

Managing Diabetes during the Muslim fasting month of Ramadan

M Velayudhan

International Medical University, 12, Jalan Indah, Taman Sri Kenangan, Batu Pahat, Johor 83000 Malaysia

SUMMARY

Target blood sugar levels in diabetes are achieved through manipulation of diet, exercise and medication. A change in any one of these three things can skew blood sugar levels and create complications associated with hyperglycemia or hypoglycemia. Fasting during the month of Ramadan is a religious activity that devout Muslims practice whether they are diabetic or not. Since such fasting involves abstinence from food and water for twelve hours or more during the day from dawn to dusk, it is evident that advice regarding exercise and medication will have to be modified during this period.

INTRODUCTION

Target blood sugar levels in diabetes are achieved through manipulation of diet, exercise and medication. A change in any one of these three things can skew blood sugar levels and create complications associated with hyperglycemia or hypoglycemia. Fasting during the month of Ramadan is a religious activity that devout Muslims practice whether they are diabetic or not. Since such fasting involves abstinence from food and water for twelve hours or more during the day from dawn to dusk, it is evident that advice regarding exercise and medication will have to be modified appropriately during this period. There is ample evidence that it is safe for well controlled diabetics to fast during the month of Ramadan^{1,2}. This paper will look at some of the published evidence on the way glucose-lowering medication can be used for managing diabetic patients during the fasting month.

PATIENTS WITH TYPE 1 DIABETES

Patients with type 1 diabetes need both prandial insulin and basal insulin. Prandial insulin is short acting insulin given before intake of food while basal insulin is long acting (or intermediate acting) insulin given to control glucose output from the liver. Good control of plasma glucose for patients with type 1 diabetes will usually require at least three insulin injections per day to control the glucose surge from the three main meals of the day plus one or two injections of basal insulin per day. When these patients fast from dawn to dusk, they will consume only two main meals per day – the predawn meal and the sunset meal. A review of five clinical trials on patients with Type 1 diabetes who fasted during Ramadan was published in *Clinical Therapeutics*³ in 2008. There are a number of different strategies that can be used for administration of insulin during Ramadan. Two such strategies, based on this article, are outlined below.

Strategy 1: Use only 70 percent of previous insulin dose and divide it into basal and prandial insulin in a ratio of 60:40.

Example: If the patient has been on a total insulin dose of 80 units per day before fasting, use only 56 units (70 percent of it) per day during the fasting month. Give 34 units (approximately 60 percent) as long acting insulin once a day in the evening before the sunset meal (Iftar). The balance of 22 units (40 percent) should be given as short acting insulin in two equally divided doses, one before the pre-dawn meal (Suhur) and the other before the meal taken at sunset (Iftar). The authors of this article recommend the long acting insulin analogue glargine and the short acting insulin analogue lispro or aspart for this strategy.

Strategy 2: Omit the afternoon dose of insulin and invert the morning and evening doses so that the morning dose is given in the evening and the fifty percent of the evening dose is given in the morning.

Example: If the patient has been on a total insulin dose of 80 units per day (for example, premixed insulin morning 40 units, regular insulin noon 10 units and premixed insulin evening 30 units) before fasting, give premixed insulin 40 units before the sunset meal (Iftar) and premixed insulin 15 units (fifty percent of the evening dose) before the dawn meal (Suhur).

PATIENTS WITH TYPE 2 DIABETES

Patients with type 2 diabetes may be on oral hypoglycemic agents alone or may use a combination of oral agents and insulin.

