# Knowledge and Practice of Gestational Diabetes Mellitus Management Guideline among the Nurses of Tertiary Hospitals in Capital Bangladesh

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## Abstract

**Background:** Gestational Diabetes Mellitus (GDM) accounts for the majority of cases of diabetes complicating pregnancy. This study aimed to delineate the levels of knowledge and practice about GDM management among the nurses of Dhaka, Bangladesh.

**Method:** This cross-sectional study was conducted among 427 nurses of three healthcare centers of Dhaka city. Data were collected by semi-structured questionnaire through face-to-face interview. All data were analyzed through descriptive and inferential statistical techniques. Knowledge and practice scores were categorized as poor (<Mean–1SD), average (Mean±1SD) and good (>Mean+1SD) by predefined scores.

**Result:** In this present study, mean age of the respon-

dents was found 27.8 ± 5.5, and level of knowledge (both basic and technical knowledge) was found to be average where basic knowledge was 66.3% and technical knowledge was 67%. Female nurses had better basic knowledge and practice regar-ding GDM, compared to their counterparts (p=0.002). There was a significant association with the respon-dent's gender, level of education and workplace with the basic knowledge regarding GDM management. There was a significant association with the level of education and marital status of respondents with technical knowledge and regarding proper GDM management practice only monthly family income of respondent's shows significant association.

**Conclusion:** The results revealed that there is a gap of knowledge and practice about the management of GDM among nurses' capital of Bangladesh. Capacity building training should conduct regularly for young graduate nurses so that they can apply knowledge properly in the practice area.

**Keywords:** Gestational Diabetes Mellitus (GDM); Pregnant Mother; Basic knowledge; Technical Kno-wledge; Practice; Management

## 1. Background

Gestational diabetes is a significant medical problem in this 21$^{st}$ century, a large portion of the population is living with diabetes around the world [1]. In 2019, it was assessed that 463 million individuals have diabetes and this number is projected to arrive at 578 million by 2030, and 700 million by 2045. It is expected that 15.8% (20.4 million) of live births are influenced by hyperglycemia in pregnancy in 2019 of which 83.6% were because of Gestational Diabetes Mellitus (GDM), even though 7.9% were the after

effect of diabetes recognized before pregnancy and 8.5% because of diabetes type 1 and type 2 are first identified in pregnancy [1]. South-east Asia (SEA) is considered the epic center of the diabetes epidemic, containing most of the populous countries in the world, securing demographic, epidemiologic, and socio-economic [2, 3]. Bangladesh is a developing country with an increased prevalence of diabetes, including GDM [2, 3]. As a SEA country, the pre-valence of GDM takes grew in Bangladesh. Several population-based studies showcased Bangladesh at different time points, exposing an increasing trend of GDM prevalence ranging from 6% to 14% according to the usage of different diagnostic criteria [2, 3].

The prevalence of gestational diabetes (GDM) goes from 8.2% in rural Bangladesh to 12.9%. Especially undiagnosed instances of women with diabetes in pregnancy are a critical worry in Bangladesh, where the economic wellbeing of women is low bringing about imbalances in regards to medical services access and sustenance [4]. According to International Diabetes Federation (IDF) report in 2017, it is assessed 21.3 million or 16.2% of live births to women in 2017 had cases of hyperglycemia in pregnancy, 86.4% cases were reasons for gestational diabetes mellitus (GDM), 6.2% produced for diabetes recognized before pregnancy, 7.4% emerge due to different sorts of diabetes (counting type 1 and type 2 diabetes) first distinguished in pregnancy [5]. The SEA region having the highest prevalence at 24.2% associated with 10.4% in the Africa Region. Maxi-mum (88%) cases of hyperglycemia were discovered in the pregnancy period, mostly happening in low and middle-income countries, maternal care is limited [5]. In Bangladesh, 7-14% of women are victims of diabetes in their reproductive age [6, 7]. The Fasting

blood glucose (FBG) ≥ 5.8 moll/l in pregnancy are connected to the risk of intrauterine death [8]. Multiparous women showed a high prevalence of GDM (~13%) [9]. Maternal mortality increased for Hyperglycemia/GDM, leading to chances of the high rate of maternal morbidity, high rate of perinatal, neonatal morbidity, and after a long term, consequences for both mother and child. Tertiary hospitals for health providers occur due to a lack of services, it's essential to have information with knowledge and practice on GDM management for nurses that are the main responsible people, but no published study was discovered to assess this issue in the Bangladesh context. This study was planned to assess the knowledge and practice on GDM management among the nurses. Studies of this information should help to plan and implement a sustainable health program to combat GDM.

