How to Cite:
Jasim, H. nsiefe, & Zarzoor, A. M. (2022). Assessment of the effect of different covid 19 vaccines on liver enzymes for corona patients in Diyala governorate. *International Journal of Health Sciences*, *6*(S5), 1184–1191. https://doi.org/10.53730/ijhs.v6nS5.8833

Assessment of the effect of different COVID-19 vaccines on liver enzymes for corona patients in Diyala governorate

Hayder nsiefe Jasim
Department of Medical Laboratories, College of Health and Medical Techniques, Middle Technical University, Baghdad region – Iraq.
Corresponding author E-mail address: hayderhhalhamdany@gmail.com , edc0014@mtu.edu.iq

Ameerah Mrebee Zarzoor
Middle Technical University, Baghdad Region, Iraq.

***Abstract*---**In Diyala Governorate, a region within Iraq, the number of people infected with Corona disease began to increase rapidly during the year 2021 and after discovering the appropriate and safe vaccine against Corona, and studying what is The best of these three covid19 vaccines types that reduce the severity of the disease and the effect of the disease on the liver by knowing the numerical changes on the liver enzymes, which include GOT, GPT and ALP, as well as comparing these variables between the vaccinated and the unvaccinated, the numbers were between 50 samples representing the control and they are for healthy, and 50 samples of unvaccinated corona patients and 300 samples of corona patients had received a vaccine in the past, the conclusion was that Corona patients may have changes in liver enzymes that rise slightly, Vaccination is play role in regulation liver functions through the increase or decreases parameters that related to it. The present study shows a significant difference between vaccinated and unvaccinated COVID-19 patients according to GOT, GPT and ALP parameters. These results show important vaccines in the regulation of liver function in COVID-19 patients. Whilst the vaccine trials have not looked specifically at safety in patients with liver disease. The present study shows there are significant differences ($p<0.05$) between GOT and ALP parameters and study groups. the GOT and ALP parameters scored the highest mean value in unvaccinated patients (24.28± 11.96 and 119.98±55.31), and the lowest mean value in vaccinated patients (13.82±6.74) compared to healthy groups for GOT, while ALP scored the least mean value in the healthy group (56.34±18.64) compared to vaccinated groups. The GPT parameters don't show significant differences among study groups The

present study revealed no significant differences among vaccine types and GOT, GPT, and ALP parameters($p>0.05$).

***Keywords*---**COVID-19 vaccines, liver enzymes, corona patients.

Introduction

Virus vaccines, whether inactivated or live-attenuated, utilise the whole virus as their vaccine target. In addition to structural proteins (S, N, M, and E proteins), these vaccines can also produce non-structural and auxiliary proteins in the body. They are therefore able to elicit wide antibody and T-cell responses that are based on one protein or protein fragments, rather than several proteins or pieces (Gao et al., 2020). Individuals aged 16 and under have received emergency use permission by US Food and Drug Administration for the Pfizer-BioNTech COVID-19 mRNA vaccine, which protects against COVID-19. Children under the age of 12 were updated to this vaccine's EUA on May 10, 2021, by the US Food and Drugs (FDA). Investigators from four randomised, controlled trials in the UK, South Africa, and Brazil now report pooled results of an interim analysis of safety and efficacy against COVID-19 of the Oxford–AstraZeneca chimpanzee adenovirus vectored vaccine ChAdOx1 to-19 (AZD1222) in adults aged 18 years and older, revealing new vaccine efficacy results. Voysey and colleagues (2021). A second Chinese vaccination has been approved by the World Health Organization (WHO) for use in emergencies. During late-stage testing, CoronaVac was shown to be 51% effective in reducing the spread of COVID-19, and researchers believe that it will be critical in slowing the spread of the pandemic. This vaccine's overall protection is lower than the WHO's seven other recommended vaccinations. But most crucially, testing show that Sinovac's inactivated viral vaccine, CoronaVac, is 100% effective at avoiding serious sickness and death." As a safe and somewhat effective SARS-CoV-2 vaccination, CoronaVac will make a substantial contribution to the global fight against COVID-19 (Palacios et al., 2021). Patients using COVID-19 may develop varying degrees of liver injury (Deng et al., 2021). Angiotensin-converting enzyme 2 (ACE2) receptors are highly expressed in bile duct cells, which is where COVID-19 patients' livers are damaged by SARS-CoV-2 binding, which leads to abnormal liver biochemical tests like elevated alkaline phosphatase (ALP), and gamma-glutamyl transpeptidase (GGT) (Hu et al., 2020). In moreover, individuals with COVID-19 may have varying degrees of liver injury, which is strongly expressed in bile duct cells and harms bile duct cells, resulting in abnormal liver biochemical tests (ALP and GGT) abnormalities (Hu et al., 2020). The first autopsy pathological investigation of a COVID-19 patient showed significant microvascular steatosis and minor lobular and portal activity in the liver tissue, which makes it likely that medication hepatotoxicity or systemic inflammatory response generate liver harm in SARS-CoV-2 infection (Huang et al., 2020).