Diabetic patients, who are managed only on oral hypoglycemic agents, can continue their medication with appropriate dose adjustments, during fasting. Mafauzy, M. *et al*⁴, had published a study involving Muslim patients on oral hypoglycemic drugs who fasted during Ramadan. Their conclusion was that fasting was safe for diabetic patients on oral hypoglycemic agents when doses were appropriately reduced. Another study⁵ which compared a short acting oral agent (repaglinide), a long acting oral agent (glimepiride) and a long acting insulin analogue (glargine) found that all three types of medication were equally effective for diabetic patients who fasted. Glibenclamide, a commonly used glucose-lowering drug which is cheap and effective, has, like glimepiride, a long duration of action. When used during the fasting month, glibenclamide has been found to be associated with a greater incidence of hypoglycemia when compared to

This article was accepted: 20 February 2012

Corresponding Author: Velayudhan Menon, International Medical University, 12, Jalan Indah, Taman Sri Kenangan, Batu Pahat, Johor 83000 Malaysia
Email: velamenon@gmail.com

an oral short acting agent⁶. However, another study⁷ did not find the same increased risk of hypoglycemia with glibenclamide and has suggested that it can be safe to use during Ramadan. It will be prudent, however, to assume that long acting oral hypoglycemic agents must be used more cautiously than their short acting counterparts during the fasting month.

There are glucose-lowering agents that have little or no risk of hypoglycemia. These have been studied for efficacy and safety during the fasting month. Pioglitazone, a thiazolidinedione, was studied in a trial where it was combined with lower-than-usual doses of oral sulphonylureas. This study⁸ however found that, contrary to expectations, Pioglitazone did not reduce the frequency of hypoglycemic events during Ramadan. Hence there does not seem to be a role for Pioglitazone as add on therapy during fasting.

Incretin mimetics (like exenatide and liraglutide) and dipeptidyl dipeptidase-4 inhibitors (DPP-4 inhibitors like sitagliptine and vildagliptine) are newer glucose lowering drugs that have a negligible risk of hypoglycemia. While the efficacy of incretin mimetics have not been studied during Ramadan, Ahmed M.H. et al, have quoted a study (9) on the use of Vildagliptine with Metformin during Ramadan. The study found that Vildagliptine was as effective as Gliclazide in controlling plasma glucose while being much safer in avoiding hypoglycemic episodes.

When Type 2 diabetics who are on both oral hypoglycemic agents and insulin undergo fasting during Ramadan, it may be prudent to initially stop the insulin while continuing the oral hypoglycemic drugs with appropriate dose adjustments. Monitoring of the plasma glucose before Suhur (the pre-dawn meal) and before Iftar (the meal at sunset) will help the doctor decide if basal insulin is needed or not.

Studies have also looked at the preferred type of insulin during the fasting month. A study which looked at premixed insulin analogues versus premixed human insulin (10) noted that premixed insulin analogues were a better therapeutic option during the fasting month of Ramadan.

CONCLUSION

Ensuring good control of plasma glucose during the fasting month of Ramadan is a challenge for both physicians and patients. Severe hypoglycemic episodes have been documented (11) to be more common during Ramadan in countries with large Muslim populations. Hence doctors must follow certain general principles while prescribing glucose lowering medication during this period. First, reduce the total

dose of medication during the fasting month. About 70 percent of the previous dose should be appropriate for both insulin and oral hypoglycemic agents. Second, medication must be given only twice daily with a larger fraction being given with the evening meal (Iftar) and a smaller fraction before the predawn meal (Suhur). Along with these changes in medication, it is important that doctors educate their patients about how their plasma glucose depends on the relationship between food intake and glucose lowering medication; patients should also be told of the need to monitor their plasma glucose on a regular basis throughout the fasting month.

