Co ntrib ution o f Mult idisciplinar y Healthcare Professio nals in the M anag ement of Gestatio nal Di abetes Melli tus: Case Study on Selected Hospital s in D haka

Submitted by

ID: 1214603 2

S ubmitted in accordanc e with the requiremen ts for the
D egree of Ba chelor of P harmacy.

DEPARTMENT OF PHA RMACY

BRAC UNIVERSITY
Inspiring Excellence

Dedicated To:

My mother,

who has sacrificed her every desire since my birth

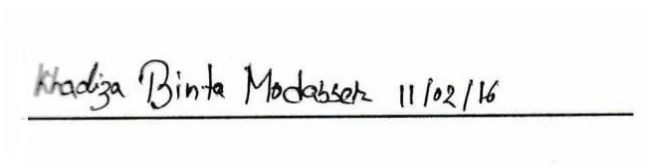
to make me a strong woman and has inspired me to make my life beautiful.

January, 2016.

Certification Statement

This is to certify that this project titled 'Contribution of Multidisciplinary Healthcare Professionals in the Management of Gestational Diabetes Mellitus: Case Study on Selected Hospitals in Dhaka' submitted for the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy from the Department of Pharmacy, BRAC University constitutes my own work under the supervision of Dr. Sharmind Neetolpol, Assistant Professor, Department of Pharmacy, BRAC University and that appropriate credit is given where I have used the language, ideas or writings of another.

Signed,



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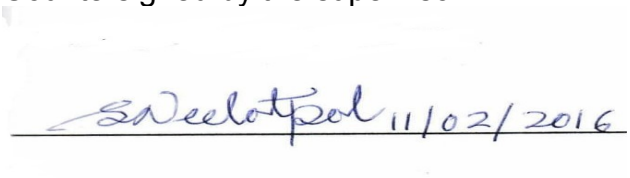

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List of Abbreviation

ADA	American Diabetes Association
AFN	Assembly of First Nations
BMI	Body Mass Index
CDA	Canadian Diabetes Association
FNW	First Nation Women
GDM	Gestational Diabetes Mellitus
GCT	Glucose Challenge Test
HAPO	Hyperglycemia and Adverse Pharmacy Outcomes
HBG	Hemoglobin Blood Glucose
MODY	Maturity Onset Diabetes of the Young
NICE	National Institute for Health Care Excellence
NIDDM	Non-Insulin Dependent Diabetes Mellitus
OGTT	Oral Glucose Tolerance Test
PCOS	Polycystic Ovary Syndrome
PIN	Pregnant Information and nutrition study
PPAR	Peroxisome Proliferator Activated Receptor
RCTs	Randomized Controlled Trials
T2D	Type 2 Diabetes
IDDM	Insulin Dependent Diabetes Mellitus
WHO	World Health Organization

Abstract

Gestational Diabetes Mellitus (GDM) is a common metabolic disorder that occurs during pregnancy. GDM can cause significant problems, including maternal complications, perinatal complications, and metabolic disorders in offspring in the later life. The primary management method for women with GDM is nutrition therapy. Some women with GDM require diet therapy alone, while some women require both diet and insulin therapy. The present study was aimed to evaluate the attitude of multidisciplinary healthcare professionals in the engagement of the treatment and management of GDM patients in Bangladesh. The sample size was selected 30 for four groups (patient, doctor, pharmacist and authority) and data were collected from 120 participants from hospital located in Dhaka city using a paper-based questionnaire survey. This study shows that, most of the patients (14%) had a history of diabetes in their family; 67% of the GDM participants feel the necessity of involvement of a pharmacist for their care, whereas, only a few think they need assistance from nurse (17%) and dietitian (17%). Nearly 43% of the doctors think a pharmacist can take responsibility in the management of GDM. Whereas, 57% of the doctors cannot agree that clinical pharmacists can take a responsibility in dose adjustment for the patients. Hundred percent of the authorities believe that pharmacist can play a significant role in the management of GDM. Moreover, 90% of the authorities are currently willing to have pharmacist in their patient management supporting team. Therefore, the findings of the study can play a significant role for the policy maker to take a decision regarding the involvement of clinical pharmacists in the management of GDM patients.

Chapter One: Introduction

Diabetes mellitus is one of the major health problem issues in the world today. Both micro-vascular (i.e. retinopathy, nephropathy, and neuropathy) and macro-vascular (i.e. myocardial infarction, peripheral vascular disease and stroke) complications are clinically associated with diabetes mellitus. It may lead to significant illness or even death. It occurs as carbohydrate intolerance because of hyperglycemia (Metzger *et al,* 1998). Hyperglycemia refers to the situation when the body has too little insulin or cannot use insulin properly. It is a long term complications which may lead to heart disease or failure of various organs such as kidney, eyes, nerves and blood vessels. Mostly 65% diabetic patients die due to heart disease or stroke (Berger *et al, 2002*).

Diabetic mellitus is a chronic disease which becomes worse rapidly (Zakia *et al,* 2013). WHO (2015 a) estimates that the prevalence of diabetes will become nearly doubled within next 20 years of time if no immediate advanced action is taken. This study shows that the number of diabetic patient would reach 336 million by 2030 which was 171 million people in the year 2000. This statistics is also supported by the UN statistics (2007) which showed the projection of diabetic patients from 2.8% to 3.95% from the year 2000 to 2030. The disease is considered as the worldwide epidemic and the third leading fatal disorder after cancer and heart disease (Zakia *et al,* 2013). In 2012 diabetes was the direct cause of 1.5 million deaths where more than 80% of diabetes deaths occur in low and middle income countries.

Gestational Diabetes Mellitus (GDM) is one kind of diabetes which mainly occurs during pregnancy and in some cases persists after pregnancy. According to American Diabetes Association (ADA) (2013), gestational diabetes is mainly the degree of glucose intolerance during pregnancy. It is related with increased risk of several adverse infant and maternal outcomes, their offspring will have a lifelong increase risk of glucose intolerance, obesity and metabolic syndrome whereas the mothers will have a higher risk of metabolic syndrome and diabetes in the future (Berger *et al, 2002*). The detection of GDM during pregnancy provides an opportunity to identify women at risk of short term and long term complications. There is evidence that early diagnosis and intervention can reduce the adverse perinatal outcomes (ADA, 2013).

Pharmacists are one of the significant practitioners who are frequently consulted by members of the community about a wide range of health issues. Pharmacists are familiar with the health conditions and could prescribe medications. They could provide précised information on medication usage and potential problems. (Diabetes Australia, 2012).

The diagnosis of diabetes can be very stressful for both younger and older patients according to Diabetes Australia (2012). Initial denial of the condition is normal. But if denial continues, diabetes care can be compromised. Some people with diabetes will require complex medication schedules and a home medicines review may be useful. This involves a pharmacist assessing people who may have problems with their medications, and recommending changes to improve effectiveness, safety and adherence.

It has been observed by Mohammmed *et al,* (2015) that even in an urban nation like USA only 30% of its patients receive formal education on diabetes. Study shows (M. Rashid *et al,* 2015) that diabetic patients in America visit Pharmacist 7 times more frequent than they visits their General Physicians. Nearly all medically managed diabetic patients interact with a Pharmacist on an ongoing basis; therefore, they could play most profound role to bridge the education gap**.**

Pharmacist can play a vital role in the management of GDM by developing the knowledge and awareness of the patients about the treatment. They help to guide the GDM patients in monitoring blood glucose level (Sullivan *et al,* 1998; Evans *et al,* 2004). They also help to control glycemia by changing lifestyle and food habit. In Bangladesh, however, multidisciplinary involvement of healthcare professionals in the management of GDM is absent.

Aim of the study:

The overarching aim of the study is to evaluate the attitude of multidisciplinary healthcare professionals in the engagement of the treatment and management of GDM patients in Bangladesh.

Objectives of the study:

The objectives of the study are

1. to identify the level of expectation of GDM patients to have healthcare services from pharmacists, nutritionists or nurses.
2. to identify the views of doctors and authorities to involve multidisciplinary healthcare professionals to support the GDM patients.
3. to identify the knowledge and confidence of clinical pharmacists in the management of GDM.

Chapter Two: Literature Review

At the beginning of literature review the researcher tries to explore the role of multidisciplinary healthcare professionals (doctors, pharmacists, nutritionists, nurse) in the management of gestational diabetes mellitus (GDM) all over the world. This chapter focuses on the current scenario of the GDM management practice in developed countries and in Bangladesh.

2.1. What is Diabetes mellitus?

Diabetes mellitus is a metabolic disease which is characterized by the defective secretion of insulin or action of insulin or both. Diabetes mellitus can be defined as a condition of chronic hyperglycemia that may develop by many environmental and genetic factors. There are many types of diabetes mellitus (WHO, 1985). It is associated with ketoacidosis or non ketotic hyperosmolar state leading to stupor, coma and without effective treatment, death. Diabetes mellitus is caused by genetic and/or acquired deficiency of insulin production by the pancreas, or by the unsuccessfulness of insulin production (Lei *et al*, 2012).

Diabetes places a burden on individual health and the health care system. It is also associated with a range of complications ranging from heart disease to eye disease (CDA, 2005-2009). Unfortunately, only about 40% of newly diagnosed type 2 diabetic patientshave estimated to attend a diabetes clinic or have received diabetes education. Moreover, only about half of them can monitor their glucose level (Assembly of First Nation, 2007).

