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# Knowledge of Diabetes Mellitus Among the Outdoor Patients in Upazilla Health Complexes Under Jhalakati District of Bangladesh

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## ABSTRACT

The study "Knowledge of diabetes mellitus among the outdoor patients in Upazilla Health Complexes under Jhalakati District of Bangladesh" was conducted among 100 patients who attended in the outpatient department of Upazilla Health Complexes under Jhalakati District. The objectives of this study are to explore the socio-demographic history and knowledge level of the patients about risk factors as well as treatment and preventing ways of diabetes mellitus among the outdoor of Upazilla Health Complexes under Jhalakati District. The study found that the demographic characteristics of majority of the respondents were above middle aged, falling the age ranges of 41-45, 46-50 and above 51 where 59 percents of respondent ware female. The respondents were chosen from various educational level and most of them had a fairly low income of between 2000-5000. Slightly more than half the respondents did not walk regularly. Very few of the respondents worked out every day whereas the majority (82%) did not. The respondents said that they knew diabetes is caused when blood has high sugar levels or is the production of symptoms of polyuria due to high blood sugar levels. 23 respondents who were not sure about the types of diabetes, 2 thought there was a single type, 24 thought there were 2 types and 26 thought there were 3 types. A small number of respondents knew of type-1 diabetes (32%). Most respondents did not know of gestational diabetes (79%). Symptoms of diabetes known by the respondents included frequent urination, excessive thirst, extreme hunger, and very dry skin along with many other symptoms 32%,26%,33% and 44% respectively. Many respondents knew about the screening tests of diabetes (65). As per the respondent's opinion the study recommends improving the knowledge of DM among the people through mass media like TV programs, theater, counseling, newspaper articles and BCC materials.

## INTRODUCTION

Diabetes mellitus recently reported as a leading non communicable public health hazards in Bangladesh (Islam, 2014). Bangladesh exemplifies all the problems of Third World countries: poverty, hunger, reduced longevity, and an illiteracy rate hovering at more than 80 percent (Barai, 2020). The status of diabetes mellitus in Bangladesh was surveyed. Diabetes mellitus is a multi-systemic illness associated in developing countries like Bangladesh and Pakistan prevalence of Diabetes Mellitus is 11%. with a variety of short-term and long-term complications (Njiru, 2022). Pakistan ranked seven in the world with 6.9 million Studies indicate that genetic factors do not account diabetics in 2007 (compared to 4.3m ranked 8th in entirely for the development of diabetes, and several 1995) (Shinjyo, 2017). In the year 2025. The most important environmental risk factors for the rapid rise of diabetes mellitus are one of the major types of diabetes are obesity and physical inactivity (Lin, 2020). In fact, up to 80% of type-2 diabetes is explosion in obesity rates worldwide has largely been preventable by adopting a healthy diet, increasing responsible for the increase in diabetes, and it is physical activity and promoting a healthy lifestyle (Zheng, 2018). Estimated that up to 80% of all new cases of diabetes can be attributed to obesity. Change in lifestyle has Therefore to manage diabetes; the individuals must have increased the incidence of obesity (Einarson, 2018). Ample knowledge of their disease, medication, diet as well as genetic and environmental risk factors. Thus, despite several advances in the field of dialectology, it is health education is integral part in the management of unfortunate that there exists a low awareness of the diabetes (Paul, 2012). The present study was designed to assess the disease among public. Diabetes education is widely accepted as integral to society to manage the disease which was also found in diabetes therapy within the diabetes community (Rydien, 2013). In the study by Roy *et al*, 2010 where lack of family supports this study awareness level of the study participants was one of the most dominant psychosocial issues poor, which is in accordance with other studies (Van Roy, 2010). Among diabetics who also stresses for the development of diabetes education program to give patients a better knowledge of their disease, and to prevent premature morbidity and Lifestyle modifications have key role in the management mortality associated with diabetes16. of diabetes. There was a lack of awareness about the role of lifestyle changes among the diabetic people visiting. Most of the study participants had their disease at two major hospitals of Karachi; and many of them did not diagnose for more than five years. This suggested that take diabetes seriously. There is a desperate need of they should have a good knowledge about management health education programs for diabetics and general of the

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disease; but many of them (43%) were not taking public by using variety of media. The vital role of family regular treatment, their (62%) diabetes was not under, and society must be recognized. Health care provider's control, 52% did not follow diet chart and a vast majority should play their part in health educating the masses. (82%) did not indulge in exercise (Shaikh, 2011). Several Epidemiology and End Results (SEER) cancer registries, it was reported that the service providers have significant role in aware the clients to early diagnosis and improve the seeking behavior for diabetes mellitus (Mollica, 2017).

