

## Importance of Self-Monitoring of Blood Glucose in Gestational Diabetes: Pharmacists' Role in Improving Patient's Compliance - Pilot Study

Radiana Staynova<sup>1</sup>, Stanislav Gueorguiev<sup>1</sup>, Elina Petkova-Gueorguieva<sup>1</sup>, Vasil Madzharov<sup>1</sup>, Stanislava Ivanova<sup>2</sup>, Kalin Ivanov<sup>2</sup>

<sup>1</sup>Department of Pharmaceutical sciences, Faculty of Pharmacy, Medical University – Plovdiv, Plovdiv, Bulgaria

<sup>2</sup>Department of Pharmacognosy and Pharmaceutical chemistry, Faculty of Pharmacy, Medical University – Plovdiv, Plovdiv, Bulgaria

Corresponding Author: Radiana Staynova

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### Abstract :

**Aim:** The aim of the present study is to: (1) analyze the role of self-monitoring of blood glucose as a major component in assessing the overall control of gestational diabetes mellitus (GDM); (2) assess the role of pharmacist as a provider of pharmaceutical care for women with GDM.

**Materials and methods:** A study was conducted among 30 women diagnosed with GDM in the period February 2017 - July 2017. For the purposes of the study an original questionnaire was used, which was filled in by the respondents during their visit to community pharmacies on the territory of Plovdiv, Bulgaria. All pregnant women participated voluntarily and anonymously. Data was statistically processed using MS Office Excel for Windows 10 and SPSS software v.17.0.

**Results:** Daily self-monitoring of blood glucose was performed by 87% of women, and 43% of them appreciated highly the help of the pharmacist when choosing a blood glucose meter and consulting him/her about using it. The respondents have received information about management of disease from many different sites - endocrinologist, obstetrician-gynecologist, GP, pharmacist, medical literature and the Internet. But the greatest help to diabetes self-management was obtained by the endocrinologist.

**Conclusion:** Pharmacists can work to expand the pharmaceutical care service by helping pregnant women with diabetes choose the right blood glucose meter and understand the importance of self-monitoring of blood glucose.

**Keywords:** gestational diabetes mellitus, pharmaceutical care, self-monitoring of blood glucose

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### I. INTRODUCTION

GDM is one of the most common complications of pregnancy that predict the fate of a mother and her child [1]. In recent years there has been an increase in the incidence of GDM worldwide, in parallel with obesity and type 2 diabetes [2]. The increasing prevalence of GDM requires increased efforts from pharmacists and other healthcare providers to raise the awareness among pregnant women.

Pharmacists are an underused resource that has competent knowledge about medicines and it can improve the prevention and care of diabetic patients. They are able to remind, strengthen and continue the patient's training, evaluate the knowledge and ensure their adherence with the prescribed treatment. Patients usually find it difficult to understand the complex professional language of doctors, and they can get answers to their unsolicited questions about taking medication from the pharmacist at the pharmacy.

Self-monitoring of blood glucose (SMBG), supported by appropriate education, is an important component of modern diabetic therapy and care needed to be achieved successful health outcomes [3, 4]. Once insulin was discovered, SMBG is considered to be the second most important 20th century discovery associated with the treatment of diabetes. Data often suggest that patients, who regularly perform SMBG measurements, strictly adhere to their prescribed treatment due to a better understanding of the treatment and the possibility of active participation in the prescribed therapeutic regimen [5]. The ability of SMBG at home and the availability of medical devices for monitoring have a positive impact on the treatment of pregnant women, regardless of the type of diabetes [6].

SMBG is a key element of diabetes management in women with GDM, it is convenient and maintains normal levels of blood glucose overnight [7]. Proper SMBG in pregnant women requires an understanding of

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the advantages and the need for self-management, as well as appropriate education for proper administration. One of the undisputed advantages of SMBG is that it makes patients feel safer, especially those who use insulin because it allows early recognition of the symptoms of hypoglycemia [6].