2.2. Types of Diabetes mellitus (DM):

There are mainly three types of diabetes: type1 (insulin dependent diabetes mellitus), type 2 (non-insulin dependent diabetes mellitus (NIDDM) or “adult onset”, and GDM (ADA, 2000)

2.2.1. Type I diabetes:

It was previously called insulin dependent diabetes mellitus or juvenile-onset diabetes. Although disease onset can occur at any age, the peak age for diagnosis is in the mid-teens. Type 1 diabetes develops when the insulin secreted beta cells in the pancreas are destroyed. This destruction is initiated or mediated by the body’s immune system and limits or completely eliminates the production and secretion of insulin, the hormone that is required to lower blood

glucose levels. To treat people with type 1 diabetes must have insulin delivered by injection or a pump. In adults, type 1 diabetes accounts for approximately 5% of all diagnosed cases of diabetes. There is no known way to prevent type 1 diabetes. Several clinical trials for preventing type1 diabetes are currently in progress with additional studies being planned (Berger *et al,* 2002).

2.2.2 Type II diabetes:

Type II diabetes is known as Non-Insulin-dependent diabetes mellitus (NIDDM) and it is mainly occurred during adulthood. Type II diabetes is defined as failure to produce not only sufficient insulin but also insulin resistance. It is caused by obesity, lack of physical exercise and ethnic background. However, childhood obesity and concurrent insulin resistance is one of the reasons in this type of diabetes which is also increased worldwide (Rosenbloom, 1999). The treatment of this type of diabetes includes having oral hypoglycemic agents, reduced food intake, and increased physical activity.

2.2.3. Gestational Diabetes Mellitus:

Gestational diabetes mellitus (GDM) was first proposed by national diabetes data group in 1979 (American Diabetes Association, 2013). GDM is same as type II diabetes. GDM is one kind of diabetes which occurs mainly during pregnancy. Approximately 50-55% of pregnant women have developed DM during pregnancy (Menato *et al,* 2008). It is not clearly over diabetes. It is mostly occurs after the end of pregnancy (American Diabetes Association, 2013). In some cases this may mean that glucose intolerance began before pregnancy, however, was only diagnosed during pregnancy (Berger *et al,* 2002). In some communities, women are screened for GDM before they are screened for routine diabetes test. For this reason, some women are unaware of their diabetic status until they have GDM. That is why; sometimes diabetes does not go away after the delivery of their baby. Obese women are at greater risk for developing gestational diabetes. The infants are at increased risk of developing type 2 diabetes with GDM mother along with high birth weight (Assembly of First Nations, 2007).

2.3. History of Gestational Diabetes Mellitus:

Scientists suggested specific criteria to describe the glucose tolerance level in pregnancy in 1964 and he identified the higher risk of GDM. Gestational diabetes mellitus (GDM) are developing diabetes after delivery (O'Sullivan *et al,* 1964). In 1979 the principle was later modified by the National Diabetes Data Group (NDDG). In 2000, the American Diabetes Association (ADA) suggested to use the Carpenter and Coustan criteria for the diagnosis of GDM. In 2008, the result of "Hyperglycemia and Adverse Pregnancy Outcomes (HAPO)" study was published (Metzger *et al,* 2008). Their study findings suggested a new diagnostic criteria in 2010 (Metzger, 2010) which highlighted the major information regarding the risks of adverse effect with GDM mother and fetus.

2.4. Mechanism of GDM:

GDM women show reduces insulin response to nutrients in contrast to healthy women (Catalano *et al,* 1999; Homko *et al,* 2001). A large defect in pancreatic beta cell function when insulin levels and responses come in contact with individual's degree of insulin resistance is found in women. It is prior to GDM (Buchanan, 2001). The majority of women of GDM have beta cell dysfunction. It is occurred on a background of chronic insulin resistance which has already presented before pregnancy (Damm *et al,* 1996; Kautzky-Willer *et al,* 1997). It is seen both lean and obese women to develop GDM showing distinct resistant to the ability of insulin. It stimulates glucose disposal and suppresses both glucose production and fatty acid level (Catalano *et al,* 1999; Homko *et al,* 2001). There are many defects found in state of insulin resistance in GDM women like defects in the binding of insulin to its receptors in skeletal muscle. Many other defects like alteration of insulin signaling pathway, reduce expression of Peroxisome activated receptor (PPARγ) and reduced insulin mediated glucose transport which have been found in skeletal muscle or fat cell (Buchanan, 2005). In the insulin signaling pathway have post receptor defect in the placenta of women with pregnancies. They are complicated by diabetes and obesity. These post receptor alterations are under selective maternal regulation and not regulated by fetus (Colomiere *et al,* 2009). The events which lead to the GDM development are conducted by an antigenic load. Human leukocyte antigen-G (HLA-G) is supposed to protect pancreatic islet cells. It also protects the fetus from immune attack by down

regulating cytotoxic T-cell responses to fetal trophoblast antigens. The central events leading to GDM development is the interaction between HLA-G and nuclear factor-κB (NF-κB).

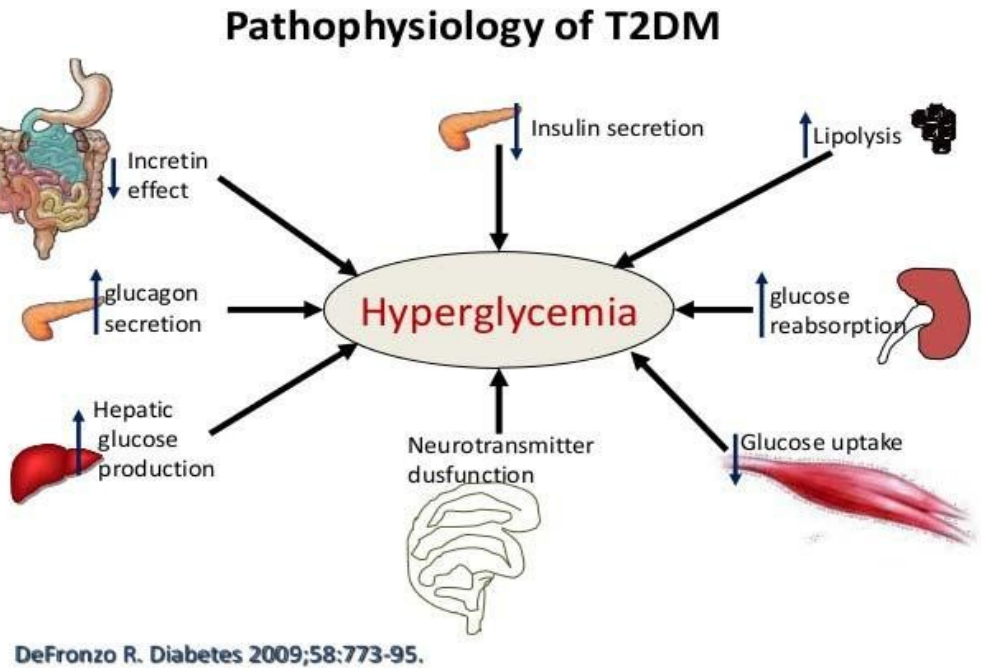

Figure: 2.1: Mechanism of gestational diabetes mellitus

(Source- Defronzo R. Diabetes 2009; 58: 773-95)

2.5. Factors contributing to gestational Diabetes mellitus:

Gestational diabetes mellitus develops over several years and has many causes. Some of these factors are non-modifiable and some of these are modifiable**.** As we are surrounded by the environment, it may pose as risk factors while some element of environment appears. Some such factors (genetic, age, personal history, family history, obesity and so on) are given below.

2.5.1 Age:

Considering the characteristics of GDM, it has been found that most of them arise in middle life. It has been noticed for many years that GDM is more common among the middle than among the young women. Most researches who studied relationships between age and GDM found that increased risk of developing GDM lies with woman's age.

2.5.2 Body mass index (BMI):

Body mass index (BMI) is very strong risk factor in GDM patients (Knowler *et al,* 1991; Almdal *et al,* 2008). The change in plasma lipids and glucose metabolism which occur during pregnancy are extended in obese women (Nelson, 2010). In obese pregnancies, insulin sensitivity is more severely impaired than in late normal pregnancy. As adipose tissue releases increased amounts of non-essential fatty acids, glycerol, hormones, pro-inflammatory cytokines and many other factors which are involved in the development of insulin resistance in obese individuals. When insulin resistance is associated with dysfunction of beta cell, insulin secretion falls. It results in failure to control blood glucose level which leads to GDM (Hebebrand, 2009).

2.5.3 Physical inactivity:

There is a positive correlation between exercise before and/ or during pregnancy which may reduce GDM risk (Zhang *et al,* 2011). It is an integral part of life style suggested that onset of GDM which can be prevented or delayed by improving insulin sensitivity and reducing insulin resistance directly. It may also improve indirectly changing in body mass and body composition (Hamman *et al,* 2006; Kay *et al,* 2006).

For last several decades Bangladesh is experiencing the rapid urbanization. Unplanned development has influenced an environment which is prohibitive and unsafe for physical activity, which may also influence the chronic disease burden more in the urban areas.

