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HEALTH CARE EXPENDITURE OF PATIENTS WITH TYPE 2 DIABETES MELLITUS IN BANGLADESH: A REVIEW

Md. Saif Zaman[1*], Parvez Hassan[1*] S. M. Shahinul Islam[1], Md. Anayet Ullah[2] and Md. Golam Rabbani[2]

[1]Institute of Biological Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh
[2]Barind Medical College, Rajshahi-6207, Bangladesh

Abstract

The main objectives of this review are to offer an in-depth examination of the analysis of health care expenditure of patients with type 2 diabetes mellitus in covering its epidemiology, causes, clinical manifestations, diagnostic techniques, treatment approaches, and prognosis in Bangladesh. Most of the information and data are mainly involved in a critical review of various studies from sample groups of different ethnicities, age groups and genders. This study employs a systematic review and meta-analysis approach to compile and analyze existing research on health care expenditure of patients with type 2 diabetes mellitus. The study follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure comprehensive and transparent reporting of the review process. Results on the basis of various reports showed that the length of diabetes and the number of co-morbidities and complications raise the cost of healthcare. The data confirms the previously reported conclusion that patients treated with insulin monotherapy or an insulin and oral hypoglycemic agents (OHAs) combination had higher direct costs and overall costs than patients treated with OHAs alone. Overall, it was discovered that the main contributing factors to the cost of therapy were the length of diabetes, the quantity of co-morbidities and complications, and the type of treatment. The prevalence of type 2 diabetes is increasing in Bangladesh, where out-of-pocket medical expenses are higher and universal health insurance is not available to the general public. Planning cost-effective diabetes management and prevention measures is necessary. A suitable insurance plan should be created with special services for diabetic patients. To reduce the negative effects of the condition, early detection of diabetes is essential as reported by several studies compiled herein. This can be accomplished through raising awareness and eradicating the social stigma, especially for women in Bangladesh.

***Key words**:* Epidemiology, health care expenditure, Type 2 diabetes mellitus.

Introduction

Several small population-based studies carried out at different points in time in Bangladesh revealed an increasing trend in the prevalence of diabetes in semi-urban (Mahtab et al. 1983), urban (Sayeed et al. 1997), and rural areas (Hussain et al. 2005, Hossain et al. 2021). Following the most recent projection from the International Diabetes Federation (IDF), 8.3% of the 382 million adult global population has diabetes; in less than 25 years, that number will rise to 592 million in the future. There was a report in 2014, where 591 adults with diagnosed diabetes mellitus (DMs) and 591 individuals without diabetes mellitus (non-DMs) who were age, sex, and residency matched participated in a matched case-control study. In this study, DMs received 9.7 times as many drugs as non-DMs, had 1.3 times as many outpatient visits, and received two more days of inpatient therapy ($p<0.005$). For DMs compared to non-DMs, the total yearly per capita spending on healthcare was 6.12 times greater.

*Author for correspondence: saifzamananando@gmail.com/ hassanparvez@ru.c.bd

Diabetes and its associated complications are becoming more common in Southeast Asia. Roughly 25% of the world's diabetes patients reside in Southeast Asia. It is estimated that 123 million people in the region would have diabetes by 2035. Adults in Mauritius have the highest rate of diabetes in the region (15.1%), with Bangladesh coming in second (10.6%), as reported by Fox (2015). In some of the world's poorest countries, people with diabetes and their families often bear the entire cost of medical care. Even though Southeast Asia has a large population of diabetics, diabetes-related healthcare spending was only expected to account for US$6 billion, or less than 1% of global healthcare spending, with India having the largest part (Fox 2015). People in low- and middle-income countries pay a larger share of the costs associated with diabetes care than people in high-income countries (Afroz et al. 2016). By 2030, the estimated cost will surpass $595 billion USD.

People in low- and middle-income countries pay a larger share of the costs associated with diabetes care than people in high-income countries (Afroz et al. 2016). They are not eligible for health insurance or publicly sponsored medical care. The American Diabetes Association estimates that the US economy lost 69 billion dollars in output in 2012 due to diabetes-related death, reduced activity days, missed workdays, low productivity at work, and permanent disability. These losses may be rather large in less wealthy countries due to the much earlier age at which diabetes-related early deaths occur (Care 2018). Due to scarce resources and growing costs, healthcare planners and providers worldwide are being compelled to make resource reductions. One of the underlying data sets required for resource allocation and planning is an estimate of current care costs. In the foreseeable future, diabetes is expected to significantly burden Bangladesh's already inadequately funded healthcare system. The per-capita expenses associated with treating diabetes patients differ significantly across countries, contingent upon the resources at hand, the treating physician's level of experience and interest in the condition, and the patients' ability to pay. In Bangladesh, there have been very few attempts to lower the expense of diabetes treatment (Afroz et al. 2019).

