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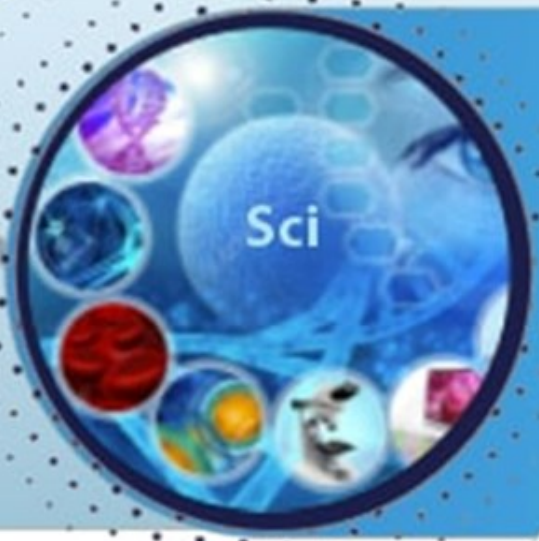

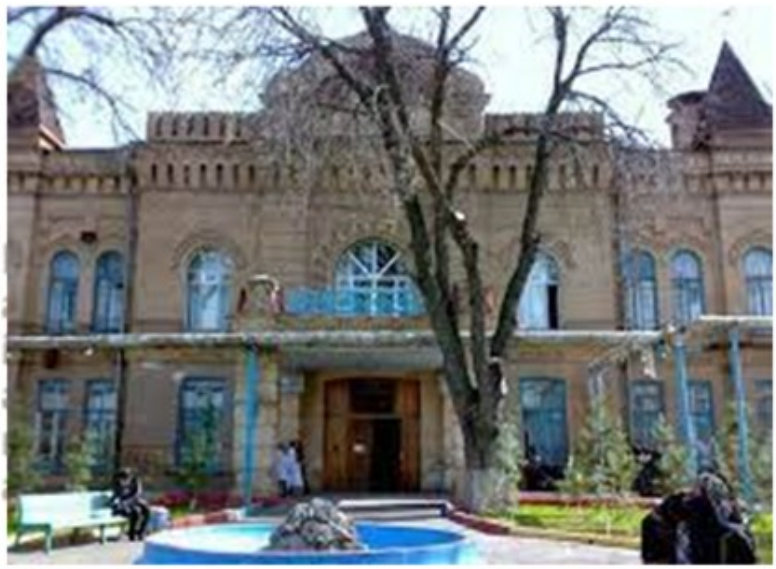

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Cytokine Status in Pregnant Women Vaccinated Against COVID-19

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Abstract

Background. One of the main measures for the specific prevention of corona virus infection (COVID-19) is to vaccinate the population, including pregnant women at risk, against this disease. Studies investigating the effects of the COVID-19 vaccine on obstetric and perinatal outcomes have been based on data that show no evidence that vaccines pose a risk to pregnant women or the fetus, or that vaccines have adverse effects on pregnancy or perinatal outcomes. The purpose of the study was to study the features of cytokine status in pregnant women vaccinated against COVID-19.

Methods. 120 pregnant women from 16 to 36 weeks of gestation, vaccinated against COVID-19 in the second and third trimesters, were examined. Immunological studies were carried out to determine the content of cytokines IL-1β, IL-4, IL-6, IL-8, IL-10 and IFNγ in blood serum.

Results. In pregnant women included in the study, regardless of which trimester and with which component of pregnancy the vaccine against SOVID-19 was vaccinated, the examination of the amount of cytokines 1 week after vaccination showed a 1.1-fold increase in the amount of IL-1, IL-6 and IFNγ cytokines compared to women in the comparison group. A 1.2-fold decrease in IL-4 and IL-8 was observed, but these changes did not exceed the normal range, and in the examination 2 and 3 weeks after vaccination, the quantitative indicators of all the above-mentioned cytokines were determined at the normal level.

