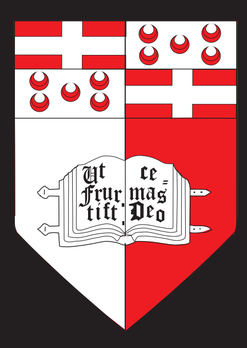
CHRONOPHARMACOLOGY AND THE MANAGEMENT OF TYPE I DIABETES MELLITUS

Michelle Cole, Lilian M. Azzopardi, Anthony Serracino-Inglott

Department of Pharmacy, Faculty of Medicine and Surgery, University of Malta, Msida, MALTA
lilian.m.azzopardi@um.edu.mt



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INTRODUCTION

In the management of diabetes, the target is to maintain the patient in normoglycaemia. Chronopharmacological aspects are highly relevant in the management of diabetes mellitus since time of day, patient activities and timing of medication may impact on the risk of occurrence of peaks and troughs in blood glucose levels.[1,2]

AIM

To compare the occurrence and mean duration in hours of nocturnal hypoglycaemia and normoglycaemia between conventional insulins and insulin analogues

METHOD

- 23 type 1 diabetic patients (9 males, 14 females) aged over 18 years of age (mean 32 years, range 18-64 years) participated in the study. The study was approved by the University of Malta Research and Ethics Committee.
- The Continuous Glucose Monitoring System (CGMS) was used, where the device was used in each patient and all patients were continuously monitored for 72 hours.
- During the monitoring period with the CGMS, patients were provided with a 72-hour diary to record daily events such as food consumed, exercise performed and amount and time of insulin administered.
- Patients were asked to take 4 daily self-blood glucose monitoring readings every day during the three days of monitoring.
- Data was downloaded from the CGMS to a computer and analysed using SPSS. The paired sample t-test was used to compare means.

Setting

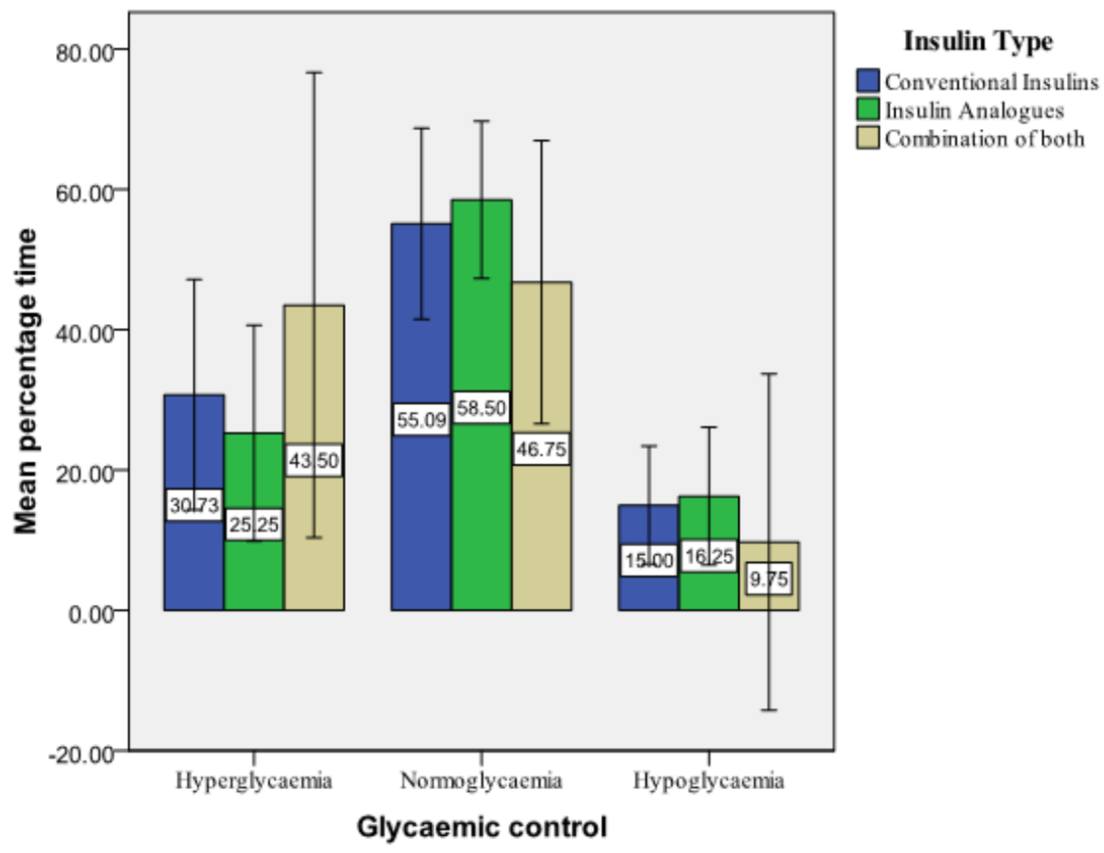
Patients were recruited from the Diabetes and Endocrine Clinic at Mater Dei Hospital. The sensor insertion was undertaken using the Sen-serter device and was performed by a diabetologist at the Clinic. The sensor was removed by a nurse at the Clinic. Patients were provided with shower packs to proctect the CGMS monitor during showering. Patients were monitored by the investigator (MC).

Sensor insertion using the Sen-Serter device

RESULTS

- Insulin used: 11 patients were using conventional insulins, 8 patients were receiving insulin analogues and 4 patients were on a combination of both types of insulin.
- The mean time of diagnosis of diabetes was 18 years (range 3-37 years).
- The mean CGMS reading was 7.5 mmol/L and the mean blood glucose reading obtained through the self-blood glucose monitoring was 7.6 mmol/L indicating a very high correlation (p value 0.898)

Figure 1: Mean % time spent in hyper-, normo- and hypoglycaemia (n=23)



The mean % spent in normoglycaemia (3.9-10 mmol/L) was highest for patients receiving insulin analogues (58.5%). Patients receiving a combination of the two types of insulin scored the lowest mean % time of normoglycaemia.

	Only during` 1 night	During more than 1 night	Mean duration (hours)
Conventional (n=11)	3	4	4.42
Analogues (n=8)	3	2	2.38
Combination (n=4)	1	1	6.33

Table 1: Number of patients experiencing nocturnal hypoglycaemic events (<3.9 mmol/l) and mean duration of nocturnal hypoglycaemia

CONCLUSION

The chronopharmacological aspects of daily events and the insulin type were recorded in this study and it was shown that patients receiving insulin analogues as a single insulin treatment achieved higher periods of normoglycaemia and had a lower risk of nocturnal hypoglycaemia.

References

1. Turkoski BB. Medication timing for elderly: The impact of biorythms on effectiveness. Geriatric Nursing 1998; 19: 146.
2. Azzopardi LM, Bonnici M, Wirth F, Zarb Adami M, Serracino-Inglott A. Chronopharmacology in diabetes. conference proceedings, ESCP Annual Conference, Dubrovnik, October 2008.