Short Reports

INFLUENCE OF AN EXCHANGE OF SEXUAL HORMONES DURING THE OVARIAN-MENSTRUAL CYCLE ON THE VERBAL MEMORY AND LEARNING EFFICIENCY OF THE WOMEN-STUDENTS STUDYING PHYSIOLOGY

Andreyev I.V., Zhanzhekova D.F.*
Kazakhstan-Russian University
**Modern Institute for the Humanities-Tehnical*

In conditions of globalization in the CIS countries the reforming of the system of higher education takes place. Thus, in Republic of Kazakhstan the correspondence form of education has been reorganized into the distant one which, in turn, allows arranging an individual trajectory of studying considering various pedagogical, psychological and physiological factors [1].

One of the physiological factors that influences on mentality as a whole, on the personal behaviour, and on efficiency of his or her activity is a hormonal exchange, in particular an exchange of sexual hormones. It is especially important in the process of women studying. However, phases of the ovarian-menstrual cycle (OMC) in pedagogical activity generally are not considered, researches of this promlem mostly have strictly medical character. There are only a few publications on this issue. Some of them are related to the field of physical training and provide insistent recommendations to decrease physical activity during the period of catameniae [2], some works deal with decision-making processes in economy [3], and reveal the change of decision-making strategy of seller-women during their critical days (due to decreasing of the level of estrogens) who become less risky and more provident which is normally specific for seller-men.

Today influence of exchange of female sexual hormones not only on emotional processes, but also on cognitive sphere is proved [4-6] this resulted in recognizing of a new diagnostic category, namely premenstrual syndrome [7]. Thus, estrogens regulate plasticity of a nerve tissue and serves as the trophic factor. It can influence on formation of connections between neurons in cognitive areas – in the hippocampus and in the brain cortex [8]. Because of neurophysiological functions of hippocampus[9-10], estrogens improves verbal short-term memory, attention and training abilities[9; 12-13]. Estrogens, progesterones and their combinations also positively influence on the serotoninergic system which is carrying out neuro-mediation functions, that is transfering of nervous signals from one neuron to another, strengthen the brain blood-flow and the transport of glucose and its metabolism, and also activate formation of dendrites and synapses [9]. Therefore, in our opinion, in the professional training of female specialists the consideration of the particular qualities of sexual hormones exchange in OMC can be perspective, especially in professional spheres where the number of women prevails over, namely, pedagogical and psychological specialties. Besides, mentioned effects of influence of estrogens on cognitive functions have been received in the course of the researching of efficiency of the replaceable hormonotherapy for women in the post menopause [9; 12-13], but not investigating the analogous processes in the organisms of young healthy women. This aspect still demands additional special research. The maximum of estrogens is being produced during the ovulation period, that is, the 14^{th}-15^{th} day of the 28-day cycle, a minimum – during the catameniae period [6].

Considering that specifics, we have offered to 58 female students at the age of 18-25 years (excluding pregnant, given birth no more than 1 year ago, and having gynecologic problems students) to take the test by technique of 10 words which examines short-term verbal memory. The test was conducted 2 times: during the menstruation period (the 1-5 days of a cycle) and during the presumable ovulation period (the 12-18 days of a cycle adjusted to its duration). The maximum quantity of the reproduced words after the fifth presentation of stimulus was considered. Besides, we have compared the progress of the students – their grades for computer modular testing according to 5 points scale, with that of OMC period. Processing of the received data has been made by SPSS 14.0. We have applied Student t-criterion for connected selections.

According to the technique of 16 words $t_{emp.}$ =-6,64; according to the modular testing $t_{emp.}$ =-6,58; $t_{cr.}$ = 2,0 at $p \leq 0,05$ ($t_{cr.} \leq t_{empir.}$).

That is, distinctions of indicators are statistically authentic and in the menstrual period the indicators of short-term verbal memory are lower, than during the ovulation period.

According to the modular testing $t_{emp.}$ =-6,58; $t_{cr.}$ = 2,0 at $p \leq 0,05$ ($t_{cr.} \leq t_{empir.}$).