2.5.4 Genetic factors:

Genetic components play an important role in GDM patients. It is reported that positive family history with first degree relatives has an increased risk of GDM. This risk is greater when both parents are affected (Ma *et al,* 2008; Bjornholt *et al*, 2000). The incident rate is 6% general population whereas 40% of first-degree relatives of GDM patient who develop diabetes (Kobberling, 1982). Genome-wide association studies (GWAS) have discovered the susceptibility loci of GDM since early 2007 (Sladek *et al*, 2007). It is a considerable number of genetic components with GDM which segregates analysis suggesting polygenic nature of GDM. 11 genes (TCF7L2, PPARG, FTO, KCNJ11, NOTCH2, WFS1, CDKAL1, IGF2BP2, SLC30A8, JAZF1, and HHEX)have been identified by recent studies which are significantly associated with risk of GDM.

2.5.5 Dietary pattern:

There is a link between specific dietary habit during pregnancy and GDM risk. The development of both impaired glucose tolerance and GDM are associated with increased fat and lower carbohydrate intake during the second trimester of pregnancy which is demonstrated by Pregnancy infection and nutrition study (PIN) (Saldana *et al*, 2004). Top food sources which are saturated fat are mayonnaises, cheese, whole milk, biscuits or muffins and deep fried potatoes. Another study has shown that soybean oil, a poly saturated fat is the main source of fat in the diet. The intake of higher percentage of calories from soybean oil is related with a lower incidence of IGT (impaired glucose tolerance) and GDM.

GDM is most common medical complication in pregnancy. Table 2.1 shows risk factors of developing gestational diabetes mellitus (GDM).In pregnancy weight gain is an important part and hormonal changes also contribute here, women become over weight which is a major risk factor of developing GDM as well as family history is also a major risk factor. GDM causes a high risk to the fetus and the mother.

Table-2.1: Risk Factors for Gestational Diabetes Mellitus:

Low risk	• <25 y of age • No history of glucose intolerance • No previous history of poor obstetric result. • Normal pre-pregnancy weight and weight gain throughout pregnancy.
Medium risk	• Does not fall into low or high risk category.
High risk	• DM in first degree relative • Obese • Current glycosuria • History of GDM or glucose intolerance.

[Perkins *et al*, 2007]

GDM is also associated with respiratory distress syndrome, neonatal hypoglycemia (low blood glucose), hyperbilirubinaemia (high bilirubin levels), polycythemia (excess red blood cell) and hypocalcaemia (low calcium) (Hunt and Schuller, 2007). It increases the risk of future obesity and type 2 diabetes mellitus (Dabelea, 2000). There is a different diagnosis and screening procedure used to identify a GDM patient.

We can see that risk factors are found positively associated with GDM (Table 2.2). Acanthosisnigricans are the highest odd ratio for past history of GDM.

Table: 2.2 Odds ratio for risk factors associated with GDM (based on bi-variate ratio)

Risk factors	Number with the condition (%)	Odds ratio
Age >25 years	144 (23.72)	3.795
BMI >25 kg/m^2	50 (8.24)	4.627
Family history of DM	50 (8.24)	2.356
Acanthesianigricans	75 (12.36)	8.047
Past history of GDM	3 (0.49)	27.463
Socio-economic status ≥ upper middle class	139 (22.89)	5.482
Weight gain >7 kg	77 (12.68)	2.594

(Source: Indian J Med Res, 2013)

.The risk of gestational diabetes mellitus should be reduced by treatment which is started before, during and after the pregnancy. Glycemic control is critical before or during pregnancy. Gestational diabetes mellitus typically resolves after child birth however it is associated with adverse effect for both mother and child in the prenatal period and in the long term. Gestational diabetes mellitus should be treated with physical exercise, maintain diet as well as pharmacotherapy (Langer, 2007). Exercise reduces postprandial glucose levels (Hemoglobin) HbA and insulin requirements in overweight women. Dietary interventions are used to achieve normal-glycaemia while avoiding ketoacidosis and risk of hypoglycaemia.

2.6 Complications of Gestational Diabetes mellitus:

For gestational patient pregnancy should be planned, folic acid supplementation begins before conception, maintain strict glycemic control are required for controlling of diabetes mellitus.

There are some complications of diabetes patients such as

- Diabetic keto acidosis
- Hypoglycemic coma
- Non ketotic hyperosmolar diabetic coma
- Lactic acidosis.
- Retinopathy
- Nephropathy
- Peripheral neuropathy
- Autonomic neuropathy
- Polycystic ovarian syndrome (PCOS)
- Foot diseases.

Diabetic patient sometimes get unconscious due to hypoglycemia, diabetic ketoacidosis, non ketotic hyperosmolar coma, stroke. The GDM patient in Bangladesh is quite high (Kay, 2002). There are many reasons responsible to worsen this condition. One of the main reasons is lack of awareness. Women don’t know about anything of this disease. They know nothing what is gestational diabetes, how it occurs, what are its sign symptoms, investigations, treatment.

2.7 Worldwide prevalence of gestational diabetes mellitus:

The prevalence of GDM patient range from 1% to 14% whereas 2-5% is the most common rate in USA (Coustan, 1991). Different rates of diabetes are distinctly noted by the WHO Ad Hoc Diabetes Reporting Group as well as IGT in different populations. To the survey, more than half of the cases of diabetes were undiagnosed. In some of the populations IGT was ignored i.e. no the clinical practice was observed. Therefore, a large amount of abnormal glucose tolerance in pregnancy goes undetected without screening (WHO Ad Hoc Diabetes Reporting Group, 1992).

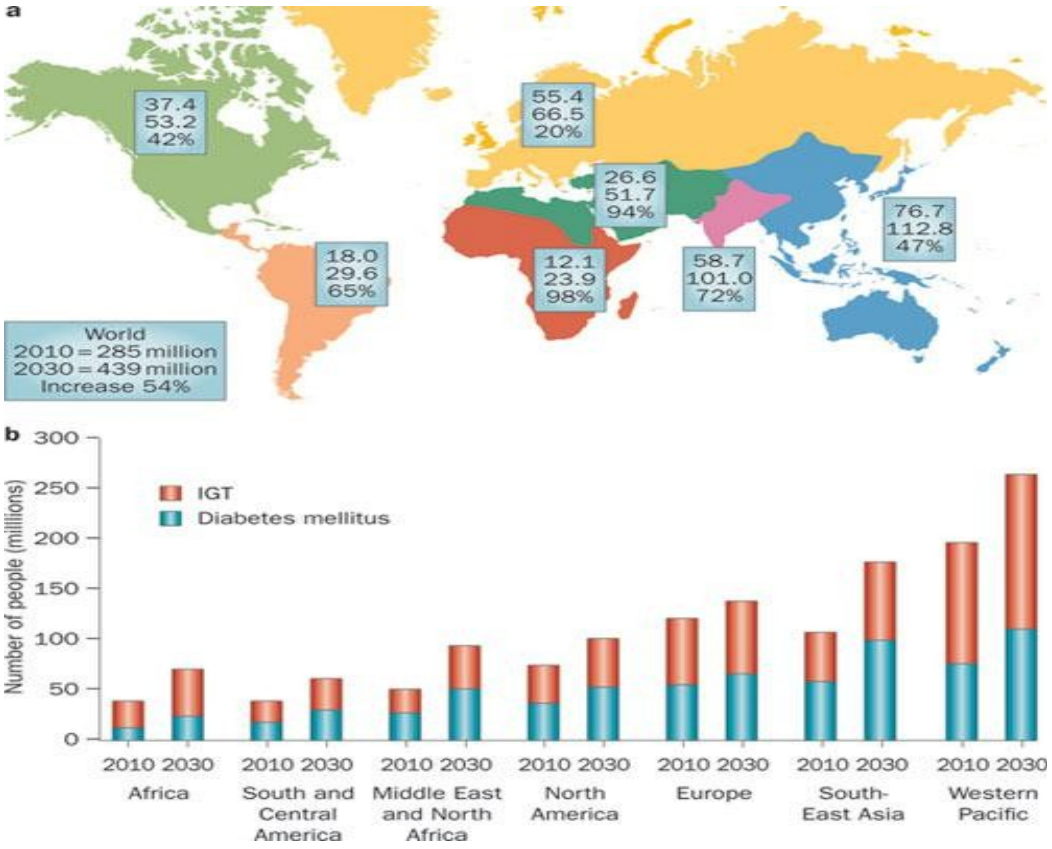

Figure: 2.2: Diabetes mellitus cases worldwide. (Source: Lei Chen, 2012)

Diabetes mellitus is a worldwide problem, although the prevalence is different between regions. Figure 2.2 shows the differences in the incidence of diabetes mellitus between the developed countries and the rest of the world. According to this study, more than half of all diabetes cases

in 2010 occurred in low-income countries and researches estimate that this proportion will increase further in 2030 (Lei Chen, 2012). Sometimes statistical comparisons of the prevalence of diabetes mellitus (DM) are actually difficult, due to lack of national DM registries for poor settings. A high prevalence of DM was observed among Zuni Indian women (14.3%), Chinese women (13.9%) as well as Indian-born women (15%) in Melbourne Australia and Asian women, Australia (11.9%) (Beischer *et al,* 1991).