Materials and Methods

Between the beginning of September 2021 and the end of April 2022, health centres and hospitals in Diyala province gathered 400 blood samples from people (50 non-vaccinated and 300 vaccinated 50 control). Within the age range of 15-90 years, blood samples were split between patients who had received the COVID-19

vaccine (300) and those who had not (50). People with COVID-19 were tested in the RT-PCR machine at the Public Health Department-Baquba Teaching Hospital-Diyala Health Department and samples were collected. Gender, age, vaccination type, and chronic conditions are all asked for on the patient questionnaires. The healthy samples of 50 people (24 men and 26 females) between the ages of 15 and 90 years were included. COVID-19 antibodies and RT-PCR results were negative in this patient's case, as was his asymptomatic state.

Measurement of biochemical tests (GOT, GPT, ALP**) in serum.**

Biochemical tests were performed for 350 patients by using the Cobas Integra system plus 400 auto-electrolysis devices (roshe company Germany technique), which analyzes the results of the following laboratory tests liver function parameters. This device is characterized by speed and accuracy in extracting results, as 400 results are extracted in one hour.

Statistical analysis

First, all parameters were checked for normalcy (Kolmogorov-Smirnov and Shapiro-Wilk test). A Mann-Whitney test was used to determine if there was a significant difference between the medians of parameters that suited both tests (no significant difference) and parameters that did not meet the normality tests (significant difference) (for comparison between two groups). Pearson-Chi-square tests or two-tailed Fisher exact probabilities were used to determine statistically significant variations in the percentage frequencies of the other parameters (p). A p-value of 0.05 or below was deemed significant in this study.

Results and Discussion
Relation of age and gender with study groups:

Concerning gender، the current results append there are no significant differences (*P>0.05*) between gender within study groups.
Based on age groups, the current study mentioned there are significant differences (*P≤0.05*) among age categories within study groups. The age group 21-40 and 41-60 years scored highest percentage for unvaccinated patients (26.0% and 30.0%), vaccinated patients (42.0% and 28.0%), and healthy (8.0% and 62.0%). While >80 age groups scored least percentage for unvaccinated patients (12.0%), vaccinated patients (2.0%,), and healthy (10.66%) (table 3-1).

Table 3-1; comparative age groups and gender within study groups by using chi-square test

			Groups			Total	P-value
			Un vaccinate	Vaccinate	Healthy		
Age groups (years)	≤20	n	6	18	2	26	P<0.001***
		%	12.0%	6.0%	4.0%	7.0%	
	21-40	n	13	126	4	143	
		%	26.0%	42.0%	8.0%	40.0%	
	41-60	n	15	84	31	130	
		%	30.0%	28.0%	62.0%	25.33%	

	61-80	n	10	66	5	81	
		%	20.0%	22.0%	10.0%	17.33%	
	>80	n	6	6	8	20	
		%	12.0%	2.0%	16.0%	10.66%	
Total		n	50	300	50	400	
		%	100.0%	100.0%	100.0%	100.0%	
P-value			P<0.05*	P<0.01**	P<0.01*	P<0.01*	
Gender	Male	n	23	162	24	209	p>0.05
		%	46.0%	54.0%	48.0%	49.3%	
	Female	n	27	138	26	191	
		%	54.0%	46.0%	52.0%	50.7%	
Total		n	100	100	100	300	
		%	100.0%	100.0%	100.0%	100.0%	
P value			p>0.05	p>0.05	p>0.05	p>0.05	

The present study showed the age groups 21-40 and 41-60 years scored the highest percentage in patients (vaccinated and unvaccinated, and that refers to the infection raised in people with more contact with others and in age progression. The differences in age groups between patients and health and among patients indicate that age is a risk factor and individuals with older ages are at higher risk of getting infected by COVID-19. (Bi et al., 2020).

