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Research Article

Study of ATPase and GTPase levels in Fibrotic Lung Disease with and without COVID-19 Vaccination

Raed M. Al-Azawee*[1], Zeinab M. Al-Rubaei[1]

[1]*Department of Chemistry, Education for Pure Science (Ibn Al-Haitham) College, University of Baghdad, Baghdad, Iraq.*

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Abstract:

Background: In eukaryotic cells, the acidification of intracellular compartments is the responsibility of vacuolar H+ ATPase, a family of proton pumps, sometimes known as V-ATPases. Small GTPases are signaling molecules that regulate important cellular processes as well as subcellular activities making the essential players, particularly in a wide variety of coronavirus infection processes.

Objectives: The purpose of this research was to assess the levels of ATPase and GTPase in fibrotic lung disease patients who had received or had not received the COVID-19 vaccination, and then to compare these levels with those of the control group.

Methods: A total of 150 individuals took part in this study, which were divided into three groups. The first group was the control group (N=50). In the second group (N=50) patients with fibrotic lung disease did not get the COVID-19 vaccination. A total of fifty patients who had received the COVID-19 vaccination made up the third group(N=50). Enzyme-linked immunosorbent assay was the method that was used to determine the amounts of ATPase and GTPase. The P- P-value of 0.05 or less is considered statistically significant. ROC tests were examined for ATPase and GTPase.

Results: The data analysis reported that there was a significant rise in alkaline phosphatase, Alanine aminotransferase, and Aspartate-aminotransferase () among the three groups. Both ATPase and GTPase levels were shown to have significantly increased in Groups 3 and 2 as compared to Group 1 levels. Moreover, a substantial rise was discovered in Group 3 in comparison to Group 2 which was detected.

Conclusion: ATPase and GTPase levels are increased in patients with fibrotic lung disease regardless of the COVID-19 vaccination state.

Keywords: ATPase; GTPase**;** COVID-19 Vaccination; Fibrotic Lung Disease**.**

Introduction

Fibrotic lung disease (FLD) is a chronic lung ailment that is characterized by an inflammation that interferes with the lung's ability to receive sufficient oxygen (1). SARS-COV-2 is a virus that is transmitted to humans. It has been shown that, even within the same SAAS-COV-2 strain, several genomic alterations have been found which suggests that mutations were acquired by a process of consensus (2,3). Research demonstrated that lung dysfunction is a consequence of COVID-19 caused by prolonged ventilation acute respiratory distress syndrome or direct harm from the virus (4,5). vacuolar H+ ATPase, the proton pumps are reliant on ATP. They are important for several cellular functions that require vacuolar compartment acidification. These processes include the trafficking of membranes, proteolysis of lysosomes, the limination of invading pathogens by phagosomes, and the secondary transport of metabolites (6). Two subunits make up the V-ATPase: a V0 complex that is trans-membrane and a V1 complex that is cytosolic (7). This V-ATPase subunit was examined in the lung damage and fibrosis model in a recent work, which showed a function that had not been known about before. Within the tiny airway, the concentration of proton is responsible for regulating location (8).

The GTPases, also known as Rho, are enzymes that play the role of a molecular switch. They are regulated by guanine nucleotide exchange agents and are responsible for catalyzing the conversion of guanidine diphosphate to guanosine triphosphate (GTP). The GTPase-activating proteins, which are responsible for stimulating GTP hydrolysis, are responsible for inactivating the enzyme when it is in its active state, which occurs when the enzyme is phosphorylated (9).

The Rho/ROCK signaling system is implicated in smooth muscle contraction sensitization via its contribution. This is a significant aspect of the system, by demonstrating that the Rho/ROCK signaling system is accountable for airway smooth muscle contraction. Myosin phosphatase, which is an essential part of the process, is inhibited to achieve this goal (10).

**Corresponding Author: raed.mahmoud2105p@ihcoedu.uobaghdad.edu.iq*

The purpose of this research was to assess the levels of ATPase and GTPase in FLD patients who had, or had not, received the COVID-19 vaccination, and then to compare these levels with those of the control group Additionally, ROC studies were conducted to test for ATPase and GTPase, both of which have the potential to be regarded significant prognostic factors in the area of COVID-19 vaccination.