During pregnancy, it is necessary to maintain fasting and postprandial blood glucose values as close as possible to those of women without diabetes. Some experts recommend that pregnant women should perform SMBG measurements 6 to 8 times a day. This includes measuring in the morning on fasting, before and 1 or 2 hours after meals, and in the evening before bedtime, sometimes at night [8]. A stricter SMBG and a greater number of measurements per day are shown in women with preexisting diabetes – type 1 and type 2 diabetes or in women with GDM who are on insulin therapy. The goal is to safely reach target levels of HbA1c without inducing hypoglycemia [9]. The American Diabetes Association (ADA) recommends targeting blood glucose levels in the GDM [10]:

Fasting  $\leq 95$  mg/dL (5.3 mmol/L) and either  
1 hour after meals  $\leq 140$  mg/dL (7.8 mmol/L) or  
2 hours after meals  $\leq 120$  mg/dL (6.7 mmol/L)

In a recent study published in *Diabetes Care*, researchers in France rated compliance and adherence to blood glucose self-monitoring recommendations for 91 women with GDM. The blood glucose values of the meter's memory and those recorded by the patients' logbooks are compared. Study data show that only 61% of women perform  $\geq 80\%$  of the necessary blood glucose tests. In conclusion, the authors conclude that although women with GDM are considered to be highly motivated, the low level of adherence to SMBG recommendations and the lack of reliability of the recorded results cause anxiety and may be associated with a poor outcome of pregnancy [11].

There is a need to be applied different approaches by healthcare providers who take care of pregnant women to improve the compliance. Since pharmacists are the ones who sell glucose meters and test strips and consult their administration, they can advise women with GDM to follow their doctor's recommendations and regularly measure their blood glucose levels. Studies have shown that pharmacist involvement in the patient care process leads to improved treatment adherence, improved self-management and deeper knowledge of the disease [12-15].

## II. AIM

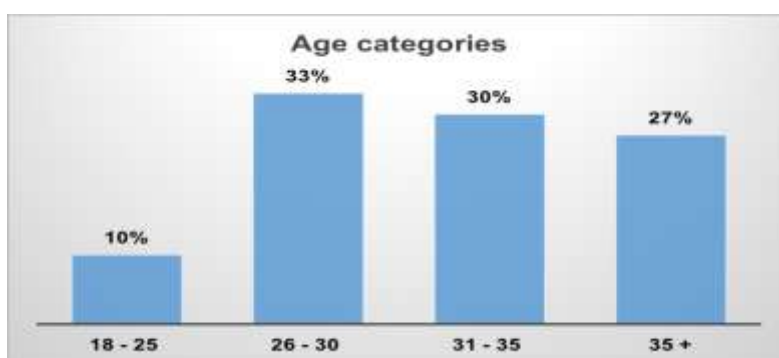
The aim of the present study is to: (1) analyze the role of SMBG as a major component in assessing the overall control of GDM; (2) assess the role of pharmacist as a provider of pharmaceutical care for women with GDM.

## III. MATERIALS AND METHODS

A survey of 30 women diagnosed with GDM was conducted. The study was conducted in February 2017 - July 2017. For the purpose of the survey a short original questionnaire was used, which was filled in by the respondents during their visit to community pharmacies on the territory of Plovdiv, Bulgaria. The questionnaire is created in a way and with questions that can be answered by a person without medical education. Pregnant women with GDM, who had been consulted by a pharmacist on medication's use or choosing a meter and test strips, were invited to participate in the study. All pregnant women participated voluntarily and anonymously. Exclusion criteria in the study were pregnant women with type 1 or type 2 diabetes, aged less than 18 years, illiterate individuals. Questionnaires are completed in the presence of a pharmacist. The results obtained are statistically processed with the help of MS Office Excel for Windows 10 and SPSS software version 17.0