Hyperglycemia, insulin resistance, and relative insulin insufficiency are the hallmarks of type 2, or non-insulin dependent diabetes mellitus, the most common kind of the disease (Maitra and Abbas 2005, Zaman et al. 2022). Type 2 diabetes is caused by a combination of behavioral, environmental, and genetic risk factors (Chen 2012, Olokoba 2012). Individuals with type 2 diabetes are more vulnerable to a range of acute and chronic issues, many of which lead to premature death. Due to the condition's ubiquity, hidden beginnings, and delayed diagnosis, type 2 diabetes patients are expected to have greater rates of morbidity and mortality, particularly in developing countries with limited resources (Azevedo and Alla 2008). Diabetes has substantial socio-economic costs for the person, the family, and the nation. Diabetes treatment is expensive since it increases the need for medical services, reduces productivity, and causes impairment. Global research findings indicate an increasing trend in diabetes-related costs: in 1995, England and Wales spent US$1.92 million (or US$204 per person); in 1997, Spain spent USD 650 million (Shobhana et al. 2000); in 1998, the American Diabetes Association spent US$98 billion; in 2000, India spent $50 million (Oliva et al. 2004); and in the Caribbean and Latin America, US$65.216 billion (Gray et al. 1995).

Different factors are influences on Type 2 diabetes mellitus (DMs)

◙ Epidemiology

In 2011, 366 million people were expected to have DM; by 2030, this number will have increased to 552 million. Every country is seeing an increase in the prevalence of type 2 diabetes, with 80% of those affected residing in low- and middle-income nations. In 2011, DM caused 4.6 million fatalities (Mota and Dinu 2013). By 2030, 439 million individuals are predicted to develop type 2 diabetes (Chamnan et al. 2011). Because of

environmental and lifestyle risk factors, the prevalence of type 2 diabetes varies greatly by geographic area (Zimmet et al. 2001).

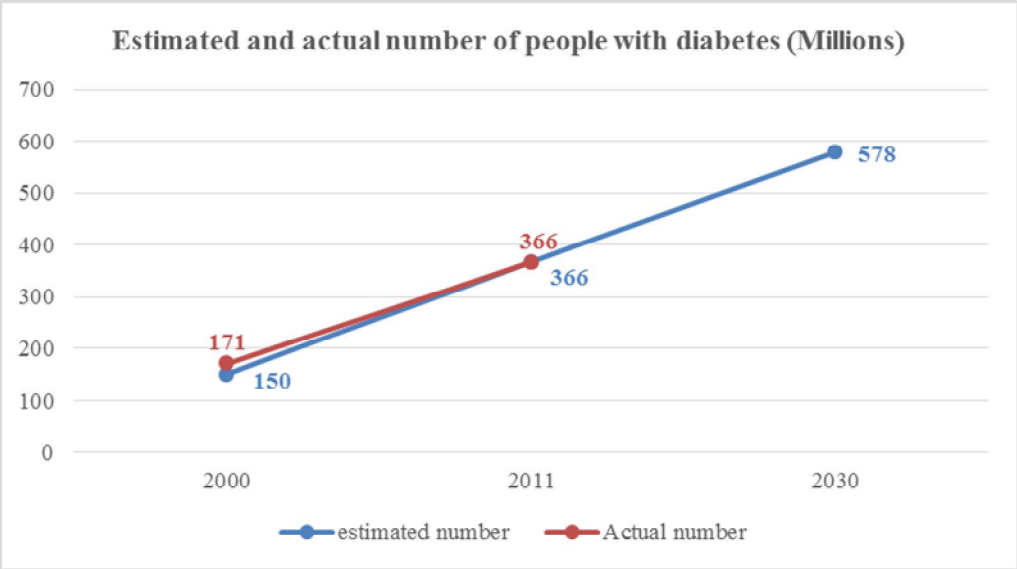

Fig. 1: Estimated and actual number of people with diabetes, data adapted from according to Wild et al. (2014) and IDF Diabetes Atlas (2019).

In Bangladesh, women now have a substantially higher prevalence of diabetes than men do (13.81% in 2018 compared to 11.25% in 2011), a considerable increase. In rural areas, among married people who are currently unemployed and those who live there, the proportionate increases in diabetes prevalence over time were 30%, 42%, and 28%, respectively (Chowdhury et al. 2022). Between 2011 and 2018, the total prevalence of diabetes among adults under 35 years of age rose from 10.95% to 13.75%. The age group of 65 to 74 years old people had the relative largest increase in diabetes prevalence (38%), and the age group of 45 to 54 years old people had the second-highest increase rate (36%) in diabetes prevalence. A study shows in Bangladesh, according to fasting blood glucose readings, the prevalence of diabetes in men and women was 9.4% and 8.0%, respectively, and the prevalence of impaired fasting glycaemia was 3.9% and 5.2%. Both males and females in the older age group had a higher prevalence of diabetes. When compared to older female individuals, the male had a greater prevalence of diabetes (Rahman et al. 2007).