2.8 Gestational Diabetes Mellitus in Bangladesh:

GDM is occurred with the 1st onset during pregnancy (Metzger *et al,* 1998). The ranking of Bangladesh according to the number of diabetic population has been 10th highest throughout the world (International diabetic foundation, Diabetic Atlas, 2001). From a pathophysiological point of view, gestational diabetes mellitus (GDM) will include a few patient who develop type 1 diabetes during pregnancy, where prompt action and easily insulin treatment will be required and some patient who develop type 2 diabetes or had unknown pre-existing type 2 diabetes in whom diabetes does not remit after pregnancy (Ben *et al*, 2004). The WHO suggests that all women meeting criteria for impaired glucose tolerance or diabetes after a 75 gm. OGTT should be classified as having gestational diabetes. The factors responsible for development of GDM are genetic factor, environmental factor, etc. (Devidson's, 22nd Edition). The insulin resistance affects carbohydrate and lipid metabolism as well as apparently protein metabolism (Ben *et al*, 2004). Most of the cases GDM can cure once when the pregnancy is over. After delivery or any time after delivery, it may continue as diabetes.

2.9 Prevalence of gestational diabetes mellitus in Bangladesh:

Bangladesh has been positioned as tenth most noteworthy of the considerable number of nations in the world as per the quantity of diabetic population (International diabetic foundation, Diabetic Atlas, 2001). In the course of recent years, a developing predominance of GDM has been seen in the clinics of Bangladesh. Diabetes mellitus especially type 2 diabetes is currently perceived as an important interminable general wellbeing issue in Bangladesh. The extent of diabetes stays obscure because of absence of countrywide study. A few studies demonstrated that the predominance is higher in urban ranges (Hussain *et al,* 2005; Abu *et al*, 1997). In a recent situation in Bangladesh a higher

prevalence of diabetes was found among urban (8.1%) population. In contrast, rural population showed GDM prevalence of 2.3% population (Hussain *et al,* 2005).

2.10 Gestational diabetes mellitus limitation in rural areas:

In a recent study in Bangladesh a higher prevalence of diabetes was found in urban (8.1%) compared with rural populations (2.3%) (Hussain and Rahim *et al,* 2005). In rural areas in Bangladesh, women don't take care of themselves during pregnancy. Their family members are also uneducated about this disease. Every year a lot of women died during pregnancy. Now it becomes a major disease in Bangladesh. Because of lack of countrywide survey the magnitude of diabetes remains unknown. In Bangladesh a recent study in a rural area establish the overall prevalence (95% CI) of diabetes 6.8% (1.88-9.32) and 8.2% (3.74-12.64) according to Fasting blood glucose (FBG) and hemoglobin blood glucose (2hBG), respectively (Sayeed *et al,* 2005).

2.11 Role of pharmacist in the management of gestational diabetes mellitus:

In the developed countries, in the management of GDM patients the duty of pharmacist is to remind and educate patient how to inject insulin and how to check blood glucose level. Obese women may need higher doses. Oral anti-diabetic therapy with glyburide and metformin is recommended by NICE guidelines if dietary intervention and exercises fails to achieve desired glycemic level (Sullivan *et al*, 1998; Evans and patry, 2004). Pregnant women who suffer from GDM have a 35-60% chance to develop type 2 diabetes within ten years. They also have a chance of developing GDM in subsequent pregnancies. Pharmacists also help to involve patient in therapeutic monitoring. The communication between pharmacist and patients are good. They make the patient understand about the purpose of the therapy. They need to involve patient in the decision making process to reach therapeutic goals (American Diabetes Association, 2009). They tell patient about the adverse effect of therapy especially those on insulin or glyburide. These drugs produce severe hypoglycemia especially when caloric intake is restricted and/or following long exercise. One of the pharmacist's most important roles is the referral of patient to other members of the diabetes care team. The role of pharmacists is not only the monitoring diabetes but also ascertaining whether physician visits and testing to assess long term glycemic control. The pharmacist can play an important role in diabetes care by screening

patients at a high risk, educating patient to empower them to care for themselves, referring patients to other health care professionals as appropriate. They can also provide monitoring outcomes (National community pharmacist association, 2002). The pharmacist should be good at communication skills, a commitment of time, effort, and resources. Pharmacist working in the diabetes clinic should have detailed understanding of GDM management and diabetic complications especially of gestational diabetes mellitus. Pharmacists should be given rewards in professional satisfaction and financial reimbursement who obtains training in diabetes management. Pharmacist knows the adverse effect of medicine as well as which medicine work well in the GDM. So, they can make people aware about the medicine. They can also tell people which medicine is good for them. Pharmacists know every details of the medicine so they can improve the quality of medicine quite well. Pharmacists should give in depth advice to the patients on dietary management by verbal, written or audio visual forms to deliver the message effectively**.**

2.12 Role of pharmacist in gestational diabetes mellitus in different countries:

There are currently over 230,000 pharmacists in the United States. (US department of labor-bureau of labor statistics, 2004). Almost all medically managed patients with diabetic interact on an ongoing basis with a pharmacist. As such, pharmacist may have a profound influence on improving the lives of the patients with diabetes whom they see in their daily practice (Kroon *et al,* 1997).

Many national associations of pharmacists have come forward to develop strategies to improve care in order to help pharmacist to contribute their role in diabetes care. For example, Canadian pharmacist association (CPhA) developed a set of diabetes practice guidelines for the pharmacist in 2008. They made a summary or the recommendation for pharmacist to treat the patient with this chronic disease. They also made a continuing education course online for the alarmist to help patients managing their diabetes. They made live workshop providing pharmacist with comprehensive tools so that they can provide management to the patient with their diabetes (World Health Organization, 2006). This initial education can be received when a pharmacist completes his degree(s) in pharmacy. Like this Australia, Finland, Hungary, Portugal or Spain made national association for pharmacist to develop comprehensive programs providing pharmaceutical care to diabetic patient. In Europe, Europharm forum in 2001 developed to provide a

protocol and guidelines to improve quality in diabetes care for pharmacist (Europharm Forum, 2001).

2.13 Role of pharmacist in Bangladesh to manage GDM

In Bangladesh, the practice of utilizing pharmacists, especially clinical pharmacists, in the management of GDM is absent. Many studies on the management issues of GDM and other clinical anomalies with the help of multidisciplinary professionals have been conducted in the developed countries and even developing countries such as India, Pakistan, and Malaysia. In their practice, clinician, clinical pharmacist, nurse, dietician and psychologist play significant role in such type of patient management issues, as a team. However, no work has been conducted yet on this ground in Bangladesh.

Chapter Three: Materials and Methods

3.1. Research Design:

This study has been conducted by paper-based questionnaire survey. The participants were selected randomly. The focus group participants were GDM patients, Physicians, clinical pharmacists and hospital authorities. The participants for this survey were recruited randomly from various government and private hospitals of Dhaka city. Initially, the researcher explained the purpose and the importance of the study to the potential participants in simplistic way. Then the participants who gave consent willingly were recruited for the study. Altogether 120 participants were recruited. Each group consists of 30 participants.

3.2 Determination of Sample Size:

The calculated sample size of the study was one hundred and twenty. The participants were from pregnant women, doctors, pharmacists and hospital authorities. Each individual group consists of thirty participants of same category. According to Johnson and Brooks (2010), 10-30 subjects should be a reasonable number for this type of study. They have suggested that "samples with N's between 10 and 30 have many practical advantages", including simplicity, easy calculation, and the ability to test hypotheses. In the medical field, Julious (2005) reiterated that "a minimum of 12 subjects per group be considered for pilot studies". Therefore, it can be said that, a total number of participants of 114 is satisfactory for this pilot study.

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3.3. Ethical Permission:

This study is based on human participation and data collection. Therefore, in this study, ethical permission was a matter of concern to ensure the rights and safety of the participants as well as the researcher. Ethical permission was approved from relevant hospitals from where participants were recruited.

3.4 Development of the Questionnaire:

The questionnaire was prepared with the help of reviewing different relevant literatures to fulfill the objective of this project. The questions were developed to find the attitude and practice of utilizing multidisciplinary healthcare professionals in the management of GDM participants.

3.5 Questionnaire: pre-testing, validity testing and finalizing

A reliable, understandable development of questionnaire, in a word, pre-testing of questionnaire is required in order to filling out the answer of the question easily. Moreover, to avoid analytical error validity testing of questionnaire is important. The simpler the questionnaire will be, the easier will be the questions for the participant to answer. In this study, pre-testing of the questionnaire was done by eight participants. Validity testing of the questionnaire was also done to ensure that the contents of the questionnaire are comprehensive enough to collect all information and relevant enough to achieve the goals of the study.

3.6 Statistical analysis:

For data analysis SPSS software (version 20) was used. Median and percentage values were used for non-metric variables. A copy of questionnaires is attached in appendix 1.

Chapter 4: Result

The study has been conducted among four groups in health sector and those are: Patient, Doctor, Pharmacist and Hospital Authority. Total number of participant's was 120. Each group consists of 30 participants. The pregnant women with diabetes; doctors, especially gynecologists, clinical pharmacist and hospital authorities who have the power to take decision in clinical arrangements were included in the study.

For patients, history of diabetes of their family has been checked where only 14% of the patients have diabetes among their family members and a large percentage of the participants (about 86%) do not have previous family history of DM. Following table (table 4.1) summarizes the family diabetes history of the patients.

Table: 4.1 Patients History on Diabetes

Name of variables	Answer Yes (%)
Family history of diabetes	14
Previous history of GDM	29
Diabetes prior to pregnancy	50
Preconception care regarding diabetes	50

It has been observed that father of 43% patients, mother of 29% patients and siblings of 14% of the patients have had diabetes. Other relationship has got 14%. Following figure (Figure 4.1) represents the results.