Relation of age and gender with vaccine groups:

Based on age groups and vaccine types, the current results appeared there are significant differences (*P<0.05*) between age groups with Sinopharm and Pfizer vaccines, but no significant differences with AstraZeneca vaccine. The vaccine types (Sinopharm and Pfizer) scored the highest percentage in the age groups 21-40 years (33% and 60%) and 41-60 years (40.0% and 15 %) respectively.

The present study revealed there are significant differences (*P<0.05*) between gender with Sinopharm and Pfizer vaccines, but no significant differences with the AstraZeneca vaccine. The Sinopharm vaccine scored the highest percentage in females (74%) than males, while the Pfizer vaccine scored the highest percentage in males (70%) than females (table 3-2).

Table 3-2; comparative age groups and gender within vaccine types by using chi-square test

			Vaccines types			Total	P-value
			Sinophar	Pfizer	AstraZenec		
Age grou (years)	≤20	N	0	10	0	10	P>0.05
		%	0.0%	10%	0.0%	3%	
	21-40	N	33	60	33	126	
		%	33%	60%	33%	42%	
	41-60	N	40	15	33	88	
		%	40%	15%	33%	29.33%	
	61-80	N	27	15	17	59	
		%	27%	15%	17%	19.66%	

	>80	N	0	0	17	17	
		%	0.0%	0.0%	17%	5.6%	
Total		N	100	100	100	300	
		%	100.0%	100.0%	100.0%	100.0%	
P-value			P<0.05*	P<0.01*	p>0.05	P<0.01*	
Gender	Male	N	26	70	66	162	P<0.01**
		%	26%	70%	66%	54%	
	Female	N	74	30	34	138	
		%	74%	30%	34%	46%	
Total		N	100	100	100	300	
		%	100.0%	100.0%	100.0%	100.0%	
P value			P<0.01*	P<0.01*	p>0.05	p>0.05	

Sinopharm and Pfizer vaccines differ significantly in terms of age groups and vaccination types, with those aged 21-40, 41-60, and over 60 years old scoring the greatest proportion of Sinopharm and Pfizer vaccines in the research. We found no variations in the AstraZeneca vaccination among the various age groups studied in this trial. A number of vaccines, including Sinopharm, Pfizer BioNTech, Moderna, Johnson & Johnson, and others, have been shown to be successful in clinical studies against COVID-19 (Chi et al., 2021). AstraZeneca and Sinopharm vaccines were shown to have a longer period of adverse effects in individuals over the age of 55, despite the fact that age had no significant influence on the length or severity of the three vaccinations. Vaccination duration was longer with the Pfizer vaccine in those participants who were 36 to 55 years old. The limited number of senior individuals who received the Pfizer vaccination may have contributed to this conclusion. According to the results of the study, the Pfizer vaccination had a higher percentage of male recipients than female recipients, whereas Sinopharm had a higher percentage of female recipients than male recipients. 2021) (Al Khames Aga and coauthors).

Table 3-3; comparative GOT, GPT, and ALP within study groups by using ANOVA (F test)

		N	Mean	Std. Deviation	P-value
GOT	Un vaccinated	50	24.28	11.96	P<0.05* LSD=5.35
	Vaccinated	300	13.82	6.74	
	Healthy	50	18.10	4.69	
GPT	Un vaccinated	50	26.19	12.48	p>0.05
	Vaccinated	300	17.97	7.83	
	Healthy	50	16.70	4.40	
ALP	Un vaccinated	50	119.98	55.31	P<0.001*** LSD=17.40
	Vaccinated	300	84.02	33.19	
	Healthy	50	56.34	18.64	

Patients with COVID-19 had lower levels of GOT, GPT, and ALP after immunisation, compared to healthy individuals. (Sarhan and coworkers, 2021) COVID-19 patients had higher levels of GOT, GPT, and ALP than healthy controls, and these results matched the current ones. COVID-19 demonstrates the importance of the liver in various disorders. Liver damage in COVID-19 is thought to be caused by a variety of

factors, including direct virus-related effects on the liver, increased immune response (Cytokine storm) and immune mediated damage, drug toxicity (Acetaminophen, antivirals or Hydroxychloroquine), as well as liver failure in patients with multiple organ dysfunction, such as those with cirrhosis (Brauner et al., 2021). In spite of the fact that abnormalities in liver function indices are widespread in COVID-19 patients, the impairment of liver function is not a significant hallmark of COVID-19 and may not have serious clinical effects (Jahanshahi et al., 2020). Infected individuals suffered significant liver damage as a result of GOT's effects, and this was one of the primary causes of liver damage in COVID- 19 patients (Klionsky et al., 2021).