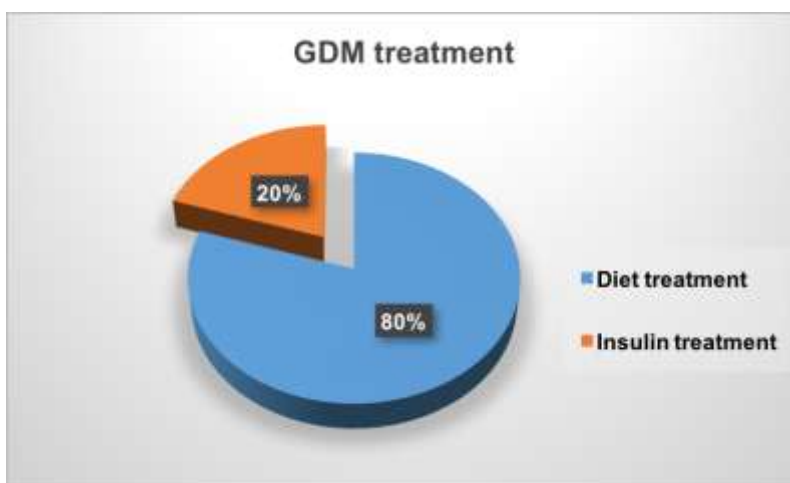
## IV. RESULTS AND DISCUSSION

The present study includes 30 women with GDM. The mean age of the women was  $31,6 \pm 5,5$ . Most women (33%) are aged 26 to 30 years old (Fig. 1). The youngest respondent is 24 years old and the oldest one is 44 years old. The majority of the pregnant women are married (82%).



**Figure 1.** Distribution of respondents by age.

A major approach to treatment of GDM is dietary advice in combination with moderate physical activity, weight management depending on pre-gestational weight and SMBG [10, 16]. Studies have shown that 70-85% of women diagnosed with GDM achieve a successful glycemic control with lifestyle modification only [10]. If lifestyle changes themselves are not sufficient to achieve blood glucose targets, insulin is a safe and effective therapeutic alternative as it does not cross the placenta and has no teratogenic effect [1, 16]. These results are also confirmed in our study. The majority of respondents (80%) achieved good glycemic control and managed to maintain blood glucose in target values for pregnancy only through diet and moderate physical activity. The remaining 20% of women received insulin therapy (Fig. 2).



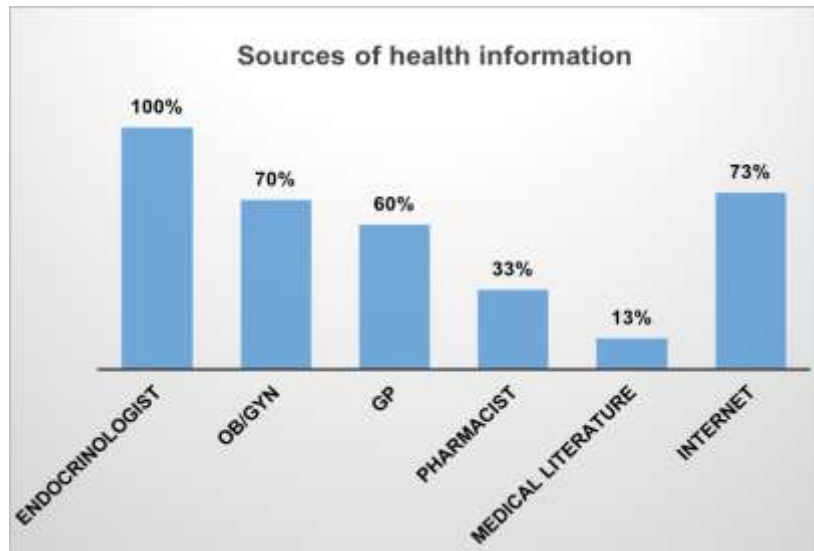
**Figure 2.** Distribution of the respondents according to the type of treatment

