

Evaluation of neurological complications in patients with covid-19 in Thi-qar – Iraq

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Keywords:

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ABSTRACT

This paper focus to know lodgment and assessment that effect of the COVID-19 some neurological disorders. (COVID-19), causes a wide range of symptoms outside the respiratory system, although the disease was initially classified as a respiratory disease. Many patients reported many symptoms affecting the cardiovascular system and nervous system; there is increasing evidence that MERS infection can include long-term neuropsychiatric defects, even in its mild or moderate respiratory forms. Data were collected from Al-Hussein Teaching Hospital, Thi-Qar, Iraq, with 200 cases divided into two groups, the male group 150 cases and the female group 50 cases. All effects on the nervous system and the complications generated were measured. A systematic search was conducted based on databases between January 20th, 2019, and April 28th, 2020, By analyzing factors based on the statistical analysis program spss soft 25, results and evidence were found that support the study page, where the value of the risk factor with was extracted prevalence (95%). The percentage was more in females than in men. As for the risk factor for symptoms, the most influential was headache (70-80) In addition to nausea, where the CI (95%) was (84.9-89.5) with a prevalence of 87.2. Meta-analyses were conducted using a comprehensive meta-analysis program, and the effects were studied by relying on the questionnaire results.



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1. INTRODUCTION

Almost all published original studies of COVID-19 cases indicate that, in addition to impaired respiratory function, a third of patients (30% -35%) show signs of damage to the nervous system [1], [2]. When infected with the SARS-CoV-2 virus, patients experience headache, nausea, vomiting, dizziness, myalgia, weakness, fatigue. Nausea and vomiting can result from disorders of both the digestive and nervous systems if these symptoms appear, along with headache and high intracranial pressure [3], [4]. Coronaviruses are important pathogens of humans, and in late 2019, the novel coronavirus was identified as the causative agent of a number of pneumonia cases in the city of Wuhan in the Chinese province of Hubei. The disease spread rapidly, causing an epidemic throughout China and then around the world. In February 2020, the World Health Organization proposed the wording of "COVID-19" - the 2019 coronavirus disease [5], [6]. The World Health Organization declared the COVID-19 pandemic on March 11, 2020 [7], [21- 39]. The virus that causes has

been classified COVID-19 as Severe Acute Respiratory Syndrome 2 (SARS-CoV-2) CO-19 [8]. Although coronaviruses do not usually cause neurological diseases, several reports indicate that the new virus can cause direct or indirect central nervous system (CNS) infections.

According to W.WANG.C, in evaluating neurological complications caused by the coronavirus, encephalopathy that is common in critically ill patients with COVID-19 was described. In one group of 58 people with acute respiratory distress syndrome associated with COVID-19, encephalopathy was present in about two-thirds of patients [9- 11].

Etiology and Pathogenesis - Critically ill patients with COVID-19 have the same causes of toxic metabolic encephalopathy as other critically ill patients and hypoxemia, common in severe COVID-19 patients, is likely to play a role in many cases [12], [13].

In the differential diagnosis of encephalitis along with other neurotrophic viruses such as COVID-19, symptoms of encephalitis include fever, headache, seizures, behavioral disturbances, and altered levels of consciousness. Early diagnosis is critical to ensuring survival as those with severe pneumonia and hypoxia [19], [20]. A case of COVID19 was reported to also occur in patients in January 2020... Patient COVID-19 encephalitis in a 56-year-old Wuhan patient diagnosed with was admitted to the intensive care unit with a low level of consciousness, so an examination was performed CT scan of the brain, which did not detect in the cerebrospinal fluid. A case of 2-SARS CoV, no diseases has been described. The diagnosis of encephalitis was confirmed by genetic sequencing of COVID-19 meningoencephalitis of a 24-year-old Japanese man who had symptoms in the nasopharynx but was detected in fluid SARS-CoV-2 RNA with generalized seizures and a deficiency in Awareness [15- 17].

Not detected. Analysis of cerebrospinal fluid showed 12 cells/ μ l (10 mononuclear and two cells ... myeloid RT - PCR by polymorphism), and on MRI of the brain, areas of hypertensiveness were observed in the right lateral ventricle and medial temporal lobe. And the hippocampus.

2. Material and method

2.1 Sample patient

Data were collected from Al-Hussein Teaching Hospital, Thi-Qar, Iraq, with 200 patient divided into two groups, the male group 150 cases and the female group 50 cases, All effects on the nervous system and the complications generated were measured.

2.2 Study design

Neurological complications resulting from COVID 19 were identified to patients through the use of eligible study, and some studies related to this topic were reviewed.

