



Initial Treatment Modalities of Diabetes Mellitus Patients Attended in Different Diabetic Centers in Bangladesh

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Key words:

Initial; management; pattern; diabetes mellitus patients

Abstract

Background: Initial management of diabetic patients is very crucial for the future outcome.

Objective: The purpose of the present study was to see the initial management pattern of diabetes mellitus patients.

Methodology: This cross sectional study was conducted in different diabetic centers in Bangladesh from August 2015 to October 2016 for a period of more than one year. All the diabetic patients at any age with both sexes were included in this study. The diabetic patients were interviewed face to face. The initial treatment modalities were collected from the diabetic guide book from all the patients.

Result: A total number of 482 diabetic patients were recruited for this study. In most patients (n=451) glycemic status was the determinant of initial treatment regimen. In 18 patients, regimens were chosen due to complication, 10 for infection and 3 for surgery. Life style with diet was advised in 10(58.82%) cases, 29(9.6%) cases and 3(1.84%) cases in less than 8.3 mg/dL, 8.3 to 13.9 mg/dL and more than 14.0 mg/dL group of FPG respectively. Considering monotherapy metformin was given in 5(29.41%) cases, 119(39.4%) cases and 26(15.95%) in less than 8.3 mg/dL, 8.3 to 13.9 mg/dL and more than 14.0 mg/dL group of FPG respectively.

Conclusion: In conclusion the initial treatment pattern of diabetes mellitus patients is varied in different diabetic centres of Bangladesh.

Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia resulting from defect in insulin secretion, insulin action or both¹. Type II diabetes mellitus constitute 85 to 95% of all diabetes mellitus. Bangladesh is situated

in south East Asian region. It is one of the most populous region in the world. Nearly one-fifth of all adult diabetes live in this region. Now 387 million (8.3%) people are estimated to have diabetes and the number of people with the disease will rise beyond 592 million in 2035 globally. It is

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estimated that every six seconds a person dies from diabetes². Magnitude of DM is increasing in Bangladesh. The number of people with DM was 5.98 million and the prevalence in adult population is 6.3% in 2013². The total number of people with diabetes in Bangladesh is projected to raise from 3.2 million in 2000 to 11.1 million in 2030³.

It has been suggested that the increase in prevalence of diabetes among Asian is due to ageing of the population, urbanization and increasing prevalence of obesity and physical inactivity⁴. Some population-based studies conducted in Bangladesh at different times have revealed an increasing trend of diabetes prevalence ranging from 1.0 to 3.8% in rural population and 1.5 to 8.0% in urban population⁵. Bangladeshis are more at risk to develop diabetes, hyperinsulinemia and coronary heart disease compared with other South Asian migrants settled in the UK⁶.

American Diabetes Association (ADA) recommends blood glucose testing by patients through self-monitoring of blood glucose (SMBG) and by health care providers for routine outpatient management of DM¹. Recently SMBG has revolutionized management of DM as it helps to achieve and maintain specific glycemic goals. Measurement of glycosylated hemoglobin (HbA1c) can quantify average glycemia over weeks and months, there by complimenting day-to-day testing⁷. Various classes of anti-diabetic drugs including insulin and oral hypoglycemic agents (OHA) are currently used in the treatment of diabetes, which acts by different mechanisms to reduce the blood glucose levels to maintain optimal glycemic control. The currently used anti-diabetic drugs are very effective, however because of lack of patient compliance, clinical inertia, insulin resistance, lack of exercise and lack of dietary control leads to unsatisfactory control of hyperglycemia⁸. Thus this present study was undertaken to see the initial management pattern of diabetes mellitus patients.

