Biomedical Research 2017; 28 (19): 8553-8556 *ISSN 0970-938X*
www.biomedres.info

Clinical efficacy and safety of novorapid flexpen in treatment of gestational diabetes mellitus.

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Abstract

Objective: To investigate clinical efficacy and safety of novorapid flexpen in treatment of gestational diabetes mellitus.
Methods: From January 2016 to May 2017, total 71 gestational diabetes patients enrolled in our hospital was selected as the research objects. All patients were randomly divided into observation group (n=36) and control group (n=35). In the control group, patients received routine treatment while patients in the observation group were given novorapid flexpen. The blood glucose level, clinical efficacy, adverse pregnancy outcome and incidence of hypoglycemia were analyzed and compared between those two groups.
Results: There was significant difference between patients in different groups in the blood glucose level, clinical efficacy and the incidence of hypoglycemia. The adverse pregnancy outcome of the observation group was obviously less than that of the control group, P<0.05.
Conclusion: Novorapid flexpen is effective and safe in treatment of gestational diabetes mellitus, thus worth clinical application.

Keywords: Novorapid flexpen, Gestational diabetes mellitus, Clinical efficacy, Safety.

Accepted on September 06, 2017

Introduction

Gestational diabetes is a disease that seriously endangers maternal and child health and if without timely treatment will cause on delivery woman terrible impacts like the incidence of postpartum hemorrhage and eclampsia. Also, it may give rise to fetal distress and premature birth followed by fetal deformity and macrosomia, which greatly increases the risk of giving birth. Therefore, scientific and rational control of blood glucose has a profound impact on patients and their new-borns [1]. According to clinical studies, novorapid flexpen has significant therapeutic effect in patients with gestational diabetes mellitus. In this study, we conducted in-depth discussion on the clinical efficacy and safety of novorapid flexpen in treatment of gestational diabetes.

Materials and Methods

Patients

From January 2016 to May 2017, total 71 gestational diabetes patients enrolled in our hospital was selected as the research objects. All patients were randomly divided into observation group (n=36) and control group (n=35). The patients in the control group aged 22 to 45 y old with an average age of 33.5 ± 1.4, including 20 primiparas and 15 multiparas. In the observation group, patients were aged 23 to 48 with an average age of 35.5 ± 1.4, including 22 primiparas and 14 multiparas. There was no significant difference between the two groups in baseline data (P>0.05).

Inclusion criteria

(1) Patients were diagnosed with gestational diabetes and they had no previous history of diabetes; (2) Patients were not allergic to novorapid flexpen; (3) Patients had no coagulation disorders [2].

Exclusion criteria

(1) Patients were the pregnant women with heart disease; (2) Patients had no complete clinical data; (3) Patients suffered severe disorder of consciousness and communication; (4) Patients and their families did not support the study [3].

Specific treatment measures

Patients in both two groups were treated by alimentary control and exercise therapy in which the former included balanced nutrition, strict limits on the intake of high-carbohydrate diet and control of sodium salt intake and the latter mainly meant

guiding the patients to do proper aerobic exercise to improve their self-immunity [4]. The control group received routine treatment as follows: Novolin R (specification: 3 ml: 300 iu/piece/box; Zhunzi: 1201J0400; Manufacturer: Novo Nordisk Pharmaceutical Industries, Inc.) was injected in the subcutaneous tissue 30 min before meals and the injection volume was adjusted at any time according to the patient's weight and diet (whether there was additional meals or carbohydrate intake) and stability of blood sugar [5].

The observation group were given treatment of novorapid flexpen (size: 100 units /ml; 3 ml /piece; Zhunzi J20100123; Manufacturer: Denmark's Novo Nordisk), which was injected 10-20 min before the meal with the volume adjusted at any time according to the patient's weight and diet (whether there was additional meals or carbohydrate intake) and stability of blood sugar [6].

Evaluation criteria

(1) Blood sugar control including fasting blood glucose, postprandial 2 h blood glucose and glycosylated hemoglobin was detected with the reference value as follows: 3.6-5.8 mmol/L in fasting blood glucose and 5.8-9.2 mmol/L in postprandial 2 h blood glucose; (2) Clinical curative effect: significant effects indicated that blood sugar of the patients restored to normal level under good control with new-born health; effective results suggested blood glucose level was close to the normal value after intervention with the new-born in good condition; invalid results meant blood glucose level failed to be controlled or went even worse with the neonatal outcome not optimistic; (3) Adverse pregnancy outcomes: premature labor, asphyxia and fetal distress; (4) Hypoglycemia: one of common adverse reactions in patients with gestational diabetes mellitus [7].

Statistical methods

The statistical software SPSS20.0 version was used in the study. The measurement data including blood glucose control were described as mean ± standard deviation for statistical description and analyzed with t-test. The numeration data including clinical efficacy, adverse pregnancy outcome and the incidence of hypoglycemia were described as "n, %" and assessed by chi-square test. $P<0.05$ suggests the difference is statistical significant.

