Determination of SARS-CoV-2 anti-spike Immunoglobulin G level after dose of Johnson and Johnsons vaccine among Healthcare Workers in Khartoum State

A. Mojtaba Hassan Alsiddig

Dr. Amira Eltom Fawzi

Abstract:

This descriptive study was done during the period from 7 to 13 October 2021 to determine the level of SARS-CoV-2 anti-spike IgG among Healthcare workers after dose of Johnson and Johnsons vaccine in Khartoum state and to evaluate the significant difference of SARS-CoV-2 anti-spike IgG level between male and female. The Venus blood samples of participants were collected from Omdurman hospital for pediatric medicine, ALkhalil, ALRawda, Libya specialization hospitals and Fedail, after obtaining ethical approval from university board committee and verbal consent from the patients. The Venus blood sample (serum) was collected and analyzed using snibe maglumi 800 analyzer. Forty participants with age ranged from 25 to 47 years old, 17, (42.5%) of participants were males and 23, (57.5%) of participants were females included in this study based on inclusion criteria. The result showed that, 30 (75%) of participants had SARS- COV-2 anti-spike IgG measurements after dose of Johnson and Johnsons COVID19 vaccine and after completion of the period from 14 to 60 days after vaccination. Also was observed that 21, (52.5%) of participants developed clinical symptoms after vaccination varied from headache, arm pain at side of injection, fatigue, fever and GIT disturbances. No history of previous COVID19 infection. The result also showed that 7, (17.5%) of participants were tend to have doubtful results.

Key words :IMUNOGLOBLIN G, COV -2,JOHNSON and Johnson , Vaccine , Khartoum

تحديد مستوى الغلوبولين المناعي G المضاد لفيروس SARS-CoV-2 بعد جرعة لقاح جونسون آند جونسون بين العاملين في مجال الرعاية الصحية في ولاية الخرطوم

أ. مجتبى حسن الصديق علي - باحث.

د. أميرة التوم فوزي عثمان – أ.مشارك – قسم الأحياء الدقيقة – كلية المختبرات الطبية – جامعة الزعيم الأزهري.

مستخلص:

أجريت هذه الدراسة الوصفية في الفترة من 7 حتى 13 ديسمبر من العام 2021 لتحديد المقياس لكمي للأجسام المضادة (ج) لأفراد الحقل الطبي ولتحديد الاختلاف في مستوى الاستجابة المناعية بين الذكور والاناث على حد سواء للذين تلقوا الجرعة من لقاح جونسون وجونسون تم جمع عينات دم (مصل) من مختلف المشاركين من مستشفى حوادث الأطفال أم درمان، الخليل ، ليبيا التخصصي والروضة ومستشفى فضيل وتم تحليل العينات باستخدام جهاز (snibe maglumi800) تراوحت اعمار الأربعين مشاركا من عمر 25 الى 47 عام وبلغت نسبة الذكور المشاركين 42 5%بينما بلغت نسبة الاناث 57.5% حيث تم اخذ عينات دم من المشاركين بعد 14 يوم بينما تجاوز البعض فترة شهرين منذ تلقيهم الجرعة من اللقاح.أظهرت نتائج التحليل ان نسبة الإيجابية (تفاعلية) بلغت 75% بينما بلغت النتائج المشكوك فيها17.5%.

الكلمة المفتاحية: s IMUNOGLOBLIN G, COV -2,: جونسون آند جونسون , لقاح ،الخرطوم.

Introduction :

The corona virus disease 2019 (COVID-19) is an infectious respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, formally known as 2019 novel coronavirus or 2019-nCoV). [1]

Coronaviruses (COV) are members of the Corona virinae family and have a microscopic crown-like shape. The COVID19 pathogen is a human RNA virus that is classified as a CoV in the CoV phylogeny.

COVID-19 was found in almost all countries around the world in a short period after cases of pneumonia of unknown etiology were detected in Wuhan City, China in December 2019 [2].

The World Health Organization (WHO) announced a global health emergency of international concern on January 30, 2020, and about 10 million COVID-19 cases were confirmed worldwide in the first six months [3}.

The vaccine induces neutralizing protective antibodies after dose of Johnson and minimized development of COVID19 disease

in vaccinated individual. The antibodies produced by B cell which provide rapid protective immunity and generation of memory B cell become capable to mounting recall response whenever re-exposed [4].