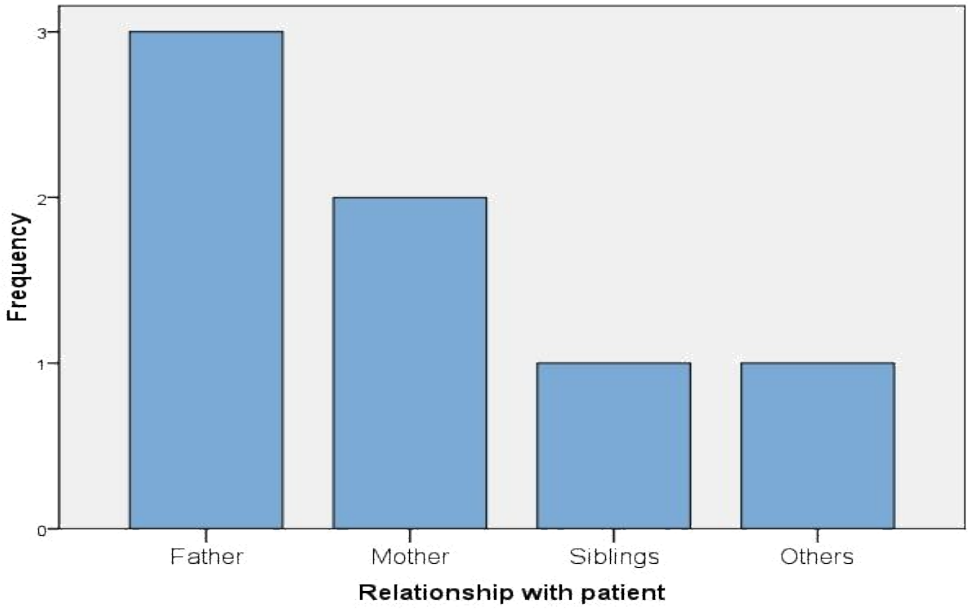

Fig: 4.1 Family history of diabetes of patients

Patient's previous history of gestational diabetes has also been checked. In case of second and third parity the statistics shows that 71% patients do not have previous history of GDM in their past conception period where as 29% patients have experienced diabetes during their past pregnancy .

The statistics is showing equal percentage i.e. half of the sample patients have already been suffering from diabetes prior to pregnancy and the rest half has not suffered yet before the pregnancy.

Fifty percent of the patients have received preconception care. All of the GDM patients mentioned that they have received preconception care and instruction from the doctors. None of them mentioned pharmacist, dietitian and other practitioners' name involved with their treatment purpose.

Sixty seven percent of the GDM participants feel the necessity of involvement of a pharmacist for their care, whereas, only a few think they need the assistance of nurse (17%) and dietitian (17%).

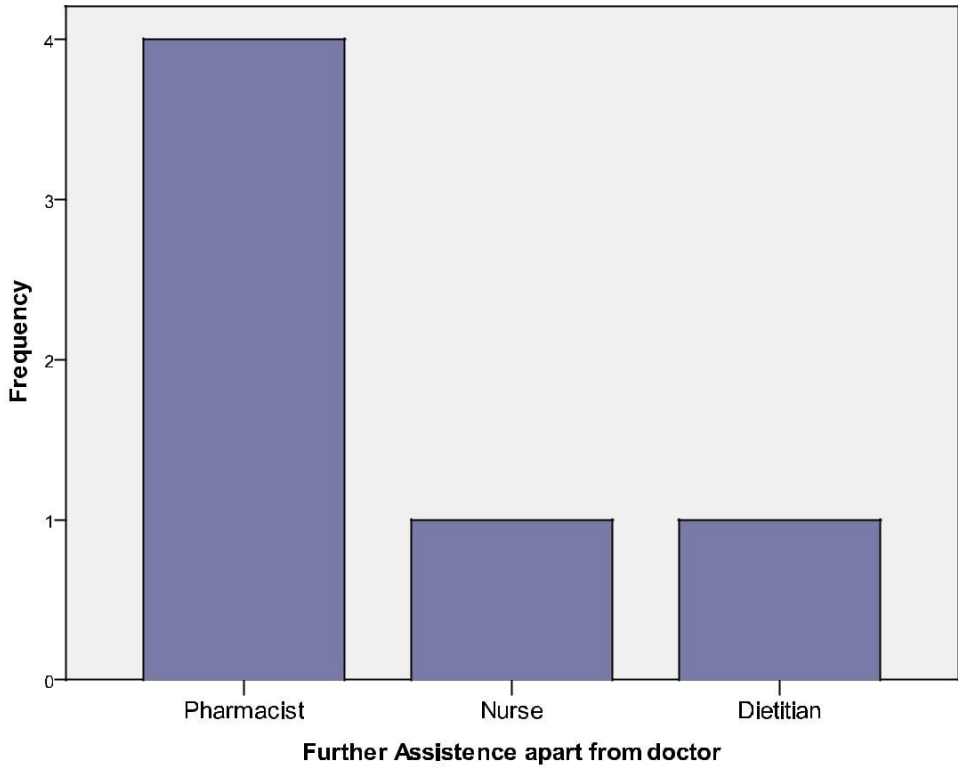

Fig: 4.2 Further Assistance Needed Apart from Doctor (Patients' view)

Among the participants from doctors, 50% of them highlighted that nurse can play a better role than pharmacist in the management of GDM apart from doctor. Only 23% thinks pharmacist can play the better role. Following figure (figure 4.3) showed the result.

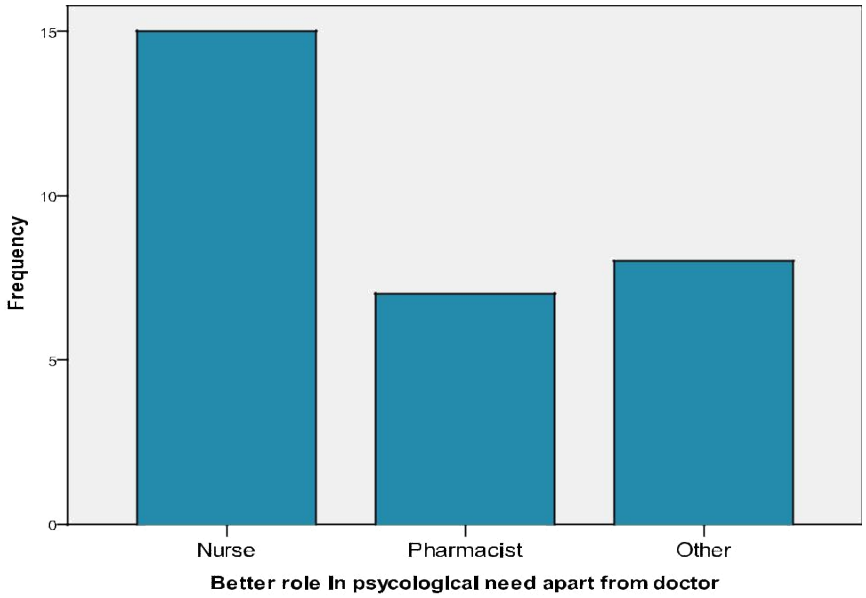

Fig: 4.3 Role of different professionals in the management of GDM Apart from Doctor (Doctors' view)

All the doctors said further assistance is required after them for effective and reducing work load. The results are highlighted in the following table (table 4.2).

Table: 4.2 Opinions from Doctors Regarding the management of GDM

Name of variables	Answers Yes (%)
Further assistance needed for effective treatment	100
Requirement of helping hands apart from a physician	83
Utilizing pharmacist to educate diabetic patients	77
Pharmacists can also adjust the dose of medicine	43

To increase the rate of effective treatment and to reduce work load, 83% of the doctors said patients need helping hands without prior appointment where only a minor amount i.e. 17% denied.

Seventy seven percent of the participant doctors agreed that authority should utilize pharmacists to educate diabetic patients. Whereas, most of the doctors (57%) cannot agree

Name of variables	Answers Yes (%)

that clinical pharmacists can take a responsibility in dose adjustment for the patients.

