

Original article

Metabolic Profile in Type 2 Diabetes before and after Ramadan Fasting: A Study of 56 Outpatients in N'Djamena

Profil métabolique des diabétiques de type 2 avant et après le jeûne de Ramadan : A propos de 56 patients suivis à N'Djaména

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SUMMARY

OBJECTIVES: To report the preliminary results of an evaluation of the effects of Ramadan fasting on the metabolic profile of type 2 diabetic patients followed in Ndjamen.

PATIENTS AND METHODS: Prospective observational and analytical study, involving Chadian diabetic type 2 followed as outpatients in the outpatient consultation of Endocrinology - Diabetology department of the National General Reference Hospital (HGRN). They had a clinical evaluation and metabolic profile (glycemic parameters and lipid profile) before and after Ramadan fasting.

RESULTS: There were 56 patients (33 male and 23 female). The mean age was 50 years. 73.2 % were taking monotherapy (sulphonylurea or biguanide), 19.6 % combination therapy (metformin + sulfonylurea) and 7.1% were only on lifestyle and dietary measures. The mean blood glucose dropped from 1.55 +/- 1.01 to 1.43 +/- 0.44 (p < 0.000), while glycated hemoglobin values increased from 7.2 +/- 1.4 to 7, 7 +/- 0.9 (p < 0.000). The mean triglyceride levels increased from 1.2 +/- 0.6 to 1.6 +/- 0.5 g / l (p < 0.000). 3 patients (5.3%) stopped Ramadan fasting prematurely because of hypoglycemia. They were taking glibenclamide.

CONCLUSION: In Chadian outpatients with type 2 diabetes, observed metabolic findings during fasting of Ramadan are an increase in glycated hemoglobin and triglycerides. It is mostly evident among elderly people, and those whose only treatment is lifestyle and dietary measures. Most patients were able to fast without acute metabolic accidents, but, 5.3% were not able to complete their fasting, because of hypoglycemia

KEYWORDS: Diabetes Type 2, Ramadan, HbA1C, lipids, N'Djamena (Chad)

RÉSUMÉ

OBJECTIF. Les auteurs rapportent les résultats préliminaires d'une évaluation des effets du jeûne de Ramadan sur le profil métabolique de diabétiques de type 2 suivis en consultation spécialisée à N'Djaména.

PATIENTS ET MÉTHODES. Étude prospective et analytique d'observation étalée sur 03 mois, portant sur 56 diabétiques de type 2 suivis en ambulatoire dans l'unité d'endocrinologie de l'Hôpital Général de référence de Ndjamen. Elle a consisté en une évaluation clinique et biologique, avant et après le Ramadan.

RÉSULTATS. Il y avait 56 patients, dont 33 hommes et 23 femmes. L'âge moyen était de 50 ans. Parmi ces patients 73,2% étaient sous monothérapie (sulfamide ou biguanide), 19,6% sous bithérapie (metformine + sulfamide) et 7,1% sous régime hygiéno- diététique. Les moyennes glycémiques variaient de 1,55 +/- 1,01 à 1,43 +/- 0,44 (p < 0,000), tandis que celles d'HbA1c étaient de 7,2 +/- 1,4 et 7,7 +/- 0,9 (p < 0,000) avant et après le Ramadan. Le taux moyen des triglycérides variait de 1,2 +/- 0,6 à 1,6 +/- 0,5g/l (p < 0,000). 3 patients (5,3%) ont arrêté le Ramadan avant son terme à cause d'une hypoglycémie. Tous les trois étaient sous Glibenclamide.

CONCLUSION. Chez les diabétiques tchadiens, les troubles métaboliques au cours du jeûne de Ramadan étaient marqués par l'augmentation du taux d'hémoglobine glyquée et des triglycérides. Ceux ci pouvaient être minimisés par un bon équilibre avant le Ramadan, surtout chez les personnes âgées. Pour cela les patients devaient être sous traitement médicamenteux et être bien suivis.

MOTS CLEFS. Diabète Type 2, Ramadan, HbA1C, Lipides, N'Djaména (Tchad)

INTRODUCTION

Fasting during the month of Ramadan (the ninth lunar month of the Muslim calendar) is a religious requirement that is part of the five (5) pillars of Islam. It features a water and energy deprivation from dawn to sunset. This prohibition of eating and drinking is valid in reality for people in good health. But many diabetics especially the type 2 patients do fast. According to EPIDIAR 2004 study in 13 countries with large Muslim populations, 78.7% of type 2 diabetics had fasted 15 days in the month of Ramadan the last year [1]. In Chad, with an estimated proportion of Muslims of 57%, in a total population of 11 175 915 inhabitants [2], no study has been conducted to assess the impact of the fasting month of Ramadan in diabetics Muslims. With the aim to improve the management of diabetes during the Ramadan fasting month, we therefore undertook this work in order to evaluate the metabolic and clinical disorders that may be found during and after the Ramadan fasting month.