Conclusion. Study of cytokine status in pregnant women vaccinated against COVID-19, regardless of which component of the vaccine was administered in which trimester of pregnancy, 1 week after vaccination, IL-1, IL-6 and IFNγ cytokines were 1.1 times compared to the comparison group. increased, and IL-4 and IL-8 cytokines decreased by 1.2 times, and in the examination 3 weeks after vaccination, it was found that the quantitative indicators of all cytokines were at the normal level, which indicates that the vaccine against COVID-19 has a negative effect on the state of cytokines indicates that he did not reveal the secret.

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INTRODUCTION

One of the main measures for the specific prevention of corona virus infection (COVID-19) is to vaccinate the population, including pregnant women at risk, against this disease [1-7]. Studies investigating the effects of the COVID-19 vaccine on obstetric and perinatal outcomes have been based on data that show no evidence that vaccines pose a risk to pregnant women or the fetus, or that vaccines have adverse effects on pregnancy or perinatal outcomes [8-11]. Getting vaccinated against COVID-19 is a very relevant and difficult choice topic for all pregnant women today [12-16].

To date, very little information has been collected about vaccination of pregnant women against coronavirus infection [17-20]. However, despite this, currently there is no information in the world literature about studies conducted to study the effect of vaccination on cytokine status in women vaccinated

against COVID-19 during pregnancy [21-25]. Based on the above, it is important to study cytokine status in pregnant women vaccinated against COVID-19, to evaluate their post-vaccination condition, and to carry out pregnancy and childbirth.

The purpose of the study was to study the features of cytokine status in pregnant women vaccinated against COVID-19.

MATERIALS AND METHODS

120 pregnant women vaccinated against COVID-19 at various stages of pregnancy were included in the study. Depending on the period of vaccination, all pregnant women were divided into 2 groups: Group I (main) - 60 pregnant women vaccinated in the second trimester of pregnancy; Group II (main) - consisted of 60 pregnant women who were vaccinated in the third trimester of pregnancy. The control group (comparison group) consisted of 30 pregnant women who refused vaccination. Vaccination against COVID-19 was carried out using the combined vector vaccine "Gam-Kovid-Vak". In all women, the quantitative status of IL-1β, IL-4, IL-6, IL-8 and IFNγ cytokines was studied after each component of the vaccine was administered. The content of cytokines in blood serum was determined using ELISA (Vektor-Best OJSC, RF).

Statistical processing of the research results was carried out using Spearman's rank correlation method using Statistica 10.0 standard package of statistical software and Epi Info 7.2.2.2 statistical program with determination of 2 variation series errors connected between natural pairs. Differences at $p<0.05$, $p<0.01$, $p<0.001$ were considered reliable.

RESULTS

The analysis of quantitative indicators of cytokines in the early period after vaccination, that is, after 1 week, in women who received components 1 and 2 of the vaccine against COVID-19 in the II trimester of pregnancy showed that IL-1, IL-6, IL-10, and The amount of IFNγ cytokines increased 1.1-fold compared to the values 3 weeks after vaccination with the upper limit of normal values of 11.0±8.2 pg/ml, 7.0±4.1 pg/ml, 31,0±0.06 pg/ml and 128.0±0.12 IU/ml. ($p<0.05$). Quantitative levels of IL-4 and IL-8 cytokines were found to be 9.1.0±4.1pg/ml and 58.0±2.1pg/ml, respectively, decreasing by 1.2 times compared to other cytokines ($p<0.05$).

The analysis of the quantitative indicators of cytokines in women of this group, 3 weeks after vaccination, showed that the quantitative indicators of IL -1, IL-6, IL-10 and IFN-γ cytokines in the blood of women decreased to 10.8±6, respectively. It was 7pg/ml, 7.0±2.7 pg/ml, 30.7±0.12 pg/ml and 124.0±0.11 IU/ml. Quantitative levels of IL-4 and IL-8 cytokines while a slight increase was found at the level of high indicators of the normal level at 10.0±4.1pg/ml and 61.6±3.1pg/ml, respectively ($p<0.05$).

Quantitative indicators of cytokines in pregnant women in the early and late periods after administration of the 1st and 2nd components of the vaccine against COVID-19 in the II trimester of pregnancy are presented in table 1.