All demographic information related to neurological symptoms and complications resulting from the impact of COVID 19 were obtained and included in the final analysis, as the demographic information and data included age and gender, in addition to the presence of symptoms in patients, neurological symptoms, and resulting complications.

2.3 Study period

A systematic search was conducted based on databases between January 20th, 2019, and April 28th, 2020

2.4 Aim of study

This paper focus to know lodgment and assessment that effect of the COVID-19 some neurological disorders.

3. Results

A questionnaire was conducted on people infected with the Coronavirus to determine the rate of anxiety and depression, as it included 200 patients, as shown in Table 1.

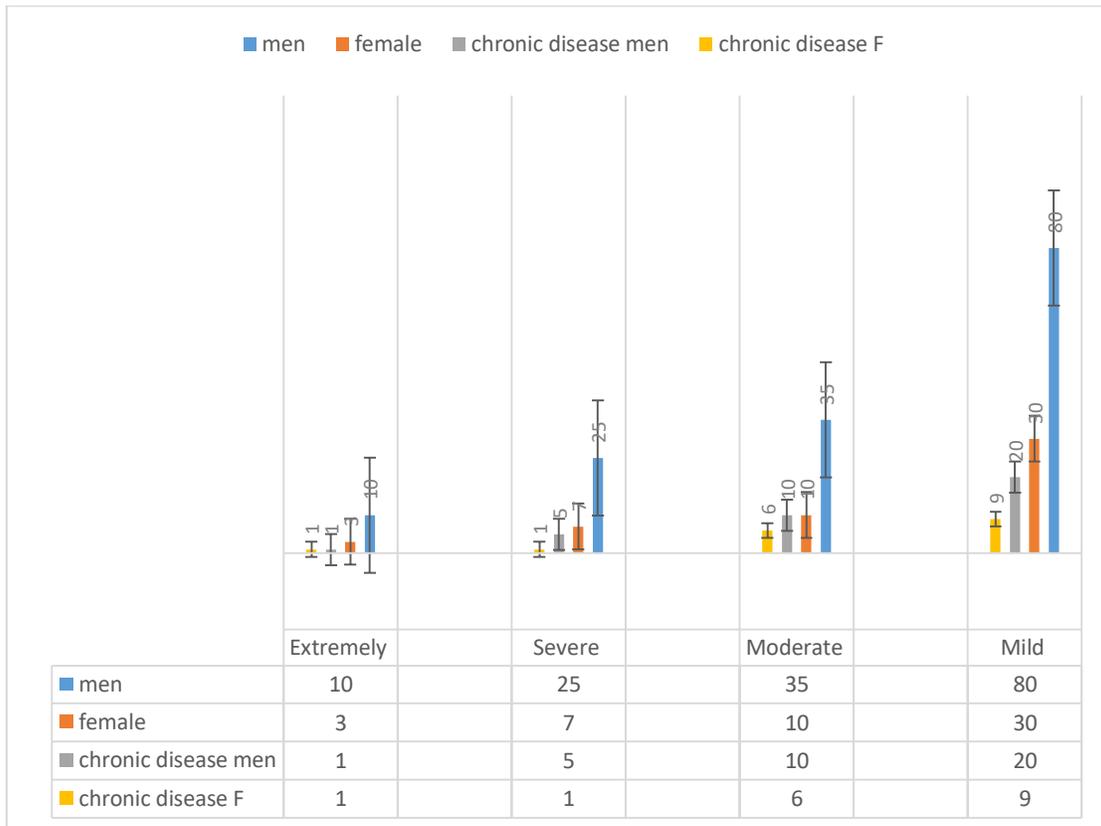


Figure 1- distribution of samples according to gender.

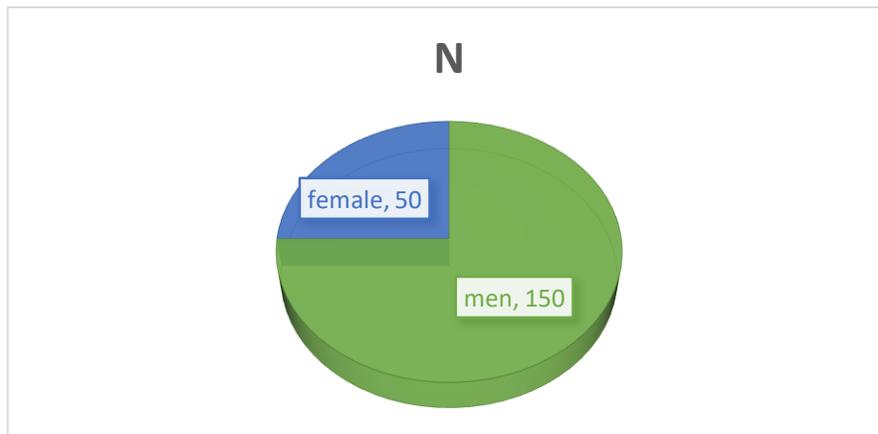


Table 2- stress factor.