PATIENTS AND METHODS

This was a prospective and analytical observational study over three months (June-August 2013). It was carried on Muslim patients with type 2 diabetes, in the outpatient consultation of Endocrinology - Diabetology department of the National General Reference Hospital (HGRN). All patients had a glycated hemoglobin (HbA1c) \leq 8 % at the first screening and consented to the study.

Clinical and laboratory evaluation was carried out on two (2) periods: the first period (T1), one month before the start of Ramadan and the second period (T2), during the month (30 days) after the end of Ramadan.

The biological parameters studied were: blood glucose, glycated hemoglobin (HbA1c), total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides. The assay was performed in the laboratory of the HGRN.

For the comparison of means Student t test was used. The statistical significance was set for a probability p less than or equal to 0.05. SPSS 17.0 the software was used for analysis.

RESULTS

Population Characteristics

During the period of our study, 208 diabetic patients of whom 118 Muslims were seen in the outpatient consultation. Among the Muslims, 56 were followed during Ramadan.

The mean age of patients was 50.11 \pm 9.8 years (range, 27-70 years). There were 33 male patients and 23 female or a sex ratio M/F of 1.4. According to oral anti diabetic treatment courses, 73.2 % of patients were on monotherapy (sulphonylurea or biguanide), 19.6 % with combination therapy (metformin + sulphonylurea) and 7.1% in lifestyle and dietary measures.

Variation of glycemie parameters

The average glycemia dropped from T1 to T2 while the mean HbA1c increased by 0.5 points and these variations were statistically significant (Table 1).

Influence of sex

Table 1: Glycemic parameters before and after Ramadan

Sex	Glycemic Parameters	T1	T2	P
Male N= 33	Blood glucose	1,57 \pm 1,24	1,38 \pm 0,42	NS
	HbA1c (%)	7,2 \pm -1,5	7,7 \pm -0,8	0,00
Female N= 23	Blood glucose	1,51 \pm 0,58	1,50 \pm 0,46	NS
	HbA1c (%)	7,0 \pm -1,4	7,8 \pm -1	0,00
All (N=56)	Blood glucose	1,55 \pm 1,01	1,43 \pm 0,44	0,00
	HbA1c (%)	7,2 \pm - 1,4	7,7 \pm - 0,9	0,00

T1: before Ramadan

T2: after Ramadan

There was an increase in HbA1c average value. The change in HbA1c was greater among women (0.8) than men (0.5 points). But in both sexes, this change was significant (Table 1).

Influence of age

The same changes were observed across the age groups and the average change in HbA1c was significant in all segments except in the 61 to 70 years. The greatest variation was noted in the age from 51 to 60 years where mean HbA1c increased by 1.1 point (Table 2).

Table 2: Glycemic parameters according to age groups

Age (years)	Glycemic parameters	T1	T2	p
30 à 40 (N= 10)	HbA1c	7,1 \pm -1,3	7,6 \pm - 0,5	0,00
41 à 50 (N= 17)	HbA1c	7,3 \pm - 1,7	7,5 \pm - 1,3	0,00
51 à 60 (N= 19)	HbA1c	6,9 \pm - 0,5	8,0 \pm - 0,6	0,00
61 à 70 (N= 9)	HbA1c	7,4 \pm - 1,4	7,7 \pm -0,8	NS
All (N=56)	HbA1c	7,2 \pm - 1,4	7,7 \pm - 0,9	0,00

T1: before Ramadan

T2: after Ramadan

Influence of current diabetic treatment

The lowest variation was found in people taking combination therapy (metformin + sulphonylurea). All changes were not significant (Table 3).

Table 3: Variation of glycemic parameters with the current treatment

Treatment	Parameter	T1	T2	P		
Lifestyle and dietary measures (N= 4)	HbA1c	6,4+/-0,7	8+/-0,3	NS		
	Sulphonylurea (N= 28)	HbA1c	7+/-1,6	7,7+/-1	NS	
		Metformin (N= 13)	HbA1c	7,2+/-1,5	7,7+/- 0,6	NS
			metformin + sulphonylurea (N= 11)	HbA1c	7,7+/- 0,9	7,8+/-1,2

T1: before Ramadan

T2: after Ramadan

Lipid variation

The mean triglyceride value increased from 1.2 g/l +/-0.6 to 1.6 g/l +/-0.5 and the difference was statistically significant. This increase was seen across all the age groups (Table 4).