The analysis of quantitative indicators of cytokines 1 week after vaccination in women who received components 1 and 2 of the vaccine against COVID-19 in the III trimester of pregnancy showed that the amount of IL-1, IL-6, IL-10 and IFN-γ cytokines, comparison group increased by 1.1 times, 11.0±2.1 pg/ml, 7.0±2.12 pg/ml and 30.8±0.04 pg/ml and 128.0±0.14 un, respectively /ml. ($p<0.05$).

Table 1

Weekly dynamics of cytokine concentration during administration of the 1st and 2nd components of the vaccine in pregnant women vaccinated against COVID-19 in the II trimester of pregnancy, M±m

Indicator	Women who received the 1st component of the vaccine (n=60)			Women who received the 2nd component of the vaccine (n=60)		
	After 1 week	After 2 week	After 3 week	After 1 week	After 2 week	After 3 week
IL-1, pg/ml	11± 8,2*	10,4± 8,9	10,8± 6,7**	11,0± 2,4	10,7± 6,1	11,0± 7,1
IL-4, pg/ml	9,1± 4,1*	9,8± 2,1	10,0± 4,1**	10,0± 5,9	9,9± 6,1	10,0± 3,1
IL-6, pg/ml	7,0± 4,1*	6,8± 2,1	7,0± 2,7**	7,0± 0,14	6,7± 2,12	7,0± 0,2**
IL-8, pg/ml	58,0± 2,1*	60,6± 1,1	61,6± 3,1**	61,9± 5,9	60,6± 3,7	60,4± 9,7
IL-10, pg/ml	31,0± 0,06	30,8± 0,04	30,7± 0,12*	31,0± 0,07	30,6± 0,02	30,8± 0,04*
IFN-γ ed.ml	128± 0,12*	126,8± 0,14	124± 0,11**	128± 0,09*	126,1 ± 0,17	128± 0,02**

Note * - significant differences compared to the indicators after 1 week of vaccination
(* – p<0,05, ** – p<0,01, *** – p<0,001)
^ – significant differences compared to the indicators 3 weeks after vaccination (^ – p<0,05,^^ – p<0,01, ^^^ – p<0,001)

Quantitative levels of IL-4 and IL-8 cytokines decreased by 1.2 times compared to the values of the late weeks of the vaccination period and were 9.4±4.1 pg/ml and 60.0±2.1 pg/ml, respectively ($p<0.05$). In women vaccinated in the third trimester of pregnancy, there were no significant changes in the level of IL-10 in the early post-vaccination period, which was -30.6±0.11 pg/ml. In this group of women, the analysis of the quantitative indicators of cytokines 3 weeks after vaccination showed that the quantitative indicators of cytokines IL-1, IL-6, IL-10, and IFN-g were at the normal level, that is, respectively, 11 It was 0±3.7 pg/ml, 7.0±2.4 pg/ml, 30.6±0.11 pg/ml and 127.6±0.24 ed/ml. The amount of IL-4 and IL-8 cytokines decreased, and the quantitative level of IL-4 and IL-8 cytokines increased and returned to the normal level, 10.0±2.7 pg/ml and 61.4±0.12 pg/ml, respectively ($p<0.05$). Quantitative parameters of cytokines in pregnant women after administration of the first and second components of the vaccine against COVID-19 in the III trimester of pregnancy are presented in Table 2.

DISCUSSION

Physiological pregnancy immunosuppression mechanisms, probably, mainly determine the dynamics of the cytokine cascade in patients in the investigated groups, in particular: an increase in the level of IL-1, IL-6, the absence of a significant increase in the level of anti-inflammatory cytokines in the late post-vaccination period. [28-32] However, the combined vector vaccine affected the secretion of cytokines and revealed a short-term increase in the levels of IL-1 and IL-6 and IFN-γ, which was most pronounced in pregnant women vaccinated in the second trimester of pregnancy. [33]

Table 2

The dynamics of the number of cytokines in different periods of vaccination in women vaccinated against COVID-19 in the III trimester of pregnancy M±m