Methodology

This present study conducted in the different diabetic centers outside Dhaka city from eight administrative divisions of Bangladesh by lottery method. By this process eight centers were selected. This study was carried out from August 2015 to October 2016 for a period of more than

one year. All the registered diabetic mellitus patients confirmed clinically and biochemically by physician of adult age group (≥ 18 years) of all socioeconomic status attending at different diabetic centers outside Dhaka city of Bangladesh were selected as study population. In each day of the study, two rooms were selected by lottery from the diabetic centers where data were collected to avoid the selection bias. One in every four patients was approached to be included in this study after fulfilling the inclusion and exclusion criteria. This study was involved collection of both primary and secondary data. Primary data was collected by face to face interview of the patients by the researcher at the diabetic centers outside Dhaka city upon their consent. Socioeconomic and personal information was recorded from patient through interview, with a semi structured pre-tested questionnaire and their guidebook which was provided from diabetic centers. The secondary data about the treatment at initial and follow-up visit, present state and diagnosis were collected from the diabetic guide book. The diabetic patients to whom the recorded data of guide book were not properly written were excluded from this study. Statistical analysis was performed by SPSS version 20.0 of windows based. The qualitative data were expressed by frequency and percentage; however, the quantitative data were expressed by mean and standard deviation.

Result

A total number of 482 diabetic patients were recruited for this study. Majority were in the age group of 40 to 50 years which was 274(56.8%) cases followed by 50 to 60 years, 60 to 70 years and 30 to 40 years which were 102(21.2%) cases, 47(9.8%) cases and 45(9.3%) cases respectively (Table 1).

Table-I
Age Distribution among the Study Population
(n=482)

Age Group	Frequency	Percent
Less than 30 Years	11	2.3
30 to 40 Years	45	9.3
40 to 50 Years	274	56.8
50 to 60 Years	102	21.2
60 to 70 Years	47	9.8
More than 70 Years	3	0.6
Total	482	100.0

Advice for lifestyle change was given in 42 cases among the glycemic status group. Monotherapy was given in 215 cases out of 482 patients among the glycemic status group. Combination oral drugs was advised in 133 cases among the glycemic status group. In most patients (n=451) glycemic status was the determinant of initial treatment regimen. In 18 patients, regimens were chosen due to complication, 10 for infection and 3 for surgery (Table II).

Among 482 patients who had FPG level at first visit 17 patients FPG were <8.3 most frequent 302 patients FPG were 8.3 - ≤13.9, 163 patients FPG ≥14 (Table III).

Only lifestyle modification was advised in 42 cases and the mean fasting plasma glucose, 2 hours after

oral glucose and post prandial glucose were measured which were found 10.1±1.8 mg/dL, 12.1±5.2 mg/dL and 12.5±5.7 mg/dL respectively. Monotherapy was given to 215 cases and the mean FPG, 2HAOG and PPG were found 12.3±1.8 mg/dL, 16.31±1.2 mg/dL and 16.3±1.1 mg/dL respectively. Combination of oral drugs was given to 139 cases and the mean FPG, 2HAOG and PPG were found 13.9±2.2 mg/dL, 17.34±1.5 mg/dL and 17.3±1.7 mg/dL respectively. Oral drug with Insulin was given in 37 cases who were 15.2±3.5 mg/dL, 19.21±3.2 mg/dL and 20.0±3.3 mg/dL level of mean FPG, 2HAOG and PPG respectively. Only insulin was given in 49 cases and the mean level of FPG, 2HAOG and PPG were 16.7±3.8 mg/dL, 20.4±5.9 mg/dL and 20.3±5.5 mg/dL respectively (Table III).

Table-II*Treatment Modality Started and Their Basis of Choice (n=482)*

Treatment Modality Stared at Initial Visit	Basis of Choice of Treatment				Total
	Glycemic status	Complication	Infection	Surgery	
Advise for Lifestyle Change	42	0	0	0	42
Monotherapy	215	0	0	0	215
Combination oral drugs	133	0	6	0	139
Oral drug+Insulin	27	10	0	0	37
Only Insulin	34	8	4	3	49
Total	451	18	10	3	482

Table-III*Treatment Modality Chosen at First Visit on Their FPG basis (n=482)*

Fasting Plasma Glucose	Only Life + Style Change	Monother	Combined Oral Drugs	Oral Drugs +Insulin	Only insulin	Total
<8.3	10	5	2	0	0	17
8.3 to ≤13.9	29	175	75	14	9	302
≥14	3	35	62	23	40	163
Total	42	215	139	37	49	482