The objective of the study was to explore the socio-demographic history of the patients, to find out the knowledge level of the respondents about risk factors of diabetes mellitus and to explore the knowledge of the respondents about treatment and preventing ways of diabetes mellitus.

## LITERATURE REVIEW

Diabetes mellitus is one of the most significant public health challenges of the 21st century. WHO estimate shows, globally the number of persons with diabetes will rise from 221 million by the year 2010, and to 300 million by 2025 (Amos, 1997). The most increase will take place in south Asia. In 2007 a UN resolution was adopted to mark significance of DM as a global public health issue. Recently the occurrence of type 2 diabetes is increasing both in rural and urban communities and it is considered as a major burden for national health budget (Zimmet, 2014). Hence, there is an urgent need to halt the exponential increase of DM in Bangladesh, which is already overburdened with the double burden of both non-communicable and communicable diseases. But there is lack of population based large scale study in the country to assess the extent of the problem and its determinants. This study topic highlights the epidemiology of diabetes in rural and urban population. The study showed that the prevalence of type 2 diabetes is higher in urban compared to rural areas with comparable levels of obesity (mean BMI and WHR) (Agyemang, 2016). During the same period trivial increase of BMI, WHR and waist circumference compared to baseline survey were noted. The study findings hypothesize that urbanization and its associated lifestyle factors may have contributed to the rising prevalence of diabetes in Bangladeshi population. Higher prevalence of diabetes in lean population may also indicate genetically susceptible population. The findings of that study will help develop policies in the health sector with a view to initiating appropriate preventive strategies to put off lifelong entrance of diabetes in the population (Martinez, 2017).

### Sign of Diabetes Mellitus

People (usually with type 1 diabetes) may also present with diabetic ketoacidosis, a state of metabolic dysregulation characterized by the smell of acetone; a rapid, deep breathing known as Kussmaul breathing; nausea; vomiting and abdominal pain; and an altered state of consciousness (Umpierrez, 2016). A rarer but equally severe possibility is hyperosmolar nonketotic state, which is more common in type 2 diabetes and is mainly the result of dehydration. Often, the patient has been drinking extreme amounts of sugar-containing drinks, leading to a vicious circle regarding the water loss. Several skin rashes can occur in diabetes that are collectively known as diabetic dermadromes (Shivashankar, 2011).

### Causes of DM

The cause of diabetes depends on the type. Type 2 diabetes is due primarily to lifestyle factors and genetics and Type 1 diabetes is also partly inherited and then triggered by certain infections, with some evidence pointing at Coxsackie B4 virus. There is a genetic element in individual susceptibility to some of these triggers which has been traced to HLA genotypes (i.e., the genetic "self" identifiers relied upon by the immune system). However, even in those who have inherited the susceptibility, type 1 diabetes mellitus seems to require an environmental trigger.

### Diagnostic Procedure of Diabetes Mellitus

Diabetes mellitus is characterized by recurrent or persistent hyperglycemia, and is diagnosed by demonstrating any one of the following:[9]

1. Fasting plasma glucose level ≥ 7.0 mmol/L (126 mg/dL).
2. Plasma glucose ≥ 11.1 mmol/L (200 mg/dL) two hours after a 75 g oral glucose load as in a glucose tolerance test.
3. Symptoms of hyperglycemia and casual plasma glucose ≥ 11.1 mmol/L (200 mg/dL).
4. Glycated hemoglobin (Hb A1C) ≥ 6.5%

Population aging, urbanization, behavior and lifestyle changes, genetic susceptibility, and the health transition from communicable to non-communicable diseases account for the increasing significance of diabetes mellitus in Bangladesh. In the absence of quantified estimates of current and future disease burden attributable to diabetes mellitus in rural and urban Bangladesh, this study aimed to provide such estimates (Islam 2014).

Modeling methods were used to estimate the epidemiology of diabetes mellitus in rural and urban Bangladesh currently, in 2010, and in 2020. Resultant estimates of the epidemiology of diabetes mellitus and estimates of the epidemiology of the diabetic squeal used in the Global Burden of Disease Study were used to calculate disability adjusted life years (DALYs) attributable to diabetes mellitus and its sequelae in these populations.