Table 3-4; comparative GOT, GPT, and ALP within the gender of study groups by using ANOVA (F test)

		Groups						P-value
		Unvaccinated		vaccinated		Healthy		
		Mean	SD	Mean	SD	Mean	SD	
GOT	Male	27.12	12.06	14.20	6.39	18.58	4.41	P<0.05*
	Femal	21.86	10.20	13.39	5.31	17.65	4.97	LSD=5.21
GPT	Male	21.03	10.95	18.13	8.40	16.92	5.32	p>0.05
	Femal	30.58	14.59	17.78	7.48	16.50	3.42	
ALP	Male	125.96	55.43	81.87	39.64	50.00	19.56	P<0.001***
	Femal	114.89	53.11	86.54	41.89	62.19	15.96	LSD=15.22

Most SARS-CoV-2 patients brought to the hospital exhibited impaired liver function, which was related with elevated levels of inflammatory markers. Patients with impaired liver function were more likely to be elderly and male, and they were more likely to proceed to severe illness (Saini et al., 2022). Males had significantly higher liver enzyme levels than females (67.4 percent vs. 46.03 percent), and these findings were consistent with the results of the current investigation. Males are more likely to have ACE2 receptors than females, according to a research out of Wuhan, China (Ni et al., 2020). It has been previously reported that a direct association between aberrant liver enzyme levels and increasing age was found (p0.001***) (Bangash et al., 2020).

Table 3-5; comparative GOT, GPT, and ALP within vaccine types by using ANOVA (F test)

		N	Mean	Std. Deviatio	P-value
GOT	Sinopharm	100	12.73	5.64	P>0.05
	Pfizer	100	13.85	6.02	
	AstraZeneca	100	16.43	7.88	
GPT	Sinopharm	100	18.19	7.86	P>0.05
	Pfizer	100	17.73	7.15	
	AstraZeneca	100	18.58	8.31	
ALP	Sinopharm	100	85.11	30.01	P>0.05
	Pfizer	100	84.95	40.54	
	AstraZeneca	100	76.80	29.37	

The present investigation demonstrated no significant differences across vaccination kinds and GOT, GPT, and ALP characteristics. Pfizer/BioNTech BNT162b2 mRNA experiment comprised just 0.6 percent (217/37,706) individuals with liver illness. Although only a small number were included in trials for Pfizer/BioNTech BNT162b2 mRNA, Moderna mRNA-1273, and the AstraZeneca/University of Oxford ChAdOx1-to-19 chimpanzee adenovirus vector vaccine, both the American Association for Study of Liver Diseases and European Association for the Study of Liver recommend vaccination against SARS-COV-2 with these highly effective and safe vaccines, given a greater risk of health consequences from SARS-COV-2 infection in these patients (Bonifacius et al., 2021). (Bonifacius et al., 2021).

Conclusion

Our study showed that assessment of liver enzymes as a biochemical parameter helped distinguish between healthy individuals with covid 19 symptoms from different aged groups and genders for further analysis of covid 19 infections. Also, Vaccination is play role in the regulation of liver functions through the increase or decrease of parameters that are related to it.in addition the vaccinated group it was better group from non-vaccinated according to liver enzyme defect.

References

Al Khames Aga, Q. A., Alkhaffaf, W. H., Hatem, T. H., Nassir, K. F., Batineh, Y., Dahham, A. T., Shaban, D., Al Khames Aga, L. A., Agha, M. Y. R., & Traqchi, M. (2021). Safety of COVID-19 vaccines. *Journal of Medical Virology*, *93*(12), 6588–6594.

Bangash, M. N., Patel, J., & Parekh, D. (2020). COVID-19 and the liver: little cause for concern. *The Lancet. Gastroenterology & Hepatology*, *5*(6), 529.

Bi, Q., Wu, Y., Mei, S., Ye, C., Zou, X., Zhang, Z., Liu, X., Wei, L., Truelove, S. A., & Zhang, T. (2020). Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen, China: a retrospective cohort study. *The Lancet Infectious Diseases*, *20*(8), 911–919.

Bonifacius, A., Tischer-Zimmermann, S., Dragon, A. C., Gussarow, D., Vogel, A., Krettek, U., Gödecke, N., Yilmaz, M., Kraft, A. R. M., & Hoeper, M. M. (2021). COVID-19 immune signatures reveal stable antiviral T cell function despite declining humoral responses. *Immunity*, *54*(2), 340–354.