Monother=Monotherapy

Table-IV*Treatment modalities chosen at first visit and their glycemic basis (n=482)*

Treatment Modality Started	n	FPG(n=482) Mean±SD	2HAOG(n=225) Mean±SD	PPG(n=257) Mean±SD
Only lifestyle change	42	10.1±1.8	12.1±5.2	12.5±5.7
Monotherapy	215	12.3±1.8	16.31±1.2	16.3±1.1
Combination oral drugs	139	13.9±2.2	17.34±1.5	17.3±1.7
Oral drug+Insulin	37	15.2±3.5	19.21±3.2	20.0±3.3
Only Insulin	49	16.7±3.8	20.4±5.9	20.3±5.5

Different drugs were given to the patients at first visit on their FPG basis. Life style with diet was advised in 10(58.82%) cases, 29(9.6%) cases and 3(1.84%) cases in less than 8.3 mg/dL, 8.3 to 13.9 mg/dL and more than 14.0 mg/dL group of FPG respectively. Considering monotherapy metformin was given in 5(29.41%) cases, 119(39.4%) cases and 26(15.95%) in less than 8.3 mg/dL, 8.3 to 13.9 mg/dL and more than 14.0 mg/dL group of FPG respectively. Regarding combination oral drug metformin with secretagogue were given in 2(11.76%) cases, 47(15.56%) cases and 30(18.4%) cases in less than 8.3 mg/dL, 8.3 to 13.9 mg/dL and more than 14.0 mg/dL group of FPG respectively. Insulin with metformin was given in 4(1.32%) cases and 14(8.58%) cases in 8.3 to 13.9 mg/dL and more than 14.0 mg/dL group of FPG respectively. Only

insulin was given in 9(2.97%) cases and 40(24.53%) cases in in 8.3 to 13.9 mg/dL and more than 14.0 mg/dL group of FPG respectively (Table V).

Neuropathy patients were treated at first visit with Life style change (4 cases), monotherapy (28 cases), combination oral drug (8 cases), insulin with oral drugs (3 cases) and insulin alone (4 cases). Nephropathy patients were initially treated with combination oral drugs (3 cases), insulin with oral drugs (3 cases) and insulin alone (4 cases). Retinopathy patients were treated with combination oral drugs (7 cases) and insulin with oral drugs (3 cases). IHD patients were treated with monotherapy (4 cases), combination oral drug (6 cases) and insulin with oral drugs (3 cases). PVD patients were treated with combination oral drug (6 cases) and insulin alone (8 cases) (Table VII).

Table-V
Treatment Modality Chosen at First Visit on Their FPG Basis

Treatment Modality	Fasting Plasma Glucose		
	<8.3 (n=17)	8.3 to 13.9 (n=302)	>14 (n=163)
Life style with diet	10(58.82%)	29(9.6%)	3(1.84%)
Monotherapy			
Metformin	5(29.41%)	119(39.4%)	26(15.95%)
Secretagogue		51(16.88%)	6(3.68%)
Dpp4 inhibitor		5(1.65%)	3(1.84%)
Combination Oral Drug			
Metformin+Secretagogue	2(11.76%)	47(15.56%)	30(18.4%)
Metformin+Dpp4 inhibitor		13(4.30%)	32(19.63%)
Secretagogue+Glitazone		11(3.64%)	0(0.0%)
Metformin+Secretagogue+Dpp4 inhibitor		4(1.32%)	0(0.0%)
Insulin with Others Drugs			
Insulin+Metformin+Dpp4 inhibitor		3(0.99%)	0(0.0%)
Insulin+Metformin		4(1.32%)	14(8.58%)
Insulin+Dpp4 inhibitor		3(0.99%)	3(1.84%)
Insulin+Secretagogue		0(0.0%)	6(3.64%)
Insulin+Metformin +Glitazone		4(1.32%)	0(0.0%)
Only Insulin		9(2.97%)	40(24.53%)

Table-VI
Treatment Modalities Chosen at First Visit and Their Relation with Complication (n=482)