Estimated current burden of disease attributable to diabetes mellitus and its sequelae were 265,718 DALYs (2.6 DALYs per 1000 persons) in rural Bangladesh and 61,829 DALYs (3.2 DALYs per 1000 persons) in urban Bangladesh. Disease burden in rural Bangladesh was estimated to increase to 311,068 DALYs (3.0 DALYs per 1000 persons) in 2010 and 389,686 DALYs (3.2 DALYs per 1000 persons) in 2020. Disease burden in urban

Bangladesh was estimated to increase substantially to 197,267 DALYs (3.8 DALYs per 1000 persons) in 2010 and 328,934 DALYs (4.4 DALYs per 1000 persons) in 2020 (Talukder, 2020).

Many assessments have been based on assumptions and information of less-than-optimal reliability. We have studied available information on healthcare expenditure, number of hospital clinics, hospital beds, income levels and any health sector information that was available to ensure that our assessment was made as realistic as possible. We believe that the results provide a realistic picture within the given frameworks and scenarios. Our experiences also underline that studies of the present kind are developed in a continuous process and there is still a need for further development and validation in the future (Van Dyne, 2015).

A health economic analysis of the standard types of evaluation – cost effectiveness analysis (CEA), cost-utility analysis (CUA) or cost-benefit analysis (CBA). Some of the controversial issues related to either of the standard types of evaluation are relevant to our study and, therefore, some of our reservations are discussed in the following First, the comparison of the current situation to the Worst scenario involves a rather big change in the society whilst most economic evaluations - at least of the CEA type – are made for smaller changes. Second, whereas the Worst scenario is not totally irrelevant for a developing country, the Ideal scenario may seem somewhat artificial, particularly in the context of a developing country (Miroshnychenko, 2021).

It is important to emphasis that the richest are those who already have access to care, have the highest productive value, are most likely to comply with treatment, and are most likely to become old enough to develop type 2 diabetes. It was discussed whether it would be relevant explicitly to divide the model into the 10% richest, the 10% poorest with free access and the remaining 80% without access to care and to analyze these groups in two separate models. We choose to model these aspects through implicit distinction between the rich and poor but in one model. It might be relevant in a deeper analysis to make analyses in two distinctly different models (Evans, 2017).

The current conditions for managing T2D in Bangladesh are poor, partly due to lack of access to basic treatment, incl. insulin, for a substantial part of the population. Improvements yielding equal access to treatment and care for all patients with T2D is costly but will be accompanied by somewhat larger gains in production value compared to the Current scenario. It is conceivable that as a consequence of such improvement, some adjustments will take place at a macro level in society, but any conclusion would be rather speculative (Misra, 2019).

A major effect of treatment of T2D patients is gains in patient-years. A derived effect may be gains in terms of productive time and costs in terms of spending time by informal caregivers and increased income from working (production value). It should be stressed again that the current population of patients with T2D has obtained its size and age composition because of any given (in the case of Bangladesh uneven) access to insulin treatment during many decades following the introduction of insulin in the early 1920´s. Therefore, a comparison of patient-years experienced under the contrasting scenarios mentioned reflects the cumulative effect of access or lack of access to insulin treatment over previous decades and cannot be interpreted as an isolated effect of insulin treatment during the year (Grunberger, 2021).

Bangladesh has experienced economic growth since the nineties. Whether this growth is reflected in a rising living standard is still to be documented as it would depend on many factors. If economic growth has led to increased population growth the average living standard may not have improved markedly. In the long term, though, a continued reduction of infant mortality probably (as experienced in other parts of the world) will lead to a lower fertility pr woman and eventually to higher average living standards (Henderson, 2012). An effect derived from increased number of patient years is the added consumption that these patients have.

## MATERIALS AND METHODS

Quantitative in nature and social survey method was apply for conducting study among the patients who received treatment from the outdoor of Upazilla Health Complexes under Jhalakati District.

### Study Area

This study was conduct at the Upazilla Health Complexes under Jhalakati District.

### Population and Unit of Analysis

The target population use includes all patients who received treatment from the outdoor of Upazilla Health Complexes under Jhalakati District. The unit of analysis was individual patient.