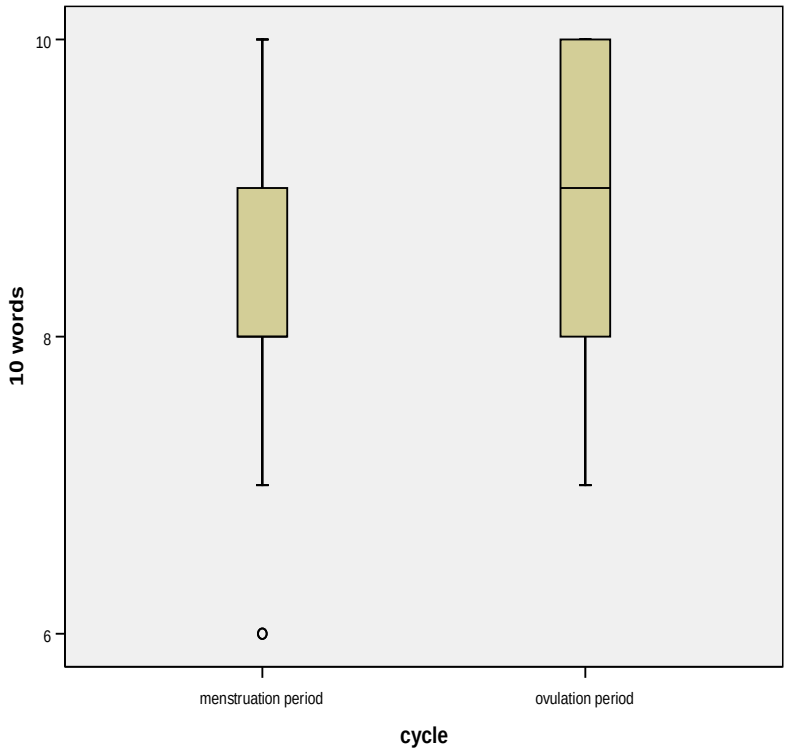

Diagram 1. Box plot of the indexes of the 'Ten Words Method' according to an ovarian-menstrual cycle

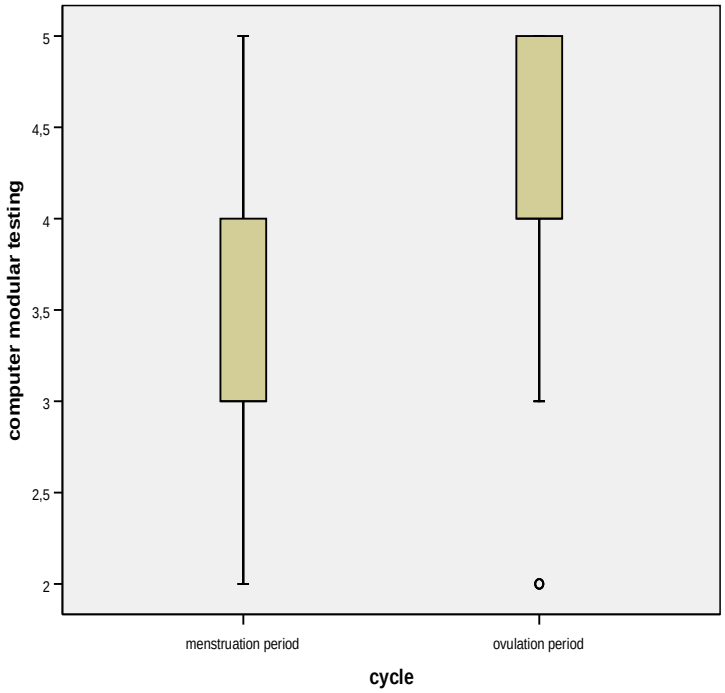

Diagram 2. Box plot of the indexes of the module testing of knowledge adaptation according to an ovarian-menstrual cycle

Moreover, the grades for modular testing reveal the same dependence: students' progress is rising during the ovulation period, i.e. during the peak period of estrogens concentration and, on the contrary, is decreasing with lowering concentration of these hormones.

Thus, it can be recommended for students to intensify their educational activity in respect of mastering of the new information and passing of control procedures in the middle of a menstrual cycle – during the period of the maximum estrogens concentration, and so more productive work of hippocampus, and to minimize the educational activity in the premesrtual period as well as during the period of menstruation.