Indicator	Women who received the 1st component of the vaccine (n=60)			Women who received the 2nd component of the vaccine (n=60)		
	After 1 week	After 2 week	After 3 week	After 1 week	After 2 week	After 3 week
IL-1, pg/ml	11,0± 2,1*	10,8± 8,9	11,0± 3,7**	11,2± 2,2*	10,8± 4,2**	11,0± 4,1**
IL-4, pg/ml	9,4± 4,1	9,6± 2,1	10,0± 2,7	11,0± 0,14*	9,9± 1,10** *	10,0± 7,12
IL-6, pg/ml	7,0± 2,12*	6,6± 0,1**	7,0± 2,4***	7,0± 1,12*	6,9± 4,2**	7,0± 2,14
IL-8, pg/ml	60,0± 2,1*	58,4± 1,1	61,4± 0,12**	60,9± 1,12*	61,1± 3,7**	60,8± 4,7
IL-10, pg/ml	30,8± 0,04*	30,0± 0,02**	30,6± 0,11**	31,2± 0,04*	30,4± 0,02**	30,6± 0,02
IFN-γ ed.ml	128,0 ±0,14*	126,4 ±0,14* *	127,6 ±0,24	127,2 ±0,04*	126,2 ±0,12* *	127,1 ±0,02

Note** - significant differences compared to the indicators 1 week after vaccination (* – P<0,05, ** – P<0,01, *** – P<0,001)
^ – significant differences compared to the indicators 3 weeks after vaccination (^ – P<0,05, ^^ – P<0,01, ^^^ – P<0,001)

In women vaccinated in the third trimester of pregnancy, there were no significant changes in the level of IL-10 in the early period after vaccination. In the groups of pregnant women under study, all changes in immunogram indicators did not go beyond the permissible limits of the norm and showed a stable state of the immune system.

Thus, the study of the cytokine status in pregnant women vaccinated against COVID-19 showed that the quantitative changes in the cytokine status describing the immunogram indicators did not go beyond the permissible limits of the norm, which is a negative effect of the vaccine used in the vaccination on the cytokine status indicates that it has not been shown.

CONCLUSION

Study of cytokine status in pregnant women vaccinated against COVID-19, regardless of which component of the vaccine was administered in which trimester of pregnancy, in the examination 1 week after vaccination, IL-1, IL-6 and IFN-γ cytokines compared to the comparison group 1 ,1-fold increase, and IL-4 and IL-8 cytokines decreased by 1.2-fold, and at 3 weeks post-vaccination examination, all cytokine quantitative indicators were found to have returned to the normal level, indicating that the vaccine against COVID-19 in them cytokine status indicates that it did not have a negative effect.

Ethics approval and consent to participate - All patients gave written informed consent to participate in the study.

Consent for publication - The study is valid, and recognition by the organization is not required. The author agrees to open publication

Availability of data and material - Available

Competing interests - No

Financing – No

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COVID-19GA QARSHI EMLANGAN HOMILADOR AYOLLARDA TSITOKINLAR STATUSINING HOLATI

Diyoraxon Mirzaalievna Mamajanova, Farxad Ishkulovich Shukurov

Toshkent Tibbiyot Akademiyasi

Abstrakt

Dolzarbligi. Koronavirus infektsiyasining (COVID -19) o‘ziga xos profilaktikasi bo‘yicha asosiy choratadbirlardan biri aholini, jumladan, xavf guruhidagi homilador ayollarni ushbu kasallikka qarshi emlashdan iborat. Bugungi kunga qadar COVID-19 vaktsinasining akusherlik va perinatal natijalarga ta’sirini o‘rganish bo‘yicha tadqiqotlar o‘tkazilmagan.

Tadqiqot maqsadi. COVID-19ga qarshi emlangan homilador ayollarda tsitokinlar statusi xususiyatlarini o‘rganishdan iborat.

Tadqiqot usuli. Tadqiqotga xomiladorligini ikkinchi va uchinchi trimestrlarida COVID-19ga qarshi emlangan 120 nafar ayollar kiritildi. Tsitokinlar miqdorini qon zardobidagi miqdorini aniqlash uchun IL-1, IL-4, IL-6, IL-8, IL-10 va IFNγ tsitokinlarini immunologik usul yordamida tekshiruvi o‘tkazildi.

