



# EFFECT OF BIPHASIC INSULIN ASPART 30 COMBINED WITH METFORMIN ON GLYCAEMIC CONTROL IN OBESE PEOPLE WITH TYPE 2 DIABETES

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## ABSTRACT

Combination therapy consisting of biphasic insulin aspart 30 bid with metformin provide better glycaemic control in obese patients with diabetes mellitus type 2. In our study, patients who were treated with 2550 mg of metformin, administered in three daily doses had poor glycaemic control. Three months after switching from metformin therapy to treatment with biphasic insulin aspart 30 + metformin twice a day, glycaemic control improved with significant reduction in hemoglobin HbA<sub>1c</sub>, fasting blood glucose and postprandial blood glucose levels.

Biphasic insulin aspart 30 in combination with metformin administered twice a day may be recommended as a starting insulin treatment in obese diabetic persons whose glycaemic control remained poor while on oral metformin therapy alone.

KEY WORDS: Biphasic insulin aspart 30, metformin, diabetes mellitus type 2.

## INTRODUCTION

Insulin therapy can help in correction of the underlying pathogenic mechanisms responsible for type 2 diabetes, insulin resistance and impaired insulin secretion. Glucose toxicity from hyperglycemia contributes to both insulin resistance and b-cell impairment as seen in type 2 diabetes (1). In vitro studies using human b-cells show that even mild, short-term hyperglycemia blunts the glucose-stimulated insulin response (2). Research has also shown that hyperglycemia increases insulin resistance and that better glycaemic control improves insulin sensitivity. Hyperglycemia is thought to increase insulin resistance by down-regulating the glucose transport system (3). New studies (UKPDS, Heart Protection Study) suggest achieving better control of the disease in order to reach fasting normglycaemia, as well as better control of postprandial glycaemia with the main objective of reducing subsequent complications of the disease (4, 5, 6). Insulin in combination with metformin is effective in achieving good glycaemic control in obese patients with diabetes type 2. Biphasic insulin aspart 30/70 is a premixed insulin analogue (BIAsp30, 30% soluble and 70% protaminated insulin aspart). This insulin is using for postprandial and basal glucose regulation.

## AIM

The aim of this study was to evaluate the effect of Biphasic insulin aspart 30 combined with metformin on glycaemic control in obese patients with type 2 diabetes.

## PATIENTS AND METHODS

This study included 15 patients (female 8, male 7) with type 2 diabetes (mean age 55 years, diabetes duration 4,5 years and BMI 29,0 kg/m<sup>2</sup>). Patients were treated with 2550 mg of metformin, administered in three daily doses. We evaluated glycaemic control by monitoring haemoglobin levels, mean fasting and postprandial glycaemia prior to the treatment and 3 months after switching from metformin therapy to biphasic insulin aspart 30 + metformin drugs administered twice a day.

## RESULTS

Three months after switching to the combined therapy with insulin and metformin, glycaemic control improved with significant reductions in haemoglobin levels -HbA1c, fasting blood glu-

cose - FBG and postprandial blood glucose - PPG. Before BIAsp 30 mean HbA1c was 8,9 % ± 0,81 % (Figure 1.), mean fasting glycaemia 9 ± 0,99 mmol/l (Figure

Parameters	Referent Values	Prior to Study
HbA1c %	7	8,9
MFBG mmol/l	6,1	9
MPPG mmol/l	7,5	10

