

## ORIGINAL ARTICLE

## THE IMPACT OF RAMAZAN I'TIKAF ON IMMUNE SYSTEM

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Email: [hheker@yahoo.com](mailto:hheker@yahoo.com)**ABSTRACT**

*I'tikaaf is a worship maintained by very deep hunger in fasting month of Ramadan. Hunger causes different results on the immune system. This is a prospective study. In this study, the changes in the immune system were investigated during the period of the i'tikaf, which is deep hunger worship. In the last 10 days of Ramadan, before and at the end of i'tikaf blood was taken from 46 male volunteers who performed i'tikaf worship and various biochemical and immunological parameters were examined. Comparison of the measures taken before and after i'tikaf indicated a statistically significant decrease in weight, BMI, waist circumference and hip circumference ( $p < 0.001$ ). Of the hematologic parameters, the lymphocyte count increased significantly ( $p = 0.009$ ). Also, a significant increase was observed in the values of IgA, IgM ve Ig G within the hematological parameters ( $p < 0.001$ ). During the period of i'tikaf, feeding with very low calories (1000 calories) caused an increase in the levels of lymphocyte and immunoglobulins and got the immune system stronger.*

**Keywords:** Immune system, Ramadan I'tikaf, weight, BMI, immune system.

**INTRODUCTION**

Each year Muslims all over the world observe the annual fast for either 29 or 30 days, changing from year to year, using the lunar calendar (every year corresponds to 10 days before the Gregorian calendar). Fasting is a worship, Muslims refrain from consuming food, drinking liquids, smoking, and engaging in sexual relations starting from pre-dawn time till sunset. As the times of sunset changes throughout the year, this period of time requires staying hungry and thirsty for shorter time such as 11-12 hours in the months with short daytime and longer time such as 17-18 hours and even more in months with long daytime<sup>1</sup>. Also, some Muslims carry out the worship of i'tikaf in conjunction with fasting in Ramadan.

According to Islamic belief, retreating somewhere and occupying oneself only with worship is called i'tikaf. Especially in the last 10 days of Ramadan, staying in mosques or similar places and being busy with worships such as worshipping, science of faith, Quran, prayers and dhikr. The legitimacy of i'tikaf is set with Quran and the sunnah of Islamic prophet<sup>2,3</sup>.

How fasting during Ramadan influenced people's vital functions was investigated through various studies? Fasting has been shown to be beneficial in some allergic and inflammatory diseases, in which the cause was considered to be associated with the immunological system<sup>4,5,6</sup>. Also, similar to the

worship of i'tikaf in fasting month, the different responses of immune system to very low calories were investigated<sup>7</sup>. However, in some studies, it is thought that the limitation of total calory intake weakens immune system<sup>8</sup>. It was observed that the immune system of malnourished people and elderly people weakened and therefore the elder people easily caught infections that required hospitalization<sup>9</sup>. On the contrary, some recently published studies stated that shock fasting for more than 3 days could get the immune system stronger<sup>10</sup>.

Lymphocytes are the leading parameters that constitute the immune system. Lymphocytes and their products, constitute the most important part of cellular and humoral components of immune system<sup>11</sup>. Lymphocytes are primarily divided into 3 groups as T cells, B cells and NK (Natural Killer) cells. For the generation and maintenance of normal immune response, there should be a balance between the lymphocyte subgroups with effector functions.

T cells carry out their regulator and effector functions via the substances called lymphokine. Lymphokines, unlike to antibodies, do not bind to antigens specifically, they play role in the regulation of cell functions. T helper lymphocytes carry the surface antigen of CD4 while suppressor and cytotoxic T cells carry the surface antigen of CD8. CD3 antigens are found in both T helper and cytotoxic T cells. These CD3 antigens, found in

both T helper and cytotoxic T cells are associated with signal transmission.

Natural Killer (NK) cells are the lymphocytes which bind to virally infected cells and some tumor cells and kill them by means of the cytotoxins that they release. These cells are found in bone marrow and spleen. Their cytotoxic activities are not antibody dependent. In some studies, increased cytolytic activity of NK lymphocytes against tumor cells was observed in acute starvation. The reason of this activity is still unknown<sup>12, 13, 14</sup>. Recently, it was seen that the ratio of neutrophil-lymphocyte is also an indicator in immunity and cancer patients with high ratios of platelet-lymphocyte and neutrophil-lymphocyte had worse prognosis<sup>15,16</sup>. Aim of the study was to investigate how immune system changes during the period of i'tikaf which contains feeding with very low calories in Ramadan.

## MATERIALS AND METHODS

A prospective study carried out in this study and it was conducted between the dates of 24.06.2016 and 01.07.2016, between the 20th and 27th days of Ramadan. In this study, male participants who performed i'tikaf in the way of seclusion in the cities of Istanbul and Denizli were included. I'tikaf can be performed via many other ways. The i'tikaf with the way of seclusion consists of a portion of unsalted, low-fat lentil soup (200g) and 150g bread in the evening meal and 21 dried grapes and 150 g bread in sahur to be eaten. The daily calorie intake in total is approximately 1000 calories.

The participants were informed about the study and an informed consent was taken from the volunteers. In total 46 volunteers participated in the study. As lightly dressed and without shoes, the weight, height, waist circumference, hip circumference of all subjects participated the study were measured and BMI was calculated. BMI was calculated as kg/height (m). Before and after i'tikaf, the blood samples were taken by going to the mosque that the participants were retreated in. The samples were brought to the Central Laboratory of Bezmialem Foundation University, Faculty of Medicine within

appropriate storage boxes (+ 4C). In blood sample analysis, the levels of IgA, IgM, IgG, which are indicators of humoral immunity, and P1, CD19, CD3, CD3 Helper, CD3 cytotoxic, CD3, NKT, NK cell, CD3 HLA DR1, CD3 HLA DR2 values which are another indicator of immune system were measured by flow cytometry. The values before and after i'tikaf were statistically compared.