## 2. Materials and Methods

### 2.1 Study design

This cross-sectional study was adopted based on descriptive approach. Semi-structured data were collected to portrait the knowledge and practice of gestational diabetes mellitus management guidelines among the nurses of capital Bangladesh.

### 2.2 Study participants, sample size and sampling

A total 427 nurses were randomly enrolled in this study. Data were collected from three selected tertiary level healthcare centers i.e. Maternal & Child Health Training Institute, Institute of Child & Mother Health and Dhaka Medical College & Hospital of Dhaka city of Bangladesh. Initially it was assumed that a potential standard sample size 384 would be taken by using the formula "n= 'Z2pq/d2" where Z (standard normal deviate) considered as 1.96; p (the

prevalence of knowledge and practice of gestational diabetes mellitus management guidelines) was unknown and was considered as 0.50 and margin of error was considered as 0.05. With a minimum calculated sample, an additional 11% was added as cushion to take into account non-response and questionnaire error factors and the final samples were 427. Study subjects were selected by systematic random sampling from the selected nurses list of the health facilities followed inclusion criteria.

### 2.3 Data collection

Data were gathered by pre-tested, semi-structured and interviewer-administered questionnaire. Interview was administered in an out-patient department setting by using a face-to-face technique. The survey was administered in local Bengali language with the utmost support of the hospital authority.

### 2.4 Ethical considerations

This study was approved by the Ethical Review Committee of the Bangladesh University of Health Sciences (memo no: BUSH/BIO/EA/19/165) and conformed to the Declaration of Helsinki. Participation of the respondents was anonymous and voluntary. Informed consent was sought from the respondents at the beginning of the survey and participants could withdraw from the survey at any time.

### 2.5 Questionnaire design

A three-section questionnaire was developed by the researcher. The question was drafted according to the specific objectives, and variables. The first section was containing socio-demographic information of nurses; the second section was about basic and technical knowledge related question on GDM and the third section include practice-related questions of

GDM. The questionnaire was finalized after completing the pre-test. The knowledge related to the management of the GDM questionnaire was validated by the Bangladesh University of Health Sciences (BUHS) and was modified for the data collection. Variables were also basically modified according to the local guidelines for GDM management which document was developed for the GDM management in 2012 by the WDF-GDM (World Diabetic Foundation-Gestational Diabetes Mellitus) project suported by Bangladesh Diabetic Association (BADAS). After the development of this document, it was distributed among 3800 health care providers in 64 districts of Bangladesh through 18 training programs.

### 2.6 Data analysis

Quality of data was checked and analyzed employing the Statistical Package for the Social Sciences (SPSS) software for Windows version 20. The knowledge level was categorized by the individual respondent's scores. Poor knowledge corresponded to a score of ($<$Mean-1SD); average knowledge corresponded to a score between (Mean±1SD); good knowledge corresponded to a score of ($>$Mean+1SD) [10]. This study was followed the statistically significant level as a probability value (p-value) of $\leq 0.05$. Frequencies were calculated for descriptive analysis. All categorical variables were summarized as counts and percentages with their distributions using Chi-square test.

### 3. Results

### 3.1 Participants' socio-demographic characteristics of the study subjects (n=427)

The table shows that the mean age of the respondents was 27.8 ± 5.5 where a majority of the respondents (44.5%) were in less than 25 years, 50.8% were in 26-40 years, and only 4.7% were in higher than 41

years. Female preponderance (85%) was observed throughout the study. Among 427 respondents, a majority (41.5%) of the respondents had completed a Diploma in nursing science and midwifery followed by 20.6 % completed Diploma in midwifery, 14.8% of the respondents had completed post-Basic in nursing, 10.1% of the respondents had completed Master in Public Health (MPH), 7.5% Bachelor in Science (B.Sc.) in nursing, 5.2% Master in Science (M.Sc.) in nursing and only 0.5 of the respondents had completed Doctoral degree (Ph.D.). The majority of the respondents (52.9%) were Muslim. Most of the respondents (87.4%) were living in the urban area. 84.8% of the respondents were single. The majority (44.3%) of the families earned 30,000 to 40,000 taka followed by 38.9% of the respondent's family earned $<$30,000 taka and 16.9 % of the respondent's family earned $>$41,000 taka**.**

### 3.2 Level of knowledge and practice among the respondents

Figure 1 shows that, the overall level of knowledge (both basic and technical knowledge) was found to be average among the respondents. The proportion of basic knowledge was 66.3% and technical knowledge was 67%. Only the slightest percentage of respondents had a good level of basic knowledge (17.8%) and technical knowledge (17.3%). Regarding the level of practice, the majority (73.8%) of the respondents had an average practice where only 13.3% of the respondents had a good level of practice on GDM guidelines.