◙ Risk factors of Type-2 DM

In Bangladesh, 14 reports are described about the risk factors for type 2 diabetes. Only five of this research was carried out between 1994 and 2004; the majority of these investigations were carried out in the last 10 years (from 2005 on). These investigations were all carried out by researchers using various techniques (Hussain et al. 2005). The Waist Hip Ratio (WHR), obesity, social class (higher annual income and education), hypertension, serum triglycerides, family history, lack of physical activity, total cholesterol, sedentary lifestyle, time spent walking, calorie intake, and ineffective diabetes management are just a few of the 14 potential risk factors for type 2 diabetes that have been identified in Bangladesh.

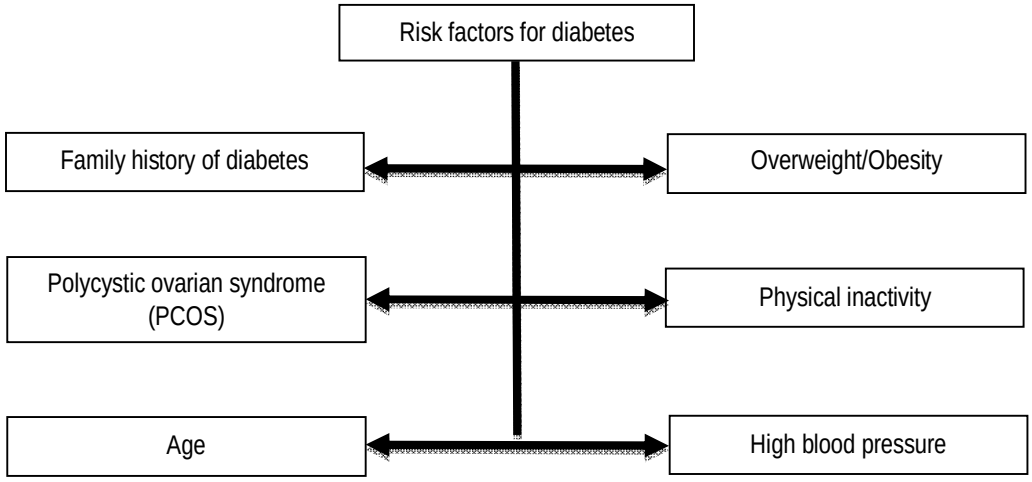

Fig. 2: The Risk factors of the type 2 diabetes mellitus.

The majority of research discovered that women were more likely than men to get diabetes. There are different risk factors for urban and rural areas, as well as different risk factors for men and women. By analyzing nine studies, it was possible to identify WHR, hypertension, socio-economic status, serum triglycerides, family history, and physical inactivity as risk factors for diabetes in rural areas. The aging population, sedentary lifestyle, family history, hypertension, total cholesterol, and triglycerides were found to be risk factors in urban areas. The two investigations, which were done in both urban and rural settings, identified social class, advancing age, WHR, and sex as risk factors. Increased age, greater income levels, and obesity (higher WHR) were revealed to be major risk factors in one study that reflects the tribal population. WHR was identified as a potential risk factor for males in three studies conducted in rural areas and one study conducted in both rural and urban areas. However, only one study identified WHR as a risk factor for females. In one study conducted in a rural area, BMI was also identified as a potential risk factor for females. Male and female tribal members both exhibited the same higher risk of diabetes (Sayeed et al. 2004, Sal-Sabil et al. 2016).

◙ Factors that keep healthy subjects' glucose tolerance at a normal level

The glucose tolerance test measures the body's response to sugar, also called glucose. This test can be used to screen for type 2 diabetes or prediabetes before you have symptoms of either condition.

Factors that keep healthy subjects' glucose tolerance at a normal level were evaluated on the basis of- i) insulin secretion; ii) tissue glucose uptake; iii) peripheral (primarily muscle); iv) splanchnic (liver plus gut); and v) suppression of HGP; a) decreased FFA; b) decreased glucagon; and vi) route of glucose administration, as mentioned by De Fronzo (2004).