Complication	Treatment modality started					Total
	Life style change	Monotherapy	Combination Oral Drug	Insulin + Oral Drug	Insulin	
Neuropathy	4	28	8	3	4	47
Nephropathy	0	0	3	3	4	10
Retinopathy	0	0	7	3	0	10
IHD	0	4	6	3	0	13
CVD	0	0	0	0	0	0
PVD	0	0	6	0	8	14
No complication	38	183	109	25	33	388
Total	42	215	139	37	49	482

IHD=Ischaemic Heart Disease; CVD=Cerebrovascular Disease; PVD=Peripheral vascular disease

Discussion

A total 482 patients were enrolled in this study from August, 2015 to October, 2016. Mean age of the study population was 49.53 ± 13.98 years, ranging from 18 to 80 years. Most frequent number 274 (56.8%) is in the age group 40-50 years and second frequent number is 50 to 60 years (21.2%). About 68% patients were below 50 years of age. Rahman et al⁷ in a study in urbanizing rural community of Bangladesh found that risk of diabetes mellitus is more in age group 31 to 40 years. This finding is similar to this study as most of the patient of our study was in this age group at the time of diagnosis. Imam⁸ found diabetes prevalence is more than twice higher (71%) in age group more than 40 years compare to age group less than 40 years in BIRDEM. In this study subjects more than 40 years age is more (88.4%) which also suggest similar result. Acharya et al⁹ in a study in tertiary teaching hospital, India found that majority (36%) of the patient was in 51 to 60 years age group, which is not similar to this study.

Among study subjects pattern of treatment modalities started at first visit were only lifestyle change in 42 (8.7%), monotherapy with single oral anti-diabetic drug in 215 (44.6%), combination of oral anti-diabetic drug in 139 (28.8%), insulin with oral anti-diabetic drug in 37 (7.7%) and only insulin in 49 (10.2%) patients. In this study, insulin was started in 86 (17.9%) patients and oral anti-diabetic drug in 354 (73.4%) patients and with life style modification in 42 (8.7%) patients. Aisha¹⁰ found 39% with insulin, 57% with oral anti-diabetic drug and 4% with lifestyle change only. Which is not similar to this study. Agarwal et al¹¹ found 43.6% with insulin and 56.4% with oral anti-diabetic drug. Acharya et al⁹ found 11.3% with insulin and 88.7% with oral medication. This finding is similar to this study.

Most common reason behind the selection of treatment regimen were glycemic status in term of FPG, PPG or OGTT in 451 patients. In 18 cases complications were the influencing factor, infection in 10 and surgery in 3 cases. HbA1c was not done in any patient but HbA1c is the most significant parameter used for choosing the treatment modalities and to see the glycemic improvement all guidelines. Treatment modalities were not selected as per guidelines. All patients with HbA1c

more than 10% should be managed with insulin alone or with oral drugs¹.

Treatment modalities were selected according to FPG level. Most common single drug used was Metformin (54.82%) and second most common was secretagogue (19.66%). Most common combination oral drug was metformin and secretagogue combination (33.66%) which is similar to Acharya et al⁹, Sivasankari et al¹² and Das et al¹³ which also suggest combination of metformin and sulfonylureas was most frequently used combination and most effective one. Ahmed et al¹⁴ found most patients (62.9%) were prescribed with oral drugs singly. Metformin alone predominated in 41% prescriptions followed by the combination of Metformin and Sitagliptin (31.4%). This result was not consistent with this study. Most commonly practiced insulin regimen was premixed human insulin (53.48%) followed by short acting insulin (13.95%). Split mixed human insulin was used in 10.46%, basal bolus regimen with analogue insulin in 4.65% and only basal insulin including NPH and analogue basal in 2.32% of the cases. In some cases (15.11%) erratic regimen of insulin like premixed insulin twice daily plus basal analogue at night. Agarwal et al¹¹ found 72.13% short acting, 8.2% intermediate acting insulin and mixed insulin in 4.9%, which is different from this study finding. Bonafede et al¹⁵ in America found 85 % of insulin naïve patients was started with basal insulin, among them 88.1% started with insulin analogue which is not similar to this study. Insulin selection pattern varies extremely from population to population.