Materials and Methods:

For this investigation, samples were obtained from Ibn Al-Nafis Teaching Hospital and the Baquba Teaching Hospital/Internal Medicine and Chest Consultant between March 2022 and January 2023. The current study involved 150 individuals who were divided into three groups. The first group (G1) comprised fifty individuals and acted as the control group without contracting COVID-19. Fifty individuals with FLD who had not received the COVID-19 vaccination made up the second group (G2). fifty FLD patients who had received the COVID-19 vaccination (Pfizer) made up the third group (G3), ll patients have COVID-19. The age group of participants was 25-55 years. Every patient was subjected to a personal interview conducted using a well-crafted questionnaire. This interview included a comprehensive history. Most patients infected with COVID-19 developed FLD more than 4 months after they were diagnosed with a CT scan and by doctors in the hospital. Following an infection with COVID-19, it has been shown that several individuals have developed new instances of emphysema, cysts, and mosaic attenuation, (11, 12). It was determined that five milliliters of venous blood should be taken from each participant. The serum was utilized to determine the levels of ATPase and GTPase using the ELISA method (My bio source in the United States, America, manual procedures used in ALP, ALT, and AST determination).

Statistics: The SPSS was used for statistical analysis. The results are expressed as mean ± SD. Independent t-tests were utilized to compare the groups in the study. To compare the differences between the two groups, the Pearson Chi-square test was used. The P-P-value of 0.05 or less is considered statistically significant. ROC tests were examined for ATPase and GTPase.

Results:

It is our understanding that this is the first research that has assessed the levels of ATPase and GTPase in fibrosing lung disease, both with and without the COVID-19 vaccine.

Data in Table (1) represented a significant increase in serum ALP level in G2 compared to G1. A highly significant increase was found in G3As compared to G1, and G3As compared to G2.

However, ALT levels showed a non-significant increase in G2 in contrast to G1. A highly significant increase in $G3_3$ compared to G1 and G3 compared to G2.

Data in Table (1) revealed a highly significant increase in G2 and G3 match to G1 for AST levels. Highly-significant increase was seen in G3 compared to G2.

Table (2) shows an ANOVA analysis of GTPase and ATPase levels for G1, G2, and G3. Results of GTPase and ATPase display a highly significant increase in G2 and G3 compared to G1. A highly- significant rise in G3 compared to G2.

Analysis of the Receiver's Operating Characteristics (ROC)

1. (ROC) for GTPase:

The Receiver Operating Characteristic (ROC) curve analysis of GTPase to three distinct groups reveals an impressive area under the curve (AUC) of 0.90, which is significant at 95%, with a P-value of 0.0027, less than 0.01t threshold. The sensitivity and specificity were 88% and 94%, respectively, as shown in Table (3) and Figure (1). Results demonstrated high accuracy levels in discrimination between the three groups and efficiency of the GTPase test among the three groups.

2. (ROC) for ATPase

ROC curve analysis of ATPase illustrated a 0.91 AUC which is a significant amount in 94% levels with a 0.0023 P-value, less than the threshold of 0.001. The ATPase optimal cut–off value was 4.48. Sensitivity and specificity were 91% and 94%, respectively. Data display a high accuracy among the three groups and efficacy, as shown in Table (5) and Figure (2).

Table (1): ANOVA test of ALP, ALT, and AST for G1, G2, and G3.

Group		Mean	Std. Deviation	Std. Error	Sig.
ALP(U/L)	G_1	103.62	9.92	3.14	HS
	G_2	113.09	8.49	1.90	
	G_3	130.81	10.34	2.31	
ALT(U/L)	G_1	29.21	2.03	0.64	HS
	G_2	31.32	2.35	0.52	
	G_3	43.21	8.84	1.98	
AST(U/L)	G_1	24.15	4.19	1.32	HS
	G_2	29.48	3.18	0.71	
	G_3	39.31	6.75	1.51	

HS: Highly significant correlation between parameters (P-value ≤ 0.01)

Table (2): ANOVA test of GTPase and ATPase for G1, G2, and G3

Group		Mean	Std. Deviation	Std. Error	Maximum
GTPase(ng/ml)	G_1	17.72	0.46	0.14	HS
	G_2	24.00	3.53	0.79	
	G_3	27.27	0.65	0.15	
ATPase(ng/ml)	G_1	3.01	0.09	0.03	HS
	G_2	4.98	0.71	0.16	
	G_3	7.31	1.80	0.40	