Table 4: lipid profile by age groups

Age (years)	Lipids (g/l)	T1	T2	P
30 – 40 (N=10)	Triglycerides	1,3+/-0,8	1,7+/- 0,5	0,00
	HDL	0,6+/-0,2	0,5+/-0,1	NS
	LDL	1,6+/-0,9	1,1+/-0,2	NS
	Cholesterol	1,9+/-0,6	1,9+/-0,3	NS
41 – 50 (N= 17)	Triglycerides	1,2+/-0,5	1,5+/-0,6	0,00
	HDL	0,7+/-0,4	0,6+/-0,3	NS
	LDL	1,5+/-0,4	1,3+/-0,3	NS
	Cholesterol	2,0+/-0,4	2,3+/-0,3	NS
51 - 60 (N= 19)	Triglycerides	1,2+/-0,5	1,8+/-0,4	0,00
	HDL	0,5+/-0,1	0,5+/-0,1	NS
	LDL	1,5+/-0,4	1,2+/-0,4	NS
	Cholesterol	1,9+/-0,2	2,2+/-0,3	NS
All (N=56)	Triglycerides	1,2 +/-0,6	1,6+/-0,5	0,00
	HDL	0,6+/-0,3	0,5+/-0,3	NS
	LDL	1,5+/-0,5	1,2+/-0,3	NS
	Cholesterol	2,0+/-0,4	2,20+/- 0,3	NS

T1: before Ramadan

T2: after Ramadan

Clinical course during Ramadan

53 patients (94.7 %) fasted the whole month of Ramadan without acute metabolic accident. But 3 patients (5.3%) had to break the fast before sunset. Premature fasting break was motive by hypoglycemia. The three patients (3/28) were taking sulphonylurea glibenclamide

DISCUSSION

In our series the mean HbA1c before and after Ramadan was 7.2 % and 7.7 % respectively. Our results were comparable to those of Hadji W & al. in 2008 in Morocco, who reported a mean HbA1c level before and after Ramadan 7.1% and 7.6% respectively [3]. By cons, they were different from those reported in the GLIRA study, which were 9.2 % before and 7.1% after Ramadan. [4] This difference is explained by the choice of methodology and sample sizes.

Concerning lipids, the mean triglyceride levels were 1.2 g / L before and 1.6 g / l after Ramadan. Our results were comparable to those obtained by Beltaifa L & al in 2002

in Tunisia , that were 1.0 g / l and 1,5 1g / l [5] . But they were different from those of Bouguerra R & al. in 2006 in Tunisia, who reported values of 2.1 g / l and 2.1 g / l [6]. This is probably explained by the size of our samples and diet would be different between our study populations.

The average cholesterol level was 2 g / l and 2.2 g / l. The variation in our series was 0.2 g / l, close to that found by Yarahmadi & al (2003), in Iran, which was 0.11 g / l (0.93 g / l before and 1, 04g / l after Ramadan) [7] . It was different of Beltaifa L & al in 2002 and Bouguerra & al., in 2006, Tunisia was in both cases of 0.00 (1.7 g / L before and 1.7 g / l after Ramadan) [5, 6]. The difference between our data and those of Tunisia is explained by the socioeconomic characteristics of our people who were different.

The mean HDL was 0.6 g / l and 0.5 g / l. The change - 0.1 g / l in our series was higher than that of AH & Latif al. in 1993 in Saudi Arabia and Uysal AR & al in 1998 in Turkey, which were 0.00 (0.4 g / l before and after Ramadan) [8, 9]. The difference between our data could be explained by the socioeconomic characteristics of our people who were very different, especially diet.

Finally, the mean LDL was 1.5 g / L before and 1.2 g / l after Ramadan. There was a decrease of - 0.3 g / l. Our results were comparable to those obtained by AH & Latif al. in 1993 in Saudi Arabia, that were 1.2 g / l and 1.0 g / l before and after Ramadan. [8] By cons Bouguerra & al. in 2006 and Beltaifa L & al in 2002 in Tunisia respectively reported 0.7g / l and 1.2 g / l, and 1 g / l and 1.1 g / l [5,6] . Our results and those reported by the above mentioned authors have shown that the change in LDL was within the normal limits.

Clinically, we recorded three (3) cases, or 5.3% of hypoglycemia that led to premature break of fasting month of Ramadan. Our results were congruent with those of M & Mafauzy al. in 2002 in Malaysia, who reported 7.9 % of cases of hypoglycemia with glibenclamide and 2.8% with Repaglinide [10]. By Bouguerra R & al (2006) in Tunisia had been no cases of hypoglycemia [7]. The difference between our results could be explained by the oral antidiabetic treatment (ADO) in progress, the climate context as well as the methodology.

CONCLUSION

In Chadian outpatients with type 2 diabetes, the increase of the mean glycated hemoglobin (HbA1c), after the Ramadan fasting is significant. It ranges between 0.5 in men and 0.8 in women. It is mostly evident among people 51-60 years old, and those whose only treatment is lifestyle and dietary measures. Concerning lipids, there is small but significant increase for triglyceride values. HDL and LDL are reduced, but the differences are not significant.

Most patients are able to fast without acute metabolic accidents. But, 5.3% are not able to complete their fasting, because of hypoglycemia. This is seen in patients taking sulphonylurea medication. There is a need to sensitize and educate the population who engage to

fasting of Ramadan, on the need of diabetes control including taking a proper medical treatment before entering Ramadan fasting

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CONFLICT OF INTEREST

None

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