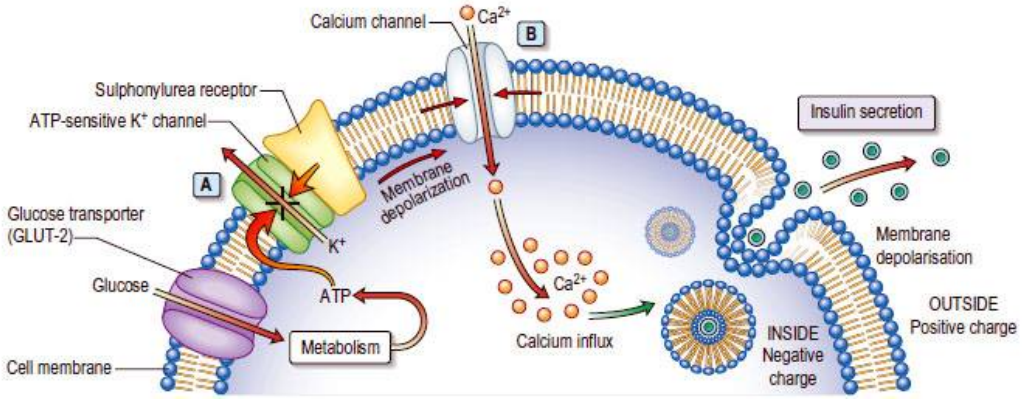

Fig. 3: A beta cell of the islet of pancreas and will explain how local factors regulate secretion of insulin. (www.medicinehack.com/2011/08/insulin-secretion-local-regulation).

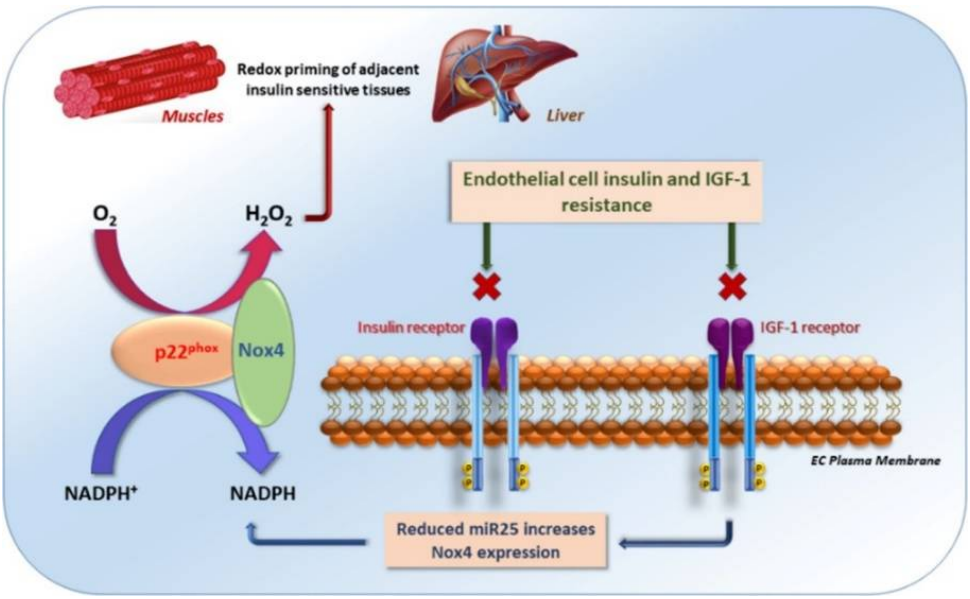

Fig. 4: Tissue glucose uptake through muscles and hepatic portal vein (https://www.ahajournals.org).

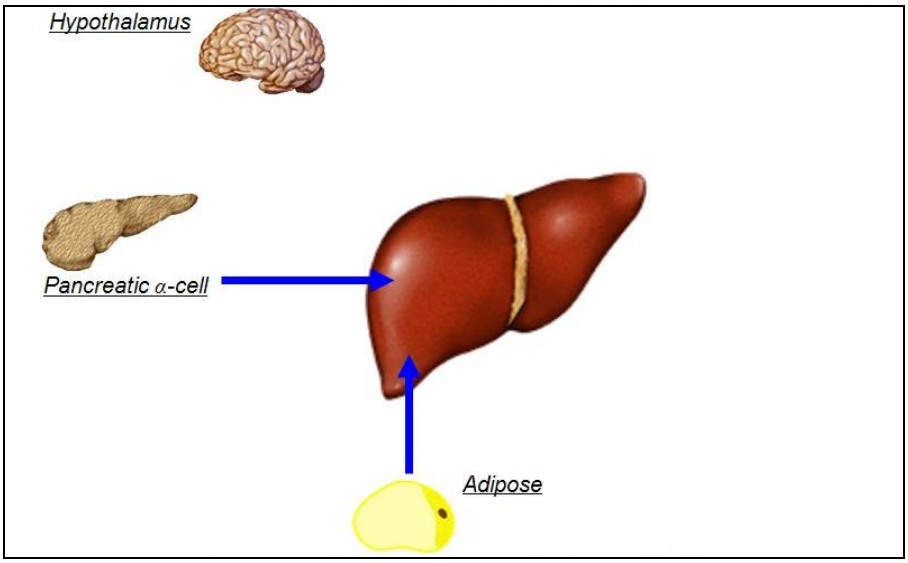

Fig. 5: Insulin's indirect effects in the suppression of hepatic glucose production (HGP) (Ramnanan et al. 2011).

