WORLD SCIENCE

Special Edition
May 15-16, 2019

VI Ukrainian Scientific Conference of Students and Young Scientists in Physiology «Physiology to Medicine, Pharmacy and Pedagogics: Actual Problems and Modern Advancements»

DOI: https://doi.org/10.31435/rsglobal_ws

Publisher –
RS Global Sp. z O.O.,

Scientific Educational Center
Warsaw, Poland

Numer KRS: 0000672864
REGON: 367026200
NIP: 5213776394

Publisher Office's address:
Dolna 17, lok. A_02
Warsaw, Poland,
00-773

Website: https://ws-conference.com/
E-mail: rsglobal.poland@gmail.com
Tel: +4(857) 898 55 10

CONTENTS

FEMALE VS. MALE: DIFFERENCE IN IMMUNE RESPONSE

Professor, DMedS ***Dmytro I. Marakushyn,*** *Associate professor, PhD* ***Inna M. Isaieva,*** *Associate professor, PhD* ***Iryna S. Karmazina,*** *assistant* ***Natalia S. Hloba, Elijah Adetunji Oluwasegun, Kateryna M. Makarova***

Ukraine, Kharkiv, Kharkiv National Medical University

DOI: https://doi.org/10.31435/rsglobal_ws/16052019/6431

ARTICLE INFO

Received: 20 March 2019
Accepted: 18 April 2019
Published: 16 May 2019

KEYWORDS

sex differences,
adaptation capacity,
humoral immunity,
cellular immunity,
Harkavy's index.

ABSTRACT

The early diagnostics of premorbid conditions plays the most important role in medical examinations. It is known, that the ability to adapt to changing environmental conditions is determined by the functioning of the sympathetic and parasympathetic links of the autonomic nervous system, as well as the endocrine system. Changes in the functional activity of the nervous and endocrine systems affect the activity of the third regulatory system - the immune system, which, in turn, can actively influence the neurohumoral path. The leukogram is an integral indicator of the balance of all homeostatic systems of the body. The cause of leukocyte rearrangements is often the general mobilization of the protective mechanisms of the body, so it is successfully used to assess the nonspecific adaptation reaction.

Therefore the purpose of research was to study the features of adaptive capacity of male and female medical students by analyzing the adaptation intensity using L. Harkavy's index.

Obtained data has shown that the relationship between humoral and cellular immunity is balanced in a greater number of males, but the distribution of the Harkavy's index in group of females and males was different that allowed to conclude the Harkavy's index in group of females indicates a more active response reaction or "re-activating" immune response.

Citation: Dmytro I. Marakushyn, Inna M. Isaieva, Iryna S. Karmazina, Natalia S. Hloba, Elijah Adetunji Oluwasegun, Kateryna M. Makarova. (2019) Female vs. Male: Difference in Immune Response. *World Science. Special Edition. VI Ukrainian Scientific Conference of Students and Young Scientists in Physiology «Physiology to Medicine, Pharmacy and Pedagogics: Actual Problems and Modern Advancements»* doi: 10.31435/rsglobal_ws/16052019/6431

Introduction. Currently, the priority goals, objectives and directions of modern practical health care are the formation of a healthy lifestyle, preservation of a healthy person's health, early diagnostics of premorbid conditions and prevention of socially significant diseases, as well as an increase in life expectancy [1]. At the same time, early diagnostics of premorbid conditions plays the most important role in medical examinations, which are preventive medical examinations, physician consultations and medical research conducted during certain age periods of a person, and also includes an assessment of the functional state, degree of stress of the body's regulatory systems and adaptation reserves [1], which are held to identify and prevent the development of various diseases in population. In this case, the most important issue is the selection of methods for rapid diagnosis of the state of

somatic and psychophysiological level of health and prognosis of the development of a particular pathological process.

It is known, that the ability to adapt to changing environmental conditions is determined by the functioning of the sympathetic and parasympathetic links of the autonomic nervous system, as well as the endocrine system. Changes in the functional activity of the nervous and endocrine systems affect the activity of the third regulatory system - the immune system, which, in turn, can actively influence the neurohumoral path [2].

The leukogram is an integral indicator of the balance of all homeostatic systems of the body. The cause of leukocyte rearrangements is often the general mobilization of the protective mechanisms of the body, so it is successfully used to assess the nonspecific adaptation reaction.

The purpose of research: to study the adaptive capacity of medical students by analyzing the adaptation intensity using L. Harkavy's index.

Materials and methods. The study involved 515 students of the 2nd year of Kharkiv National Medical University, among them there were 125 males (24%) and 383 females (76%). Adaptation intensity index of L. Harkavy (IH) was calculated using the following formula: IH = lymphocytes / segmented neutrophils, which normally ranges from 0.3 to 0.5. The values of leukocytes have been obtained during analysis of the results of medical preventive examinations, in particular the hematology reports.

Results and its discussion. The analysis of the IH in females showed that the average value of the IH was 0.62, while the value of the IH, which was within the physiological norm, was detected in 42% of cases, a decrease in the IH was observed in 1%, and an increase in IH was found in 57% of cases. Analysis of the IH among males revealed the following: value of IH which was within the physiological norm was found in 38% of cases, that is 4% less than in the group of females, while in 62% of cases there was an increase in the IH, which is 5% more than in the group of females.