TABLE 1. Patients treated with metformin alone

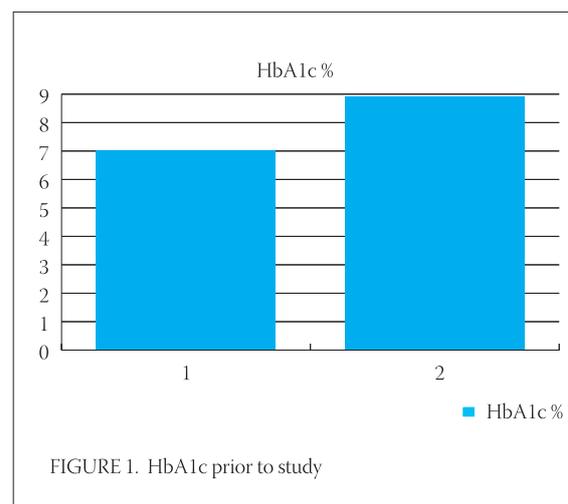


FIGURE 1. HbA1c prior to study

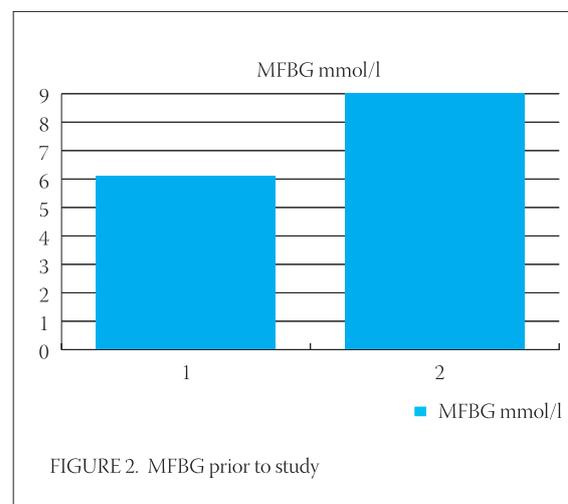


FIGURE 2. MFBG prior to study

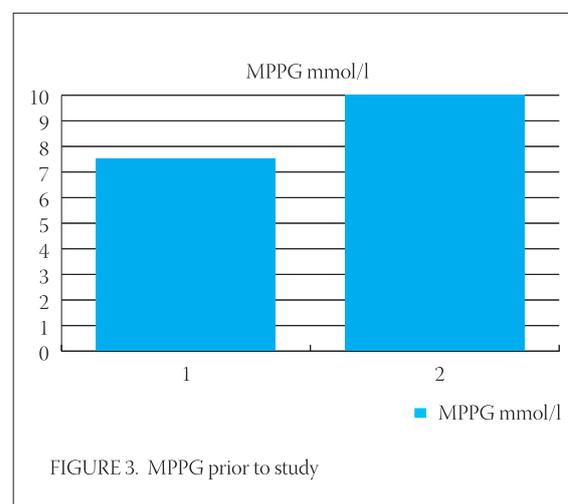


FIGURE 3. MPPG prior to study

2.), mean postprandial blood glucose  $10 \pm 0,81$  mmol/l ( Figure 3., Table 1.). Three months after including BI-Asp 30 mean HbA1c was  $6,7 \pm 0,69$  % ( $p = 0,0002$ ) (Figure 4.), mean fasting glycaemia  $7,5 \pm 0,77$  mmol/l ( $p = 0,0001$ ) ( Figure 5.), mean postprandial blood glucose  $8,3 \pm 0,45$  mmol/l ( $p = 0,0001$ ), (Figure 6., Table 2.).

Parameters	Referent Values	Prior to Study	After Study
HbA1c %	7	8,9	6,7
MFBG mmol/l	6,1	9	7,5
MPPG mmol/l	7,5	10	8,3

TABLE 2. Patients treated with Biphasic insulin aspart 30 in combination with metformin

