Research Journal of Biological Sciences 3 (9): 1094-1096, 2008
ISSN: 1815-8846

Influence of Microwaved Food Eating on Blood Iron and Transferrin in Rat

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Abstract: The health consideration of microwave radiation has been the subject of scientific investigations particularly in the last decades. But there is a few information about the health effect of micro waved food consuming for a long time. The aim of this trial is to evaluate blood iron and also plasma transferrin as a protein transporter of iron in rat after eating microwaved food for a period of 1 year. For this study 64 young Sprague Dawley rats in 4 groups, each 16 (8 males and 8 females), 2 treated and 2 controls, were used under the standard conditions with free access to tap water and standard food. The 2 treated groups were consuming standard rat food pellets heated by 2450 MHz microwave radiation in 30 min for group (A) and 5 min for group (B). One of the control group (C) were consuming same pellets heated by electric oven at 200°C for 30 min and another control group (H) were eating the food pellets without any heating by microwave or electric oven. Animals were observed daily and the body weight and food and water consumption were assessed weekly too. In the end of the study the blood samples were taken from the heart of animals after 12 h fasting under ether anesthesia and the serum iron and transferrin analysis was performed on the blood samples. According to the statistical analysis, the level of iron was significantly decreased in all treated groups in comparison with control group of (C) and significant decreasing of iron, in female groups of B and male groups of A, in comparison with control (H). But transferrin level was significantly increased in female groups of A and B and male group of A in comparison with control (C) and only male group of A in comparison with control (H).

Key words: Microwave, rat, blood, iron deficiency, serum transferrin

INTRODUCTION

The health effect of Micro waved food has been given rise to public debate about possible adverse effect of consuming these foods particularly in the last decades with increasing use of microwave radiation in food science and technology.

In spite of many laboratory research in field of biological effect of microwave radiation, there is a few investigation about the possible health effect of micro waved food. In this study we present any probable effect of micro waved food consuming on blood iron and also transferrin as a protein transporter of iron, in rat after a period of 1 year (Burtis and Ashwood, 1994; Beguin, 2003; Takala and Suominen, 2003; Remacha and Sarda, 1998).

MATERIALS AND METHODS

Animals: Total 64 Sprague Dawley rats at 5 weeks age (weighing 62-65 g) were used in this study for a period of one year. The animals were housed individually in polycarbonate cages under standard condition with free access to tap water and food pellets (Royal Society/UFAW, 1987; Clarke *et al*., 1977; Boever, 1983). The rats were divided to 4 groups (A, B, C and H), 2 treated and 2 controls. The 2 treated groups were consuming standard rat food pellets heated by 2450 MHz microwave radiation in 30 min for group (A) and 5 min for group (B), daily. One of the control groups (C) were consuming same pellets heated by electric oven at 200°C for 30 min daily and another control group (H) were eating the rat pellets without any heating by microwave or electric oven in duration of study.

Records and controls: The rats were weighed before experiment and weekly. Food and water consumption were controlled weekly too. Any clinical observation were noted and recorded.

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Method of serum iron and transferrin measurement: In the end of the study the blood samples were taken from the heart of animals under diethyl ether anesthesia, after 12 h fasting. The level of serum iron was measured by Nitro Pars method. In this method Iron is released from transferrin by decreasing the pH of the serum and iron is reduced from Fe (III) to Fe(II) and it then complexes with chromogen that contains the reactive group of –N = C-C = N-. The level of transferrin was measured by immunochemical method (Burtis and Ashwood, 1994).

Statistical analysis: The differences between groups were analyzed using appropriate 1 way analysis of variance (anova) technique, followed by a multiple comparison. The 1 way anova was applied using the F distribution to assess significance at the level of 0.05.

RESULTS AND DISCUSSION

General observation: There was no abnormality observed in treated and control groups.

Body mass and food and water consumption: According to the results, percentage of body mass and food consumption was decreased, but the percentage of water intake was increased, in treated groups in comparison with that of controls.

The results of serum iron and transferrin: Figure 1 and 2 indicates means differences of serum iron and Fig. 3 and 4 indicates serum transferrin in male and female groups.

