Effect of Glucagon Like Peptide 1 (GLP1) Analogues on Obese Egyptians With and Without Diabetes

KHALED A. ELBANA, M.D.

The Department of Internal Medicine, Faculty of Medicine, Zagazig University, Zagazig, Egypt

Abstract

Background: The Glucagon Like Peptide 1 (GLP1) receptor agonists are a new class for treatment of both type 2 diabetes and obesity.

Aim of Study: To evaluate efficacy of GLP1 analogues in both weight reduction and glycemic control in obese Egyptians with and without diabetes.

Patients and Methods: This intervention study was conducted from August 2017 to August 2018. Total of 40 patients were divided into 3 groups: Obese group, obese group with diabetes & obese group with diabetes after failure to lose 10% of their initial weight after bariatric surgery. Clinical data were collected, anthropometric measures and laboratory investigation included fasting blood glucose and HbA1c in the beginning and every 3 months for a year were done.

Results: This study showed statistically significant body weight and BMI reduction in all groups, there was statistically significant reduction of fasting blood glucose, and HbA1c in the 2nd & 3rd group.

Conclusion: GLP1 analogues are effective in treatment of obese patients with and without diabetes.

Key Words: GLP1 analogues – Type 2 diabetes – Obesity.

Introduction

MOST patients with type 2 diabetes are obese (diabesity) and this can explain the dramatic increase in the prevalence of type 2 diabetes last years. Insulin resistance may be the main link [1].

The Glucagon Like Peptide 1 (GLP1) receptor agonists are a new class of injectable drugs with double benefit as it can be used for treat both type 2 diabetes and obesity [2].

For this reasons, the aim of this research to evaluate the effect of GLP1 analogues on obese Egyptian patients with and without diabetes.

Correspondence to: Dr. Khaled A. Elbana, E-Mail: aboamro76@yahoo.com

Patients and Methods

This intervention non-randomized controlled study had been conducted in Internal Medicine Outpatient Clinic at Zagazig University Hospitals from August 2017 to August 2018. We started the study on 40 subjects; after exclusion of patients with diabetes mellitus type 1 or patients with family history of medullary thyroid carcinoma and patients suffering from gastroparesis. Their ages ranged from 30 to 65 years; with mean ± SD 48.6±9.6 years.

The patients divided into three groups:

• Group I: Obese group included 14 patients.

• Group II: Obese group with diabetes included 13 patients.

• Group III: Obese group with diabetes, after failure to lose 10% of their initial weight, 6 month after bariatric surgery included 13 patients.

Patients were subjected to thorough history taking and anthropometric measures were calculated including weight, BMI. Full clinical examination and routine investigations were done. Specific investigations included HbA1c, fasting blood glucose ethical.

Written informed consent was taken from the patient to participate in the study. Approval for performing the study was obtained from Internal Medicine and Medical Biochemistry Departments, Zagazig University Hospitals after taking Institutional Review Board (IRB) approval.

Statistical analysis:

Data analysis was performed using the software SPSS (Statistical Package for the Social Sciences) Version 20. Quantitative variables were described using their means and standard deviations. Cate-
orical variables were described using their absolute frequencies. Kolmo gorov-Smirnov (distribution-type) and Levene (homogeneity of variances) tests were used to verify assumptions for use in parametric tests. To compare means, independent sample t test was used when appropriate. Nonparametric test (Mann Whitney) was used to compare means when data was not normally distributed and to compare medians in categorical data. To assess the best cutoff for study variables, ROC curve analysis was used. The level statistical significance was set at 5% ($p<0.05$).

Results

This study included 40 patients divided into 3 groups, the 1st group was obese non diabetic consisted of 14 patients, 2nd group was obese diabetic and consisted of 13 patients and the 3rd group was obese diabetic who failed to lose 10% of their initial weight within 6 months after bariatric surgery and also consisted of 13 patients. In the three groups all variables were measured 4 times. 1st before using GLP-1 receptor agonist; subcutaneous injection of 3mg liraglutide and then every 3 months later for one year follow-up.

This table shows that there was statistically significant difference (reduction) in BMI between the four times in the three studied groups. But, there was no statistically significant difference between the studied groups in BMI in the four times.

