

CHANGES IN TASTE AND FOOD INTAKE DURING THE MENSTRUAL CYCLE**Nurov Sarboz A'zim o'g'li**Magistr of the Department of General Hygiene and Ecology, Bukhara State Medical Institute
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Abstract. Dietary changes during the menstrual cycle may be the result of the interference of female hormones on taste; however, little is known about this possible relationship.

Keyword: menstrual cycle; taste; food intake; ghrelin; insulin.

ИЗМЕНЕНИЯ ВКУСА И РАЦИОНА ПИТАНИЯ ВРЕМЯ МЕНСТРУАЛЬНОГО ЦИКЛА

Аннотация. Изменения в рационе питания во время менструального цикла могут быть результатом влияния женских гормонов на вкус. однако мало что известно об этой возможной взаимосвязи.

Ключевые слова: менструальный цикл; вкус; прием пищи; грелин; инсулин.

INTRODUCTION

Changes in the food intake of women have been related to hormonal fluctuations resulting from menstrual cycle. The literature reports that during the menstrual cycle, women may experience changes in appetite and size of meals, changes in types of macronutrients consumed, in the selection of food to be ingested, food cravings and compulsion for certain foods. According to Kuga, Ikeda, food choices can be influenced by changes in taste that seem to occur during the phases of the menstrual cycle. Basic tastes such as sweet, salty and bitter are influenced differently by serum levels of sex hormones during the menstrual cycle. Changes in taste among healthy women during the menstrual cycle have been the subject of some studies, but the literature is scarce and little is known about the consequences of these changes on the nutritional status of women.

Patients and Methods This was an observational, longitudinal and randomized study with convenience sample. This study was conducted during 2013-2014, on 70 females aged from 20 to 40 years old, in which adult women were followed for a period of three months, with three complete menstrual cycles. Having briefed the subjects on the study, they enrolled for the research, if agreed to participate in the program. The inclusion criteria were regular menstrual cycle (average length 22-35 days), minimum age of 20 and maximum of 40 years, absence of disease and use of supplements. Exclusion criteria were being smoker, presence of fever, cold, flu or any complications in the oral cavity during the period of sensory analyses, since these factors could interfere with the perception of tastes. The recruitment of subjects and the development of the study were conducted at the School of Nutrition, Federal Fluminense University (UFF), and Niterói – RJ. After clarification of the study purpose and use of data under the guarantee of anonymity and having provided the written informed consent the subjects were interviewed about their general and personal characteristics including information on lifestyle,

age at menarche, onset of sexual intercourses and contraceptive use. Seventy subjects were recruited and submitted to weight (kg) and height (m) measurements to calculate the Body Mass Index (BMI) in each phase: luteal phase (between days 24 and 27 of the cycle) and follicular phase (between days 10 and 12 of the cycle) of each menstrual cycle. Body weight measurement was carried out by means of bioimpedance scale Tanita Model TBF 350 – accuracy of 0.2 kg – at the Laboratory of Nutrition and Functional Assessment of the School of Nutrition - UFF (LANUFF) and height was measured using a audiometer. The criteria of the World Health Organization (WHO) were adopted for the classification of the nutritional status of subjects: BMI with a standard solution (water) as described by Dutcosky [9] with adjustments in the following concentrations: citric acid to 0% (water), 0.035%, 0.07%, 0.105% and 0.14% sucrose to 0% (water), 0.5%, 1%, 1.5% and 2%; caffeine to 0% (water), 0.017%, 0.035%, 0.0525% and 0.07% and sodium chloride at 0% (water), 0.05%, 0.1%, 0.15% and 0.2%. Solutions were served at room temperature in disposable, white and odorless cups containing 20 mL of each solution coded with three digits, following the order of increasing physical concentration. The subjects were asked to indicate on the evaluation sheet the concentration of the solution in which they perceived the tastes offered. Water was provided during the test to minimize the effect from one sample to another. The taste-intensity and constant stimulus tests were not performed on the same day in order to avoid induced errors of sensory analysis due to continuous stimulation. Biochemical evaluation was performed only during the luteal phase (between days 24 and 27 of the menstrual cycle) due to resistance of volunteers to perform more than one blood sample collection. Blood collection was performed by a trained technician via venipuncture with disposable syringe. About 10 mL of blood were collected after a 12-hour overnight fasting period. Serum and plasma obtained were divided into aliquots in micro tubes and frozen at -70°C. The levels of hormones (progesterone, estrogen, insulin and ghrelin) were measured using a specific enzyme-linked immunosorbent assay (ELISA) kit with 0.5 sensitivity. The results of this study are presented using descriptive statistics such as arithmetic mean and standard deviation. Analysis of variance (ANOVA) with repeated measures and Tukey's post-test was used. The Fisher exact test was used for comparison of frequencies. Pearson correlation was used to identify possible associations between taste, food intake and concentration of hormones during the menstrual cycle. The normality assumption (Gaussian distribution) of data was verified by Kurtosis and Skewness tests to support the use of statistical methods described above. To analyze data that were not normally distributed, the corresponding nonparametric test was applied. Data analysis was done using SPSS statistical software (version 18), tests with $P < 0.05$ was considered as statistically significant. The study protocol complied with the ethical principles of the Declaration of Helsinki and the norms of Resolution 196/96 of the National Health Council, and was revised and approved by the Ethics Research Committee in Humans of the Antonio Pedro University Hospital, approved in the National Information System on Ethics in Research Involving Humans (SISNEP) under protocol number 0084.0.258.000-07. Results Most volunteers were unmarried college students, with average age of 23 years, with menarche at age of 12. The onset of sexual intercourse occurred around 18 years. About 20% of volunteers reported to be engaged in regular physical activity (average of 4 hours/week), while the majority (74%) did not perform any physical activity. Regarding the use of contraceptive methods, 64% of volunteers used only hormonal method; while 8% used the barrier method (condoms: 6% and

IUD: 2%); 6% used both methods and 22% were not using any contraceptive method. The menstrual cycle had duration of 28 days, which can be considered normal. The general characteristics of subjects are shown in Table 1. Regarding nutritional status, most of the subjects were eutrophic

Conclusion The present study suggests that there are changes in the sour taste perception in the luteal phase of the menstrual cycle, influencing the food intake of adult women, thus modifying their eating behavior, inducing improper food choices, which may compromise the health of these women, raising concern about the increased chances for developing chronic diseases and overweight/obesity. This study also suggests the possibility that hormones ghrelin and insulin influence taste, acting to control food intake. The low consumption of calcium, magnesium and potassium throughout the menstrual cycle can be an indicator of poor dietary habits and also increases the likelihood of developing osteoporosis/ osteopenia, while excessive sodium intake predispose women to the development of hypertensive diseases. Thus, there is a need for the implementation of prevention actions and nutritional counseling for adult women at childbearing age, since their physiology exposes them to greater risk for the development of chronic diseases.

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