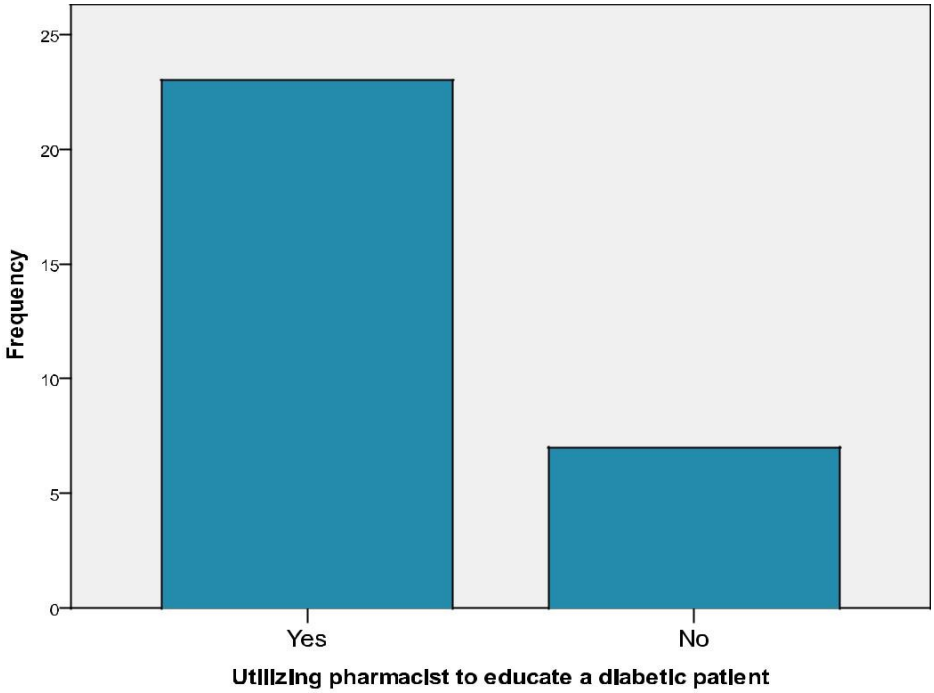

Fig: 4.4 Utilizing Pharmacist to Educate a Diabetic Patient

In case of the role of pharmacists in the management of GDM, 100% pharmacists were aware about their role. Among them, 60% pharmacists believe that they can educate patient, 30% said they can provide drug related information whereas, 10% do not have any practical knowledge.

Awareness about the role of pharmacist	100
Primary role of pharmacist in educating the patient	100
Responsibility of pharmacist in anti diabetic drug therapy	60
Role to minimize complications in mother and fetus	100

Table: 4.3 Significance Bearing Data for pharmacist

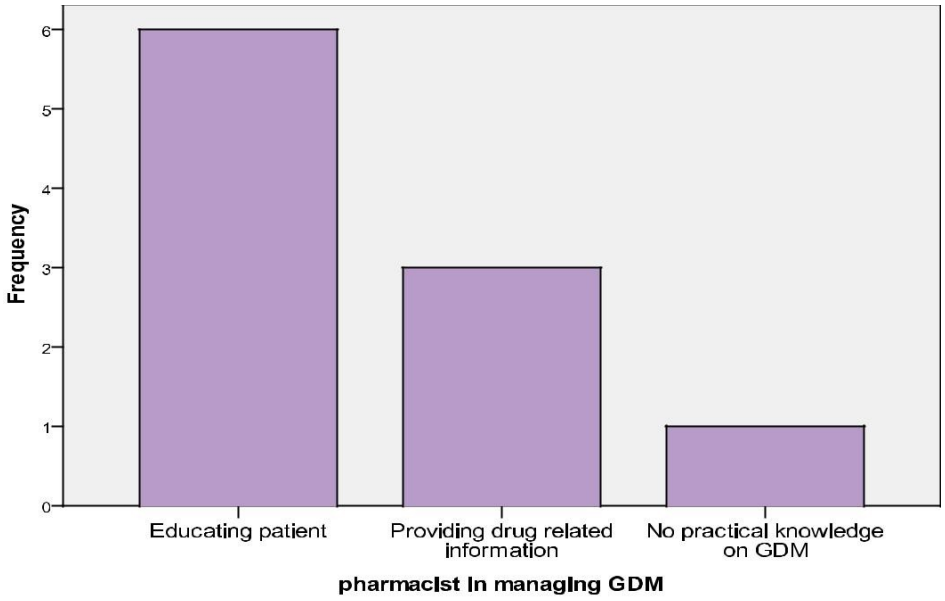

Fig: 4.5 Role of Pharmacists in the management of GDM

All the pharmacists in the study think that their primary role is to educate the GDM patient.

Among them 60% believe that they can take responsibility in repetitive dose adjustment of antidiabetic drug therapy. However, 40% of them think they cannot.

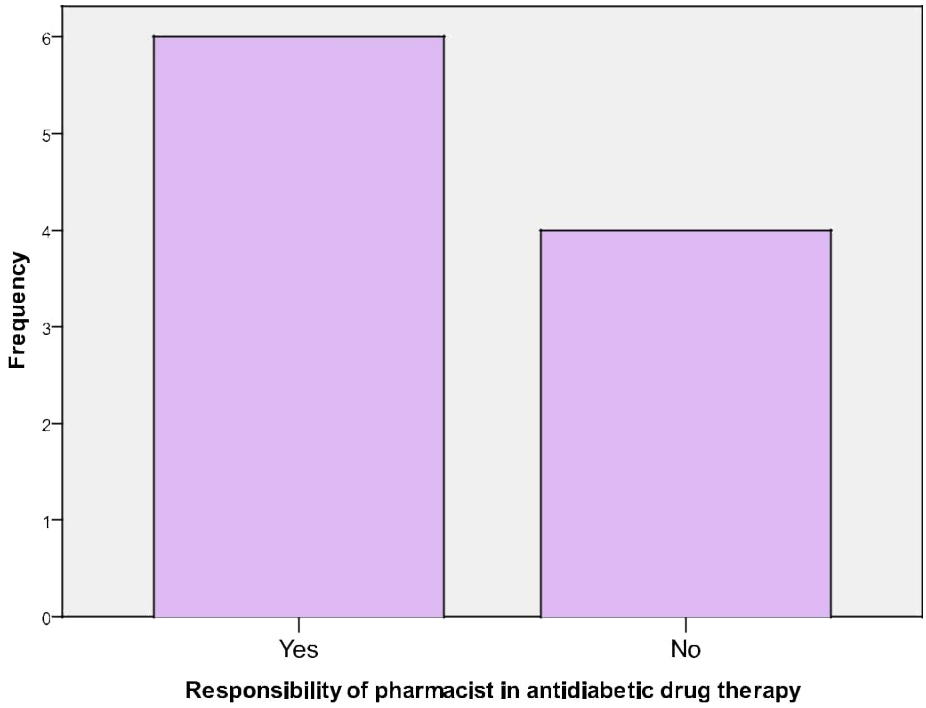

Fig: 4.6 Responsibility of pharmacist in antidiabetic drug therapy

All of the participated pharmacists (100%) believe that they can minimize developed complications in mother and fetus by educating the patients about the lifestyle, food habit, side effects and toxic effects of drug etc.

Ninety percent of the participant pharmacists think that by being more accessible to the patient, they can establish proposed service or role for what they are supposed to be assigned in management of GDM. On the other hand, 10% think by offering longer hours of service they can do it.

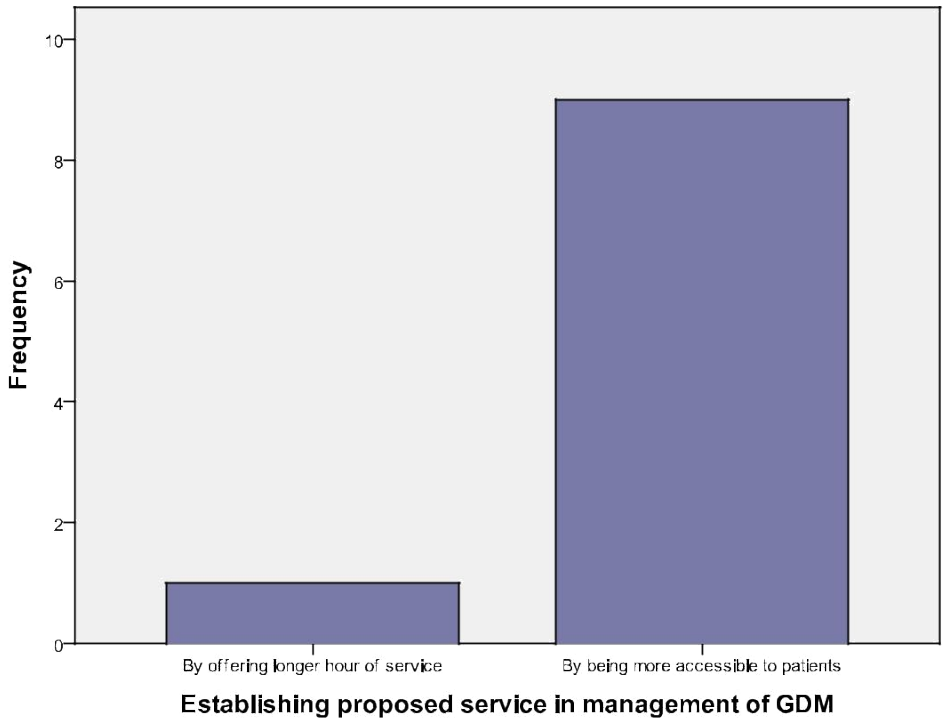

Fig: 4.7 Establishing proposed service in management of GDM

All the participants from the authority of the hospitals believe the necessity of further assistance is required after a doctor.

Among the participants, 77% of the authority thinks that pharmacist can play an important role in the management of GDM. On the other hand, 23% thinks pharmacist cannot.

Moreover, 92% of the authority has agreed on the very important point that if a pharmacist is made available along the doctors, patient will be benefited. But 8% disagreed.

Table: 4.4 Views of Authority to employ clinical pharmacist

Name of variables	Answers Yes (%)
Necessity of further assistance after a doctor	100%
Role of pharmacist in management of GDM	77%
On availability of pharmacist patients benefit	92%

In the query of pharmacist's participation to work as a team along with the doctors, nurse and dietitians, 100% of all the authority of the study believes in support of having pharmacist.

