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RESEARCH ARTICLE

IMPACT OF FASTING RAMADAN ON KIDNEY FUNCTION IN PATIENTS WITH DIABETES TYPE 2 IN MARRAKECH

M. Elbahi, S. Rafi, G. Elmghari and N. Elansari

Department of Diabetology, Endocrinology, Nutrition and Metabolic Diseases Errazi Hospital, Chu Mohammed Vi, Marrakech.

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Abstract

There are concerns as to the effect of the ramadan on kidney function in patients with type 2 diabetes who choose to fast, especially when ramadan occurs during a hot, dry season with a long period of daylight hours. This study objective is to explore the safety of fasting for the whole month of ramadan on renal physiology among patients with type 2 diabetes. We followed diabetic type 2 patients with stable kidney function who chose to fast during the month of ramadan. Body mass index (bmi), blood pressure (bp), serum creatinine with calcul of glomerular filtration rate (gfr) was recorded before the beginning and at the end of the month. Total body water was measured with an impedancemeter before and after ramadan. Only 39 patients who were able to fast 4 weeks and responded to the proposed follow-up after ramadan. Mean baseline estimated bmi, bp, gfr and total body water were respectively; 30,25kg/m², 13/7mmhg, 130 ml/min, 34,69 %. A rise of serum creatinine was noted during fasting by the end of ramadan in 23 patients (57%) and glomerular filtration rate had concomitantly decreased. We noticed that total body water has decreased in 7 patients (18 %). The risk of developing dehydration and acute renal failure was significantly higher for patients with baseline creatinine clearance of <60 ml/min/1.73 m² and a total body water under the average. The small sample size does not allow us to draw any firm conclusions on fasting during ramadan in well controlled diabetic type 2 patients. Studies on larger numbers of patients are required.

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Introduction:-

Fasting during the sacred month of ramadan is one of the five pillars of islam. It is practiced by hundreds of millions of muslims throughout the world. According to an epidemiology of diabetes and ramadan study conducted in 2000 in 13 maghreb countries and the middle east among 12,000 diabetic patients, 43% of patients with type 1 diabetic and 79% of those with type 2 diabetic were fasting during ramadan (1,2). ramadan consists of stopping eating and drinking from sunrise to sunset. Duration of the fasting ranges from 10 to 18 h per day, and varies according to the geographic location and the season. According to islam, sick people are exempted from fasting especially people with chronic diseases as diabetes, still a significant number of them insist on observing this religious practice due to their personal beliefs and satisfaction. There are concerns as to the effect of the ramadan fast on kidney function in patients with type 2 diabetes, especially when ramadan occurs during a hot, dry season with a long period of

Corresponding Author:- M. Elbahi

Address:- Department of Diabetology, Endocrinology, Nutrition and Metabolic Diseases Errazi Hospital, Chu Mohammed Vi, Marrakech.

daylight hours, as was the case during the time period of the current study in marrakech, there is a possible risk of dehydration and hyperviscosity leading to deterioration of kidney functions and vascular thrombosis. in these cases, physicians face a dilemma as to how they can offer clinical advice for their fasting patient. this study objective is to explore the safety of fasting for the whole month of ramadan on renal physiology among patients with type 2 diabetes trying to help both, physicians and patients, to take the right decision.

Methods:-

It was a prospective comparative study conducted during the month of ramadan 2019 and included patients with type 2 diabetes who were attending the open days of ramadan education in the department of endocrinology and diabetology of chu mohammed vi, before and after ramadan. education sessions included recommended nutritional and health rules for this month. instructions for frequent monitoring of blood glucose and self-management of hypoglycaemia and hyperglycemia. The therapeutic adjustment was individualized according to the type and dose of treatment taken by each patient.

We followed diabetic type 2 patients with stable kidney function who chose to fast during the month of ramadan and who were considered eligible for fasting according to the international diabetes federation (idf) recommendations.

The collection of socio-demographic data, the pathologic antecedents, duration, treatment and complications of the diabetes were written down by a doctor during the interviews

Conducted face to face using a pre-established questionnaire containing closed questions. Body mass index (bmi), blood pressure (bp), serum creatinine with calculation of glomerular filtration rate was recorded before the beginning and at the end of the month. Total body water was measured with an impedancemeter before and after ramadan.

Data were processed on excel and statistical analyzes were performed using spss 16. The threshold of statistical significance was set at 0.05.

Results:-

A total of 81 (46 %) of 147 patients with type 2 diabetes included in this study have chosen to fast during ramadan, but only 39 patients who were able to fast 4 weeks and responded to the proposed follow-up after ramadan. 42 patients were lost to follow-up.

The average age of the patients was 57.18 ± 11 years. 79% were women and 21% were men.