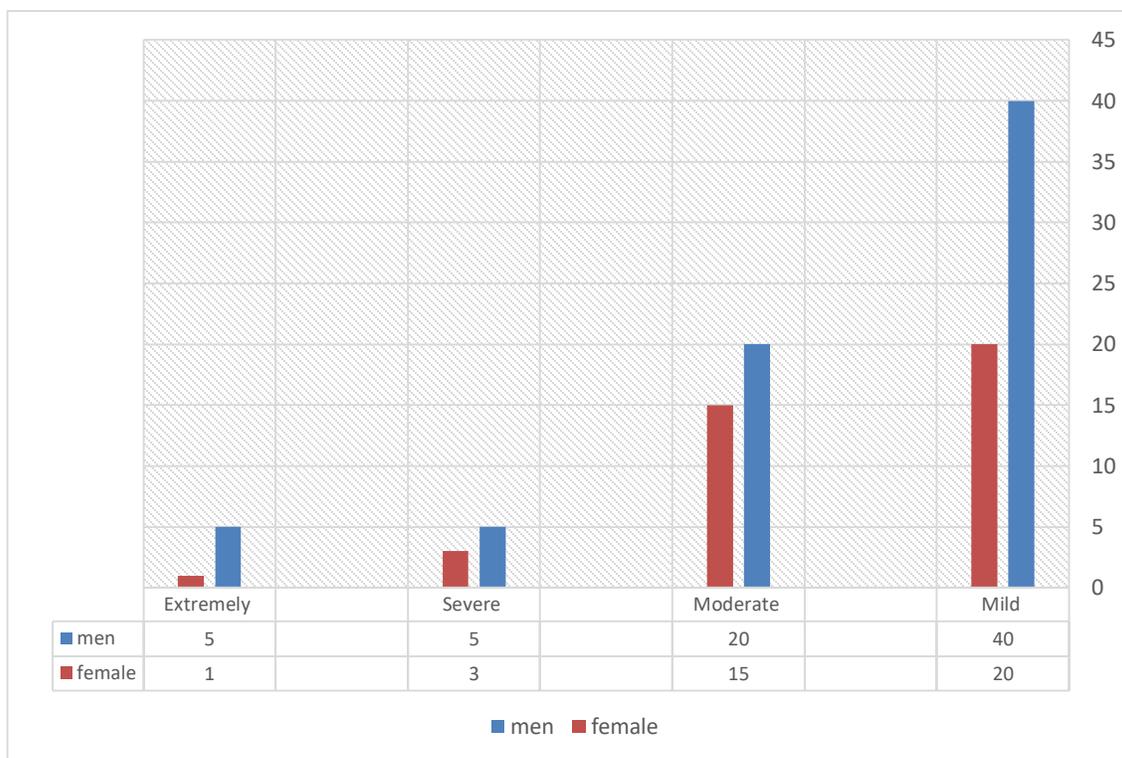


Table 1- characteristics of the patient (Neurological symptoms)

V	P%
headache	80%
Dizziness	40%
muscle pain	30%
Olfactory dysfunction	17%
Nausea	77%
Anorexia	78%
Gustatory dysfunction	66%

Table 2- Complication of patient

necrotizing hemorrhagic encephalitis	33%
epilepsy	7%
peripheral nervous system	12%

At the musculoskeletal level	9%
Change in level of consciousness	14%
Hypertension	45%
Strokes	5%
Sense of taste	16%

Table 3- analysis of result through risk factor Prevalence, % (95% CI)

P	Prevalence	95% CI
Sex		
Male	35	30-40
Female	55	50-60
Neurological symptoms		
headache	75	70-80
Dizziness	71.05	66.9-75.2
muscle pain	52.25	44.3-60.2
Olfactory dysfunction	63.15	56.1-70.2
Nausea	87.2	84.9-89.5
Anorexia	63.8	59.9-67.7
Gustatory dysfunction	62.15	55.5-68.8

Table 4 – risk factor of final results

P	Prevalence	95% CI
Risk factor (95%) Prevalence		
necrotizing hemorrhagic encephalitis	27.75	23.6 – 31.9

epilepsy	15.85	12.2-19.6
peripheral nervous system	15.05	11.3-18.8
At the musculoskeletal level	11.29	7.8-16.3
Change in level of consciousness	14.365	10.33-18.4
Hypertension	19.88	15.67-24.1