Table (3): Difference between sensitivity and specificity of GTPase

Variable	Sensitivity	Specificity	The area under the curve	Accuracy		Cut off value
				L.B.	U.B.	
GTPase	0.88	0.94	0.90	0.83	0.97	26.20

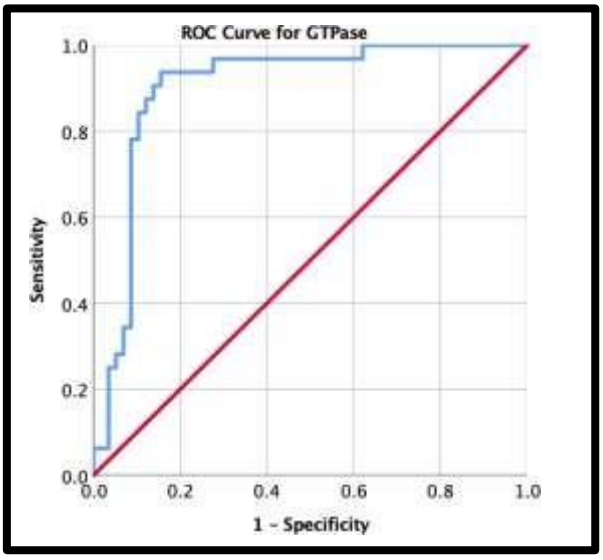

Figure (1) curve of the GTPase.

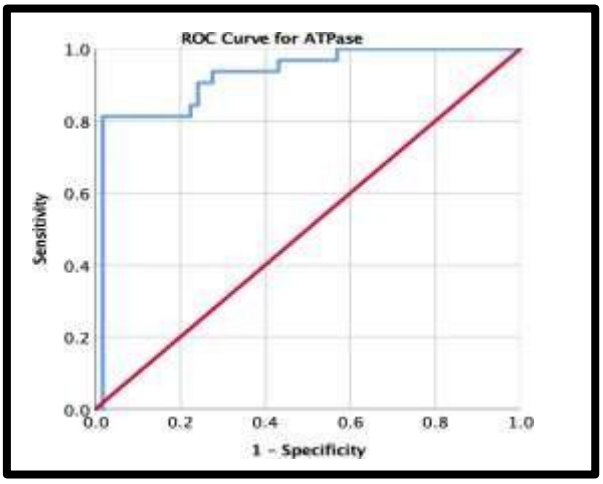

Figure (2): ROC curve of ATPase.

Discussion

There is a possibility that COVID-19 might result in several adverse effects, including lung fibrosis, pneumonia, respiratory failure, and syndrome of cytokine release (13,14). An infection caused by COVID-19 cannot be treated with any of the drugs that are presently on the market and are effective. The data will likely make it simpler to carry out clinical experiments on COVID-19 (15).

The results of analytical investigations indicated that the COVID-19 vaccination has a substantial influence on hearing thresholds for a variety of frequencies that are distributed and distinct from one another (irregular distribution). The research proposed using a larger study sample size, a novel. Design, or researching a more extended age range to accomplish the goal of validating the results (16,17). Recent research demonstrated that a strong intelligence swarm algorithm is important in addition to chest X-ray classifiers in differentiating COVID-19 patients from conventional chest X-ray pictures (18).

Another recent research concluded that mRNA sequences that were involved in the study have a length of 107 bases, and the deterioration rates scored in the first 68 bases of the sequence. The actual COVID-19 mRNA vaccine should be longer, which displays that additional study should be conducted to investigate the predicting longer sequences of algorithms reliability (19).

ALP, ALT, and AST signs of liver damage, which are used as biomarkers in sepsis, viral pneumonia, and obstructive pulmonary diseases, have been reported to increase in patients with COVID-19 [20,21]. The results of the current study agreed with the findings of another study, which demonstrated that the levels of AST, ALT, and ALP in the blood of the patients who had recovered were all high compared to the control. Researchers concluded that certain biochemical markers are relevant (22-24). The analysis of GTPase and ATPase levels for G1, G2, and G3 display a highly significant increase in G_2 and G_3 compared to G_1. A highly-significant rise in G_3 compared to G_2. To determine the levels of GTPase and ATPase for G1, G2, and G3, ANOVA test was carried out. When compared to G_1, the

results of the GTPase and ATPase tests suggested that there was a considerable increase in the levels of G2 and G3 in comparison to G1. Furthermore, in contrast to G2, there has been a very significant increase in G3, which is a trend that should be seen as beneficial. An examination of the lung cDNA library led to the discovery that the isoform subunit of V-ATPase G1 has direct contact with the 3CLpro that is generated by the SARS coronaviruses. In addition, it was found that the G1 subunit has a 3CLpro cleavage site, and it was shown that the viral protease can cleave cell culture experiments. A drop in the intracellular pH was shown to be connected with cleavage of the G_1 subunit in cells that expressed 3CLpro.

