

The effect of Ramadan fasting on thyroid function tests: a study of patients on thyroxine replacement therapy

Budour Alkaf¹, Tomader Ali¹, Nader Lessan¹

¹ Research Department, Imperial College London Diabetes Centre, Abu Dhabi, UAE

Background Ramadan fasting is characterized by the abstinence of food and drink from dawn to sunset for ~30 days. Muslims practicing Ramadan have two main meals, one immediately after sunset (*Iftar*), and the other just before dawn (*Suhoor*). As per clinical therapeutic guidelines, levothyroxine (LT4) is to be administered half an hour before breakfast; and thus, in Ramadan, patients with hypothyroidism have to wait for an extra half an hour before *Iftar* or *Suhoor* for their medication. That leaves the majority unable to comply with the proper timings of LT4 administration. Consequentially, patients face deterioration in their condition. However, whether this deterioration continues after Ramadan is still unclear.

Aim Investigate the short and long-term impact of Ramadan fasting on thyroid function of patients on thyroxine replacement therapy.

Methods Patients with hypothyroidism who attended Imperial College London Diabetes Centre (ICLDC, Abu Dhabi) during 2012 and 2017, and were; (1) Arab-Emirati; (2) aged ≥ 18 years; (3) on LT4; (4) not diagnosed with type 1 diabetes; (5) had a thyroid function test (TFT) within 3 months before Ramadan (BR); and (6) had a TSH result ≤ 10 μ IU/mL at that visit (BR), were initially included. Selected patients were then followed up to check if they had a TFT at; (1) 1-2 weeks post Ramadan (PR1); (2) 2-3 months post-Ramadan (PR2); and (3) 4-6 months post-Ramadan (PR3). Mann-Whitney test was used to test for significant differences ($P \leq 0.05$) in TSH, FT3, and FT4 levels at BR, compared to PR1, PR2, and PR3.

Results 197 patients had a TFT at all 4 timepoints (BR, PR1, PR2, and PR3), and were included in the analysis. Of the cohort studied, 89.9% were females; mean age 44.7 ± 12.3 years. Prevalence rates of prediabetes and type 2 diabetes were 33.5% and 9.1%, respectively. At PR1, TSH levels were significantly higher, while FT3 and FT4 levels were significantly lower, compared to BR (**Table 1, Figure 1**). These significant differences were not observed at PR2 and PR3; where TSH levels decreased while FT3 and FT4 levels increased.

Conclusions Ramadan fasting leads to deterioration of thyroid function in patients with hypothyroidism; however, their condition returns to normal within 2-3 months after Ramadan.

Table 1. TSH, FT4, and FT3 levels before Ramadan (BR) compared to the 3 timepoints after Ramadan (PR1, PR2, and PR3) in a cohort of 197 individuals with hypothyroidism. Related-Samples Mann-Whitney Test was used to test the median of differences in TSH, FT4, and FT3 values before and after Ramadan. $P < 0.05$ represents a significant difference in TSH, FT4, or FT3 levels tested between BR and either PR1, PR2, or PR3.

	BR	PR1		PR2		PR3	
	(Before Ramadan)	(1-2 weeks Post-R)		(2-3 months Post-R)		(4-6 months Post-R)	
	Median	Median	<i>P</i> value	Median	<i>P</i> value	Median	<i>P</i> value
TSH ($\mu\text{IU/mL}$)	1.6	2.8	<0.0001	1.9	0.21	1.7	0.29
FT4 (pmol/L)	17.3	16	0.0003	16.4	0.02	16.6	0.11
FT3 (pmol/L)	4.2	4	0.0015	4.2	0.88	4.3	0.16

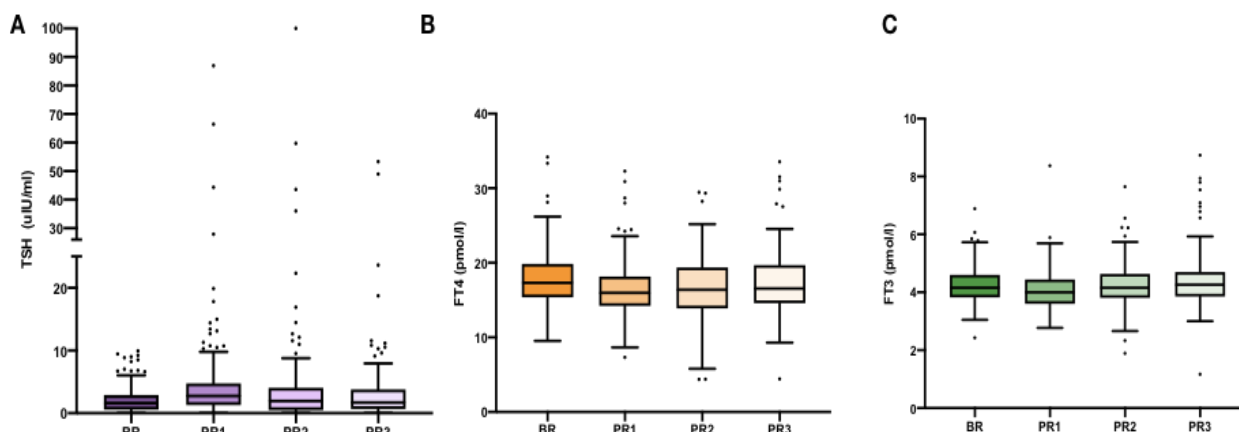


Figure 1. The impact of Ramadan fasting on thyroid function tests. Box plots demonstrating levels of (A) TSH, (B) FT4, and (C) FT3, at: within 3 months before Ramadan (BR) or 1-2 weeks (PR1), 2-3 months (PR2) and 4-6 months (PR3) post-Ramadan.