### 3.3 Predictors of basic knowledge

Table 2 shows that, on bivariate analysis, a positive and significant (p<0.05) association was found between basic knowledge regarding GDM management

and respondent's gender, level of education & workplace status. Findings also indicated that the female participants, whose education level was Diploma in Midwifery and whose workplace status was autonomous, had a poor level of basic knowledge. However, there was no significant association with marital status, monthly family income, and basic knowledge. This table showed that those who were unmarried, had monthly family income between 30,000/- to 40,000/- BDT had a poor level of basic knowledge.

### 3.4 Predictors of technical knowledge

The data of Table 3, shows that only there was a significant ($p<0.05$) association with the technical knowledge and their level of education, marital status

of respondents. This study shows that those whose level of education was Diploma in nursing science and midwifery and were unmarried had a poor level of technical knowledge. But the other differences were not statistically significant ($p<0.05$).

### 3.5 Predictors of practice

The data of table 4 revealed that, only there was a significant association with the respondent's practice and monthly family income. The findings of this study showed that those whose monthly family income was within 30,000/- BDT had a poor level of practice. But the differences for other variables were not statistically significant ($p<0.05$).

| Variables | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age ( in years)** | | |
| <25 | 190 | 44.5 |
| 26-40 | 217 | 50.8 |
| >41 | 20 | 4.7 |
| **Gender** | | |
| Male | 65 | 15.2 |
| Female | 362 | 84.7 |
| **Last Degree** | | |
| Diploma in nursing science & Midwifery | 177 | 41.5 |
| Diploma in Midwifery | 88 | 20.6 |
| Bachelor science in nursing | 32 | 7.5 |
| Post basic in nursing | 63 | 14.8 |
| MPH | 43 | 10.1 |
| M.Sc. | 22 | 5.2 |
| PhD | 2 | .5 |
| **Religion** | | |
| Muslim | 226 | 52.9 |
| Hindu | 120 | 28.1 |
| Christian | 65 | 15.2 |

| Buddhist | 16 | 3.7 |
| **Residence** | | |
| Urban | 373 | 87.4 |
| Semi-urban | 54 | 12.6 |
| **Marital Status** | | |
| Single/unmarried | 284 | 66.5 |
| Married | 140 | 32.8 |
| Widowed | 3 | .7 |
| **Monthly family income** | | |
| < 30,000/- | 166 | 38.9 |
| 30000 to 40000 | 189 | 44.3 |
| > 41000 | 72 | 16.9 |