Results

Comparison of blood glucose level

There was no significant difference between the two groups in the control of blood glucose before treatment, $P>0.05$. However, after treatment, there was significant difference between patients in two groups in fasting blood glucose, postprandial 2 h blood glucose and glycated, $P<0.05$ (Table 1).

Table 1. *Comparison of blood glucose level.*

Group	Fasting blood glucose (mmol/L)		Postprandial 2h blood glucose (mmol/L)		Glycated hemoglobin (%)	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation	6.88 ± 0.92	5.69 ± 1.21	10.72 ± 2.01	7.03 ± 1.84	18.69 ± 0.63	15.78 ± 0.59
Treatment	6.94 ± 0.93	6.87 ± 0.97	11.05 ± 2.37	10.46 ± 1.92	18.99 ± 0.71	12.97 ± 0.88
t	0.2732	4.5259	0.6334	7.6864	1.8845	5.8446
P	0.7855	0.025	0.5286	0.019	0.707	0.031

Comparison of clinical efficacy

The total effective rate was 94.44% (34/36) in the observation group and 74.29% (26/35). The difference is statistically significant $P<0.05$ (Table 2).

Comparison of adverse pregnancy outcomes and incidence of hypoglycemia

In the observation group the incidences of premature birth, asphyxia, fetal distress and hypoglycemia were respectively 2.78%, 2.78%, 2.78% and 2.78% while in the control group they were 8.57%, 8.57%, 11.43% and 20% (Table 3).

Discussion

Gestational diabetes mainly refers to the occurrence of diabetes during gestation period with abnormality in fasting blood glucose and sugar tolerance, the cause of which has certain correlation with age, obesity and heredity [8]. With the two-child policy, the parturient women of advanced age increase closely year by year in China and the existing studies show that the women over the age of 40 are subject to the incidence of gestational diabetes mellitus 8.2 times higher than that of the women aged 20-30 y. There are therefore great pregnancy risks in pregnant women with advanced maternal age and it, to a certain extent, increases the probability of preterm birth, macrosomia and polyhydramnios [9]. With partial regional results tallied, in gestational diabetes the probability of premature is 9.5%-25%, macrosomia (the most common complication which occurs during perinatal period in patients with gestational diabetes) is 25%-40% and polyhydramnios (the most common complication) is 13%-36% [10]. Such huge data again alert us to pay close attention to gestational diabetes and quality improvement of delivery. Gestational diabetes is

mainly due to insulin secretion deficiency or insulin resistance in patients' body, so it requires grasping the islet β-cell function firstly before the treatment of gestational diabetes mellitus. This is mainly because the dysfunction of islet β-cell can lead to abnormality of glucose tolerance and thus to protect the islet β-cell function becomes the main goal in treatment of pregnancy diabetes [11].

Table 2. *Comparison of clinical efficacy.*

Group	Significantly effective	Effective	Invalid	Total effective rate
Observation	26 (72.22)	8 (22.22)	2 (5.56)	34 (94.44)
Control	15 (42.86)	11 (31.43)	9 (25.71)	26 (74.29)
x^2	-	-	-	5.5082
P	-	-	-	0.0189

Table 3. *Comparison of adverse pregnancy outcomes and incidence of hypoglycaemia.*

Group	Premature birth	Asphyxia	Fetal distress	Adverse pregnancy outcomes	Incidence of hypoglycemia
Observation	1 (2.78)	1 (2.78)	1 (2.78)	3 (8.33)	1 (2.78)
Control	3 (8.57)	3 (8.57)	4 (11.43)	10 (28.57)	7 (20.00)
x^2	-	-	-	4.8596	5.2647
P	-	-	-	0.0274	0.0217

This study shows that after treatment the fasting blood glucose, postprandial 2 h blood glucose and glycated hemoglobin in the observation group were significantly different from those of the control group, $P<0.05$. Total effective rate of the observation group (94.44%) was markedly higher than that of the control group (74.29%), ($P<0.05$), and in the observation group the incidences of premature birth, asphyxia, fetal distress and hypoglycemia were respectively 2.78%, 2.78%, 2.78% and 2.78% while in the control group they were 8.57%, 8.57%, 11.43% and 20% of significant difference ($P<0.05$). The main reasons are: the traditional method of controlling blood sugar, with hysteretic quality, is mainly conducted with animal insulin as the main basis of blood sugar control. But it fails to reach a satisfactory effect because the animal insulin has moderately slow metabolism and long onset time [12-15]. The treatment of gestational diabetes is related to maternal and child health, so the method applied should be safe and reliable while keeping pace with the times. In recent years novorapid flexpen has been widely used and highly recognized in clinical trials. Novorapid flexpen makes the insulin re-synthesized through science and technology with the main component of aspartic acid, which can change the insulin into the monomer. Therefore, after subcutaneous injection, the novorapid flexpen can be quickly absorbed into the blood, give full play to the effect of insulin in a short period, slow down the absorption of sugar and inhibit enzyme activity in patients to make it work on 10-20 min with the maximum duration up to 1-3 h and hypoglycemic duration 3-5 h. So, it has good effect in controlling blood glucose, enabling to control the postprandial blood glucose at a reasonable level in a short period of time. More importantly, the novorapid flexpen contains a lot of protein molecules; rarely gives rise to hypoglycemia occurs during the application and has fewer effects on the fetus with high security [16-18]. Therefore, as long as with correct drug use against infection, novorapid flexpen turns out to have good effects in the treatment of gestational diabetes, which sets the template for the therapy of the disease and also provides a reference for the future treatment of gestational diabetes mellitus [19,20].