A key component of mammalian V-ATPase, Ac45, is capable of interacting with a component of the SARS CoV-2 viral replicas/transcriptase complex. It seems that V-ATPase could have a role in the viral transmission process (25,26).

The results of a study that investigated single-cell RNA sequencing (bronchoalveolar lavage fluid), bulk-RNA sequencing, and proteomics revealed that the expressions of V-ATPase were found to be enhanced in SARS-CoV-2 infection. These results revealed that S protein boosted V-ATPase in COVID-19 infection resulting in the generation of a microenvironment that was more conducive to cleavage of S protein. Activation of inflammatory cells was likely to occur as a result of calprotectin enhancement in respiratory epithelium (27,28).

As time goes on, it is becoming more apparent that several viruses can form a broad range of connections with Rho GTPase signal lings and manipulate these interactions to have its aid. Rho GTPases, in particular, have a role in the pre-entry process and endocytosis when it comes to the infection that is induced by the COVID-19 virus. (29-31). Rho GTPases are the most potent signaling cells' molecules. They are present in eukaryotic creatures and govern cell polarity via their effect on the cytoskeleton, trafficking of membranes, and adhesion cells (32). It was discovered that small GTPase has the potential to be used as an adjuvant target in the process of developing a vaccine against CoV. Within the context of the hunt for new adjuvants for CoV vaccines, this might prove to be of aid (33). It was possible to examine the response to infection in nasal swabs obtained in persons who were positive for SARS-CoV-2 and those who were negative for the virus. This was accomplished by evaluating the expression of genes in the respective host cell retarget role with Rho GTPases (34).

Conclusions:

Many COVID-19 vaccinations were used in the protection from this virus. The current study showed that lung fibrosis, a side effect appears in many people diagnosed by CT scan and some laboratory parameters such as ALP, ALT, and AST serum levels. Moreover, elevated ATPase and GTPase levels in recipients of the coronavirus vaccine showed a relationship between these markers and the vaccination in these individuals. The Receiver Operating Characteristic (ROC) study for ATPase and GTPase revealed that these parameters could act as efficient tests across patient groups.

Authors' declaration:

We hereby confirm that all Figures and Tables in this manuscript are ours. Besides, the figures and images, which are not ours, have been permitted re-publication and attached to the manuscript.

Ethical Clearance**:** The institutional Scientific Committee at the Diyala Health Department approved this study according to the Declaration of Helsinki of Human Studies (Consent number: 54 on 5 March 2023).

Conflict of interest: None

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Author Contributions:

Study conception & design: (Raed Mahmoud Al-Azawee). Literature search: (Raed Mahmoud Al-Azawee & Zeinab M. Al-Rubaei). Data acquisition: (Raed Mahmoud Al-Azawee & Zeinab M. Al-Rubaei). Data analysis & interpretation: (Raed Mahmoud Al-Azawee & Zeinab M. Al-Rubaei). Manuscript preparation: (Raed Mahmoud Al-Azawee & Zeinab M. Al-Rubaei). Manuscript editing & review: (Raed Mahmoud Al-Azawee & Zeinab M. Al-Rubaei).

References:

1- *Raghu G, Remy-Jardin M, Myers JL, Richeldi L, Ryerson CJ, Lederer DJ, et al . Diagnosis of idiopathic pulmonary fibrosis. An official ATS/ERS/JRS/ALAT clinical practice guideline. American journal of respiratory and critical care medicine. 2018 Sep 1;198(5):e44-68.* https://doi.org/10.1164/rccm.201807-1255st.

2- *Auda IG, Auda J, Salih RH. SARS-CoV-2 and other Coronaviruses: A matter of variations. Al-Kindy College Medical Journal. 2023 Apr 30;19(1):5-10.* https://doi.org/10.47723/kcmj.v19i1.927 .

