Influence of Ethyl Alcohol on to the Condition of Normal and Polycystic Ovaries Left After Unilateral Ovariectomy (Experimental Research)

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Abstract**—**The problem of alcoholic consumption in women appeared to be of a great value both from medical and social point of view. The experimental research carried out on female rats with normal and polycystic ovaries after unilateral ovariectomy in introduction of ethyl alcohol showed that the condition of the vessels, parenchyma, amount of growing and mature follicles in the ovary left after surgical intervention in case of normal ovaries were getting worse in comparison with the control group whether the changes in the single polycystic ovary left were not that severe.

Keywords**—**experiment, ovariectomy, polycystic ovary, ethyl alcohol, fertility.

I. Introduction

ALCOHOLISM is a chronic, progressive, and potentially fatal disease. Characterized by tolerance and physical dependency, it can also include pathological organ changes, all due to the direct or indirect consequences of the alcohol ingested [1].

The problem of alcoholic consumption for women appeared to be of a great value both from a medical and social point of view. In many developed countries the significant growth of women in their fertile age were revealed to have chronic alcoholic intoxication. Female alcoholism usually develops faster than in the opposite sex and its course appears to be malignant from the very beginning [2, 3]. Experimental data shows that the distribution volume of alcohol in females differs from males due to their smaller body mass and water constitution [4]. Alcohol is also slightly metabolized differently in women. The rate of excretion of ethanol was slower in the female rats in comparison to their counterparts [5].

Females are additionally more susceptible to alcoholism due to their low level of testosterone, which appears to play a protective role against the development of chronic alcoholism [6]. But among the researches on chronic alcoholism being carried out there are no data that describes the influence of alcohol on the normal and polycystic ovary left after unilateral ovariectomy which is important because of the growing incidence of pathology of the gametes producing systems.

The **aim** of our work was to investigate the character of morphological changes taking place in normal and polycystic ovary after a twin organ had been removed in introduction of ethyl alcohol.

II. Materials and Methods

The research was carried out on 80 female Wistar rats, weight 75-110 g (the age of the rats – 1 month old). Twelve rats served as a control. For solving this problem, the experiment was created. Experimental group was divided into two groups – rats with normal ovaries, and rats with the induced polycystic ovarian syndrome. Polycystic ovary syndrome was induced according to the certified method – by injecting 0.1ml of the 5% testosterone solution subcutaneously to newborn female rats in a 6 hour period right after they were born [7]. Unilateral ovariectomy (UOE) was performed on all of the rats who were under experiment with ether anesthesia. Chronic alcoholic intoxication was induced by the intragastric introduction of the 40% ethyl alcohol to the rats daily during 1 month period (0.015 ml of the 96% ethyl alcohol per 1 g of body mass) [8]. Terms of observation were determined at 1 month interval after UOE. The weight of the rats and the weight of the removed ovaries were counted. To unify the results of the research we were making all the calculations for the right ovary left after UOE only (as the dominant one) [9]. Histological (hematoxilyn&eosin stain, Mallory stain, ABH&E stain [10] and morph metrical researches were used to evaluate the degree of compensational processes taking place in an ovary left after unilateral ovariectomy. The results received were analyzed in MedStat (certified version, serial number – MS 000030, version 3) [11].

III. Results

Organ metrical data are presented in the Tab. #1. As it follows from the table the results were significant in case of polycystic ovaries. The mass of the ovary and the mass of the rats were increased in comparison with the control group in rats with polycystic ovaries and UOE whether the same data of the normal ovary were decreased.

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TABLE I
ORGAN METRICAL DATA OF THE NORMAL AND POLYCYSTIC OVARY LEFT AFTER UNILATERAL OVARIECTOMY IN INTRODUCTION OF ETHYL ALCOHOL

Experimental group	Mass of the rats (g)	Mass of the ovary (mg)	Volume of the ovary (mm3)	Relative weight of the ovary (mg/mm3)
normal ovary after UOE	90.7±2.0	16.4±0.4	20.2±1.6	0.8±0.07*
polycystic ovary after UOE	83.3±1.1*	15.3±0.2**	6.3±0.3*	2.4±0.11

Footnote: * - P<0,05; ** - P<0,01; *** - P<0,001 – possibility of the mistake.

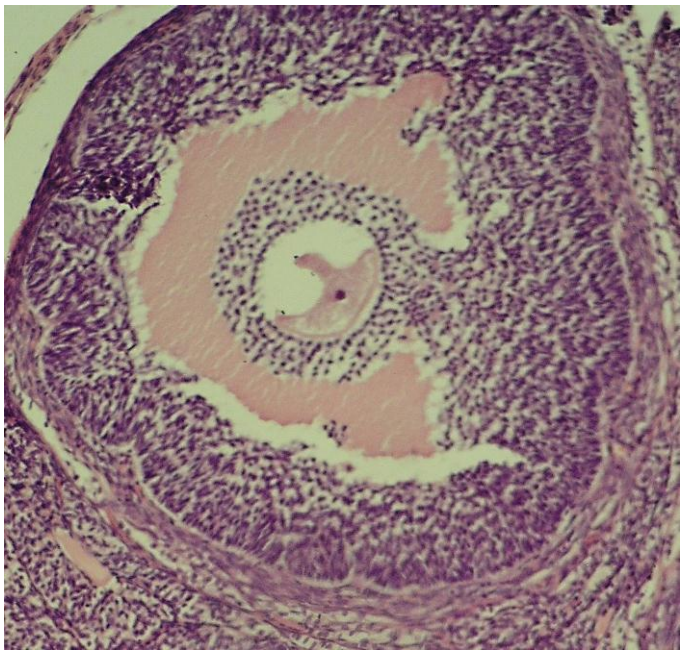
The relative area of generative elements is significantly decreases in case of normal ovary left after UOE in introduction of the ethyl alcohol (Tab. #2). In case of polycystic ovary left after UOE the correlation of the stroma and parenchyma is close to the control group. The relative area of the vessels in the normal ovary significantly decreases which serves as the sign of stroma sclerosis.