REFERENCES

1. Katibi IA, Akande AA, Bojuwoye BJ, Okesina AB. Blood sugar control among fasting Muslims with type 2 diabetes mellitus in Ilorin. *Niger J. Med.* 2001 Jul-Sep; 10(3):132-4. (<http://www.ncbi.nlm.nih.gov/pubmed/11806014>)
2. Khatib FA, Shafagoj YA. Metabolic alterations as a result of Ramadan fasting in non-insulin-dependent diabetes mellitus patients in relation to food intake. *Saudi Med J.* 2004 Dec; 25(12):1858-63. (<http://www.ncbi.nlm.nih.gov/pubmed/15711655>)
3. Kobeissy A, Zantout MS, Azar ST. Suggested insulin regimens for patients with type 1 diabetes mellitus who wish to fast during the month of Ramadan. *Clin Ther.* 2008 Aug; 30(8):1408-15. (<http://www.ncbi.nlm.nih.gov/pubmed/18803984>)
4. Mafauzy M, Wan Mohammed WB, Yasmin Anum MY *et al.* A study of fasting diabetic patients during the month of Ramadan. *Medical Journal of Malaysia.* 1990; 45(1): 14-17. (<http://www.cabdirect.org/abstracts/19931466223.html;jsessionid=C743263ACFC93CA334037761C2EA580C>)
5. Mustafa Cesura, Demet Corapcioglu, Alptekin Gursoy *et al.* A comparison of glyemic effects of glimepiride, repaglinide, and insulin glargine in type 2 diabetes mellitus during Ramadan fasting. *Diabetes Research and Clinical Practice.* 2007 Feb; 75(2): 141-147 (<http://www.sciencedirect.com/science/article/pii/S0168822706002294>)
6. M Mafauzy. Repaglinide versus glibenclamide treatment of Type 2 diabetes during Ramadan fasting. *Diabetes Research and Clinical Practice.* 2002 Oct; 58(1): 45-53 (<http://www.sciencedirect.com/science/article/pii/S0168822702001043>)
7. J Belkadir, H el Ghomari, N Klöcker, et al. Muslims with non-insulin dependent diabetes fasting during Ramadan: treatment with glibenclamide. *BMJ.* 1993 July; 307: 292. (<http://www.bmj.com/content/307/6899/292.abstract>)
8. Senthil Vasana et al. A double-blind randomized multicentre study evaluating the effects of pioglitazone in fasting Muslim subjects during Ramadan. *Int. J. Diab Dev Ctries.* 2006 June; 26(2). (http://rssi.in/diabetesbulletin/2006/april/IntJDiabDevCtries26270-2680438_072644.pdf)
9. Ahmed MH, Abdu TA. Diabetes and Ramadan: An update on use of glyemic therapies during fasting. *Ann Saudi Med* 2011; 31:402-6
10. V Mattooa, Z. Milicevic, J. K. Malone, et al. A comparison of insulin lispro Mix25™ and human insulin 30/70 in the treatment of type 2 diabetes during Ramadan. *Diabetes Research and Clinical Practice.* 2003 Feb; 59(2):137-143 (<http://www.sciencedirect.com/science/article/pii/S0168822702002024>)
11. Ibrahim Salti *et al.* A Population-Based Study of Diabetes and Its Characteristics During the Fasting Month of Ramadan in 13 Countries: Results of the Epidemiology of Diabetes and Ramadan (EPIDIAR) study. *Diabetes Care.* 2004 Oct; 27(10): 2306-2311 (<http://care.diabetesjournals.org/content/27/10/2306.short>)

Managing Diabetes during the Muslim fasting month of Ramadan CME questions

1. **Which of the following glucose-lowering medications is best avoided during the fasting month of Ramadan?**
 - a. Metformin
 - b. Short acting sulphonylureas
 - c. Long acting sulphonylureas
 - d. Human insulin
 - e. Insulin analogues
 - f. DPP-4 inhibitors.

2. **A patient with Type 2 diabetes is on Tab Metformin 1gram BD and Injection Mixtard insulin 20 units in the morning and 10 units in the evening. His diabetic control is good. When this patient begins to fast during Ramadan, what will you advise him regarding his insulin?**
 - a. Stop the insulin
 - b. Reduce the total dose of insulin and give it twice a day with the larger portion being given before the evening meal.
 - c. Stop the Metformin but continue the insulin in the same dosage as before
 - d. Change Mixtard insulin to short acting Actrapid insulin and give it twice a day before food in the morning and evening.

3. **A patient with Type 1 diabetes is on Injection Glargine once a day before breakfast and Injection Actrapid insulin three times a day before meals. Which of the following are appropriate changes to be made in her insulin regimen when she begins to fast during Ramadan? (There may be more than one correct answer).**
 - a. Give a reduced dose of Glargine injection in the morning
 - b. Reduce the dosage of all three Actrapid injections
 - c. Reduce the dose of Glargine injection and give it before the evening meal.
 - d. Omit the noon injection of Actrapid and reduce the doses of Actapid injections in the morning and evening.