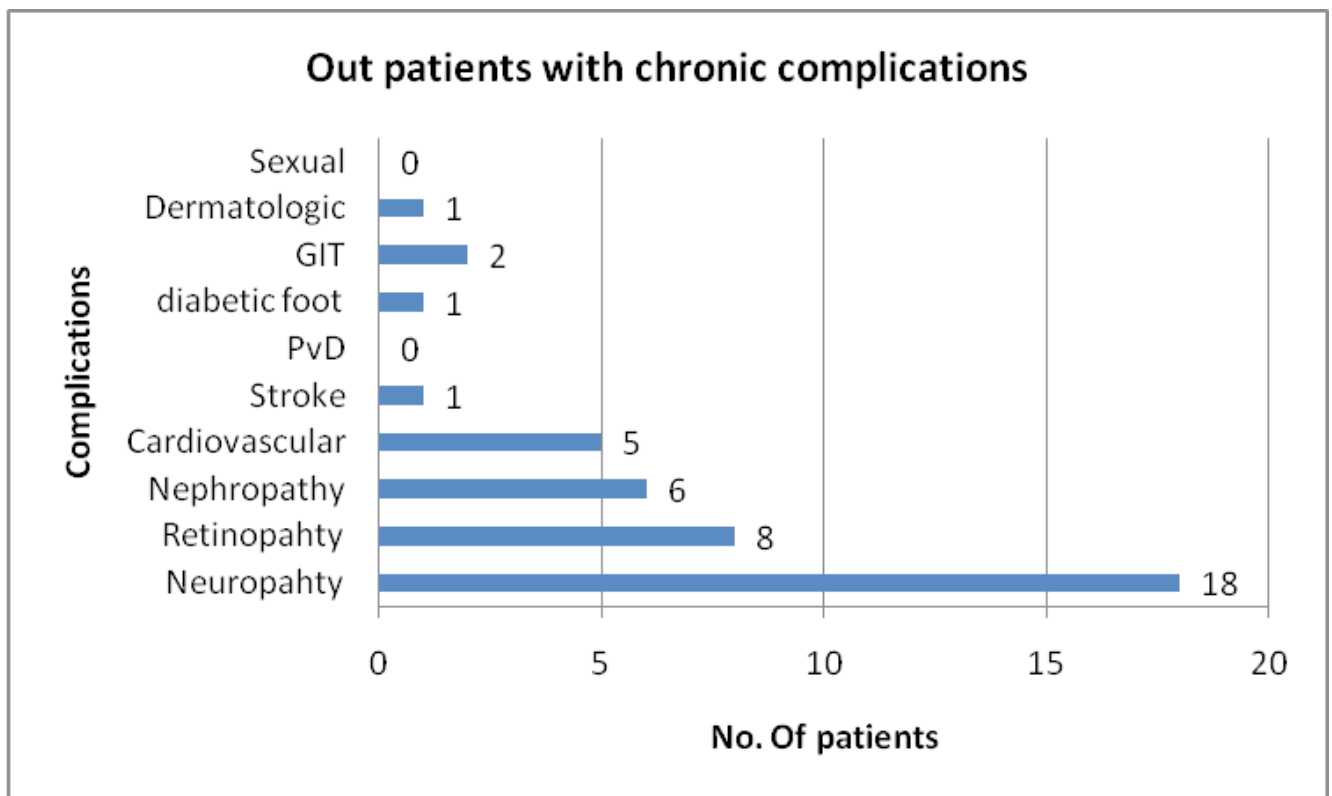


Fig. 2



Among 100 confirmed cases of diabetes mellitus (51 male and 49 female). Of all diabetes, 99% were type 2, 1% were type 1. About 42% subjects were of age group between 40-60 yr. (Fig.1 and Fig.2)

Fig. 3



The most common and frequent chronic complications were neuropathy (44.4%) followed by cardiovascular and retinopathy (27.7%), nephropathy (16.6%) and others (11.3%) (Fig.3)

Table. 1

BMI	Type 1 DM	Type 2 DM
Acceptable (18.5 - 22.9)	1	8 (8.08%)
Overweight (23 - 24.9)	0	29 (29.29%)
Obese (25 - 29.9)	0	56 (56.56%)
Morbidly obese (>30)	0	6 (6.06%)

Table. 2

Hypertension	Type1 DM (n=1)	Type 2 DM (n=99)
Pre hypertension	1	74 (74.74%)
Stage I	0	17 (17.17%)
Stage II	0	18 (8.08%)

When BMI ≥ 23 kg/m² (as recommended for Asians) is taken as the determining factor for overweight, 29% of patients were overweight, 56% obese and 6% morbid obese.