Among 388 patients whom complication related to diabetes was not evident in initial visit, 178 presented with complication in follow up visit. Most common was neuropathy (47.19%) followed by nephropathy (28.65%). Out of 178 patients, 51 patients came into follow up after 12 months from first visit.

Conclusion

The present study found that the initial treatment pattern of diabetes mellitus in diabetic centers in Bangladesh is variable. There are several treatment modalities are given like life style modification, combined use of oral anti-diabetic drugs, insulin with oral drugs or insulin alone. So

recommendation of diabetic treatment and the changing treatment pattern are not followed. Short term and long-term glycemetic control are poor in all modalities of treatment.

References

1. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes care*. 2010;33(Supplement 1):S62-9
2. Ogurtsova K, da Rocha Fernandes JD, Huang Y, Linnenkamp U, Guariguata L, Cho NH, Cavan D, Shaw JE, Makaroff LE. IDF Diabetes Atlas: Global estimates for the prevalence of diabetes for 2015 and 2040. *Diabetes research and clinical practice*. 2017;128:40-50
3. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes care*. 2004;27(5):1047-53
4. McNeely MJ, Boyko EJ. Type 2 diabetes prevalence in Asian Americans: results of a national health survey. *Diabetes care*. 2004;27(1):66-9
5. Sayeed MA, Mahtab H, Khanam PA, Latif ZA, Ali SK, Banu A, Ahren B, Khan AA. Diabetes and impaired fasting glycemia in a rural population of Bangladesh. *Diabetes care*. 2003;26(4):1034-9.
6. Martin D, Lange K, Sima A, Kownatka D, Skovlund S, Danne T, Robert JJ, SWEET group. Recommendations for age appropriate education of children and adolescents with diabetes and their parents in the European Union. *Pediatric diabetes*. 2012;13:20-8.
7. Rahman MM, Rahim MA, Nahar Q. Prevalence and risk factors of type 2 diabetes in an urbanizing rural community of Bangladesh. *Bangladesh Medical Research Council Bulletin*. 2007;33(2):48-54
8. Imam T. Diabetic prevalence in Bangladesh: the role of some associated demographic and socio-economic characteristics. *Int J Adv Res Technol*. 2012;1(7):95-105
9. Acharya KG, Shah KN, Solanki ND, Rana DA. Evaluation of antidiabetic prescriptions, cost and adherence to treatment guidelines: A prospective, cross-sectional study at a tertiary care teaching hospital. *Journal of basic and clinical pharmacy*. 2013 Sep;4(4):82-7
10. Al-Ghamdi AA. Role of HbA1c in management of diabetes mellitus. *Saudi medical journal*. 2004;25(3):342-5
11. Agarwal AA, Jadhav PR, Deshmukh YA. Prescribing pattern and efficacy of anti-diabetic drugs in maintaining optimal glycemetic levels in diabetic patients. *Journal of basic and clinical pharmacy*. 2014;5(3):79-83
12. Sivasankari V, Manivannan E, Priyadarsini SP. Drug utilization pattern of anti-diabetic drugs in a rural area of Tamilnadu, South India—A prospective, observational study. *Int J Pharm Biol Sci*. 2013;4:514-9
13. Das P, Das BP, Rauniar GP, Roy RK, Sharma SK. Drug utilization pattern and effectiveness analysis in diabetes mellitus at a tertiary care centre in eastern Nepal. *Indian J Physiol Pharmacol* 2011;55(3):272-80
14. Ahmed Z, Hafez MA, Bari MA, Akhter J. Pattern of anti-diabetic drugs prescribed in a tertiary care hospital of Bangladesh. *International journal of basic and clinical pharmacology*. 2016;5(1):6
15. Bonafede MM, Kalsekar A, Pawaskar M, Ruiz KM, Torres AM, Kelly KR, et al. A retrospective database analysis of insulin use patterns in insulin-naïve patients with type 2 diabetes initiating basal insulin or mixtures. Patient preference and adherence. 2010;4:147-156