Based on the obtained data, it can be assumed that the relationship between humoral and cellular immunity is balanced in a greater number of males, but if to consider the distribution of the IH in both groups of research, we can find the following: in 94% of the males the IH was in the range of 0.3-0.7, while in the group of females the same IH value was found in 86% of cases, that is, in 13% of cases, the IH value was greater than 0.7, moreover, in 3% of cases the IH value was greater than 1, but this phenomenon was not encountered in the group of males.

The mentioned above features of the distribution of IH in a group of females indicate a more active response reaction, i.e. "re-activating" immune response.

The activity of the immune system, as well as the corresponding response of the body, is due to a variety of endogenous and exogenous factors. Gender plays, in this case, an integral role in the quality and quantity of the response [3,4]. One of the fundamental factors is that women have a more pronounced innate, cellular and humoral links of immunity than men, which makes it possible to facilitate the immune response to the action of a pathogenic factor, but, on the other hand, increases the risk of autoimmune pathology [5,6].

In the medical aspect, sex is determined by genetic status, and at the same time, gender by social and cultural characteristics.

The concentration of sex hormones, the genes of the chromosome, as well as the influence of external and internal factors determine immunological dimorphism. It is known that the immune response to pathogenic factors in men and women is heterogeneous, while women are less susceptible to various kinds of infectious diseases, due to a more pronounced humoral and cellular immune response, as well as innate immunity [7].

There are several differences in the quality and quantity of innate immunity in men and women, in particular, in women, more pronounced phagocytic activity of neutrophils and macrophages, as well as antigen-presenting cells, in comparison with men. Also, it was found that females CD4 + T cells were higher, while men have lower CD3 + and CD4 + T cells counts, CD4 + to CD8 + T cells ratio. Sex hormones such as estrogen, progesterone and testosterone also affect the quantitative and qualitative state of the immune response through the impact on certain specific receptors [8].

The microbiome composition is regulated by sex-specific determinants and potentially influences immune cells functional profile. This affects specific response reaction to vaccination where some studies have shown that women receiving half dose seasonal influenza vaccination

generated a stronger antibody response compared to male vaccination with full dose. Also, besides influenza the same vaccination response has been observed for other vaccines, such as hepatitis, measles, herpes simplex and others [9].

Conclusions. Therefore, the strategies of therapy and prevention of infectious diseases should be based on differences taken into account to sex and gender.

REFERENCES

1. Таранцова А. В. Результаты интегральной скрининг-оценки состояния уровня здоровья молодежи (на примере Центра здоровья Ростовской области) // Вестник Здоровье и образование в XXI веке. 2010. №1. URL: https://cyberleninka.ru/article/n/rezultaty-integralnoy-skrining-otsenki-sostoyaniya-urovnya-zdorovya-molodezhi-na-primere-tsentra-zdorovya-rostovskoy-oblasti.
2. Казидаева Е.Н. Физиологические корреляты адаптационных реакций по Л.Х. Гаркави у подростков и молодых людей с избыточной массой тела и мягкой артериальной гипертензией [Електронний ресурс]: Вестник новых медицинских технологий. – 2015. – №1. Публикация 2-9. Режим доступу до журн.: http://www.medtsu.tula.ru/VNMT/Bulletin/E2015-1/5072.pdf
3. Marriott, I. & Huet-Hudson, Y.M. Immunol Res (2006) 34: 177. https://doi.org/10.1385/IR:34:3:177
4. Klein SL. Immune cells have sex and so should journal articles. Endocrinology 2012;153(6):2544-50. DOI:10.1210/en.2011-2120
5. Klein SL, Jedlicka A, Pekosz A. The Xs and Y of immune responses to viral vaccines. Lancet Infect Dis 2010;10(5):338-49. DOI: 10.1016/S1473-3099(10)70049-9
6. Cook IF. Sexual dimorphism of humoral immunity with human vaccines. Vaccine 2008;4;26(29-30):3551-5. DOI: 10.1016/j.vaccine.2008.04.054
7. Hewagama A, Patel D, Yarlagadda S, et al. Stronger inflammatory/cytotoxic T-cell response in women identified by microarray analysis. Genes Immun 2009;10(5):509-16. DOI: 10.1038/gene.2009.12
8. Nalbandian G, Kovats S. Understanding sex biases in immunity: effects of estrogen on the differentiation and function of antigen-presenting cells. Immunol Res 2005;31(2):91-106. DOI: 10.1385/IR:3:2:091
9. Engler RJ, Nelson MR, Klote MM, VanRaden MJ,Huang CY, Cox NJ, Klimov A, Keitel WA, Nichol KL,Carr WW, Treanor JJ; Walter Reed Health Care System Influenza Vaccine Consortium. Half- *vs* full-dose trivalent inactivated influenza vaccine (2004-2005): age, dose, and sex effects on immune responses. *Arch Intern Med* 2008;168(22):2405-14. DOI: 10.1001/archinternmed.2008.513