Subsequently, 90% of the authority said that they have plan to utilize pharmacists in clinical pharmacy like the developed countries where as 10% authority said currently they do not have such plan.

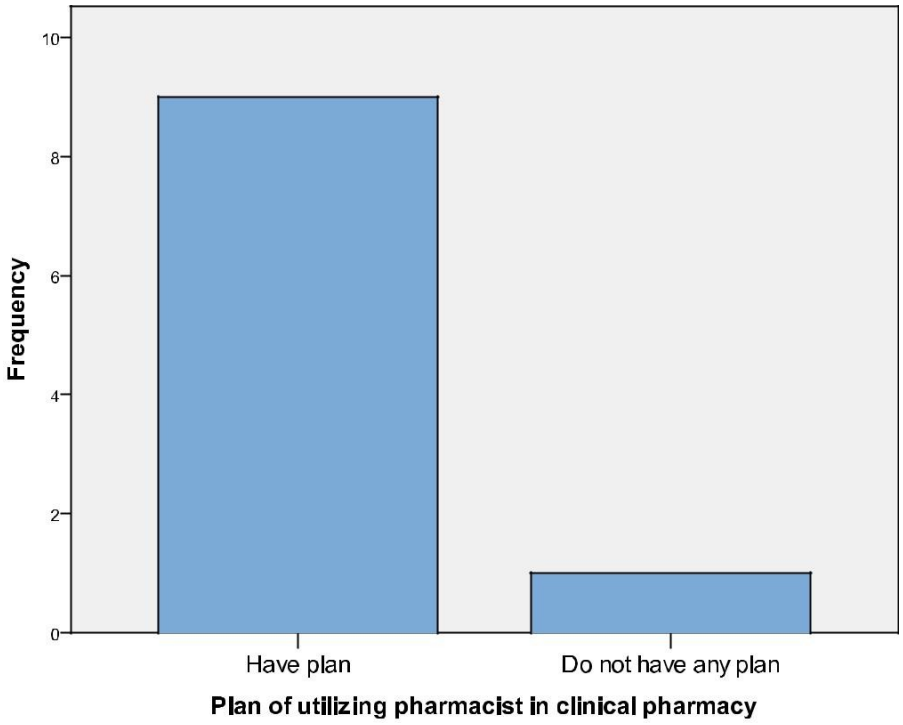

Fig: 4.8 Plan of utilizing clinical pharmacists with patients' treatment purpose

Chapter Five: General Discussions

Gestational diabetes mellitus (GDM), a condition characterized by glucose intolerance during pregnancy, is associated with a variety of adverse birth outcomes, including excessive fetal weight gain and related increases in the rate of cesarean delivery and prenatal injury. GDM increases the risk for a number of longer term adverse outcomes, including progression to type2 diabetes (T2D) in the mother as well as increased risk of obesity, diabetes, and possibly adult cardiovascular disease in the infant (Reece *et al,* 2010).

Doctor, Pharmacist and Nurse, the most mention worthy three figures of health science are playing the most important roles and these are of a disease specialist, of a drug expert and the most caring figure respectively. Where the birth of a new born is a very sensitive issue, the disease, Gestational Diabetes Mellitus (GDM) has become the more common type of disease that causing agitation both in a mother and a new born baby's life. The birth weight of the infant from the GDM mother may be macrosomic (birth weight >4,000 g) and may also be at higher risks of: traumatic delivery, Congenital anomalies, such as- cardio-vascular, central nervous system, skeletal (sacral agenesis), genito-urinary; low blood sugar and mineral levels at birth, hypocalcemia, jaundice, pre-term birth, temporary breathing problems. Later in life, the baby might have higher risks of obesity and diabetes.

The management of GDM focuses on the woman's physical, psychological, and educational needs. Education is the basis for ensuring the best possible outcome for the mother-infant pair, where parallel with clinicians, the Clinical Pharmacists can play a vital role to integrate the process of the management of GDM. The woman must acquire new knowledge and skills regarding diet, blood glucose monitoring, insulin therapy, and exercise from the Clinical Pharmacists. An individualized approach to treatment includes sensitivity to the woman's cultural background and learning ability. Compliance with the treatment plan can be enhanced by rapport between the woman and health care providers.

GDM management is the art of keeping the delicate balance of glycemic control in the patients. In this context, Clinical Pharmacists can play an important role in a multidisciplinary team. In this practice model, pharmacists collaborate with doctors to educate patients and manage GDM. Clinical Pharmacists have the opportunity to contribute medication expertise in making

pharmacotherapeutic decisions. By collaborating with the clinicians providing obstetric care, Clinical Pharmacists can offer education on lifestyle modifications, self-monitoring of blood glucose, and drug therapy.

From the scenario of Bangladeshi hospital, it has been seen that there is a very strong harmony in the work of a doctor and a nurse but the drug experts i.e. the pharmacists are being neglected where the major weapon to treat a disease is drug! This study has tried to strain out the actual condition of a pharmacist in a hospital of Bangladesh and their present role in managing Gestational Diabetes Mellitus. Here, it has also been tried to bring into light that what are the views of the doctors and the authorities. Finally, the aim was also to see whether a patient feel the necessity of a drug expert. Here, to ease the study to think more fact fully, the role of a pharmacist has been analyzed on a certain disease and that is managing GDM. GDM is chosen as here not only a life but lives are interrelated and assistance apart from doctors is required in every sensitive step.

The study has been conducted among four groups and these are doctors, pharmacists, patients and authority. Doctors are selected to see their point of view regarding the role of a pharmacist. Pharmacist is taken as another group just to see whether they are aware of their role and position or not. Patients are selected to see whether feel the necessity or not. Last but not the least, authorities are selected and asked questions to know what is the current condition of pharmacists in managing GDM, whether they have future plans for pharmacist's empowerment or not and if yes, then how the administrators are working. All the questions for the survey were selected in such a way that helps to reach our aim.

The sample size was selected 30 for each group and that is 120 in total. Clinical pharmacists were selected in managing GDM disease because pharmacist's role in clinics is not established yet and that is why their role is evaluated. Gynecologists were selected as doctors as the role is evaluated in managing GDM.

Family history of diabetes, previous pregnancy with GDM, age, weight, these are the risk factors of gestational diabetes. This study shows that only 14% of the patients have diabetes from their family member(s), Family history of diabetes mellitus has been reported to be associated with

higher chances of developing GDM. Scientists observed a significant association between the family history of diabetes mellitus and the occurrence of GDM among pregnant women (Seshiah *et al,* 2004).

All of the GDM patients mentioned that their treatment is supported by the doctors. None of them mentioned pharmacist, dietitian and other practitioners' name involved with their treatment purpose. Maximum 67% of the GDM participants feel the necessity of involvement of a pharmacist for their care, whereas, only a few think they need the assistance from nurse (17%) and dietitian (17%). A study conducted by Caroline *et al,*, (2005) showed the assurance of proper treatment and management by a group of professionals: clinicians, pharmacist, nurse, and dietician to reduce perinatal morbidity and improved health care. Another related article by Srinivasa *et al,* (2014), showed that establishment of a collaborative relationship of clinical pharmacists can make positive differences in GDM patient health. In patient centered medical model, pharmacists are putting their hands to ensure best course of action as drug expertise and are helping the doctors to pick the right option to choose one among insulin and oral therapy.

Among the participants from doctors, everyone feels the necessity of further assistance after a doctor for effective treatment but only 23% thinks pharmacist can play the role better and 50% of them highlighted that nurse can play a better role than pharmacist in the management of GDM apart from doctor. 77 % doctors think that authority should utilize pharmacist to educate a diabetic patient as they have the knowledge on pharmacology and clinical pharmacy. As antidiabetic drug therapies often require repeated adjustments of dose which is a time consuming process, 43% of the doctors think a pharmacist can take responsibility in that case. Whereas, most of the doctors (57%) cannot agree that clinical pharmacists can take a responsibility in dose adjustment for the patients.

100% pharmacists in this study think that they can play important role in the management of GDM and their primary role is to educate the patient on self-monitoring of blood glucose, drug therapy, symptoms of hypoglycemia, life modification, diet etc. Among them 60% believe that they can take responsibility in repetitive dose adjustment of antidiabetic drug therapy. But 40% of them think they cannot. Most of the participated pharmacists think that they can minimize the risk of complications in the mother and fetus by informing patients about the consequences of uncontrolled GDM and the importance of controlling blood glucose.

All the participants from the authority of the hospitals believe the necessity of further assistance is required after a doctor. Among the participants, 77% of the authority thinks that pharmacist can play an important role in the management of GDM. On the other hand, 23% thinks pharmacist cannot. Moreover, 92% of the authority has agreed on the very important point that if a pharmacist is made available along the doctors, patient will be benefited. But 8% disagreed.

This study shows that all the participants from the authoritative group believes to have clinical pharmacists in the team along with the doctors, nurse and dietitians,. Subsequently, 90% of the authority agreed on the similar point when they were asked whether they have any plan to utilize Clinical Pharmacists in the hospitals. Nevertheless, rest of them was decided not to involve Pharmacist in the same role yet.

Scientists showed that establishment of a collaborative relationship of clinical pharmacists can make positive differences in GDM patient health. In patient centered medical model, pharmacists are putting their hands to ensure best course of action as drug expertise and are helping the doctors to pick the right option to choose one among insulin and oral therapy (Srinivasa *et al,* 2014).