3- *Jasim RZ. Biochemical Action of Vaccines in Iraqi Patients with COVID-19 Infection. Baghdad Science Journal. 2023 Aug 30;20(4 (SI)):1469-79.* https://dx.doi.org/10.21123/bsj.2023.8750.

4- *Solomon JJ, Heyman B, Ko JP, Condos R, Lynch DA. CT of post-acute lung complications of COVID-19. Radiology. 2021 Nov;301(2):E383-95.* https://doi.org/10.1148/radiol.2021211396.

5- *Wong AW, Fidler L, Marcoux V, Johannson KA, Assayag D, Fisher JH, et al. Practical considerations for the diagnosis and treatment of fibrotic interstitial lung disease during the coronavirus disease 2019 pandemic. Chest. 2020 Sep 1;158(3):1069-78.* https://doi.org/10.1016%2Fj.chest.2020.04.019.

6- Park MS, Kim JI, Lee I, Park S, Bae JY, Park MS. Towards the application of human defensins as antivirals. Biomolecules & therapeutics. 2018 May;26(3):242. https://doi.org/10.4062/biomolther.2017.172.

7- Lee JU, Hong J, Shin H, Ryu CB, Park SW, Jeong SH. Overexpression of V-ATPase B2 attenuates lung injury/fibrosis by stabilizing lysosomal membrane permeabilization and increasing collagen degradation. Experimental & Molecular Medicine. 2022 May;54(5):662-72. https://doi.org/10.1038/s12276-022-00776-2 .

8- Li X, Villacreses R, Thornell IM, Noriega J, Mather S, Brommel CM, et al . V-type ATPase mediates airway surface liquid acidification in pig small airway epithelial cells. American journal of respiratory cell and molecular biology. 2021 Aug;65(2):146-56. https://doi.org/10.1165/rcmb.2020-0349oc

9- Shimokawa H, Sunamura S, Satoh K. RhoA/Rho-kinase in the cardiovascular system. Circulation research. 2016 Jan 22;118(2):352-66. https://doi.org/10.1161/circresaha.115.306532 .

10- Yoshii A, Iizuka K, Dobashi K, Horie T, Harada T, Nakazawa T, et al . Relaxation of contracted rabbit tracheal and human bronchial smooth muscle by Y-27632 through inhibition of Ca2+ sensitization. American Journal of Respiratory Cell and Molecular Biology. 1999 Jun 1;20(6):1190-200. https://doi.org/10.1165/ajrcmb.20.6.3441 .

11- Nagpal P, Guo J, Shin KM, Lim JK, Kim KB, Comellas AP, et al. Quantitative CT imaging and advanced visualization methods: potential application in novel coronavirus disease 2019 (COVID-19) pneumonia. BJR| Open. 2021 Feb;3(1):20200043. https://doi.org/10.1259/bjro.20200043 .

12- Al-Mendalawi MD. Two Decades in the Journey of Al-Kindy College Medical Journal: Key Barriers, Achievements, and Prospects. Al-Kindy College Medical Journal. 2022 May 8;18(1):3-4. https://doi.org/10.47723/kcmj.v18i1.838 .

13- Al-Hamamy HR. The impact of COVID-19 on healthy related issues, a structured review. Al-Kindy College Medical Journal. 2021 Dec 30;17(3):152-7. https://doi.org/10.47723/kcmj.v17i3.419.

14- Lami F, Elfadul M, Rashak H, Al Nsour M, Akhtar H, Khader Y, et al. Risk factors of COVID-19 critical outcomes in the Eastern Mediterranean Region: multicountry retrospective study. JMIR Public Health and Surveillance. 2022 Mar 15;8(3):e32831. https://doi.org/10.2196/32831.

15- Faraj AM, Qadir SA, Mohammed OA, Aziz PY, Alkhafaji M, Rahman HS, et al. Current potential options for COVID-19 treatment in Iraq-Kurdistan region and the rest of the world: A mini-review. Iraqi Journal of Science. 2022 Mar 30:948-58. https://doi.org/10.24996/ijs.2022.63.3.4 .

16- Hamid MK. Impact of COVID-19 Vaccine on Hearing Status of Young Ages (Medical College Students as a Sample). Baghdad Science Journal. 2023 Aug 30;20(4 (SI)):1498-. https://doi.org/10.21123/bsj.2023.8694.

17- Mustafa MW. Audiological profile of asymptomatic COVID-19 PCR-positive cases. American journal of otolaryngology. 2020 May 1;41(3):102483. https://doi.org/10.1016/j.amjoto.2020.102483.