### Inclusion Criteria

1. Patients who visited outdoor for any services of Upazilla Health Complexes under Jhalakati District
2. Patients who were willing to participate in the study
3. Patients who were present during data collection

### Exclusion Criteria

1. Patients who visited outdoor for any services of Upazilla Health Complexes under Jhalakati District but not able to responds.
2. Patients who were not willing to participate in the study
3. Patients who were not present during data collection

### Sampling

Sample size was 100 patients. Sampling will be respondents were select that are available and interest in interview.

### Techniques of Data Collection

By using interview and observation techniques. Through

purposive sampling 100 respondents were indemnified from patients who received treatment from the outdoor of Upazilla Health Complexes under Jhalakati District. All the patients were included under the study as because a smaller number of patients in patients who received treatment from the outdoor of Upazilla Health Complexes under Jhalakati District. Observation will be watching and recording behaviour and characteristics.

**Data Analysis and Processing**

Microsoft Excel was used to analysis the data. Descriptive statistics will be used to express percentage performance, mean, standard deviation table, graph charts and interpretation with statistical information.

**Ethical Consideration of the Study**

Prior to the commencement of this study, the research protocol was approved by the research committee (local ethical committee). The aims and objectives of the study along with its procedure, risks and benefits of this study were explained to the respondents in easily understandable local language and then informed consent was taken from each participant. Then it was assured that all information and records was keep confidential and the procedure was used only for research purpose and the findings will be helpful for developing awareness package to increase awareness and improve hygiene awareness among the pregnant mother in hospitals in Bangladesh.

## RESULTS AND DISCUSSION

Socio-Demographic Characteristics of the Respondents. Most of the respondents were above middle aged, falling the age ranges of 41-45(39), 46-50 (30) and above 51 (9). A small number (22) of them were below 40.

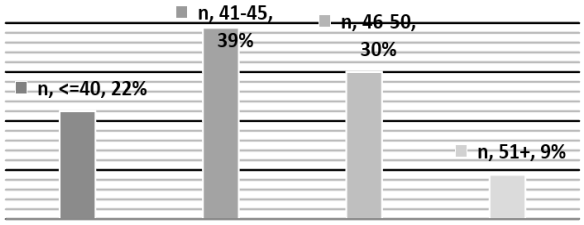


**Figure 1:** Distribution of the respondents by age

The number of female (59) respondents was a bit higher than the number of male respondents (41) that was 59% and 41% respectively.

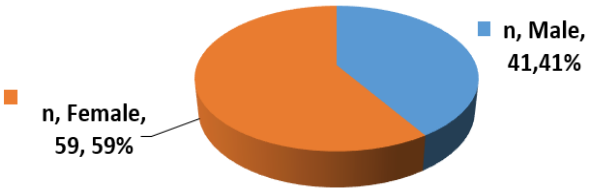


**Figure 2:** Distribution of the respondents by sex

Slightly mre than half the respondents were followers of Islam while small numbers of them were Hindus (22) or Christian (23).

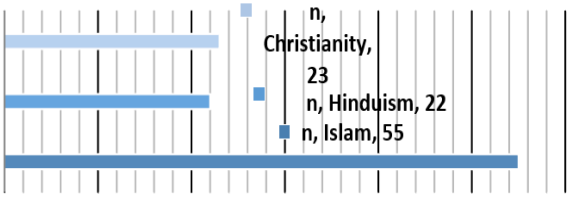


**Figure 3:** Distribution of the respondents by religion

A fairly small number of the respondents had received higher education (2 had done their Masters and 20 of them had done their degree level). The rest had studied up to finishing their SSCs (20), HSCs (10), were below class X but above VI (16) or had only studied up to class V or below (16).

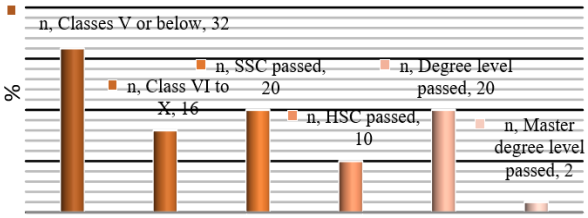


**Figure 4:** Distribution of the respondents by educational level

The respondents came from a wide variety of employments (or businesses) of which the most common sector was the service sector (2), tailoring (10) or owning a small business (11). Small numbers of them were scattered across jobs such as fishing (2), farming (7), running/working at poultry farms (5), day labouring (4), tutoring (2), teaching (3) or being a maid (6). A fairly large number of the woman were housewives (30).