### Table (2): Comparing serial fasting blood glucose measures between the studied groups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (14) Obese non diabetic</th>
<th>Group 2 (13) Obese diabetes</th>
<th>Group 3 (13) Obese diabetes after bariatric surgery</th>
<th>F-test</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Fasting Glucose</td>
<td>93.5±19.9 (76-154)</td>
<td>251.5±49.9 (174-310)</td>
<td>235.6±66.8 (98-370)</td>
<td>20.9</td>
<td>0.001 **</td>
</tr>
<tr>
<td>FBG 1st time</td>
<td>85.2±24.9 (76-115)</td>
<td>147±63.59 (98-240)</td>
<td>137±29.2 (76-190)</td>
<td>42.9</td>
<td>0.001 **</td>
</tr>
<tr>
<td>mean ± SD</td>
<td>85.2±26.2 (77-94)</td>
<td>119±126.2 (86-190)</td>
<td>124±16.6 (78-140)</td>
<td>20.8</td>
<td>0.001 **</td>
</tr>
<tr>
<td>FBG 3rd time</td>
<td>88.2±14.2 (70-129)</td>
<td>122±25.3 (90-201)</td>
<td>117±15.3 (74-135)</td>
<td>13.9</td>
<td>0.001 **</td>
</tr>
<tr>
<td>mean ± SD</td>
<td>86.2±11.3 (70-121)</td>
<td>118±20.1 (90-180)</td>
<td>100±1.02 (72-120)</td>
<td>11.2</td>
<td>0.001 **</td>
</tr>
<tr>
<td>ANOVA test for repeated measures</td>
<td>* $p$-value* 0.3</td>
<td>0.001 **</td>
<td>0.001 **</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**: Statistically highly significant difference ($p<0.001$).

This table shows that there was highly statistically significant difference between the three studied groups in FBG in the four times. Also, there was statistically significant difference in FBG between the four times in each of the three studied groups.

This table shows that there was statistically significant difference (reduction) in HBA1c between the four times in the three studied groups. But, there was no statistically significant difference between the studied groups in HBA1c in the four times.

### Table (3): Comparing serial HBA1c measures between the studied groups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (14) Obese non diabetic Mean ± SD</th>
<th>Group 2 (13) Obese diabetes Mean ± SD</th>
<th>Group 3 (13) Obese diabetes after bariatric surgery Mean ± SD</th>
<th>F-test</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>5.1±0.6 (4.2-6.3)</td>
<td>10.1±1.2 (8.1-12)</td>
<td>8.8±1.7 (4.9-12)</td>
<td>10.7</td>
<td>0.001 **</td>
</tr>
<tr>
<td>HBA1c 1st time</td>
<td>4.8±0.4 (4.2-5.9)</td>
<td>7.9±0.5 (7.9)</td>
<td>7.5±0.8 (5.2-8.3)</td>
<td>59.7</td>
<td>0.001 **</td>
</tr>
<tr>
<td>mean ± SD</td>
<td>4.9±0.4 (4.5-6.2)</td>
<td>7.4±0.3 (7.9)</td>
<td>7.2±0.6 (5.7-8)</td>
<td>101.5</td>
<td>0.001 **</td>
</tr>
<tr>
<td>HBA1c 3rd time</td>
<td>5.1±0.5 (4.5-6.5)</td>
<td>7.3±0.2 (7.8-13)</td>
<td>7.2±0.5 (5.2-7.8)</td>
<td>97.1</td>
<td>0.001 **</td>
</tr>
<tr>
<td>mean ± SD</td>
<td>4.9±0.3 (4.5-6.2)</td>
<td>6.6±0.5 (5.8-6.9)</td>
<td>6.7±0.6 (5.2-7.5)</td>
<td>95.1</td>
<td>0.001 **</td>
</tr>
<tr>
<td>ANOVA test for repeated measures</td>
<td>* $p$-value* 0.6</td>
<td>0.001 **</td>
<td>0.001 **</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**: Statistically highly significant difference ($p<0.001$).

*: Statistically significant difference ($p<0.05$).

$p$-value* = For comparing the 3 groups.

$p$-value* = For comparing repeated BMI in each group.
This table shows that there was highly statistically significant difference between the studied groups in \( \text{HBA}_{1c} \) in the four times. Also, there was statistically significant difference between the four times in the 2nd and 3rd studied groups but not statistically significant in the 1st group.

**Discussion**

Obesity is one of the most important public health issue worldwide [3].

The Glucagon Like Peptide 1 (GLP1) receptor agonists are a new class of injected drugs for the treatment of both type 2 diabetes and obesity, they are associated with considerable \( \text{HBA}_{1c} \) reduction and weight loss with a low risk of hypoglycemia [2].

Therefore, the present study was designed to estimate the role of GLP1 analogues in obese patients with and without diabetes including patients who failed to lose weight after bariatric surgery.