It is clear, that such tactics of educational process is unlikely in conditions of the traditional form of education with the regulated schedule of learning process, but it can be realized in its innovative forms, for example distant education [2] while the subject of pedagogical process forms the individual trajectory of studying. It is also necessary to note that the received results are preliminary, considering multivariate character of researched phenomena and the necessity of their further complex studying.

References:

1. Distance education (2004). In D. H. Jonassen (Ed.), Handbook of Research in Educational Communications and Technology, 2nd ed. Mahwah, NJ: Lawrence Erlbaum Associates.

2. Sokolova N.I. Women's health in modern sports [in Russian] // http://lib.sportedu.ru/Books/XXPI/2003n3/p34-40.htm

3. Chen Y., Katuscak P., Ozdenoren E. Why Can't a Woman Bid More Like a Man? // www.si.umich.edu/~yanchen/papers/demoq20050903

4. Kelly G.F. (2003) Sexuality Today. The Human Perspektive (7th Edition), McGraw-Hill Humanities.

5. Krug, R., Finn, M., Pietrowsky, R., & Fehm, H. (1996) Jealousy, general creativity, and coping with social frustration during the menstrual cycle**.** *Archives of Sexual Behavior*. 25, 181-199.

6. Psychological Symptoms PMS // http://www.pms.org.uk/About+PMS/Be+Informed/Psychological+Symptoms

7. Connolly M. (2001) Premenstrual syndrome: an update on definitions, diagnosis and management // Advances in Psychiatric Treatment; 7, 469-477.

8. Sexual hormones & Brain [in Russian] // www.climax.ru/doctors/article.asp?id=1129

9. Vinogradov O. S. (1975) The Hippocampus and Memory [in Russian]. Nauka, Moscow.

10. Danilova N.N. (1998). Psychophysiology [in Russian]. Aspekt-Press, Moscow.

11. Phillips S., Sherwin B.B. Effects of estrogen on memory function in surgically menopausal women // Psychoneuroendocrinology. 1992;17:485-495.

12. Kampen D L; Sherwin B B. Estrogen use and verbal memory in healthy postmenopausal women // Obstetrics and gynecology 1994; 83(6): 979-483

THE EFFECT OF *ESCHERICHIA COLI* TOXINS ON BLOOD MICROCIRCULATION IN VENTRAL MESENTERY OF WHITE RATS

Podschibyakin D.V. [a], Ulyanov S.S.[b], Ulianova O.V.[c, b], Tikhomirova E.I.[a], Shibaeva M.A.[a]

[a]*Department of Microbiology and Plant's Physiology, Biological Department,*

[b]*Department of Optics and Biomedical Physics, Physical Department,*

Saratov State University

[c]*Department of Ecology, Plant Protection and Agroecology Department,*

Saratov State Agrarian University

1. Introduction

Bacteria *Escherichia* is the basis of human and animal intestinal microflora. The group of entheropathogenic

E. coli causative colibacillosis has biomedical implication. The virulence of these bacteria associated, at first, by toxins production. The affect of *E. coli* toxins on physiological processes of microorganism particularly investigated.[1] At the same time response of intestine blood vessels on the action of toxins ex tempore in vivo is not describe practically. Changes in blood microcirculation system can be important diagnostic sign, reflecting the interaction of microorganism with surrounding internals' and tissues' cells. One of the perspective methods of evaluation of these changes in biomedical researches is speckle-microscopy[2-5]. Thereby, we carried on an investigation with this method to study the effect of *E. coli* toxins on blood microcirculation in the course of short intervals of time.

2. Methods and materials

2.1 Cultures

We studied exotoxin producing by strain *Escherichia coli* A5 and endotoxin producing by strain *Escherichia coli* B6. Each strain cultured in meat infusion bouillon at 37^{o} C separately. Daily strain cultures centrifuged at 600 g to get supernatants, which used for experiments.

2.2 Laboratory animals

An experimental animals (white rats) sedated by intramuscular injection of 5-Ethyl-5-(1-methylbutyl)-

2,4,6-pyrimidinetrione (*Nembutal*). Then we abducted the abdominal cavity and eviscerated the ventral mesentery. After the abduction we placed rat on the thermostabilizing stage of speckle-microscope. So, the loop of ventral mesentery was placed directly under the microobjective.