**Table 1:** Distribution of the respondents by occupation

| Criteria | n | % |
|---|---|---|
| Housewife | 30 | 30.0 |
| Housemaid | 6 | 6.0 |
| Teacher | 3 | 3.0 |
| Service | 20 | 20.0 |
| Tailoring | 10 | 10.0 |
| Tutoring | 2 | 2.0 |
| Small business | 11 | 11.0 |
| Day laborer | 4 | 4.0 |
| Poultry farm | 5 | 5.0 |
| Agriculture | 7 | 7.0 |
| Fishing | 2 | 2.0 |
| Total | 100 | 100.0 |

A very large number of the respondents were married (77). Others were unmarried (1), separated (11), divorced (9) or had been deserted (2).

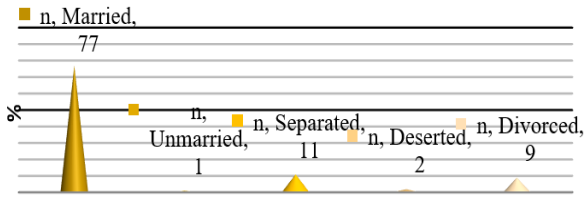


**Figure 5:** Distribution of the respondents by marital status

The highest number of respondents had a fairly low income of between 2000-5000 (54). 32 of them earned between 5000-10000 and only 14 of them earned more than 10000.

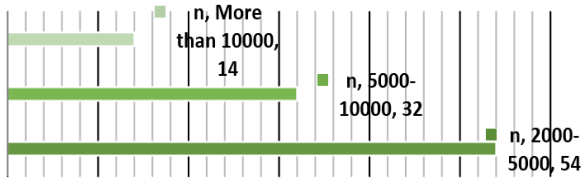


**Figure 6:** Distribution of the respondents by income

Slightly more than half the respondents (51) did not walk regularly. The rest did.


**Figure 7:** Distribution of the respondents by regular walking status

Very few of the respondents actually worked out every day (18). The majority (82%) did not.

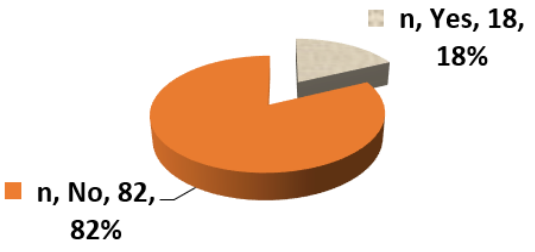


**Figure 8:** Distribution of the respondents by regular exercise status

Based on multiple responses, the respondents said that they knew diabetes is caused when blood has high sugar levels (37) or is the production of symptoms of polyuria due to high blood sugar levels (56). Only 2 of them knew the fact that it happens when the body does not produce enough insulin, or because cells do not.

**Table 2:** Distribution of the respondents by knowledge about diabetes mellitus

| Criteria | n | % |
|---|---|---|
| Metabolic diseases | 9 | 9.0 |
| A person has high blood sugar | 37 | 37.0 |
| Body does not produce enough insulin, or because cells do not | 2 | 2.0 |
| High blood sugar produces the classical symptoms of polyuria | 56 | 56.0 |

** Multiple responses*

A moderately large number of respondents knew about the monitoring tests of diabetes (61).

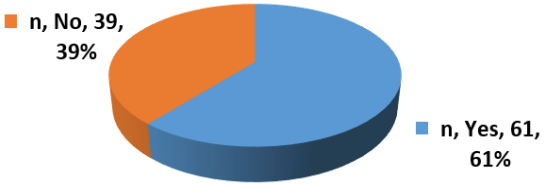


**Figure 9:** Distribution of the respondents by knowledge about the monitoring tests of diabetes mellitus

Respondents said the diabetes monitoring tests include detecting both hyperglycemia or hypoglycemia (7), checking blood glucose concentrations (6), monitoring the diet (34) and suggesting exercise (32).

**Table 3:** Distribution of the respondents by knowledge about the monitoring tests procedure of diabetes mellitus

| Criteria | n | % |
|---|---|---|
| To check blood glucose concentrations | 6 | 6.0 |
| Detecting both hyperglycaemia and hypoglycaemia | 7 | 7.0 |
| Monitor the diet required | 34 | 34.0 |
| To suggest exercise | 32 | 32.0 |
| NA | 39 | 39.0 |

**Multiple responses*

Many of the respondents replied that the hospital has enough facilities to provide treatment for diabetes. 25 of them were unsure and 18 of them disagreed saying the hospital was not good enough.