Brauner, J. M., Mindermann, S., Sharma, M., Johnston, D., Salvatier, J., Gavenčiak, T., Stephenson, A. B., Leech, G., Altman, G., & Mikulik, V. (2021). Inferring the effectiveness of government interventions against COVID-19. *Science*, *371*(6531), eabd9338.

Chai, X. et al. S. A. expression in cholangiocytes may cause liver damage after 2019-nCoV infection. P. at bioRxiv https://doi. org/10. 1101/2020. 02. 03. 93176. (2020). (2020). Specific ACE2 expression in cholangiocytes may cause liver damage after 2019-nCoV infection. *Biorxiv*.

Chi, N. T. L., Anto, S., Ahamed, T. S., Kumar, S. S., Shanmugam, S., Samuel, M. S., Mathimani, T., Brindhadevi, K., & Pugazhendhi, A. (2021). A review on biochar production techniques and biochar based catalyst for biofuel production from algae. *Fuel*, *287*, 119411.

Deng, M.-L., Chen, Y.-J., Yang, M.-L., Liu, Y.-W., Chen, H., Tang, X.-Q., & Yang,

X.-F. (2021). COVID-19 combined with liver injury: Current challenges and management. *World Journal of Clinical Cases*, *9*(15), 3487.

Gao, Q., Bao, L., Mao, H., Wang, L., Xu, K., Yang, M., Li, Y., Zhu, L., Wang, N., & Lv, Z. (2020). Development of an inactivated vaccine candidate for SARS-CoV-2. *Science*, *369*(6499), 77–81.

Hoffmann, M., Kleine-Weber, H., Schroeder, S., Krüger, N., Herrler, T., Erichsen, S., Schiergens, T. S., Herrler, G., Wu, N.-H., & Nitsche, A. (2020). SARS-CoV-2 cell entry depends on ACE2 and TMPRSS2 and is blocked by a clinically proven protease inhibitor. *Cell*, *181*(2), 271–280.

Hu, L.-L., Wang, W.-J., Zhu, Q.-J., & Yang, L. (2020). Novel coronavirus pneumonia-related liver injury: etiological analysis and treatment strategy. *Zhonghua Gan Zang Bing Za Zhi= Zhonghua Ganzangbing Zazhi= Chinese Journal of Hepatology*, *28*(2), 97–99.

Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Zhang, L., Fan, G., Xu, J., & Gu, X. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, *395*(10223), 497–506.

Jahanshahi, A. A., Dinani, M. M., Madavani, A. N., Li, J., & Zhang, S. X. (2020). The distress of Iranian adults during the Covid-19 pandemic–More distressed than the Chinese and with different predictors. *Brain, Behavior, and Immunity*, *87*, 124.

Klionsky, D. J., Abdel-Aziz, A. K., Abdelfatah, S., Abdellatif, M., Abdoli, A., Abel, S., Abeliovich, H., Abildgaard, M. H., Abudu, Y. P., & Acevedo-Arozena, A. (2021). Guidelines for the use and interpretation of assays for monitoring autophagy. *Autophagy*, *17*(1), 1–382.

Ni, L., Ye, F., Cheng, M.-L., Feng, Y., Deng, Y.-Q., Zhao, H., Wei, P., Ge, J., Gou, M., & Li, X. (2020). Detection of SARS-CoV-2-specific humoral and cellular immunity in COVID-19 convalescent individuals. *Immunity*, *52*(6), 971–977.

Palacios, R., Batista, A. P., Albuquerque, C. S. N., Patiño, E. G., Santos, J. do P., Tilli Reis Pessoa Conde, M., Piorelli, R. de O., Pereira Júnior, L. C., Raboni, S. M., & Ramos, F. (2021). *Efficacy and safety of a COVID-19 inactivated vaccine in healthcare professionals in Brazil: the PROFISCOV study*.

Sarhan, M. A., Shihab, S., Kashem, B. E., & Rasheed, M. (2021). New Exact Operational Shifted Pell Matrices and Their Application in Astrophysics. *Journal of Physics: Conference Series*, *1879*(2), 22122.

Voysey, M., Clemens, S. A. C., Madhi, S. A., Weckx, L. Y., Folegatti, P. M., Aley, P. K., Angus, B., Baillie, V. L., Barnabas, S. L., & Bhorat, Q. E. (2021). Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. *The Lancet*, *397*(10269), 99–111.