Table. 3

Duration of DM	Type1 DM	Type 2 DM
≤ 5 years	0	55
6- 10 years	1	25
> 10 years	0	19

Fifty five patients with type 2 diabetes were having diabetes since less than 5 years compared to type 1 diabetes. 74.74% of type 2DM had prehypertension followed by 17.17% and 8.08% of stage I and stage II hypertension respectively.

Table.4 Micro-vascular complications related to duration of diabetes mellitus

Complications	< 5yrs	5 - 10 yrs	>10yrs
Neuropathy	12 (66.66%)	4 (22.22%)	2(11.11%)
Retinopathy	2 (25%)	2 (25%)	4 (50%)
Nephropathy	1 (16.6%)	2 (33.3%)	3 (50%)

When we compared microvascular complications related to duration of diabetes mellitus most of the patients had neuropathy 12 (66.66%) during less than 5 years followed by retinopathy 4(50%) and nephropathy 3(50%) during more than 10 years of diabetes.

Discussion

Diabetes mellitus is a very common metabolic and preventable disorder. Micro-vascular complications due to diabetes mellitus are the cause for much morbidity and mortality. In many studies worldwide. It was documented that macro as well as micro-

vascular complications of diabetes mellitus had statistically significant association among the complications which increases with duration of disease and poor glycaemic control.^{14, 15}

In our study ,male was found to be more than female (51 M: 49F) with 42% subjects were of age group between 40-60 yr which was similar to study done in Taiwan in 1998 among 558 patients (293 men and 265 women, aged 61.4 +/- 10.0 yr) with non-insulin-dependent diabetes mellitus.¹⁶

The most common complication was neuropathy (44.4%) in our study which is higher than the Indian results (27.5%).¹⁷ The reason could be neuropathy is often ignored due to insidious onset and slow progress. We had retinopathy (27.7%), nephropathy (16.6%) and others (11.3%).The high figures of retinopathy in our population could be attributed to a lack of awareness in our patients to undertake regular eye examination.

The prevalence of obesity in our results was 56% with BMI above (>27kg/m²) which was similar as Haider et al ¹⁸ reported 56% of 500 subjects with essential hypertension to be obese as measured by the Ponderal Index. This emphasizes the importance of routine measurement of WHR which is we have not done and is major limitation of our study. For Asian population, there is perhaps a need for lower BMI indices as cut levels for obesity. Because according to a cross-sectional survey among government employees in five urban Nepalese districts linked lifestyle to obesity; one third of the employees were overweight or obese.¹⁹ Increased age, marital status, higher education, greater job responsibilities, increased alcohol consumption, and motorized transport all associate significantly with obesity. Taken together, these studies suggest that urbanization is the major driving force behind obesity in Nepal.

We had type 2 diabetes patients having diabetes since less than 5 years more as compared to type 1 diabetes.74.74% of type 2DM had prehypertension followed by 17.17% and 8.08% of stage I and stage II hypertension respectively. When we compared microvascular complications related to duration of diabetes mellitus most of the patients had neuropathy 12 (66.66%) during less than 5 years followed by retinopathy 4(50%) and nephropathy 3(50%) during more than 10 years of diabetes which was similar to study done by K. N. Yogi in Nepal.²⁰

Our study concluded that the prevalence of diabetic microvascular complications was higher in people with poor glycaemic control, longer duration of diabetes associated hypertension and obesity. We recommend screening of high risk groups and emphasize importance of early diagnosis of diabetes and detection of chronic complications so that appropriate treatment initiated at the earliest.