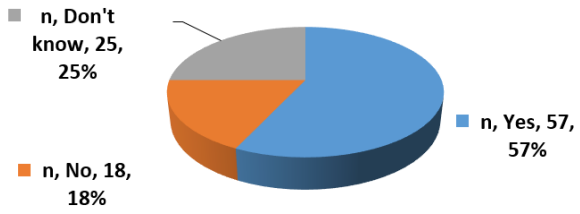


**Figure 10:** Distribution of the respondents by attitude about this hospital there is enough facilities to provide treatment of diabetes mellitus.

**Table 4:** Distribution of the respondents by opinion about the awareness program is necessary to improve the knowledge of DM among the people.

| Criteria | n | % |
|---|---|---|
| Yes | 100 | 100.0 |
| Total | 100 | 100.0 |

All respondents agreed that the awareness program is necessary to improve the knowledge of DM among the people.

Based on multiple responses, the respondents said that the things required to improve knowledge of DM among the people are TV programs (48), a theater (57), counseling (54), newspaper articles (12) or BCC materials.

**Table 5:** Distribution of the respondents by knowledge about type of awareness program is necessary to improve the knowledge of DM among the people.

| Criteria | n | % |
|---|---|---|
| BCC materials | 7 | 7.0 |
| Theater | 57 | 57.0 |
| Article in newspaper | 12 | 12.0 |
| TV program | 48 | 48.0 |
| Counseling | 54 | 54.0 |

**Multiple responses*

Other than the 23 respondents who were not sure about the number of types of diabetes, 2 thought there was a single type, 24 thought there were 2 types and 26 thought there were 3 types.

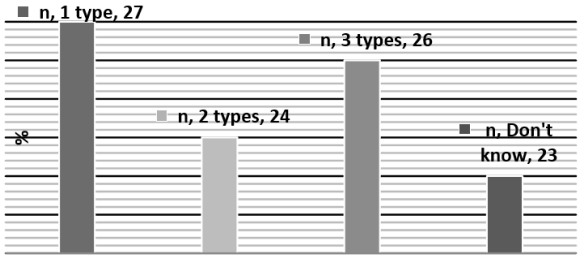


**Figure 11:** Distribution of the respondents by knowledge about the types of diabetes mellitus

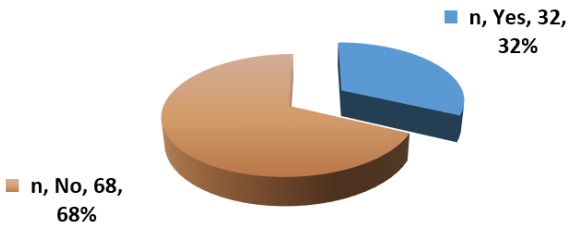


**Figure 12:** Distribution of the respondents by knowledge about type 1 diabetes mellitus

A small number of respondents knew of type-1 diabetes (32%). Many respondents did not have any knowledge about type-1 diabetes (68). The ones who did said that it is from the bodies failure to produce insulin (13), requires the person to inject insulin (21) or is known as IDDM for short (2)

**Table 6:** Distribution of the respondents by knowledge about type 1 diabetes mellitus

| Criteria | n | % |
|---|---|---|
| Results from the body's failure to produce insulin | 13 | 13.0 |
| Requires the person to inject insulin | 21 | 21.0 |
| Referred to as IDDM for short | 2 | 2.0 |
| Don't know | 68 | 68.0 |

Most respondents did not know of gestational diabetes (79%).

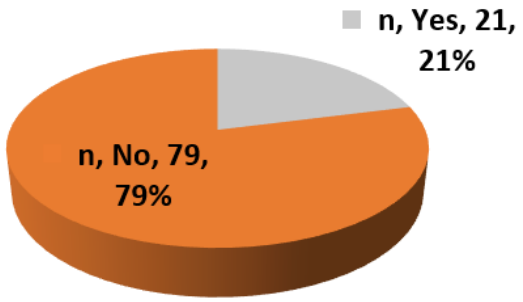


**Figure 13:** Distribution of the respondents by knowledge about gestational diabetes

The respondents said that gestational diabetes is when pregnant women have a high blood glucose level during pregnancy (17) and some knew that it may precede development type 2 DM.