◙ Pathophysiology

Insulin insensitivity caused by insulin resistance, decreased insulin production, and eventually failing pancreatic beta cells is the hallmark of type 2 diabetes (Kahn 1994, Hossain et al. 2022a, b). As a result, less glucose is transported into the liver, muscle, and fat cells. With hyperglycemia, there is an increase in the breakdown of fat. In the pathogenesis of type 2 diabetes, decreased alpha-cell function has recently been observed. This malfunction prevents meals from suppressing the glucagon and hepatic glucose levels that rise during fasting. Hyperglycemia occurs from low insulin levels and elevated insulin resistance. The incretins play a significant role in the gut in mediating insulin release and, in the case of GLP-1, glucagon suppression. Despite the fact that type 2 DM patients have diminished GIP function, GLP-1 still has insulinotropic effects, making it a potentially helpful therapeutic alternative. GLP-1, like GIP, is quickly rendered inactive in vivo by DPP-IV. GLP-1 analogues with longer half-lives and DPP-IV inhibitors, which stop the breakdown of endogenous GLP-1 as well as GIP, are two treatments for this issue that have been developed (Fujioka 2007). Both kinds of drugs have demonstrated promise, with the ability to normalize fasting and postprandial glucose levels as well as enhance beta-cell mass and function. Studies on the involvement of mitochondrial dysfunction in the emergence of insulin resistance and the pathogenesis of type 2 diabetes are still being conducted (Garcia-Roves 2011). Most people with type 2 diabetes are obese, with central visceral adiposity. As a result, the pathophysiology of type 2 DM depends greatly on adipose tissue. Two novel ideas are developing to explain this connection, including the ectopic fat storage syndrome (deposition of triglycerides in muscle, liver, and pancreatic cells) and the portal/visceral hypothesis, which places a major emphasis on high non-esterified fatty acid concentrations. Within this paradigm, researchers will examine how our obesogenic environment and the risk of type 2 diabetes interact with insulin resistance and beta-cell dysfunction in the coming ten years (Fujioka 2007).

◙ Screening and Diagnosis

There are many easily available tests for DM diagnosis and screening are mentioned below the in the schematic diagram. The test that is advised for both screening and diagnosis is identical, so a positive screen is comparable to a diagnosis of pre-diabetes or DM (Cox and Edelman 2009). Despite the fact that 25% of type 2 DM patients already had microvascular problems at the time of diagnosis, which indicates that they have had the condition for more than 5 years at that point (Harris et al. 1992). It is still based on the American Diabetic Association's (ADA's) guidelines from 1997 or the World Health Organization's (WHO's) National Diabetic Group criteria from 2006, which are for a single elevated glucose reading with symptoms (polyuria, polydipsia, polyphagia, and weight loss), otherwise elevated values on two occasions, of either fasting plasma glucose (FPG) 37.0 mmol/l (126 mg/dL), or with an oral glucose tolerance.