Natijalar. Tadqiqotga kiritilgan homilador ayollarda COVID-19ga qarshi vaktsinaning homiladorlikni qaysi trimestri va nechanchi komponenti bilan emlanganligiga qaramasdan, emlashdan 1 xaftadan keyingi tsitokinlar miqdorini tekshiruvi ularda taqqoslash guruxiga kiruvchi ayollarga nisbatan IL-1, IL-6 va IFNγ tsitokinlar miqdorining 1,1 baravarga ortishi kuzatilib, IL-4 va IL-8 ning miqdori 1,2 baravarga pasayishi kuzatilib, biroq bu o‘zgarishlar me’yor chegaraasidan chiqmadi, emlashdan keyingi 2 va 3 xaftadan keyingi tekshiruvda esa, yuqorida zikr etilgan barcha tsitokinlarning miqdoriy ko‘rsatkichlari me’yor darajasida aniqlandi.

Xulosa. COVID-19 ga qarshi emlangan homilador ayollarda tsitokinlar holatini o‘rganish, vaktsinani qaysi komponentini homiladorlikni qaysi trimestrida yuborilganiligiga qaramasdan, emlashdan 1 xafta o‘tgandan keyin IL-1, IL-6 va IFNγ sitokinlarining taqqoslash guruxi ko‘rsatkichlariga nisbatan 1,1 barobar ortishi, IL-4 va IL-8 tsitokinlarning esa 1,2 barobar pasayishi, emlashdan 3 xaftadan keyingi tekshiruvda esa, barcha tsitokinlar miqdoriy ko‘rsatkichlari me’yor darajasiga qaydganligi aniqlandi, bu holat ularda COVID-19ga qarshi emlash tsitokinlar holatiga salbiy ta’sir ko‘rsatmaganligidan dalolat beradi.

Kalit sozlar: homilador ayollar, COVID-19ga qarshi emlash, tsitokinlar

ЦИТОКИНОВЫЙ СТАТУС У БЕРЕМЕННЫХ ЖЕНЩИН, ВАКЦИНИРОВАННЫХ ПРОТИВ COVID-19

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Абстракт

Введение. Одной из основных мер специфической профилактики коронавирусной инфекции (COVID-19) является вакцинация населения, в том числе беременных из группы риска, против этого заболевания. Исследования, изучающие влияние вакцины против COVID-19 на акушерские и перинатальные исходы до сегодняшнего дня, не были проведены.

Цель. Изучить особенности цитокинового статуса у беременных женщин, вакцинированных против COVID-19.

Методы. Обследовано 120 беременных в сроке от 16 до 36 недель гестации, вакцинированных против COVID-19 во втором и третьем триместрах. Проведены иммунологические исследования по определению содержания цитокинов IL-1β, IL-4, IL-6, IL -8, IL -10 и IFNγ в сыворотке крови.

Результаты. У беременных, включенных в исследование, независимо от того, в каком триместре и с каким звеном беременности была привита вакцина против COVID-19, исследование количества цитокинов через 1 неделю после вакцинации показало увеличение количества IL-1 в 1,1 раза. 1, цитокинов IL-6 и IFNγ по сравнению с женщинами группы сравнения. Отмечено снижение в 1,2 раза IL-4 и IL-8, но эти изменения не выходили за пределы нормы, а при обследовании 2 и 3 недели. после вакцинации количественные показатели всех вышеперечисленных цитокинов определялись на уровне нормы.

Вывод. Исследование цитокинового статуса у беременных, вакцинированных против COVID-19, независимо от того, какой компонент в каком триместре беременности вакцины вводили, через 1 неделю после вакцинации цитокины IFNγ, IL-6 и IL-1 повышались в 1,1 раза по сравнению с группе сравнения, а цитокины IL-4 и IL-8 снизились в 1,2 раза, а при обследовании через 3 недели после вакцинации было установлено, что количественные показатели всех цитокинов регистрировались на нормальном уровне, что свидетельствует о том, что вакцинация против COVID -19 не оказывал негативного влияния на состояние цитокинов.

Ключевые слова. беременные женщины, вакцина от COVID-19, цитокины