The majority (72%) was treated only with oral anti-diabetic agents; the rest of the patients were on only lifestyle intervention or on insulin therapy with or without combined oral anti-diabetics drugs. A significant proportion (67%) of our study population had a diabetes duration of less than 10 years. All our patients who had observed this month and have been followed after ramadan had a $\text{gfr} > 60 \text{ ml/min}$ with an average of (91 %).

| | Effective | Percentage |
|------------------------------------|-----------|------------|
| Sex | | |
| women | 31 | 79 |
| men | 8 | 21 |
| Age | | |
| <40 years | 3 | 7 |
| 40-60 years | 23 | 58 |
| 40-60 years | 13 | 35 |
| Duration of diabetes | | |
| < 10 years | 26 | 67 |
| 10 to 20 years | 9 | 23 |
| > 20 years | 4 | 10 |
| Diabetes treatment | | |
| Lifestyle interventions | 4 | 10 |
| Oral anti-diabetic agents | 28 | 72 |
| Oral anti-diabetic agents +insulin | 5 | 13 |

| | | |
|--------------------|----|----|
| Bmi | | |
| Normal | 5 | 14 |
| overweight | 17 | 43 |
| obesity | 17 | 43 |
| Bp(blood pressure) | | |
| normal | 19 | 49 |
| type1 | 13 | 33 |
| type 2 | 4 | 10 |
| type 3 | 3 | 8 |
| Microalbuminiuria | | |
| <30 | 34 | 87 |
| 30-300 | 3 | 8 |
| >300 | 2 | 5 |

Table 1:- Descriptive Characteristics Of Patients.

(mean baseline estimated bmi, bp,gfr and total body water were respectively; 30,25kg/m², 13/7mmhg,130 ml/min, 34,69 %. A rise of serum creatinine was noted during fasting by the end of ramadan in n= 23 patients(57%)and glomerular filtration rate had concomitantly decreased. We noticed that total body water has decreased in n= 7 patients (18 %)

| Variables | Before ramadan | After ramadan | P |
|----------------|----------------|---------------|-------|
| Weight | 76,85±12,8 | 76,21± 12,8 | 0,019 |
| Bmi | 30,25± 4,97 | 30,21± 4,69 | 0,8 |
| Egfr | 130± 38,85 | 117± 38,69 | 0,013 |
| Hydration rate | 34,69 ± 5,21 | 35,04 ± 5,19 | 0,041 |

Table 2:- Analytical Data of the Study.

Discussion:-

Our study showed that ramadan fasting appears to confer benefits to the body composition of type 2 diabetics. All the more so if they have received prior training in the necessary dietary advice, glycemic monitoring and therapeutic adjustment.

Indeed, our results showed a significant reduction in weight, as objectified in the study by m.sebbani and co. (3) carried out on 71 young type 2 diabetics at the mohamed vi university hospital in marrakech during ramadan 2010. According to modibo traore and co. (4) the decrease in weight noted during ramadan is explained by the restriction of water intake during fasting and dehydration during the day rather than by a variation in nutritional intake as such.

This weight reduction has also been documented in several studies (5,6,7) and it is attributed to the reduction of meal frequency during ramadan, which often results in reduction of energy intake and loss of body mass and body fat. Other contributing factors are extracellular volume contraction secondary to lower sodium and fluids intake, and the moderate degree of dehydration.

A significant decrease in creatinine clearance was observed during ramadan $p > 0.0001$ as observed by sebai and co. (8). In their study, after 15 days of fasting, diabetic patients had deteriorated renal function as evidenced by an increase in serum creatinine was also observed.

Moreover, in others studies, there was a significant improvement in the estimated gfr, which could be explained by several mechanisms: first, the reduction in the blood pressure during fasting with a positive effect on the kidney function in ckd patients, [9,10] second, weight loss indicating reduction in the relative overhydration, with subsequent improvement of cardiac function and better renal perfusion. Third, dietary reduction of protein intake and exogenous creatinine intake. Finally, modest directional changes in serum creatinine and weight result in an increment in egfr. (11)

In our study, there was also a significant variation in the hydration rate, which can be explained by the low water intake during the month of ramadan. Others studies found a variation in hydration but without significant

deterioration in renal function. In this study, the fact that a substantial proportion of ckd patients were overhydrated before the beginning of the fast may essentially have “protected” them from developing volume depletion and deteriorating their kidney function, during and after the ramadan fast. Obviously this “protection” will not suffice in conditions of more severe volume depletion (12, 13).

Exposure to hot sunlight can also predispose diabetic patients to dehydration. This tendency to dehydration in our study could explain the decrease in clearance observed significantly in our study population but also by a deterioration in blood pressure which has not been demonstrated.

Limitations of our study include small sample size and lack of quantification of physical activity and water intake. Despite these limitations, this study presents important results given the high prevalence of fasting during ramadan in diabetic patients. Future studies involving larger sample sizes will be useful to confirm our findings and elucidate the determinants of these changes in water composition and renal function.

Conclusion:-

The risk of developing dehydration and acute renal failure was significantly higher for patients with baseline creatinine clearance of $<60 \text{ ml/min/1.73 m}^2$ and a total body water under the average. However, the small sample size does not allow us to draw any firm conclusions on fasting during ramadan in well controlled diabetic type 2 patients. Studies on larger numbers of patients are required. However, fasting should be under close medical supervision with strict attention to fluid intake, daily activity, and adjustment of drug regimens with a special attention for the management of diabetic ckd patients.

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