In summary, the effect of treating gestational diabetes with novorapid flexpen is significant. It brings a good control of the blood glucose and greatly improves the treatment effect by reducing the incidence of adverse pregnancy outcomes and hypoglycemia, thus worthy of reference and adoption in clinical practices.

References

1. Ye H. Clinical efficacy and safety of treating gestational diabetes mellitus with novoMix flexpen. Maternal and Child Health Care of China 2015; 30: 966-968.
2. Shi Y, Yao L, Wang Q. The efficacy of novorapid flexpen combined with Huangqi Sijunzi Decoction and its effects on pregnancy outcome in treatment of patients with gestational diabetes mellitus. Internal Med Chinese 2015; 10: 793-795.
3. Wang Z, Jia X. Application value of metformin in treatment of gestational diabetes. Chinese J Woman Child Health Res 2015; 26: 754-768.
4. Leng L. The efficacy of novorapid flexpen combined with Huangqi Sijunzi Decoction and its effects on pregnancy outcome in treatment of patients with gestational diabetes mellitus. Diabet New World 2016; 19: 29-30.
5. Wang H, Li M, Feng R. Clinical observation on individual health intervention combined with novorapid flexpen in treatment of gestational diabetes mellitus. Chinese J Clin Rational Drug Use 2015; 10: 89-90.
6. Zhou L, Fan L. Efficacy and safety of insulin aspart versus regular human insulin for women with gestational diabetes mellitus. National Med J Chinese 2012; 92: 1334-1336.
7. Li Q, Ma Y. The effect of standardized treatment of gestational diabetes mellitus on pregnancy outcome. Chinese General Pract 2012; 15: 3009-3011.
8. Li B, Wang X, Shang L. Clinical observation of individualized medical nutrition therapy combined with exercise therapy in the treatment of gestational diabetes mellitus. Shandong Med J 2014; 36: 87-89.
9. Jiang H, Mao XG. Clinical study on self-made tonifying spleen decoction for treating gestational diabetes mellitus with spleen deficiency type. Inform Trad Chinese Med 2017; 34: 68-71.
10. Liu H. Effects of insulin combined with Chinese medicine prescription on serum Mg2+, visfatin levels and maternal and infant outcomes in pregnant women with gestational

diabetes mellitus. J Hainan Med College 2017; 23: 617-619.

11. Zou Q, Huang L, Song W. Effect of prompt diagnosis and treatment of gestational diabetes mellitus on pregnancy outcome. Hainan Med J 2013; 24: 1916-1918.
12. Wu H. Insulin aspart and novolin-R in efifcacy and safety in the treatment of gestational diabetes mellitus. Chinese J Med Guide 2013; 10: 1653-1654.
13. Tang G, Zhang X, Tan A. Effects of metformin and insulin aspart on serum cystatin C, homocysteine and maternal and neonatal outcomes in pregnant women with gestational diabetes mellitus. Chinese J Mod Med 2016; 2: 76-79.
14. Liu W, Wang B, Guo L. Comparison of curative effect of gestational diabetes mellitus between novorapid and Novolin-R. Chinese Pharm 2011; 20: 75-76.
15. Ji J, Han Z, Mi Y. Clinical application of standardized treatment and individual nutrition intervention in gestational diabetes mellitus. Maternal Child Health Care Chinese 2016; 31: 1172-1174.
16. Balsells M, García-Patterson A, Gich I. Ultrasound-guided compared to conventional treatment in gestational diabetes leads to improved birth weight but more insulin treatment: Systematic review and meta-analysis. Acta Obstetricia et Gynecologica Scandinavica: Official Publication of the Nordisk Forening for Obstetrik och Gynekologi 2014; 93: 144-151.
17. Cheng YW, Chung JH, Block-Kurbisch. Fetal male gender and the benefits of treatment of mild gestational diabetes mellitus. Am J Obstetr Gynecol 2012; 206: 422.
18. Yvonne WC, Judith HC, Ingrid BK, Maribeth I, Aaron BC. Treatment of gestational diabetes mellitus: Glyburide compared to subcutaneous insulin therapy and associated perinatal outcomes. J Matern Fetal Neonatal Med 2012; 25: 379-384.
19. Silva JC, Fachin DRRN, Coral ML. Perinatal impact of the use of metformin and glyburide for the treatment of gestational diabetes mellitus. J Perinatal Med 2012; 40: 225-228.
20. Fastest Obstetrics, Gynecology and Pediatric Insight Engine. Markedly different rates of incident insulin treatment based on universal gestational diabetes mellitus screening in a diverse HMO population. Am J Obstetr Gynecol 2013; 209: 440-440.

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