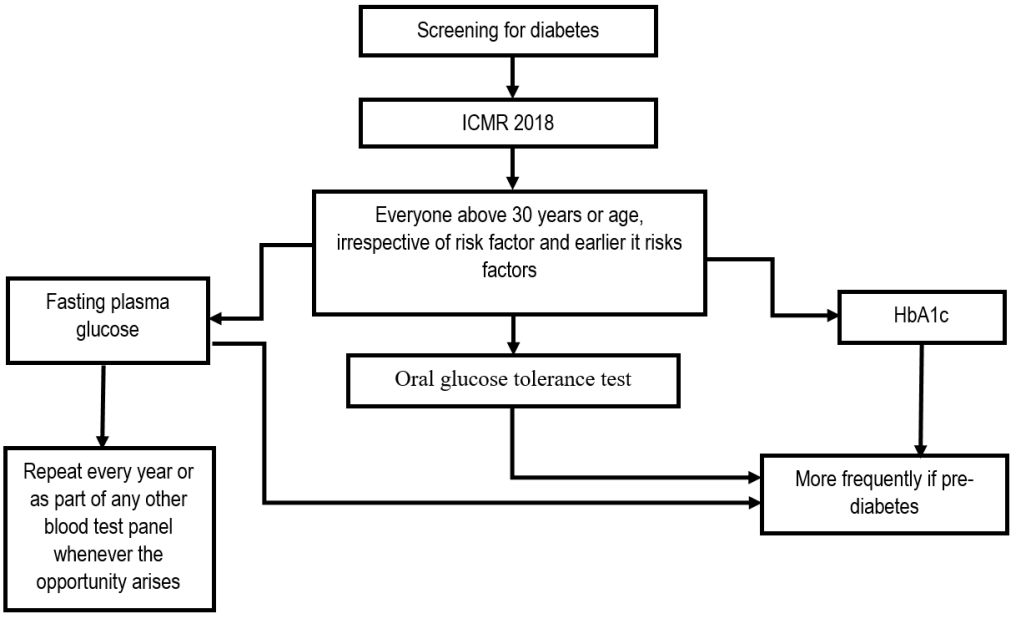

Fig. 6: An overview and schematic diagram on diagnosis of diabetes mellitus.

The 1997 ADA criteria for diagnosing DM place more emphasis on the FPG than the OGTT, according to WHO. The IEC chose to suggest a threshold for DM diagnosis that emphasizes specificity, noting that this struck a balance between the stigma and expense of incorrectly labeling people as diabetic and the minimal clinical repercussions of delaying the diagnosis in a patient with an HbA1c level below 6.5% (American Diabetes Association 2009).

◙ Management

Through dietary and behavioral changes. Studies have shown that maintaining a body mass index of 25 kg/m^2, eating a diet high in fiber and unsaturated fat and low in saturated and trans fats and glycemic index, regular exercise, quitting smoking, and moderate alcohol consumption significantly reduced the incidence of

type 2 DM (Hu et al. 2001, Chen et al. 2012). Suggesting that changing one's lifestyle can prevent the bulk of type 2 DM. A medical nutrition examination should be given to type 2 diabetic patients, and lifestyle suggestions should be made in accordance with each patient's unique physical and functional capabilities (Willi et al. 2007, Chiniwala and Jabbour 2011).

◙ Pharmacological agents

●**Biguanides:** Biguanides in patients who are overweight or obese of which metformin is the most popular-suppress hepatic glucose production, improve insulin sensitivity, enhance glucose uptake by phosphorylating GLUT-enhancer factor, increase fatty acid oxidation, and reduce glucose absorption from the digestive tract (Collier et al. 2006). An additional mechanism of action for metformin, according to research released in 2008, is the stimulation of AMP-activated protein kinase, an enzyme involved in the production of the hepatic gluconeogenic genes (Kim et al. 2008).

● **Sulfonylureas:** These are often well tolerated but provide a risk of hypoglycemia because they enhance endogenous insulin secretion (Chiniwala and Jabbour 2011). Sulfonylurea therapy for elderly DM patients increases their risk of hypoglycemia by 36% when compared to younger patients (Van Staa et al. 1997).

● **Meglitinides**: Although the binding location is different, repaglinide and nateglinide are non-sulfonylurea secretagogues that work on the ATP-dependent K-channel in pancreatic beta cells to stimulate the release of insulin from the beta cells (Fuhlendorff et al. 1998).

● **Thiazolidinediones:** A selective ligand for the transcription factor peroxisome proliferator-activated gamma, thiazolidinedione is an insulin sensitizer. They are the first medications to treat type 2 DM patients' fundamental issue with insulin resistance (Yki-Järvinen 2004).

● **Alpha-glucosidase inhibitors:** Although not frequently used to treat type 2 DM patients, acarbose, voglibose, and miglitol are probably safe and effective. These medications should not be used in patients with severe renal impairment because they are most useful for treating postprandial hyperglycemia. Due to the high rates of side effects such as diarrhea and flatulence, their use is typically restricted (Chiniwala and Jabbour 2011).

● **Incretin-based therapies:** The cornerstone of incretin-based medicines, which aim to address this hitherto unknown aspect of DM pathogenesis, is glucagon-like peptide 1 (GLP-1) analogues. These therapies lead to lasting improvements in glycemic control and better body weight management (Stonehouse et al. 2012).

● **Dipeptidyl-peptidase IV inhibitors:** Inhibitors of dipeptidyl-peptidase IV (DPP IV) inhibit the widely distributed enzyme dipeptidyl peptidase-4 (DPP-4), which rapidly inactivates both GLP-1 and GIP. By raising the levels of these hormones in the blood, they also enhance islet function and glycemic management in type 2 diabetes (Pratley and Salsali 2007).