The vaccine firstly introduced to front line Healthcare workers and elderly people. [5] Johnson and Johnsons vaccine is likely to be widely used globally in developing and developed countries. (6).

The Johnson COVID-19 Vaccine is administered as a single dose, into the muscle.

The Johnson COVID-19 Vaccine is an unapproved vaccine that may prevent COVID-19.

The FDA has authorized the emergency use of the Janssen COVID-19 Vaccine to prevent COVID-19 in individuals 18 years of age and older under an Emergency Use Authorization (EUA). In 2020.

The serological tests for COV-2 antibodies determination could be useful for supporting the assessment of cases of uncertain identification or with moderate illness, as well as for contact tracing and for epidemiological studies. The latter could in turn be helpful for the correct identification of asymptomatic subjects and for correctly estimating the illness and death rate. To date there are several available SARS-COV-2 serological tests. Different papers have already compared some of these methods, and found acceptable classification concordance although very dispersed results when quantitative data were evaluated [6].

Objective:-

General objective :

-To determine of SARS-CoV-2 anti-spike Immunoglobulin G (IgG) level after dose of Johnson and Johnsons vaccine among Healthcare Worker.

Specific Objective Are To:

- Measure the efficacy of Johnson and Johnsons vaccine after dose by examining of immunoglobulin G level among healthcare workers.

- Compare the level of immunoglobulin G according to gender, age and residence place among healthcare workers.

2-: MAterials and Methods

- Study Settings:

The samples of participant blood were collected from Omdurman of pediatric medicine, ALkhalil, ALRawda, Libya specialization hospital and Fedail hospital.

Study Duration Study carried out from 7 to 13 December 2021.

Study Design

This is a descriptive cross sectional study

S**tudy Population** :

A total of 40 samples were collected from vaccinated healthcare worker who met the inclusion criteria.

D**ata analysis:**

Data were analyzed by using computer based programmed excel and statistical package for social science (SPSS).

- Ethical approval and consent to participate

Approval was taken from research ethic committee of Alzaeim Alazarhi University and verbal consent was taken from each patient. And all the information's taken were treated confidentially and it was used for research purpose only.

DEVICES AND EQUIPMENTS: -

-Electrical centrifuge

-Refrigerator

- Automated pipette

-snibe magloumi 800

Electrical centrifuge

Principle

Used centrifugal force to separate various components of fluid.

M**ethod** :

I was put the sample on sample tube for at least 15 minutes at 2500 RPM within one hour of collection. Then the serum transferred to a glass screw-cap vial for storage and transport.

Snibe maglumi 800

Principle

We measured immunoglobulin G (IgG)/IgM Ab using Snibe 2019-Novel Corona virus (nCOV) Kit, a CE-IVD marked assay on MAGLUMI 800 The method uses nucleocapsid and spike proteins as antigens (Ags), as they were appeared to be promising targets for Ab detection against other coronaviruses.3 The produced light emission (relative light unit [RLU]) by indirect immunoassay (IA) reaction is proportional to the specific Ab quantity in the sample. RLUs are then transformed to arbitrary units (AU/ML) [7].

A level greater than 1.1 AU/ML is interpreted as positive for Ab [8].

Result:

This research was conducted for determination of SARS-CoV-2 IgG level among healthcare workers after dose of Johnson and Johnsons COVID19 vaccine in Khartoum state and to evaluate the significant difference of IgG level between male and female. A total of 40 participants were included in this study. Their gender was 23, (57.5%) of participants were female whereas 17 (42.5%) of participants were male received dose of Johnson and Johnsons COVID-19 vaccine (0.5ml) Most of them ranged in 25-30 years old and most of them reside in Omdurman city 30, (75%) (Table 1).

The clinical symptoms ranged from arm pain at the side of injection, headache, fever, fatigue, and GIT disturbances after vaccination and no history of previous COVID19 infection except for only one participant. The test was done by using snibe maglumi 800 analyzer to detected SARS-CoV-2 IgG.

The result showed that 30, (75%) of participants were reactive (positive SARS-CoV-2 IgG) after the dose of Johnson and SARS-CoV anti-spike IgG antibody titer ranged from (1.1 – 2) AU/ML and a few of participants 7 (17.5%) showed doubtful result (Table 2).