Regular SMBG measurements with glucose meter were performed by 87% of the respondents, and this percentage included all women using insulin therapy. Only 13% said they did not follow strict blood glucose monitoring (Fig. 3). In Bulgaria, the Health Insurance Fund reimburses 1100 test strips for the period of pregnancy in patients with basal-bolus insulin regimen and 150 test strips in patients using only basal insulin. These test strips are in most cases insufficient for a 6-fold measurement of blood glucose. Women using only nutrition therapy themselves should purchase the necessary test strips, meter and consumables.



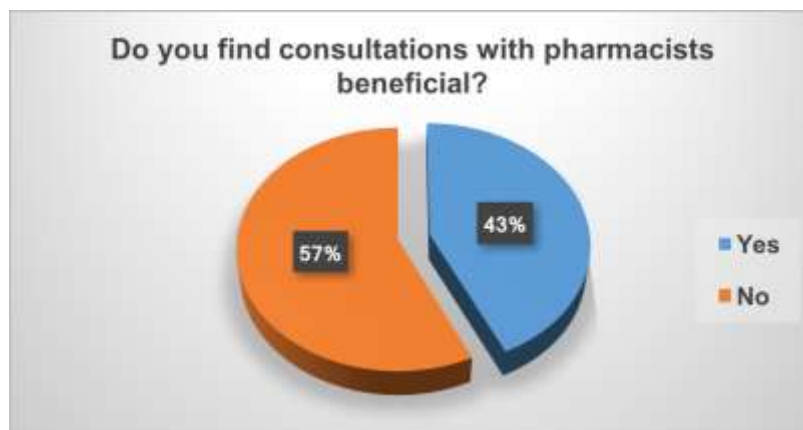
**Figure 3.** Regular self-measurement of blood glucose among the respondents

It turns out that respondents receive information about the diabetes management from many different sites - endocrinologist, obstetrician-gynecologist, GP, pharmacist, medical literature and the Internet (Fig. 4). But the greatest help to control the disease was obtained from the endocrinologist. Many pregnant women use the Internet as a source of information about pregnancy and as a means of avoiding their worries [17-19]. This is also confirmed in our study and the high rate of response to the Internet as a source of information for the GDM. It should be taken into consideration that the information on the Internet can be misleading, not objective enough and cannot replace consultation with a doctor or pharmacist.



**Figure 4.** Sources of information on the treatment and management of GDM in respondents

With regard to the consultation with a pharmacist, 43% of the women highly appreciate the assistance in choosing the glucose meter, the instructions for working with it, and the recommendations for the prescribed therapy. However, for slightly more than half the women (57%) the consultation with a pharmacist was not sufficient (Fig. 5).



**Figure 5.** Distribution of respondents finding consultations with pharmacists beneficial

There is a need to increase the quality of pharmaceutical care provided in community pharmacies, and to increase consultation time. The focus of pharmaceutical care in women with GDM should be focused not only on drug therapy but also on the management of hyperglycemia through appropriate lifestyle management advice, SMBG and the prevention of future type 2 diabetes. In order to be effective advisors for women with GDM, pharmacists must constantly increase their knowledge of diabetes management.

## V. CONCLUSION

This study confirms the need of pharmaceutical care and education for women with GDM. Appropriate diabetes self-management education can improve health outcomes in patients with GDM and may also provide long-lasting benefits to the mother and baby. Collaboration and good communication between healthcare providers is very important and can lead to the improvement of the patient care. Regular blood glucose monitoring allows pregnant women to avoid episodes of hypoglycemia and hyperglycemia and, with the help healthcare providers, adjust their diet, exercise or treatment to minimize the adverse effects and complications associated with diabetes. Pharmacists can work to expand the pharmaceutical care service by helping pregnant women with diabetes choose the right glucose meter and understand the importance of SMBG.

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