**Table 7:** Distribution of the respondents by knowledge about gestational diabetes

| Criteria | n | % |
|---|---|---|
| When pregnant women have a high blood glucose level during pregnancy | 17 | 17.0 |
| It may precede development of type 2 DM. | 4 | 4.0 |
| I don't know | 79 | 79.0 |
| **Total** | **100** | **100.0** |

## CONCLUSION

Bangladesh is a poor country and struggle to manage its disease burden. Here, there is a lack of access to basic treatment. In the case of managing diabetes, insulin is a substantial part. Improvements need to be made and access to treatment and care for all patients with T2D and T1D. It is conceivable that because of such improvement, some adjustments will take place at a macro level in society, but any conclusion would be rather speculative. The economic analyses of the "improved" and I deal scenarios assume 100% access to healthcare systems for everybody in the country at current prices. The population of Bangladesh Is not literate enough to assess their own health to attend the health service provider. Diabetes may cause both hyperglycemia as well as hypoglycemia based on the situation. It is very important to know the sign

symptoms of both hyperglycemia and hypoglycemia for them who are suffering from diabetes to take specific precautions. The patient will be aware through the health service providers to whom they attend during their sickness to be cured. If the service providers provided rationale training on diabetes, then it would be easy for them to provide adequate information to the patient to prevent and control of diabetes to reduce the disease burden of Bangladesh.

## RECOMMENDATIONS

The study was carried out among the patients attending the OPD of Upazilla Health Complexes under Jhalakati District to know their knowledge on diabetes mellitus. After analyzing the findings, the study recommends for the followings.

1. The knowledge of the respondents about the sign symptoms of diabetes mellitus is found to be poor as they have less scope to know about the disease. Awareness package should be developed to increase the knowledge level of the patients to decrease the morbidity and mortality of the patients due to diabetes mellitus.

2. The patients who suffer from diabetes were expected to be more knowledgeable about the diagnostic procedure of the disease diabetes mellitus. But those who are not suffering from the disease are found less knowledgeable. It was due to the experience they got during the diagnostic procedure. General knowledge regarding the diagnostic procedure of diabetes mellitus needs to be increased to decrease the fear of the patients about the diagnostic procedure.

3. The respondents have the considerable knowledge about the risk factors of diabetes mellitus. But the knowledge level needs to be further increased so that they can avoid the risk factors to get them healthy to live a healthful leaving free from diabetes mellitus.

4. The knowledge of the respondents about treatment procedure is fear because it is very easy to them to understand and recall. Intervention to be continued to maintain the knowledge level of the respondents.

5. Preventing ways of diabetes mellitus need to be broadcast through the national mass media to make the people aware. The health service providers should be providing enough knowledge, so that they can disseminate the knowledge when patients come to them for their health service.

## REFERENCES


Agyemang, C., Meeks, K., Beune, E., Owusu-Dabo, E., Mockenhaupt, F. P., Addo, J., ... & Stronks, K. (2016). Obesity and type 2 diabetes in sub-Saharan Africans–Is the burden in today's Africa similar to African migrants in Europe? The RODAM study. *BMC medicine, 14,* 1-12.

Amos, A. F., McCarty, D. J., & Zimmet, P. (1997). The rising global burden of diabetes and its complications: estimates and projections to the year 2010. *Diabetic medicine, 14*(S5), S7-S85.

Barai, M. K. (2020). Introduction: Construction of a development model for Bangladesh. *Bangladesh's Economic and Social Progress: From a Basket Case to a Development Model,* 3-62.

Einarson, T. R., Acs, A., Ludwig, C., & Panton, U. H. (2018). Prevalence of cardiovascular disease in type 2 diabetes: a systematic literature review of scientific evidence from across the world in 2007–2017. *Cardiovascular diabetology, 17*(1), 1-19.

Evans, R. G., & Stoddart, G. L. (2017). Producing health, consuming health care. In Why are some people healthy and others not? 27-64. Routledge.

Grunberger, G., Sherr, J., Allende, M., Blevins, T., Bode, B., Handelsman, Y., ... & Unger, J. (2021). American Association of Clinical Endocrinology clinical practice guideline: the use of advanced technology in the management of persons with diabetes mellitus. *Endocrine practice, 27*(6), 505-537.

Henderson, J. V., Storeygard, A., & Weil, D. N. (2012). Measuring economic growth from outer space. *American economic review, 102*(2), 994-1028.