● **Insulin analogs:** The ability of insulin therapy to simulate typical physiologic insulin production was rather limited. Traditional intermediate- and long-acting insulins (NPH insulin, Lente insulin, and ultra-Lente insulin) are constrained by variable absorption and action peaks that could cause hypoglycemia (Burge et al. 1997). The onset and durations of action of the novel insulin analogues range from rapid to protracted, and their pharmacokinetic profiles are dissimilar from those of normal insulins. Currently, there are three types of insulin analogues on the market: insulin lispro, insulin as part, and insulin glargine (Nathan et al. 2009).

● **Future in drug therapy inhaled insulin:** Rapidly acting insulin's inhaled formulation, which became accessible in 2006 (Rosenstock et al. 2010). After it was authorized by the FDA and the European Medicines Evaluation Agency to treat individuals with type 1 and type 2 DM (Holman et al. 2009).

● **Bromocriptine:** Recently, quick-release bromocriptine was created to treat type 2 diabetes. The mode of action is unclear, though. Studies have indicated that after 24 weeks of therapy, they reduce the mean HbA1c levels by 0.0% to 0.2% (Mikhail 2011).

● **Others:** inhibitors of 11ß-hydroxysteroid dehydrogenase 1, which lessen the effects of glucocorticoids on liver and fat, and sodium-glucose cotransporter 2 inhibitors, which enhance renal glucose clearance. For the objective of creating a new medication therapy for type 2 diabetic patients, insulin-releasing glucokinase activators, pancreatic-G-protein-coupled fatty-acid-receptor agonists, glucagon-receptor antagonists, and metabolic inhibitors of hepatic glucose output are being evaluated (Tahrani et al. 2011).

◙ **Complications of type 2 diabetes mellitus**

-Acute: Diabetic ketoacidosis and diabetic coma, hypoglycemia, hyperglycemia and chronic factors are reported by Farmaki et al. (2020).

-Macroangiopathy: This term refers to significant cardiac and vascular lesions that can cause erectile dysfunction in males, hypertension, artery narrowing, coronary artery disease, and strokes.

-Diabetic retinopathy: This condition seriously impairs vision, primarily because it harms the eye's blood vessels. In the West, it is the most typical cause of blindness.

-Diabetic nephropathy: Renal insufficiency may occur from diabetic nephropathy. Intense discomfort in the lower limbs, sensory problems, muscular atrophy, trouble walking, injuries with wound formation—these are all symptoms of diabetic neuropathy. Tachycardia, orthostatic hypotension, urinary incontinence, indigestion, nausea, diarrhea, and/or constipation are also caused by it.

-Diabetic foot: By this term, we refer to the lesions seen in diabetics below the knees that are associated with pain, sensory disturbance, dry skin, the development of calluses, wounds, and ulcers, frequently complicated by serious local infections and progressing to gangrene and finger amputation.

-Additional diseases: Related other additional diseases that are frequently linked to diabetes mellitus include liver damage, myopathy, osteoporosis, arthropathies, and infection susceptibility.

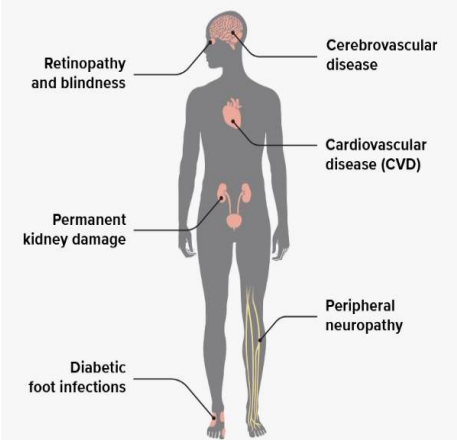

Fig. 7: Figure shows the potential health complications of type 2 diabetes can systematically affect the body. By Kelly wood (Medical News Today) (www.medicalnewstoday.com).

◙ Cost of management of type 2 diabetes mellitus in Bangladesh and some other countries of the world

● In India

The findings of the study showed an average monthly expenses per person (pppm) of people with self-reported recognized diabetes were significantly higher (1,357.65 pppm) than those with unknown or non-diabetes (999.91 pppm) ($p<0.05$). The participants' rural and urban locations ('2,893 pppm and '4,162 pppm, respectively) and their ages ('1,996 pppm and '5,059 pppm) also differed significantly from one another (Nagarathna et al. 2020).