**Table 1:** Socio-demographic characteristics of the study subjects (n=427).
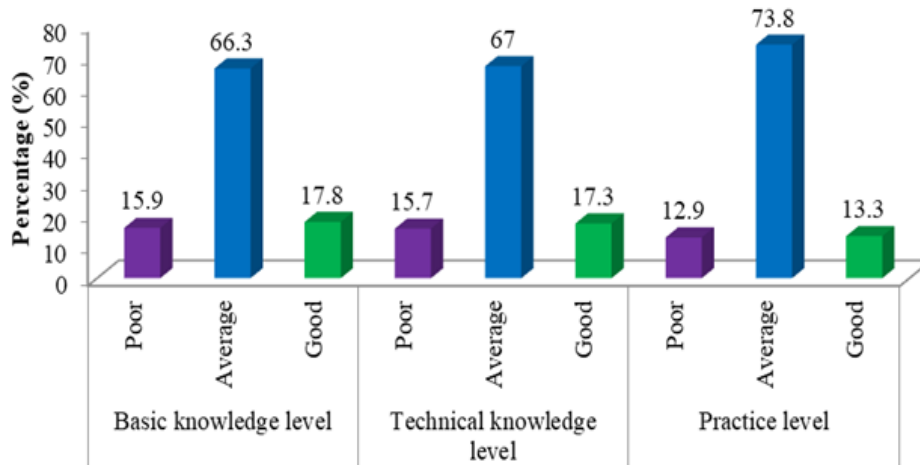


**Figure 1:** Level of knowledge and practice among the respondents.

| Variables | Levels of basic knowledge | | | | | | $\chi^2$ | p value |
|---|---|---|---|---|---|---|---|---|
| Gender | Poor | | Average | | Good | | | |
| | n | % | n | % | n | % | | |
| Male | 20 | 30.8 | 35 | 53.8 | 10 | 15.4 | | |
| Female | 48 | 13.3 | 248 | 68.5 | 66 | 18.2 | 12.647 | 0.002* |
| **Level of Education** | | | | | | | | |
| Diploma in nursing science & Midwifery | 18 | 10.2 | 120 | 67.8 | 39 | 22.0 | 31.790 | 0.001* |
| Diploma in Midwifery | 43 | 11.9 | 266 | 73.5 | 53 | 14.6 | | |
| Bachelor Science in nursing | 8 | 25.0 | 17 | 53.1 | 7 | 21.9 | | |
| Post basic in nursing | 15 | 23.8 | 39 | 61.9 | 9 | 14.3 | | |
| MPH | 10 | 23.3 | 33 | 76.7 | 0 | .0 | | |
| M.Sc. | 7 | 31.8 | 14 | 63.5 | 1 | 4.5 | | |
| Ph.D. | 1 | 50.0 | 1 | 50.0 | 0 | .0 | | |
| **Residence** | | | | | | | | |
| Urban | 60 | 16.1 | 244 | 65.4 | 69 | 18.5 | | |
| Semi-urban | 8 | 14.8 | 39 | 72.2 | 7 | 13.0 | 1.190 | 0.552 |
| **Marital Status** | | | | | | | | |
| Single/unmarried | 54 | 19.0 | 187 | 65.8 | 43 | 15.1 | | |
| Married | 14 | 10.0 | 93 | 66.4 | 33 | 23.6 | 10.071 | 0.39 |
| Widowed | 0 | .0 | 3 | 100.0 | 0 | .0 | | |
| **Work Place Status** | | | | | | | | |
| Government | 12 | 21.4 | 35 | 62.5 | 9 | 16.1 | | |
| Autonomous | 29 | 10.6 | 191 | 69.7 | 54 | 19.7 | 17.756 | 0.001* |
| Non-government | 27 | 27.8 | 57 | 58.5 | 13 | 13.4 | | |
| **Monthly Family Income** | | | | | | | | |
| 30,000/- | 26 | 15.7 | 10.2 | 61.4 | 38 | 22.9 | | |
| 30,000/- – 40,000/- | 30 | 15.9 | 134 | 70.9 | 25 | 13.2 | 5.878 | 0.208 |
| >41,000/- | 12 | 16.7 | 47 | 65.3 | 13 | 18.1 | | |

n=number of respondents; %= percentage; *=significant

**Table 2:** Association between levels of basic knowledge with socio-demographic characteristics among the respondents (n=427).

| Variables | Levels of Technical knowledge | | | | | | $x^2$ | p value |
|---|---|---|---|---|---|---|---|---|
| Gender | Poor | | Average | | Good | | | |
| | n | % | n | % | n | % | | |
| Male | 12 | 18.5 | 48 | 73.8 | 5 | 7.7 | | |
| Female | 55 | 15.2 | 238 | 65.7 | 69 | 19.1 | 5.024 | 0.081 |
| **Level of Education** | | | | | | | | |
| Diploma in nursing science & Midwifery | 31 | 17.5 | 103 | 55.2 | 43 | 24.3 | 26.88 | 0.008* |
| Diploma in Midwifery | 11 | 12.5 | 61 | 69.3 | 16 | 18.2 | | |
| Bachelor Science in nursing | 4 | 12.5 | 20 | 62.5 | 8 | 25.0 | | |
| Post basic in nursing | 12 | 190 | 46 | 73.0 | 5 | 7.9 | | |
| MPH | .8 | 18.5 | 34 | 79.1 | 1 | 2.3 | | |
| M.Sc. | 1 | 4.5 | 20 | 90.9 | 1 | 4.5 | | |
| Ph.D. | 0 | .0 | 2 | 100.0 | 0 | .0 | | |
| **Residence** | | | | | | | | |
| Urban | 64 | 17.2 | 244 | 65.4 | 6.5 | 17.4 | 5.139 | 0.077 |
| Semi-urban | 3 | 5.6 | 42 | 77.8 | 9 | 16.7 | | |
| **Marital Status** | | | | | | | | |
| Single/unmarried | 52 | 18.3 | 194 | 68.3 | 38 | 13.4 | 13.483 | 0.009* |
| Married | 15 | 10.7 | 89 | 63.6 | 36 | 25.7 | | |
| Widowed | 0 | .0 | 3 | 100.0 | 0 | .0 | | |
| **Work Place Status** | | | | | | | | |
| Government | 11 | 19.6 | 39 | 69.9 | 6 | 10.7 | 5.223 | 0.265 |
| Autonomous | 38 | 13.9 | 181 | 66.1 | 55 | 20.1 | | |
| Non-government | 18 | 18.6 | 66 | 68.0 | 13 | 13.4 | | |
| **Monthly Family Income** | | | | | | | | |
| 30,000/- | 29 | 17.5 | 111 | 66.9 | 26 | 15.7 | 5.446 | 0.244 |
| 30,000/- – 40,000/- | 29 | 15.3 | 131 | 69.3 | 29 | 15.3 | | |
| >41,000/- | 9 | 12.5 | 44 | 61.1 | 19 | 26.4 | | |