Conclusion

Diabetes Mellitus is associated with many complications. Neuropathy, retinopathy, nephropathy and cardiovascular complications were more frequently seen. Obesity was seen in 56% of patients. Life style modification is essential for better life. So I would suggest all diabetic patients to follow IDF slogan “Walk More and Eat Less” for preventing diabetes.

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References

1. P. Zimmet. Type-2 DM an Epidemiological overview. *Diabetologia* 1982 (22):399-4.
2. International Diabetes Digest. Cambridge: FSG Communications Limited & International Diabetes Federation, 1995; **6** (4):87-8.
3. S.C. Smelter, B.G. Bare. Text book of Medical–Surgical Nursing Lippincott, United Kingdom, 8th edi. 1996.
4. A.A. John. Hunter, Davidson’s Principles and Practice of Medicine, Churchill Livingstone, 20th Edi. 2002.
5. F. White, G. Rafique. Diabetes prevalence and projections in South Asia. *Lancet* 2002; **360** (93):804-5.
6. G.P. Koirala. Demographics dynamics changing consumption pattern, poverty, agriculture and rural development, role of farmers in sustainable development, sectoral reports on sustainable development agenda for Nepal (SDAN). [online]. 2002 [cited 2009 june 25]. Available from: <http://www.scdp.org.np/sdan/SDANrpt1.pdf>.
7. D.L. Singh, M.D. Bhattarai. High prevalence of diabetes and impaired fasting glycemia in urban Nepal (letter). *Diabet. Med.* 2003; **20**(2):170-1
8. P. Karki, N. Baral, M. Lamsal et al. Prevalence of non-insulindependent diabetes mellitus in urban areas of eastern Nepal: a hospital based study. *South East Asian J Tropical Med Public Health*, 2000; **31**(1):163-6.
9. D.L. Singh, M.D. Bhattarai, A. Maskey A. Demographic profile of diabetic patients admitted in medical wards of Bir Hospital, Nepal, 1990 to 1994.
10. WHO expert consultation. Appropriate Body Mass Index for Asian populations and its implications for policy and intervention strategies. *Lancet* 2004; **363**: 157-63.
11. P.R. Satyal. Evolution of nephrology in Nepal. Souvenir: 1st International CME Programme of Nepal Society of Nephrology, 13 October 1998, Kathmandu, Nepal: 1-4.
12. R.S. Mehta, P. Karki, S.K. Sharma. Risk factors, associated health problems, reasons for admission and knowledge profile of diabetes patients admitted in BPKIHS. *Kathmandu University Medical Journal* 2006; **4**(1):11-3.
13. Expert committee on diagnosis and classification of Diabetes Mellitus: *Diabetes Care* 2003; **23** (suppl.1); S4-S19.
14. United Kingdom Prospective Diabetes Study: Intensive blood glucose control with sulphonylurea or insulin compared with conventional treatment and risk of complications in type 2 diabetes (UK PDS-33) *Lancet*. 1998; 352-837.
15. D.M. Nathan, D.E. Singer, J.E. Godine et al. Similar frequency of retinopathy in IDDM and NIDDM. Retinopathy in older NIDDM diabetics. Association with glucose control. *Diabetes* 1986; **35**:797-901.
16. Y.D. Jiang, L.M. Chuang, Wu HP et al. Role of an outpatient clinic in screening chronic complications of diabetes: a model for diabetes managed care. *J Formos Med Assoc.* 1998; **97**(8):521-7.
17. A. Ramachandran, C. Snehalatha, K. Satyavani, et al. Prevalence of complications and their risk factors in type 2 diabetes. *J Assoc Physicians India* 1999; **47**:1152-6.
18. Z. Haider, K.A. Bano. Prevalence of obesity in patients with essential hypertension of varying severity *J Pak Med assoc* 1985; 35354-7

19. P. Simkhada, A. Poobalan, P.P. Simkhada et al. Knowledge, attitude, and prevalence of overweight and obesity among civil servants in Nepal. *Asia Pac. J. Public Health* 2009, Oct 12 [Epub ahead of print].
20. K. N. Yogi. Micro-vascular complication in diabetic patient's of type -2 diabetes mellitus. *Journal of Institute of Medicine*, December, 2008; (3) 49-58.