● In China

This study showed, a total of 62 523 patients with diabetes were hospitalized throughout the study period, and 41 875 (67.0%) of those patients experienced problems related to their diabetes. For diabetic patients, the median hospital stay cost was 7996.11 RMB. Two significant sources of hospitalization costs, accounting for 36.2% and 22.4%, respectively, were prescribed medications and laboratory testing. Hospitalization expenses were substantially correlated with length of hospital stay (LOS), complications, age, admission status, year of admission, sex, and health insurance ($p<0.001$). As the frequency of problems rose, so did hospitalization expenses and length of stay (LOS) ($p<0.001$). The diabetic individuals with foot issues had the highest hospitalization expenditures (Bao et al. 2017).

● In the USA

The objectives of this study were to compare high-cost (HC) and not-high-cost (NHC) T2DM patients and to evaluate the predictors of becoming a high-cost (HC) patient. 1,720,041 patients in total satisfied the criteria for inclusion, of which 172,004 were HC. In comparison to NHC patients, HC patients had a mean (SD) CCI score of 4.3 (3.0) as opposed to 2.1 (1.7). Costs per patient per year were $56,468 ($65,604; $56,778-$56,157) for HC patients and $4,674 ($4,504; $4,695-$4,652) for NHC patients on average (SD; upper 95% confidence interval-lower 95% confidence interval). HC patients paid more for inpatient treatment and prescription drugs than NHC patients did. A CCI score of 2 or above was the best indicator of being an HC patient (odds ratio [OR] = 4.896), followed by an obese diagnosis (OR = 2.106), renal impairment (OR = 2.368), and insulin use (OR = 2.098) (Meyers et al. 2014).

● In Bangladesh

Between January and July 2014, 591 adults with diagnosed diabetes mellitus (DMs) and 591 individuals without diabetes mellitus (non-DMs) who were age, sex, and residency matched participated in a matched case-control study. In the BIHS hospital in Dhaka, Bangladesh, the study enrolled DMs from ongoing patients and non-DMs from companions. DMs received 9.7 times as many drugs as non-DMs, had 1.3 times as many outpatient visits, and received two more days of inpatient therapy ($p<0.005$). For DMs compared to non-DMs, the total yearly per capita spending on healthcare was 6.12 times greater (USD 635 vs. 104, respectively). 9.8% of DMs said they had not taken any anti-diabetic medicine in the previous three months, compared to 46.4% who had taken metformin, 38.7% who had taken sulphonylurea, 40.8% who had taken insulin, 38.7% who had taken any hypertension medication, and 14.2% who had taken anti-lipids (Islam 2015).

This study's annual cost per participant was US$314 in 2010, which was more expensive than the US$165 reported by a study conducted in China in 2006 (Wang et al. 2009) and the US$197 reported by another OPD-based study conducted in a clinic in Pakistan (Khowaja et al. 2007). In this analysis, the direct cost per person was US$283, accounting for 91.5% of the total yearly cost, while the indirect cost accounted for the remaining 8.5% (US$37). Results of an experiment conducted in India in 2007 revealed that the mean

annual direct cost for all diabetes patients seeking outpatient care was US$94.5, and the estimated indirect cost was US$155 (Kapur 2007). The results of this research show that the length of diabetes and the number of co-morbidities and complications raise the cost of healthcare. Studies conducted in a number of industrialized nations, including Iran (Solli et al. 2010), Norway (Nolan et al. 2006), and Canada (Dawson et al. 2002), also found this pattern. The expense of controlling the disease is increased by diabetes-related complications, and diabetes is linked to a number of consequences that will ultimately have an impact on the healthcare system. Likewise, a longer duration of the disease makes the condition worse, which eventually results in a higher cost of treatment. The analysis confirms the previously reported conclusion that patients treated with insulin monotherapy or an insulin and OHA combination had higher direct costs and overall costs than patients treated with OHA alone. Overall, it was discovered that the main contributing factors to the cost of therapy were the length of diabetes, the quantity of co-morbidities and complications, and the type of treatment (Afroz et al. 2016, 2019).

Conclusion and Recommendation

In Bangladesh, diabetes has placed a heavy strain on individuals, families, and society. The current study's findings revealed that the yearly cost of diabetes care at the outpatient department (OPD) of a tertiary care facility was US$314, and with an estimated 5.1 million adult patients (20-79 years) with diabetes, the total annual burden will be US$1.5 billion (BDT 11, 654 billion), which is a significant amount. The entire cost of diabetes care in the nation would be close to 5.1% of our gross domestic product (US$28.9 billion) even without the expense of inpatient services. The prevalence of type 2 diabetes is increasing in Bangladesh, where out-of-pocket medical expenses are higher and universal health insurance is not available to the general public. Planning cost-effective diabetes management and prevention measures is necessary. A suitable insurance plan should be created with special services for diabetic patients. To reduce the negative effects of the condition, early detection of diabetes is essential. This can be accomplished through raising awareness and eradicating the social stigma, especially for women in Bangladesh.

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