Islam, S. M. S., Purnat, T. D., Phuong, N. T. A., Mwingira, U., Schacht, K., & Fröschl, G. (2014). Non-Communicable Diseases (NCDs) in developing countries: a symposium report. *Globalization and health, 10*(1), 1-8.

Lin, X., Xu, Y., Pan, X., Xu, J., Ding, Y., Sun, X., ... & Shan, P. F. (2020). Global, regional, and national burden and trend of diabetes in 195 countries and territories: an analysis from 1990 to 2025. *Scientific reports, 10*(1), 1-11.

Martinez, N. G., Niznik, C. M., & Yee, L. M. (2017). Optimizing postpartum care for the patient with gestational diabetes mellitus. *American journal of obstetrics and gynecology, 217*(3), 314-321.

Misra, A., Gopalan, H., Jayawardena, R., Hills, A. P., Soares, M., Reza-Albarrán, A. A., & Ramaiya, K. L. (2019). Diabetes in developing countries. *Journal of diabetes, 11*(7), 522-539.

Miroshnychenko, A., Uhlman, K., Malone, J., Waltho, D., & Thoma, A. (2021). Systematic review of reporting quality of economic evaluations in plastic surgery based on the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement. *Journal of Plastic, Reconstructive & Aesthetic Surgery, 74*(10), 2458-2466.

Mollica, M. A., Lines, L. M., Halpern, M. T., Ramirez, E., Schussler, N., Urato, M., ... & Kent, E. E. (2017). Patient experiences of cancer care: scoping review, future directions, and introduction of a new data resource: Surveillance Epidemiology and End Results-Consumer Assessment of Healthcare Providers and Systems (SEER-CAHPS). *Patient Experience Journal, 4*(1), 103-121.

Njiru, L. N. (2022). Association between depression, anxiety and adherence to treatment among patients attending the Kenyatta National Hospital (KNH) diabetes outpatient clinic (Doctoral dissertation, University of Nairobi).

Paul, R., & Norbury, C. (2012). Language disorders from infancy through adolescence-E-Book: Listening, speaking, reading, Writing, and Communicating. Elsevier Health Sciences.

Rydén, L., Grant, P. J., Anker, S. D., Berne, C., Cosentino, F., ... & Xuereb, R. G. (2013). ESC Guidelines on diabetes, pre-diabetes, and cardwiovascular diseases developed in collaboration with the EASD: the Task Force on diabetes, pre-diabetes, and cardiovascular diseases of the European Society of Cardiology (ESC) and developed in collaboration with the European Association for the Study of Diabetes (EASD). *European heart journal, 34*(39), 3035-3087.

Shaikh, Z. A., SHAIKH, M. Z., & ALI, G. (2011). Diabetic patients: Awareness about life style modifications. *The Professional Medical Journal, 18*(2), 265-268.

Shivashankar, M., & Mani, D. (2011). A brief overview of diabetes. *International Journal of Pharmacy and Pharmaceutical Sciences, 3*(4), 22-27.

Shinjyo, N., & Green, J. (2017). Are sage, rosemary and lemon balm effective interventions in dementia? A narrative review of the clinical evidence. *European Journal of Integrative Medicine, 15,* 83-96.

Talukder, A., & Hossain, M. Z. (2020). Prevalence of diabetes mellitus and its associated factors in Bangladesh: application of two-level logistic regression model. *Scientific Reports, 10*(1), 10237.

Umpierrez, G., & Korytkowski, M. (2016). Diabetic emergencies—ketoacidosis,]hyperglycaemic hyperosmolar state and hypoglycaemia. *Nature Reviews Endocrinology, 12*(4), 222-232.

Van Dyne, L., Ang, S., & Koh, C. (2015). Development and validation of the CQS: The cultural intelligence scale. *In Handbook of cultural intelligence*, 34-56. Routledge.

Van Roy, B., Groholt, B., Heyerdahl, S., & Clench-Aas, J. (2010). Understanding discrepancies in parent-child reporting of emotional and behavioural problems: Effects of relational and socio-demographic factors. *BMC psychiatry, 10*(1), 1-12.

Zheng, Y., Ley, S. H., & Hu, F. B. (2018). Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. *Nature reviews endocrinology, 14*(2), 88-98.

Zimmet, P. Z., Magliano, D. J., Herman, W. H., & Shaw, J. E. (2014). Diabetes: a 21st century challenge. *The lancet Diabetes & endocrinology, 2*(1), 56-64.