



## SOMOGYI EFFECT IN TYPE 2 DIABETES MELLITUS: A CASE REPORT

**N.S.Neki<sup>\*1</sup>, Ankur Jain<sup>2</sup>, Rohit Bajaj<sup>2</sup>, Mohit Manav<sup>2</sup> Jasbir Kumar<sup>3</sup> Avtar Singh Dhanju<sup>4</sup> and Nehal Minda<sup>5</sup>**

<sup>1</sup>Professor, Department of Medicine, Govt. Medical College, Amritsar 143001 (India).

<sup>2</sup>Junior Resident, Department of Medicine, Govt. Medical College, Amritsar 143001 (India).

<sup>3</sup>Associate Professor, Department of Medicine, Govt. Medical College, Amritsar 143001 (India).

<sup>4</sup>Assistant Professor, Department of Medicine, Govt. Medical College, Amritsar 143001 (India).

<sup>5</sup>Medical Intern, Geetanjali Medical College and Hospital, Udaipur Rajasthan—313001.

**\*Correspondence for Author: Prof N.S.Neki**

Professor, Department of Medicine, Govt. Medical College, Amritsar 143001 (India).

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### ABSTRACT

Somogyi effect occurs in insulin users. It is characterised by insulin induced hypoglycaemia and rebound insulin resistant hyperglycemia occurring in a person taking insulin but misses regular bedtime snacks. Ultimately blood sugar levels fall during night. In response to this many body hormones raise the blood sugar levels. Dawn phenomenon is more encountered than Somogyi effect. To diagnose these effects, early morning (2-5 am) plasma glucose levels should be measured or advocate use of continuous blood glucose monitoring system.

**KEYWORDS:** Somogyi effect; Rebound insulin resistant hyperglycemia; Dawn phenomenon.

### INTRODUCTION

Morning hyperglycemia in type 2 diabetes mellitus patient can occur due to Dawn phenomenon or Somogyi effect or as a result of uncontrolled blood sugar levels. Dawn phenomenon is characterised by morning hyperglycemia induced by release of excess hormones like growth hormone, cortisol and catecholamine.

Insulin induced posthypoglycemic-hyperglycemia is an important cause of poor glycemic control.<sup>[1]</sup> This phenomenon is termed as Somogyi effect which is characterised by insulin induced hypoglycaemia, in response to glycogen release. As a result of this there occurs wide fluctuations in blood glucose levels, which are unrelated to dietary intake and thus blood sugar levels fall during the night with development of nocturnal sweating and nightmares.

### CASE REPORT

A 45 years old obese male patient known case of type 2 diabetes mellitus since 2 years on insulin mixtard (30/70) presented with fasting hyperglycemia (FBG-260 mg/dl) and generalized muscle weakness. On examination, he was conscious, BMI-27kg/m<sup>2</sup>, pulse rate 90/mm, BP 130/90 mmHg. Examination of central nervous system, gastrointestinal and cardiovascular system was non contributory. He had no family history of diabetes.

Laboratory investigations revealed haemoglobin 11.2 g/dl with normal renal, lipid and hepatic profile.HBA<sub>1C</sub>

was 8.4%. He was taking mixtard insulin (30/70) 16 units before breakfast and 16 units before dinner as prescribed by a local practitioner. As his blood sugar could not be controlled, the practitioner increased the dose to 25 units before breakfast and 25 units before dinner. Following this he came to us with complaints of night sweats and night mares since 2 weeks and generalized weakness during evening hours. He was advised for self monitoring of blood glucose (with glucometer) 5 times daily for next three days at 7 am (fasting), 1 pm, 8 pm (before dinner) 10 pm (before going to bed) and 2 am (next day). Various findings of blood sugar measured in mg/dl were as follows:-

	7 am	1 pm	8 pm	10 pm	2 am
Monday	262	127	147	124	65
Tuesday	276	132	150	128	69
Wednesday	270	130	152	129	64

The above table shows development of hypoglycaemia after midnight and early morning rebound hyperglycemia. This documented Somogyi effect. Accordingly his treatment plan was modified. Mixtard insulin (30/70) was stopped and he was put on insulin glargin (Lantus), 18 units daily at 8 am, along with 500 mg metformin twice daily in between food. He was advised to take small snack before going to bed. After 3 days of this treatment, his fasting blood sugar(270 mgf/dl) came down to 158 mg/dl and his 2 am blood

sugar was 145 mg/dl. There was clinical improvement in the disappearance of night sweats and night mares.

## DISCUSSION

The phenomenon of Somogyi effect was described by Somogyi and Kirstein.<sup>[2]</sup> Other workers also confirmed this phenomenon in their studies.<sup>[3,4]</sup> Its prevalence is about 12.6%.<sup>[5]</sup> But in our clinical settings these cases often go undetected, which may be due to unawareness of this phenomena on the part of practitioners. For this high index of suspicion is needed in these patients reporting high fasting blood sugar levels inspite of increasing night dose of insulin. This phenomenon can be detected by continuous glucose monitoring (CGM) system with a device which can measure blood sugar levels every 5 minutes both day and night and FDA has approved it. Even these cases can be detected by self monitoring of blood glucose by a glucometer 5 times daily including one sample between 2-3 am in the morning. Use of long acting insulin like glargine instead of NPH can decrease the episode of nocturnal hypoglycaemia. Some clinicians recommended use of short acting insulin like lispro at night to manage such cases.

But better results are achieved with injection glargine given between 7-9 am in the morning. A small snack just before going to bed is also helpful to overcome this phenomenon. The best option these days is continuous insulin delivery by insulin pump.

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