A randomized control trial has been conducted by Elnour *et al,* (2008) on 165 patients (99 intervention group, 66 control group). They have shown that pharmaceutical care can work as catalyst in the effective progress of GDM management issue through the improvement of maternal and neonatal outcomes ($p < 0.05$).

Ragland *et al,* (2010) has conducted a pilot study on 50 GDM patients with depression symptoms. The intervention of the participants by the pharmacist has improved the condition. Their finding suggested that pharmacists can also play a vital role for a better long lasting physical and mental health.

Another study by Amin *et al,* (2013) showed that patients need counselling before the intake of some medication. For example, metformin decreases vitamin B_{12} in anaemic patients. Therefore, this essential drug in GDM can be harmful for the anaemic patient. As a result, a

drug expertise is required to reduce the further harmful effects of the drug and to suggest the clinicians for a better substitute.

For pharmacists, a collaborative approach to combat today's public health challenges should be viewed as an opportunity for the profession to assume previously inaccessible service roles. This process helps to reinforce their professional image as well. The concept of clinical pharmacy is still in the early stage in our country where physicians, nurses and other healthcare providers are playing the more or less roles. Physicians are over loaded with huge number of patients. Therefore, Bangladesh is lags behind in comparison with other developed countries directly in support of patients by clinical pharmacists.

Chapter Six: Conclusion

Gestational Diabetes Mellitus is one of the major health problems throughout the world. It is emerging as a serious health problem in Bangladesh and other developing countries. GDM may occur due to genetics, improper diet, unwillingness towards exercise and obesity. The consequences include macrosomia, congenital anomalies, still birth, pre-eclapmsia, jaundice, respiratory distress syndrome, hyperinsulinemia, polycythemia, shoulder dystocia etc. Our negligence and unawareness may lead to these life threatening diseases. Not only the mother but their babies are also at a high risk of developing type2 diabetes and obesity in future. In a third world country like Bangladesh, it puts a great pressure on the economy to treat high cost diseases such as diabetes or gestational diabetes mellitus.

In 1990, a useful definition of pharmaceutical care was given by Helper and Strand. They mentioned that pharmaceutical care is nothing but the responsibility of provision of drug therapy for the purpose of achieving definite outcomes which improves a patient's quality of life (Mil and Schulz, 2006). Pharmacists have always involvement in health improvement. Moreover, in recent years the focus on this aspect has increased greatly (Eades *et al,* 2011). A pharmacist have different roles among them clinical pharmacy is one. Worldwide the role of clinical pharmacists in the management of particular disease condition has been documented and they have been integrated into the health care teams, health promotion and disease management programs (George *et al,* 2010). For giving significant advice on medicine use to ensure safe and responsible self-care, promote medication adherence as well as encourage healthy life-style through appropriate health education strategies, clinical pharmacists are considered to be an important contributors in improving public health (Jamshed *et al*, 2010). Thus, the findings of the study can play a significant role to the present state of knowledge in the field of healthcare service.

Policy Recommendation

The study findings have identified the need of policy recommendations. In particular, the government has an important role in developing necessary integrated policies with the involvement of multidisciplinary healthcare professionals for the service of the GDM patients. A minimal set of recommendations, supported in part by the findings of this study, are as follows:

1. Clinical Pharmacists should contribute in parallel with the doctors for the support of the patients.
2. Clinical Pharmacists should play a role in the development of the GDM patients' lifestyle, changes of food habit, encourage them for exercise etc.
3. Clinical Pharmacists should suggest/advice/support the doctors for any dose calculation and adverse drug reaction, if needed.

By collaborating with the clinicians providing obstetric care, clinical pharmacists can offer a better pregnancy outcome with the GDM patients. This can contribute a significant financial benefit for the society as well as for the nation.

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Appendix 1 (Questionnaire) Sl No:

‘Questions on the Management of Gestational Diabetes Mellitus in Bangladesh.’

General Information:

NAME: _____ AGE: _____

ADDRESS: _____

_____

OCCUPATION : _____

PHONE: _____ EMAIL : _____

Questions for Patients:

1. Do you have a family history of diabetes? A. Yes B. No

2. If yes, what is the relationship between you two?

3.Do you have a previous history of gestational diabetes? A. Yes B. No

4.Did you have diabetes prior to pregnancy? A. Yes B. No

5. If you had diabetes prior to this pregnancy, did you receive preconception care and/or instruction regarding diabetes and pregnancy? A. Yes B. No

6. If yes, who has taken care of you first? (tick all that apply): a. Doctor

b. Pharmacist

c. Dietitian

d. You yourself by reading books/magazines/internet

e.Other _____

7. Do you think you need further help/advice/assistance from the following person apart from Doctor?

a. Pharmacist

b. Nurse

c. Dietitian
d. Other

8.How many full term deliveries have you had? ☐

9. Had you previously experienced abortions or miscarriages? ☐

10. If yes, was that related to GDM ? ☐

11. Have you had any complications in prior pregnancies? (Tick all that apply)

a. Premature birth
b. Large size baby (9 pounds or more)
c. Preterm labor
d. Pre-eclampsia (toxemia, high blood pressure)
e. Still birth
f. Other (please explain) _____

12.How many weeks pregnant are you today? _____

13. Are you aware of the impact of diabetes on pregnancy and on the baby? A. No B. Yes

14. Do you know about the symptoms of hypoglycemia? A. Yes B. No

15. Do you know about the management of diabetes during Ramadan? A. Yes B. No

16. Do you exercise? A. Yes B. No

17. If yes, what type of exercise, explain _____
_____

18. Do you get any help or advice from the community pharmacist? A. Yes B. No

Sl No:

‘Questions on the Management of Gestational Diabetes Mellitus in Bangladesh.’

General Information:

NAME: _____ AGE: _____

ADDRESS: _____

_____

OCCUPATION : _____

PHONE: _____ EMAIL : _____

Questions for Doctors:

1. Do you believe that ‘disciplined life’ is the key word for the management of diabetes? A. Yes B. No
2. Who can play a role better in fulfilling a patient’s psychological need apart from a doctor? (Tick as many as apply)
   a. Nurse
   b. Pharmacist
   c. Other : _____
3. To increase the rate of effective treatment and to reduce your work load don’t you think a patient needs a further assistance after you in this issue?
   a. Yes
   b. No
4. Do you think apart from a physician, a GDM patient always requires available helping hands without a prior appointment system?
   a. Yes
   b. No

5. How often does a GDM mother go through screening test?

6. Do you think the authority should utilize pharmacist to educate a diabetic patient as they have the knowledge on pharmacology, and clinical pharmacy? A. Yes B. No

7. Do you think a pharmacist can work on lifestyle modification and pharmacotherapeatic decision making collaborating with you (the doctors)?

   A. Yes B. No

8. Antidiabetic drug therapies often require repeated adjustments of dose which is a time consuming process. Do you think, a pharmacist can take responsibility in that case?

   A. Yes B. No

9. How do you evaluate the statement below-

   'The collaboration of a pharmacist and a doctor can assure a better standard of quality and safety for the patient'.

Sl No:

‘Questions on the Management of Gestational Diabetes Mellitus in Bangladesh.’

General Information:

NAME: _____ AGE: _____

ADDRESS: _____

_____

OCCUPATION : _____

PHONE: _____ EMAIL: _____

Questions for Pharmacists:

1. Do you think, a pharmacist can also play an important role in the management of GDM?

A. Yes B. No

2. As a pharmacist, what do you do to manage gestational diabetes mellitus?

3. Do you think,the primary role of the pharmacist in GDM management is to educate the patient?

A. Yes B. No

4. According to you, patients should be educated on :

   a. Self-monitoring of blood glucose
   b. Drug therapy
   c. Symptoms of hypoglycemia
   d. Life modification
   e. Diet
   f. All of these

5. Antidiabetic drug therapies often require repeated dosage adjustments which is a time consuming process. Do you think, a pharmacist can take responsibility in that case?

A. Yes B. No

6. Do you think, a pharmacist can play an important role in educating the patients on healthy lifestyle and dosing of medication?

A. Yes B. No

7. Does a pharmacist play a significant role in informing patients of consequences of uncontrolled GDM and the importance of controlling blood glucose to minimize the risk of complications in the mother and fetus?

8. As a pharmacist, how can you position your proposed service in the management of GDM?

a. By offering longer hours of service.
b. By being (more) accessible to the patient
c. Other : _____

9. Your opinion :

Sl No:

‘Questions on the Management of Gestational Diabetes Mellitus in Bangladesh.’

General Information:

NAME: _____ AGE: _____

ADDRESS: _____

_____

OCCUPATION : _____

PHONE: _____ EMAIL : _____

Questions for Authority:

1. Do you feel confident that your hospital staff can effectively handle patients with GDM?
   A. Yes B. No

2. Do you think a GDM patient needs a further assistance after a doctor?
   A. Yes B. No

3. According to you, who can help in the management of GDM except doctors?
   a. Dieticians
   b. Pharmacists
   c. Nurses
   d. Other : _____

4. Do you think, a pharmacist can play an important role in the management of GDM ?
   A. Yes B. No

5. Do you think that if a pharmacist is made available in the hospital along the doctors, patient will be benefited? A. Yes B. No

6. What is your personal opinion about pharmacists to work as a team with doctors, nurse and dieticians?

7. Have you any plan to utilize pharmacists in clinical pharmacy sector like developed countries?