n=number of respondents; %= percentage; *=significant

**Table 3:** Association between levels of technical knowledge with socio-demographic information among the respondents (n=427).

Obstetrics and Gynecology Research - Vol. 5 No. 1– March 2022.

76

| Variables | Levels of Practice | | | | | | $\chi^2$ | p value |
|---|---|---|---|---|---|---|---|---|
| **Gender** | **Poor** | | **Average** | | **Good** | | | |
| | **n** | **%** | **n** | **%** | **n** | **%** | | |
| Male | 12 | 18.4 | 49 | 75.4 | 4 | 6.2 | | |
| Female | 43 | 11.9 | 266 | 73.5 | 53 | 14.6 | 4.855 | .088 |
| **Level of Education** | | | | | | | | |
| Diploma in nursing science & Midwifery | 20 | 11.3 | 127 | 71.8 | 30 | 16.9 | 13.61 | 0.326 |
| Diploma in Midwifery | 13 | 14.8 | 62 | 70.5 | 13 | 14.8 | | |
| Bachelor science in nursing | 2 | 6.2 | 24 | 75.0 | 6 | 18.8 | | |
| Post basic in nursing | 8 | 12.7 | 49 | 77.8 | 6 | 9.5 | | |
| MPH | 9 | 20.9 | 33 | 76.7 | 1 | 2.3 | | |
| M.Sc. | 3 | 13.6 | 18 | 81.8 | 1 | 4.5 | | |
| Ph.D. | 0 | .0 | 2 | 100.0 | 0 | .0 | | |
| **Residence** | | | | | | | | |
| Urban | 53 | 14.2 | 269 | 72.1 | 51 | 13.7 | 5.365 | 0.068 |
| Semi-urban | 2 | 3.7 | 46 | 85.2 | 6 | 11.1 | | |
| **Marital Status** | | | | | | | | |
| Single/unmarried | 41 | 14.4 | 213 | 75.0 | 30 | 10.6 | 8.085 | 0.89 |
| Married | 14 | 10.0 | 39 | 70.0 | 27 | 19.3 | | |
| Widowed | 0 | .0 | 3 | 100.0 | 0 | .0 | | |
| **Work Place Status** | | | | | | | | |
| Government | 8 | 14.3 | 44 | 78.6 | 4 | 7.1 | 6.964 | 0.138 |
| Autonomous | 39 | 14.2 | 192 | 70.1 | 43 | 15.7 | | |
| Non-government | 8 | 8.2 | 79 | 81.4 | 10 | 10.3 | | |
| **Monthly Family Income** | | | | | | | | |
| 30,000/- | 31 | 8.7 | 112 | 67.5 | 23 | 13.9 | 20.991 | 0.001* |
| 30,000/- – 40,000/- | 18 | 9.5 | 155 | 82.0 | 16 | 8.5 | | |
| >41,000/- | 6 | 8.3 | 48 | 66.7 | 18 | 25.0 | | |

n=number of respondents; %= percentage; *=significant

**Table 4:** Association between levels of practice with socio-demographic information among the respondents (n=427).

## 4. Discussion

The main objectives of this survey were to determine the level of both basic knowledge and technical knowledge related to GDM management among the nurses. The present study revealed that the level of knowledge (both basic and technical knowledge),