All calculations were done using the SPSS v. 11.5 statistical software package (the system for statistics) for analysis of the data. All data were expressed as mean standard deviation (SD). Comparisons between means observed before and after i'tikaf were tested using a paired t-test. The data within each phase were also examined using Pearson r correlation analysis to find the relationship between the studied variables. All differences were considered to be significant at  $p < 0.05$ .

## RESULTS

Forty-six healthy male volunteers participated and Chi-square student test used in the study. The mean age of the participants was 41 years. Of the parameters measured before and after i'tikaf, weight, waist circumference, hip circumference and BMI decreased significantly (Table 1). A statistically significant increase was noted in the lymphocyte count, one of the hematological parameters ( $p=0.009$ ). The monocyte count which is another hematologic parameter was observed to be increased but the increase did not reach the level of statistical significance ( $p=0.07$ ). The neutrophil count, another hematologic parameter, did not change significantly ( $p=0.60$ ). There was a statistically significant increase in the indicators of humoral immunity which are IgA, IgM, IgG ( $p < 0.001$ ,  $p < 0.001$ ,  $p = 0.03$ , respectively) (Table-1). P1, CD19, CD3, CD3 Helper, CD3 cytotoxic, CD3 NK cell, CD3 HLA DR1, CD3 HLA DR2 which are another indicator of immune system response were assayed with flow cytometry. Although a minimal decrease was observed after i'tikaf, it was not statistically significant. There was a minimal but statistically insignificant increase in NKT cells after i'tikaf.

Table 1. Differences before and after I'tikaf

Parameters	Before i'tikaf	After i'tikaf	Difference	P value
Weight	81,19+12,65	79,08+12,56	2,11+1,3	0,00***
BMI	26.7	26.0	0.7	0.00***
Waist circumference(cm)	95.5	93.0	2.5	0.00***
Hip circumference(cm)	106.8	104.4	2.4	0.00***
WBC	6.00	5.99	0.01	0.96
Neutrophil	3.02	2.95	0.07	0.60
Lymphocyte	2.12	2.56	-0.44	0.009**
Monocyte	0.49	0.54	-0.05	0.07
Platelet	223	227	-4.43	0.23
All events	1.72	1.53	0.19	0.00***
P1	5.54	5.25	0.29	0.29
CD 19	6.35	5.51	0.86	0.053
CD 3	4.10	3.87	0.23	0.27
CD 3 Helper	2.29	2.11	0.18	0.12
CD 3 cytotoxic	1.57	1.48	0.09	0.26
CD 3 NK cell	7.70	7.60	0.10	0.84
NKT	3.89	4.23	-0.34	0.18
CD 3 HLADR1	7.80	7.11	0.69	0.16
CD 3 HLADR2	6.21	6.49	-0.28	0.41
MPV	7.73	8.52	-0.79	0.00***
NLR	1.73	1.21	0.52	0.11
MLR	0.26	0.22	0.04	0.27
TLR	1.25	0.91	0.34	0.10
Ig A	2.40	2.68	-0.27	0.00***
Ig M	8.40	9.79	-1.38	0.00***
Ig G	1.15	1.22	-0.68	0.03*

\*significant at  $p < 0.05$ , \*\*significant at  $p < 0.01$ , \*\*\*significant at  $p < 0.001$

## DISCUSSION

In our study when the situations before and after i'tikaf were compared, a reduction occurred in weight, BMI, waist and hip circumference in healthy volunteers. These results were similar to the results of the studies conducted on Ramadan fasting<sup>17, 18, 19, 20, 21, 22, 23</sup>.

The comparison of immunological parameters before and after i'tikaf did not result in a statistically significant change in the values of neutrophil and monocyte. But a statistically significant increase was detected in the rate of lymphocyte. The finding is accepted as an indicator of cellular immunity. The increase in the ratios of ML, NL, PL was regarded as a bad prognostic sign in cancer patients<sup>24,25</sup>. However, in our study, despite being insignificant, the ratios of NL, ML and PL were decreased and this condition drew the conclusion that i'tikaf has beneficial effects on immune system.

In our study after i'tikaf, a statistically significant increase was observed in the levels of Ig A, Ig M and IgG. Although a very few studies addressed these issues, in another study, the levels of

immunoglobulins showed an increase in like manner to our study<sup>26</sup> and formed the opinion that i'tikaf (short term deep hunger) affects the humoral immunity positively.

Although an increase was noted in natural killer T lymphocytes which are an indicator of cellular immunity, statistical significance was not reached. Despite the fact that there are very few studies on this subject, in both previous and recent studies, a strengthened immunity was detected after very deep hunger lasting more than 72 hours<sup>12,8</sup>. Our results are also in the direction that the immune system got stronger during the period of i'tikaf, which requires a very deep hunger.

The studies by Murray in Nigeria in 1973 and in Ethiopia in 1975 detected that the incidence of the diseases like tuberculosis, malaria and brucellosis was lower in the victims striving on starvation in Ethiopia and Nigeria, but their incidence increased after the victims were placed to the camping areas and started to feed<sup>27, 28, 29</sup>. The results of our study also suggest that immunity gets stronger with fasting.

## CONCLUSION

According to the results of this study, i'tikaf (short term deep hunger) has decreased in weight, BMI. It has beneficial effects on immune system and immune system got stronger during the period of i'tikaf. The results of this study should be interpreted considering the limitations of this study. The results of this study cannot be generalized to all the people who have done i'tikaf due to small sample size, more clinical studies are needed.

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