The mean of male and female was detected which show 1.63 and 1.38 respectively with P value>0.05.

TABLE (1)

The distribution of study group according to their gender, and residence place

Characteristic	Study group	N /%
Gender	-Male	%42.5) 17-)
	-Female	-23 (%57.5)
Residence place	-Omdurman	-30 (%75)
	-Khartoum	-10 (%25)

N; number

TABLE (2)

Level of SARS-CoV-2 IgG -after Johnson and Johnsons vaccination

	Overall number of participants =40	
	Study Group	Range of SARS-CoV2 IgG result AU/ML
	N= 30 (75%)	1.1 -2.1
	N=7 (17.5%)	0.9-1
	N=3 (7.5%)	<0.9

P value <0.05

>1.1AU/ML=+e

<0.9AU/ML=-e

Between 0.9-1AU/ML=doubtful

TABLE (3)

Descriptive of age among covid vaccinated participants

	N	Minimum	Maximum	Mean	Std. Deviation
Age (years)	40	25	45	29.72	5.3

Discussion 4-1-:

In this cross sectional study, the Johnson and Johnsons vaccine (SARS-CoV-2 anti-spike IgG antibody) has shown positivity rate (75% P=0.05) in Sudanese healthcare workers (Khartoum state) after dose of Johnson and Johnsons vaccine. This result of positivity agreed with all the following studies mentioned. In 2021 susan sadoughi, Richard saitz, the study showed detectable SARS-CO-2 anti-spike IgG in the majority of individuals after dose of Johnson vaccine Adults aged 18-65 after dose of Johnson antibody titers had increased [9]. Also After the administration of the first vaccine dose in 805 participants in cohorts 1 and 3 and after the second dose in cohort 1, the most frequent solicited adverse events were fatigue, headache, myalgia, and injection-site pain. The most frequent systemic adverse event was fever. Systemic adverse events were less common in cohort 3 than in cohort 1 and in those who received the low vaccine dose than in those who received the high dose. Reactogenicity was lower after the second dose. Neutralizing antibody titers against wild-type virus were detected in 90% or more of all participants on day 29 after the first vaccine dose [10]. Also we present preliminary data in an ongoing observational study reporting SARS-CoV-2 spike protein reactive antibody levels from a convenience cohort of over 200 individuals in Kansas City. We observe stable antibody levels over 11 months in individuals who recovered from COVID19 infection caused by SARS-CoV-2. Our data revealed higher-than recovered levels from naïve individuals vaccinated with Pfizer or Moderna vaccines and similar-to recovered levels from Johnson & Johnson (J&J) recipients. For all vaccines, inoculation after recovery resulted in higher antibody levels than vaccination alone. Responses to Pfizer and Moderna vaccines decreased over time from high initial levels but at the time of publication remain higher than those for recovered or J&J recipients [11].

The symptoms of Johnson and Johnsons after injection ranged from arm pain, fever, fatigue, headache and GIT symp-

toms. About 17.5% has shown doubtful result and did not show adequate rise in anti-spike IgG. Three participants with doubtful result were smokers and (four of them relieved doubtful result and three (7.5%) showed negative result<0.9 AU/ML) were shared same working place and source of vaccine and these decreased might due to failure to store and handle vaccine properly.

My findings are both similar and dissimilar to published evidence in randomized controlled trials. This study compared the neutralization titers of serum antibodies from individuals immunized with three U.S. FDA Emergency use authorization vaccines (BNT162b2, mRNA-1273 and Ad26.COV2. S) against viruses with the VOC and Lambda spike proteins. The study groups were controlled for age, clinical co-morbidity, history of pre-vaccination infection and sera were collected on similar days' post-vaccination. The results demonstrate a high level of cross-neutralization by antibodies elicited by BNT162b2 and mRNA-1273 on the variants but significantly decreased neutralization by those elicited by the single dose Ad26.COV2. S [12].

4-2-: C**onclusion:**

- Johnson revealed protective immune response (IgG) in some Sudanese healthcare workers after dose of vaccine.
- Female and male have similar immune response. -
- The results confirm earlier studies on Johnson vaccine efficacy.

RECOMMENDATION 4-3-:

Evaluate the vaccine efficacy in community-

Evaluate cellular immune response against Johnson and Johnsons vaccine

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