

**TACHYCARDIA, DIABETES, AND ILLNESS PSYCHOLOGY INTERPLAY AT THE EDGE: A CASE REPORT.**

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**Abstract**

We present here a case of a 54 years old woman diagnosed previously by persistent tachycardia and type-II diabetes mellitus. She was brought to our clinic suffering a critical hypoglycemia. Intensive care and a personalized study of the case parameters and subsequently a management of her case were provided successfully and uncommon biochemical interactions were observed. A systematic analysis revealed that psychology-induced low calorie intake and an uncommon severe metformin-propranolol synergistic interaction were the reasons.

**Keywords:** hypoglycemia, metformin, propranolol, low calorie diet, psychology.

**Introduction**

Type-II diabetes mellitus (DM-II) is increasing noticeably in parallel with the modern day's lifestyle and is becoming a suspect disease among the over-weight individuals. However, it might be successfully delayed, avoided, or reversed by a proper diet and physical activities program. On the other hand, upon failure to maintain normal blood glucose levels one medication or more, depending on the case, becomes mandatory to avoid the harmful or even the fatal consequences. Metformin alone or combined with other drug is a popular medication for this purpose [1]. The details of the present case of metformin therapy are unique to our clinic, and to best of our knowledge, are new to the literature.

**Case Presentation:**

A 54 years old post-menopause obese woman (159 cm height weighing 84 kg) was brought in the morning (around 09:30 AM) to our comprehensive health care center by her husband and son. Her husband informed us that she took her medications (metformin and propranolol) and while she was taking care of the in-house matters the symptoms started. When she was presented to the clinic she was very weak, sweating but slightly cold, and not able to communicate positively. Her primary vital signs were taken immediately and they were as the following. The blood pressure (BP): 115/76, the heart rate (HR): 63, the body temperature (BT): 35.3 °C, the respiratory rate (RR): 12, the blood oxygen saturation was 99% in open air. The finger stick blood glucose level was 51 mg/dl, which confirmed that she was suffering a critical stage of hypoglycemia. After collecting blood samples, 50

ml of 50% dextrose was administered intravenously and slowly. She had diabetic glycosylated (glycated) hemoglobin test result (HbA1c= 7.3%) while the other laboratory results were normal. After gaining better condition and awareness she illustrated that she had similar but milder symptoms every day in the last ten days.

**Management and Discussion:**

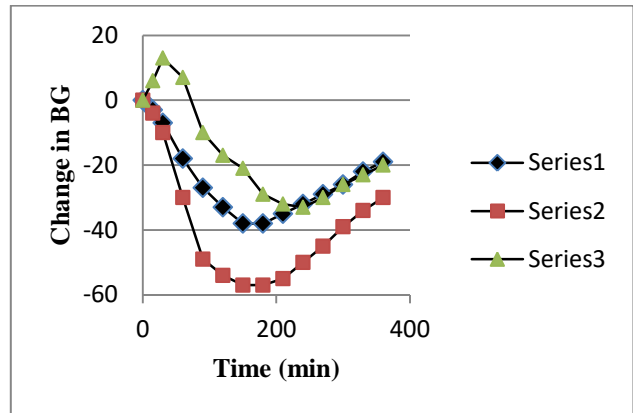
We investigated three axes of her case; the details of her medical history, her psychology, and her medications. About 3 years ago the patient had persistent increase in her heart beats (110-120/min). Since that time and on a regular daily basis she took propranolol (40 mg two times/day; one in the morning and one in the evening, nearly 12 hours apart). She did not report any complains to her physician about the medication. About one year ago, she had high glycosylated (glycated) hemoglobin test result (HbA1c= 10.2%) and complained about blurred vision and coldness in her hands and legs. Her physician evaluated her case and diagnosed her by type-II diabetes mellitus (DM-II) and since that time she was put on metformin (two 850 mg tablets per day, normal release). The patient used to take one tablet of metformin (850mg) and one tablet of propranolol (40 mg) after the morning and the evening meals.

The qualitative psychological evaluation revealed the following. As she was diagnosed by DM-II, her physician recommended decreasing the carbohydrates and the fat in her food. Also, she mentioned that there was a death case among her close relatives due to complications of uncontrolled DM-II. It seemed that propranolol was not good enough as an anxiolytic and all this caused a psychological shock and independent act; her fears pushed

her gradually to decrease her food content of sweets, bread, rice, potato, and all kinds of fat and she converted the evening meal to, mainly, vegetables (This attitude is noticeable among DM-II patients attending the clinic). After we consulted a nutrition specialist, it appeared that the daily intake at least in the last ten days before the incidence did not exceed 700 kcal.

In the morning of the second day (FBG= 142 mg/dl; after 12-hours fasting), the patient was given crushed 500 mg of metformin and after 6 hours 40 mg of propranolol with a balanced meal (250 kcal of the biscuits, nearly 250 kcal of proteins (canned tuna in brine), vegetables (sliced tomato; 50g including the juice). In the morning of the third day (FBG= 142 mg/dl; after 12-hours fasting), the patient was given crushed 500 mg of metformin and crushed 40 mg of propranolol and then after 6 hours the meal. In the morning of the fourth day (FBG= 147 mg/dl; after 12-hours fasting), the patient was given crushed 500 mg of metformin, crushed 40 mg of propranolol, and the meal. We recorded the change in the blood glucose level over a period of 6 hours while the patient was laying down as the following: the zero-time value, after 15 min, after 30 min, then every 30 min over period of six hours. Qualitatively, the graph (Figure 1) illustrates that propranolol had two effects. It increased the glucose-lowering effect of metformin which consequently resulted in a significant decrease in the fasting blood glucose value (synergistic effect). Also, it appears that propranolol increased the life time of metformin in the plasma. There are several examples in the literature that support this finding [2-6].

In order to exploit the case further, the patient was asked to take three measured balanced meals (designed by a paid specialized nutritionist to be approximately 500 kcal each with a wider range of alternative choices), to change the original metformin dose (850 mg two times/day) to 500 mg (three times/day; 1 tablet 500 mg every six hours with the meal), and to take the same propranolol dose (40 mg two times/day; one in the morning and one after 12 hours). Over a period of one week of monitoring, the patient did not complain of the previously experienced symptoms and she was feeling better. The fasting blood glucose readings were acceptable which after all proved that the metformin-propranolol synergistic interaction can cause a severe hypoglycemia in presence of low calorie diet even without excessive physical activities. Upon her request, a follow up of her case for another nine months confirmed that she complied with the recommended regimen. There was a gradual improvement in the HbA1c data (measured every three months); 7.0, 6.8, and 6.6%.



**Figure 1:** The graph presents the relationship between the time (minutes; min) and the change in the blood glucose level (BG; mg/dl). Metformin (500 mg) (series 1; the second day after the incidence). Metformin (500 mg) and propranolol (40 mg) (series 2; the third day after the incidence). Metformin (500 mg), propranolol (40 mg), and the 500 kcal meal (series 3; the fourth day after the incidence).

#### Conclusion:

The illness psychology can be as important as the medication therefore we urge to establish realistic, effective, and systematic parallel health care programs especially in the developing countries where this side is nearly absent.

#### Patient consent:

A verbal and a written patient's consent were obtained to publish her data.

#### Learning points:

- Seemingly valueless drug-drug interference could be harmful or even fatal.
- Patient psychology might be as valuable as the medication.
- In general, adjunct psychological-medical health caring would be more effective.

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