We found statistically significant reduction in weight, BMI in all studied groups in every 3 months evaluation for one year. But, there was no statistically significant difference between the studied groups in BMI in the four times, which means reflect the efficacy of GLP1 analogues in obese patient either with diabetes or without even after failure to lose weight after bariatric surgery.

This in in agreement with previous study showed that weight loss with liraglutide which is dose dependent to 3.0mg once daily in obese subjects without diabetes in comparison to placebo or orlistat [4].

Also, in agreement with our results, study evaluated the efficacy of liraglutide in patients with prior bariatric surgery who experienced either suboptimal weight loss or weight regain after their procedures with recommended dose 0.6mg SC once daily increasing to maximal dose of 3mg/day and after 3 months of follow-up, mean weight and BMI reduction were 8.38±9.19Kg and 2.94±3.14 Kg/m respectively [5].

Similarly significant body weight reductions in patients randomized to 3mg liraglutide when compared with placebo at 56 weeks alongside increased 5% and 10% responder rates [6].

Interestingly, supraphysiological doses of GLP-1 reduce appetite and food intake in both lean and obese subjects, physiological GLP-1 doses reduces appetite and food intake in only lean subjects [7]. GLP-1 has been found to delay gastric emptying in healthy lean, obese and T2DM subjects [8].

In the present study, there was statistically significant reduction in FBG and \( \text{HBA}_{1c} \) in patient with diabetes (2nd and 3rd groups). This may be explained by body weight reduction in agreement with recent clinical trial showed that about 50% of patients with T2DM achieved remission to non-diabetic state after weight loss and this may be associated with the early and sustained improvement of beta cells function [9].

In obese patients with T2DM even modest weight loss have been shown to improve glycemic control and patients who lose weight achieve target HbA1c more likely those with stable weight [10].

We can conclude that GLP1 receptor agonists are effective tool in both glycemic control and weight reduction even in patients who failed to lose weight after bariatric surgery.

**Acknowledgements:**

We thank all the individuals share in this study.

**Conflicts of interest:**

The authors declare that they have no competing interests.

**References**


3208 Effect of GLP1 Analogues on Obese Egyptians With & Without Diabetes


تأثير محفزات مستقبلات الببتيد شبيه الجلوكاجون
على مرضى السمنة المصريين المصابين وغير المصابين بالسكرى

السمنة هي حالة ضارة تترافق فيها الدهون الزائدة في الجسم إلى حد يقلقه لتأثير سلبي على الصحة، وعادة ما يعتبر الناس بنينيين عندما يزيد مؤشر كتلة الجسم لديهم عن 30 كجم/م².

إن محفزات مستقبلات الببتيد شبيه الجلوكاجون في فئة جديدة من الأدوية التي تعالج الدهون الزائدة ومرضى السكري من النوع الثاني تقدم بزيادة تأثير هورمون انكريفين وخفض الإفرازات الأنسولينية، وتبني حركة المعدة وتحفز الشبع مما يؤدي إلى إنقاص الوزن وانخفاض مستوي الهيمولوجين السكري.

الهدف من الدراسة هو دراسة تأثير محفزات مستقبلات الببتيد شبيه الجلوكاجون على مرضى السمنة المصريين المصابين وغير المصابين بالسكرى من تناول الأدوية على الوزن ومستوي الجلوكوز بالدم والهيمولوجين السكري.


اشتركل في الدراسة 20 شخص تم تقسيمهم كالتالي:
1- 14 شخص يعانون من السمنة.
2- 12 شخص يعانون من السمنة والسكري.
3- 13 شخص يعانون من السمنة والسكري بعد فشل إنقاص 10% من وزنهم بعد 6 شهور من إجراء جراحة لعلاج السمنة.

تم أخذ التاريخ المرضي والفحص السريري الشامل للمريض في المجموعات الثلاث.

تم عمل متابعة لكل ثلاثة أشهر لجميع المرضى لمتابعة الوزن ومستوي الجلوكوز بالدم والهيمولوجين السكري.

النتائج: تمت اجراء محفزات مستقبلات الببتيد شبيه الجلوكاجون بشكل فعال في إنقاص الوزن في مرضى السمنة وخفض مستوي الجلوكوز بالدم وتبني مستوي الهيمولوجين السكري في مرضى السكري من النوع الثاني.

الوصول: يوصى بإستخدام محفزات مستقبلات الببتيد شبيه الجلوكاجون في مرضى السمنة كما يوصى بإستخدام هذه الأدوية في مرضى السكري من النوع الثاني المصابين بالسمنة.