18- Mohammad AM, Attia H, Ali YH. Comparative Analysis of MFO, GWO, and GSO for Classification of Covid-19 Chest X-Ray Images. Baghdad Science Journal. 2023 Aug 30;20(4 (SI)):1540-. http://dx.doi.org/10.21123/bsj.2023.9236.

19- Sulayman N. Deep Learning-based Predictive Model of mRNA Vaccine Deterioration: An Analysis of the Stanford COVID-19 mRNA Vaccine Dataset. Baghdad Science Journal. 2023 Aug 30;20(4 (SI)):1451-8. https://doi.org/10.21123/bsj.2023.8504.

20- Kavsak PA, de Wit K, Worster A. Emerging key laboratory tests for patients with COVID-19. Clinical biochemistry. 2020 Jul;81:13. https://doi.org/10.1016%2Fj.clinbiochem.2020.04.009.

21- Samsudin I, Vasikaran SD. Clinical utility and measurement of procalcitonin. The Clinical Biochemist Reviews. 2017 Apr;38(2):59. https://pubmed.ncbi.nlm.nih.gov/29332972.

22- Salman ZZ, Mohammed SB, Muhi SA. Studying the Effect of COVID-19 on Liver Enzymes and Lipid Profile in Iraqi Recovering Patients. Baghdad Science Journal. 2023 Aug 30;20(4 (SI)):1489-. https://doi.org/10.21123/bsj.2023.8347.

23- Baroiu L, Dumitru C, Iancu A, Leşe AC, Drăgănescu M, Baroiu N, Anghel L. COVID-19 impact on the liver. World Journal of Clinical Cases. 2021 Jun 6;9(16):3814. https://doi.org/10.12998%2Fwjcc.v9.i16.3814.

24- Chai X, Hu L, Zhang Y, Han W, Lu Z, Ke A, et al. Specific ACE2 expression in cholangiocytes may cause liver damage after 2019-nCoV infection. biorxiv. 2020 Feb 4:2020-02. https://doi.org/10.1101/2020.02.03.931766.

25- Lin CW, Tsai FJ, Wan L, Lai CC, Lin KH, Hsieh TH, et al. Binding interaction of SARS coronavirus 3CLpro protease with vacuolar-H+ ATPase G1 subunit. FEBS letters. 2005 Nov 7;579(27):6089-94. https://doi.org/10.1016%2Fj.febslet.2005.09.075.

26- Wang R, Wang J, Hassan A, Lee CH, Xie XS, Li X. Molecular basis of V-ATPase inhibition by bafilomycin A1. Nature communications. 2021 Mar 19;12(1):1782. https://doi.org/10.1038/s41467-021-22111-5.

27- Li X, Villacreses R, Thornell IM, Noriega J, Mather S, Brommel CM, et al. V-type ATPase mediates airway surface liquid acidification in pig

small airway epithelial cells. American journal of respiratory cell and molecular biology. 2021 Aug;65(2):146-56.
https://doi.org/10.1165/rcmb.2020-0349oc

28- *Biancatelli RM, Solopov PA, Sharlow ER, Lazo JS, Marik PE, Catravas JD. The Pathophysiology of COVID-19 and SARS-CoV-2 Infection: The SARS-CoV-2 spike protein subunit S1 induces COVID-19-like acute lung injury in K18-hACE2 transgenic mice and barrier dysfunction in human endothelial cells. American Journal of Physiology-Lung Cellular and Molecular Physiology. 2021 Aug 8;321(2):L477.* *https://doi.org/10.1152/ajplung.00223.2021* .

29- *Lv X, Li Z, Guan J, Hu S, Zhang J, Lan Y, et al. Porcine hem agglutinating encephalomyelitis virus activation of the integrin α5β1-FAK-cofilin pathway causes cytoskeletal rearrangement to promote its invasion of N2a cells. Journal of Virology. 2019 Mar 1;93(5):10-128.*
https://doi.org/10.1128%2FJVI.01736-18.

30- *Li Z, Zhao K, Lan Y, Lv X, Hu S, Guan J, et al. Porcine hem agglutinating encephalomyelitis virus enters neuro-2a cells via clathrin-mediated endocytosis in a Rab5-, cholesterol-, and pH-dependent manner. Journal of Virology. 2017 Dec 1;91(23):10-128.*
https://doi.org/10.1128%2FJVI.01083-17.