TABLE II
CORRELATION BETWEEN STROMA AND PARENCHYMA IN THE NORMAL AND POLYCYSTIC OVARY LEFT AFTER UNILATERAL OVARIECTOMY IN INTRODUCTION OF ETHYL ALCOHOL

Experimental groups	Parenchyma (generative elements) (%)	Stromal elements (%)	
		Stroma	Vessels
normal ovary after UOE	48.9±0.9**	46.7±1.2	4.4±0.4**
polycystic ovary after UOE	50.1±0.7*	44.3±0.8	5.6±0.7*

Footnote: * - P<0,05; ** - P<0,01; *** - P<0,001 – possibility of the mistake.

On the histological slides in case of the normal ovary left after UOE in introduction of ethyl alcohol, it is clearly seen that generative elements are impaired (Pic. #1). Theca cells are forming folds that intrude into the follicle cavity due to the lack of blood supply. The colour and, accordingly, chemical structure of the follicular liquid is changed to the more hyalin-like substance. Zona pellucida of the follicle if folded, contacts in between follicular cells are rather loose. Those are the signs of the cyst formation. The amount of primary follicles has decreased and amount of atretic follicle increased.



(magnification *100, hematoxylin-eosin stain)
Picture 1 Micro Slide Of The Normal Ovary Left After Unilateral Ovariectomy In Introduction Of Ethyl Alcohol

In case of the polycystic ovary histological differences in between control and experimental group are not significant

IV. DISCUSSION

According to the results received it was revealed that the condition of the vessels, parenchyma, amount of growing and mature follicles in the ovary left after UOE in case of introduction of ethyl alcohol were getting worse in case of initially intact ovaries whether the changes in the polycystic ovary left after UOE were not that severe.

V. CONCLUSION

Based on the results of this experiment we came to the following conclusions:

1. Ethyl alcohol consumption has a great negative influence on female genital glands especially on the single ovary left after unilateral ovariectomy which result in infertility due to the massive follicle loss.
2. In case of polycystic ovary syndrome the influence of ethyl alcohol is not severe. According to our opinion it is happening due to the impaired hormone level (increased level of testosteron) in the organism of the rat with the polycystic ovary syndrome.

There are still a lot of unknown and controversial issues requiring follow-up experiments of the polycystic ovary syndrome, and ways to prevent follicle loss in female patients.

REFERENCES

[1] Yunda L., Onischenko Ye. Pathogenesis and therapy of the ethyl alcohol addicted people / Liki Ukrayinyi. – 2004. - №12. – P. 73-76.
[2] Diagnostics and treatment of the chronic alcoholic disease / V.N. Morozov, A.S. Galtsev, I.V. Darmograyi et al. // Clinical and laboratory diagnostics. – 2004. - №9. – P. 80-85.

[3] Petrova Yu.V. About the mechanisms of the ethyl alcohol influence on the human organism // Nutrition questions. – 2004. – Vol. 73, №3. – P.43-46.
[4] The significance of the sex differences of the experimental animals for ethanol and acetaldehyde distribution / L.A. Andronova, M.M. Ushakova, R.V. Kudryavtsev et all. // Pharmacology and toxicology. – 1982. - №5. – P. 101-105.
[5] Pharmacokinetics of the ethanol in drugs action and endogenous ethanol in female rats / L.A. Andronova, M.M. Ushakova, R.V. Kudryavtsev at all. //Bulleten of the experimental biology and medicine. – 1982. - №12. – P. 60-62.
[6] Cole-Harding S. Ethanol metabolism in men and women / S. Cole-Harding, W.R. Sames // S.Stud. Alcohol. – 1987. – Vol. 48. - №4. – P. 380-387.
[7] Reproduction of gynecological diseases in experiment. Lazarev N.I., Ird E.A., Smirnova I.O. – Moscow: 1976.
[8] Clinical and experimental research of the circulatory system reaction to the alcohol consumption in relation to the way and incidence of its usage // V.A. Kononyachenko, V.A. Frolov, V.E. Dvornikov et al. // Cardiology. – 1983. - №7. – P. 102-103.
[9] Lyashchenko O.I. Structural asymmetry of the ovaries and uterus / O.I. Lyashchenko, Ye.Yu. Bessalova // Klinichna anatomiya ta operatyivna hirurgiya. — 2007. — T. 6, № 1. — C. 72–74.
[10] Arkadiy I. Brusilovskiy, Applying eosin before hematoxylin speeds the staining process and aids in detection of amphoteric substances // American Journal of Clinical Pathology. – December 5. – 2005.
[11] Lyach Yu.E., GuryanovV.G., Homenko V.N., Panchenko O.A., Basics of computer biostatistics: the analysis of the obtained information in biology, medicine and pharmacology using the statistical software MedStat. – Donetsk. – 2006.