found the maximum respondents are staying with average knowledge there are basic knowledge 66.3 % and technical knowledge 67%, minimum respondents are staying with poor knowledge there are basic knowledge 15.9 % and technical knowledge 15.7% and middle level are good range is basic knowledge 17.8 % and technical knowledge 17.3%. The good basic knowledge (15% vs 18%), Technical Knowledge (8% vs 19%) and practice (6% vs 15%) towards GDM were found poorer among male participants compared to their counterparts. The study revealed that females had better basic knowledge and practice regarding GDM, compared to their counterparts (p= 0.002) (Figure 1). This is similar to another study conducted Morocco to found public health care providers have a basic understanding of gestational diabetes but screening and management practices are not uniform, All providers stated they had heard about gestational diabetes (GDM) and 89% described it correctly as a form of diabetes occurring during pregnancy. Most of the respondents (87.9%) had previously encountered women affected by GDM. The majority of providers stated that GDM occurred during pregnancy without specifying a period time (77.7%; 66) while 22.4% (19) indicated that GDM would start later in pregnancy, either in the second or even in the third trimester [10]. Second similar to another study conducted Bangladesh to found Approximately 16%, 66%, and 18% of respondents had good, average, and poor (GAP) basic knowledge respectively and 10%, 78%, and 12% of respondents had GAP technical know-ledge, about DM. About 90% of respondents from both basic and technical GAP did not test their blood glucose regularly; a significant relationship existed between basic knowledge and glucose monitoring. Technical know-ledge and foot care were significantly related, though

81% with good technical know-ledge and about 70% from average and poor groups did not take care of their feet. Approximately 85%, 71%, and 52% of the GAP technical knowledge group, consumed betel nuts; a significant relationship existed between technical knowledge and consum-ption of betel nuts. Around 88%, 92%, and 98% of GAP technical knowledge groups failed to follow dietary advice from a diabetes educator. About 26%, 42%, and 51% of GAP basic and technical sometimes ate meals at a fixed time (p < 0.05). Approximately one-third of respondents in each basic knowledge group and 29%, 32%, and 32% of GAP technical knowledge groups partially followed rules for mea-suring food before eating. Total basic knowledge (TBK) and the business profession were significant independent predictors of good practice. OR for TBK: 1.28 (95% CI: 1.03 to 1.60); OR for business profession 9.05 (95% CI: 1.17 to 70.09) [11].

The present study revealed or found that the level of practice among 427 respondents, majority 73.8% of the respondents were average practice group, and minority 13.3 % of the respondents were good practice groups. This is similar to another study conducted in Morocco to find after diagnosing GDM, 88.5% of providers refer patients to specialists, and only 11.5% treat them as outpatients. There was a significant association with the respondent's gender, level of education and a workplace with basic knowledge regarding GDM management. However, there was no association with marital status, monthly family income, and basic knowledge (Table 2). The data shows that there was a significant association with the level of education and marital status of respondents with technical knowledge (Table 3). The data revealed that only there was a significant association

with the respondent's practice and monthly family income (Table 4). This is similar to another study conducted in Morocco to found 56.8% of the doctors had some pre-service training on gestational diabetes, most nurses and midwives lack such training. Only 36.1% of 97 health care workers who answered the question related to training stated their pre-service training included aspects of GDM. Overall, 56.8% (21) of doctors reported being taught about GDM during their studies whereas only 23.3% (14) of the nurses and midwives stated they did receive any pre-service training on GDM [10].

## 5. Conclusions

This study revealed that the majority of the nurses had an average level of basic (66.3%) and technical (67.0%) knowledge as well as practice (73.8%). Moreover, results indicated that poor level of basic, technical knowledge and practice were more visualized among the female and unmarried participants, those with completed Diploma in Midwifery course, who worked in autonomous organizations, resided in the urban area and monthly family income was within 30,000/- BDT.

## Recommendations

This study recommends that, as the number of female nurses in the nursing profession is high and many patients are under pressure in the tertiary hospitals of the city, they have to be under a lot of workloads. Therefore, to reduce this workload, there needs to make an administratively specific plan. The nurses who are unmarried and have completed the diploma course they need to further increase their knowledge through professional training. Then they will be able to ensure the better services of GDM patients including all types of patients properly. Finally, there need

to proper educational training about the GDM management guideline and preventive measure to decrease the prevalence and complication rate of GDM. Moreover, a strong follow-up system needs to introduce to increase the practice level to manage GDM properly.

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Obstetrics and Gynecology Research - Vol. 5 No. 1– March 2022.

79

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