31- *Mattioli B, Straface E, Matarrese P, Quaranta MG, Giordani L, Malorni W, et al. Leptin as an immunological adjuvant: enhanced migratory and CD8+ T cell stimulatory capacity of human dendritic cells exposed to leptin. The FASEB Journal. 2008 Jun;22(6):2012-22.*
https://doi.org/10.1096/fj.07-098095.

32- *Zhang S, Kazanietz MG, Cooke M. Rho GTPases and the emerging role of tunneling nanotubes in physiology and disease. American Journal of Physiology-Cell Physiology. 2020 Nov 1;319(5):C877-84.*
https://doi.org/10.1152%2Fajpcell.00351.2020.

33- *Hou W, Wang S, Wu H, Xue L, Wang B, Wang S, et al. Small GTPase—A Key Role in Host Cell for Coronavirus Infection and a Potential Target for Coronavirus Vaccine Adjuvant Discovery. Viruses. 2022 Sep 14;14(9):2044.*
https://doi.org/10.3390/v14092044.

34- *Segatori VI, Garona J, Caligiuri LG, Bizzotto J, Lavignolle R, Toro A, et al. Effect of ivermectin and atorvastatin on nuclear localization of importin alpha and drug target expression profiling in host cells from nasopharyngeal swabs of SARS-CoV-2- positive patients. Viruses. 2021 Oct 15;13(10):2084.*
https://doi.org/10.3390/v13102084.

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دراسة مستويات ATPase و GTPase في مرض التليف الرئوي للملقحين وغير الملقحين لفايروس كورونا

راند محمود العزاوي [1] , زينب منيب الربيعي [1]
[1] قسم الكيمياء, كلية التربية للعلوم الصرفة (ابن الهيثم) , جامعة بغداد, العراق

الخلفية : في الخلايا حقيقية النواة، تقع مسؤولية تحمض الأجزاء داخل الخلايا على عاتق عائلة من مضخات البروتون المعروفة باسم-H+ATPases الفراغية، والمعروفة أحيانا باسم V-ATPases. إن GTPases الصغيرة عبارة عن جزيئات إشارة تنظم العمليات الخلوية المهمة بالإضافة إلى الأنشطة دون الخلوية، مما يجعلها تلعب دور اساسي، خاصة في مجموعة واسعة من عمليات الإصابة بفيروس كورونا .

هدف الدراسة: كان الغرض من هذا البحث هو تقييم مستويات ATPase وGTPase لدى مرضى مرض الرئة الليفي (FLD) الذين تلقوا أو لم يتلقوا تطعيم COVID-19، ومن ثم مقارنة هذه المستويات مع تلك الموجودة في المجموعة الضابطة .

المرضى وطرق العمل : شارك في هذه الدراسة 150 شخصا تم تقسيمهم إلى ثلاث مجموعات، المجموعة الأولى (G_1)، كانت بمثابة مجموعة ضابطة وتضمنت (50) شخصا. المجموعة الثانية (G_2) تكونت من (50) مريضا بمرض التليف الرئوي غير الحاصلين على لقاح كوفيد-19 . المجموعة الثالثة (G_3) تكونت من (50) مريض بالتليف الرئوي مع لقاح (فايزر) كوفيد-19. كانت الايلايزا هي الطريقة التي تم استخدامها لتحديد كميات ATPase وGTPase.

النتائج: أظهر تحليل البيانات وجود ارتفاع معنوي في إنزيم الفوسفاتيز القلوي، الأنين أمينوترانسفيراز، الأسبارتات-أمينوترانسفيراز بين المجموعات الثلاث، كما أظهرت النتائج أن مستويات ATPase وGTPase قد زادت بشكل ملحوظ في المجموعتين 3 و2 مقارنة بمستويات المجموعة 1. كذلك، تم اكتشاف ارتفاع كبير في المجموعة الثالثة مقارنة بالمجموعة الثانية.

الاستنتاج: ارتفعت مستويات ATPase و GTPase لدى مرضى تليف الرئة بغض النظر عن حالة التطعيم ضد فايروس كورونا باستخدام لقاح (فايزر) المستخدم في العراق .

الكلمات المفتاحية : ATPase, GTPase , , , , , لقاح (فايزر) كوفيد-19, تليف الرئوي .