According to the statistical analysis of results the level of iron in female groups of A and B and male group of A was decreased in comparison with control (C). The p-value was $p<0.034$ for group A and $p<0.000$ for female groups of B and $p>0.013$ for male groups of A. The level of serum iron was decreased in female group of B and male group of A, in comparison with that of control (H), with $p<0.019$ for female groups of B and male group of A. The serum transferrin level was increased in female group A and B and male group of A in comparison with control (C), with p-value ($p<0.000$) for all groups mentioned. Transferin level alteration in treated groups in comparison with that of control (H) was significant only in male group of A ($p<0.004$).

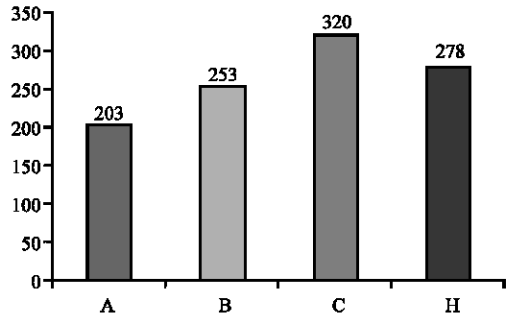

Fig. 1: Content of serum iron in male groups

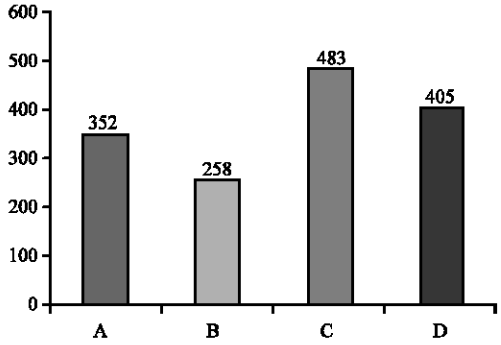

Fig. 2: Content of serum iron in female groups

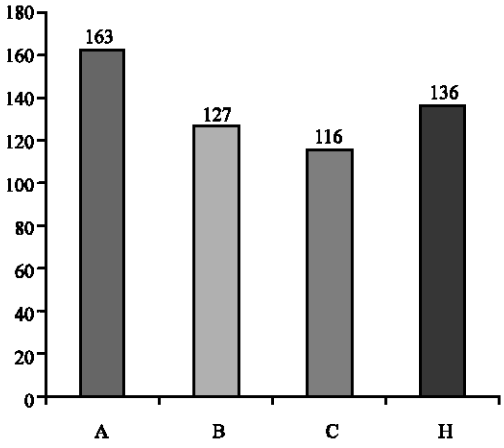

Fig. 3: Content of serum transferrin in male groups

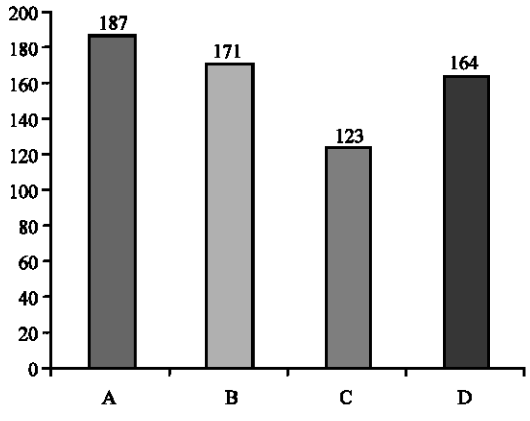

Fig. 4: Content of serum transferrin in female groups

CONCLUSION

The results mentioned above confirm a probable iron deficiency with plasma transferrin increasing after a period of long time micro waved food consumption in rat, which should be considered.

ACKNOWLEDGEMENT

We wish to thank to Dr. Zahra Maleki for her advice and also grateful to Miss. T. Niavarani and F. Rashid Najafi and Mr A Kohbodi for technical assistance and Mr. S. Kasgeh, for assistance with the data analysis and statistical evaluation. We also thank to research center of Pars Azmoon for supporting this research.

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