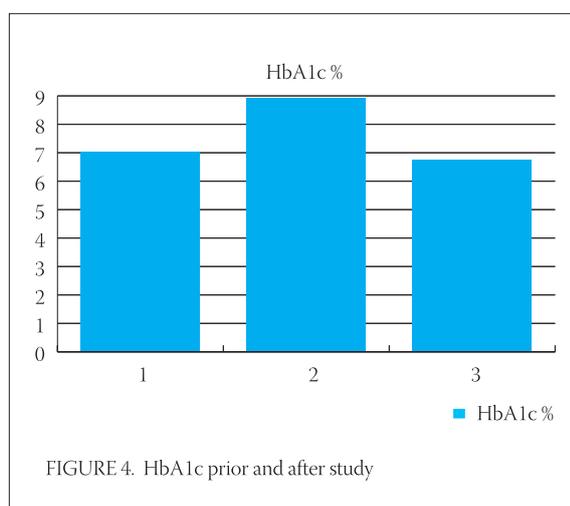


FIGURE 4. HbA1c prior and after study

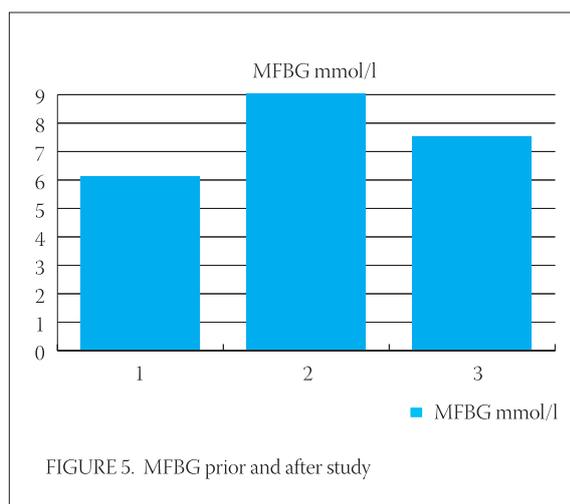


FIGURE 5. MFBG prior and after study

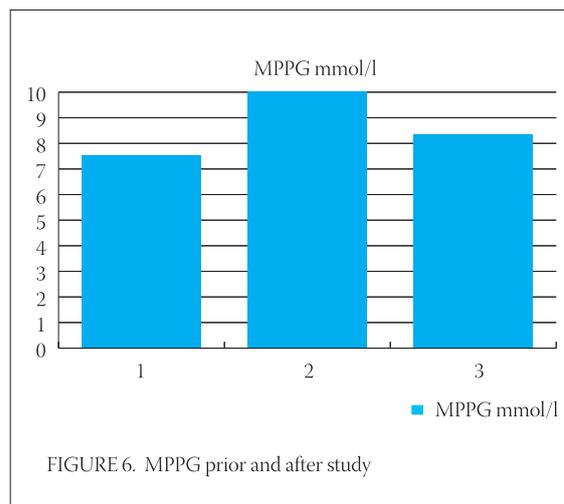


FIGURE 6. MPPG prior and after study

## DISCUSSION

Obese diabetes type 2 patients with poor glycaemic control treated with metformin therapy alone, had improved glycaemic control with significant reductions in haemoglobin levels -HbA1c, fasting blood glucose - FBG and postprandial blood glucose - PPG three months after switching to combination therapy with insulin and metformin. Similar improvement in glycaemic control was recorded in international studies: BIAsp30 in combination with oral hypoglycaemic therapy results in long – lasting near – optimal glycaemic regulation in non-obese patients with diabetes mellitus type 2 uncontrolled by oral hypoglycaemic therapy. BIAsp30 in combination with oral hypoglycaemic therapy can be initiated once a day pre-dinner, but most non – obese patients with diabetes mellitus type 2 need more than one daily dose in order to reach and maintain glycaemic regulation within defined levels after one year (7). In subjects with diabetes mellitus type 2 that is inadequately controlled by oral antidiabetic agents, addition of one daily dose of BIAsp30 to metformin therapy or substitution with two daily doses of BIAsp30 offer significant clinical benefit (8). More patients with type 2 diabetes, poorly controlled by 2 oral agents, could achieve currently recommended ADA and IDF HbA1c levels using BIAsp 30 + metformin+ pioglitazone alone (9).

## CONCLUSION

Two daily doses of biphasic insulin aspart 30 in combination with metformin drugs may be recommended as starting insulin treatment in obese diabetic persons whose glycaemic control remained poor while on oral metformin therapy alone.

### *List of Abbreviations*

ADA	-	American Diabetes Association
BIAsp30	-	biphasic insulin aspart
IDF	-	International Diabetes Federation
MFBG	-	mean fasting blood glycaemia
MPPG	-	mean postprandial blood glycaemia

## REFERENCES

- (1) Glaser B., Cerasi E. Early intensive insulin treatment for induction of long-term glycaemic control in type 2 diabetes. *Diabetes Obes. Metab.* 1999; 1: 67-74.
- (2) Donath D.Y., Gross D.J., Cerasi E., Kaiser N. Hyperglycemia-induced beta cell apoptosis in pancreatic islets in Psammomys obesus during development of diabetes. *Diabetes* 1999; 48: 738-744.
- (3) Eizirik D.L., Korbitt O.S., Hellerstrom C. Prolonged exposure of human pancreatic islets to high glucose concentrations in vitro impairs the beta cell function. *J. Clin. Invest.* 1992; 90: 1263 - 1268
- (4) UK Prospective Diabetes Study (UKPDS) Group, Intensive blood – glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33 ). *Lancet* 1998; 12: 352
- (5) Stratton I.M., Adler A.I., Neil H.A. et al. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. *BMJ* 2000; 12: 356
- (6) UK Prospective Diabetes Study (UKPDS) Group: Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes. (UKPDS 38) *Br. Med. J.* 1998; 317: 703 –713
- (7) Lund S.S., Tarnow L., Nielsen B.B. and al. Effect of BIAsp 30 in combination with oral hypoglycaemic agents on glycaemic regulation in non obese patients with type 2 diabetes. European Association for the Study of Diabetes 42nd Annual Meeting, Copenhagen – Malmoe, September 2006.
- (8) Naiker P., Makan H.A., Omar M.A.K., Kedijang T., Kong L.L. and the BIAsp -1579 Study Group: Effect of biphasic insulin aspart 30/70 ( BIAsp30) in combination with metformin on glycaemic control in subjects with type 2 diabetes not optimally controlled on oral antidiabetic agents. European Association for the Study of Diabetes 42nd Annual Meeting, Copenhagen – Malmoe, September 2006.
- (9) Raskin P., Braceras R., Schwartz S., Chaykin L., Chu P.L., and Wynne A. Over 75% of patients with type 2 diabetes reached HbA1c less than 7% by adding biphasic insulin aspart 30 to optimized metformin and pioglitazone treatment. European Association for the Study of Diabetes 42nd Annual Meeting, Copenhagen – Malmoe, September 2006.