Table 5- P-value of results

<i>T</i>	<i>P-value <0.05</i>	<i>Type of association</i>
G		
Male	0.005	Sig
female	0.001	Sig
Neurological symptoms		
headache	0.001	Sig
Dizziness	0.00	Sig
muscle pain	0.0089	Sig
Olfactory dysfunction	0.0034	Sig
Nausea	0.005	Sig
Anorexia	0.00	Sig
Gustatory dysfunction	<0.001	Sig
Complication		
necrotizing hemorrhagic encephalitis	0.001	Sig
epilepsy	0.001	Sig
peripheral nervous system	0.005	Sig
At the musculoskeletal level	0.0054	Sig
Change in level of consciousness	0.001	Sig
Hypertension	0.00	Sig

4. Recommendation to solve problem

Increasing evidence indicates that the virus may reach the brain and attack nerves directly. If this is indeed the case, we may have to reconsider some of the treatments currently being developed for "Covid-19", and we should also prepare for long-term chronic neurological conditions in some survivors.

5. Discussion

The acute and very severe stress, anxiety, and depression were in the sample collected at Al-Hussein Teaching Hospital, Thi-Qar, Iraq.

This data is striking, considering that the survey was carried out in the initial phase of the COVID-19 outbreak. This may have several explanations. On the one hand, there can be more information about the virus, as it can show that the levels that affected the rate of anxiety and stress and the nervous system in general, as the sample was collected from 200 males and females, included 150 samples of men and 50 samples of percentage. Where a high percentage of the effect of the virus was found, which was the presence of headaches in most patients.

The ages included between 20 to 65 years, and a percentage of patients were found to have chronic diseases. In patients with Covid-19, we see an inflammatory phenomenon in the muscles, which is more pronounced in these patients. We don't know if there is a greater loss of muscle mass, but if there is a clear weakness more pronounced in these patients than in others.”

In subjects who were in a prone position (face down) as a way to improve their respiratory capacity upon intubation, pain, and discomfort associated with peripheral nerve entrapment, which patients refer to as a strange sensation spreading to the extremities (similar to a blow to the elbow), have also been described.

A large number of COVID-19 patients have neurological complications such as headache, dizziness, nausea, vomiting, neck muscle tension, impaired smell and taste, and psychological and psychiatric disorders. Although such symptoms may seem insignificant in many cases against the background of an acute respiratory disorder, cases of encephalitis, meningitis, cerebrovascular disorders, depression, and other mental disorders have been identified. The appearance of neurological symptoms is an indicator of a poor prognosis in the course of the disease. Therefore, the prevention of such symptoms as well can be critical for the cure of patients with COVID-19.

From the stages of the disease, symptoms such as headaches, changes in the shape and functions of the brain, or encephalopathy, which would lead to serious diseases, and at lower rates, 16% of them lost the sense of taste and 17% of the sense of smell. All of these symptoms are related to neurotransmitters.

Coronavirus can lead to neurological complications such as delirium, encephalitis, stroke, and nerve damage. The list of neuropathy symptoms in people with the disease includes strokes, brain hemorrhage, and memory loss. It should be noted that it is not uncommon for dangerous diseases to cause such effects. Still, the scale of the spread of the “Covid-19” pandemic means that thousands - or even tens of thousands - of people can already have these symptoms, and some may face problems that persist with it for a long time. Life is a result of infection with the virus.

6. Conclusion

Coronavirus has contributed to several effects, the most important of which are the effects in the central nervous system (specifically in the brain), indicating that it can destroy the brain defense formed by the blood-

brain barrier, protecting the brain from the entry of pathogens through the bloodstream. At first, it was believed that the lungs were the main destination for the emerging coronavirus. Still, later it became clear that what was hidden was worse and that this virus was capable of causing permanent brain damage.

The problem is that the mentioned studies confirm psychological disorders, but they could not determine their nature. Psychiatry is still unable to accurately diagnose it, while cases range from psychosis, for example, to delirium, hallucinations, or compulsive fear states. This indicates that psychiatrists are still at the beginning of the road.

7. References

- [1] Wang, D., Hu, B., Hu, C., Zhu, F., Liu, X., Zhang, J., Wang, B., Xiang, H., Cheng, Z., Xiong, Y., and Zhao, Y., 2020. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus–infected pneumonia in Wuhan, China. *Jama*, 323 (11), pp.1061-1069.
- [2] Lu, H., Stratton, C.W. and Tang, Y.W., 2020. The outbreak of pneumonia of unknown etiology in Wuhan, China: the mystery and the miracle. *Journal of medical virology*, 92 (4), pp. 401-402.
- [3] Verity, R., Okell, L.C., Dorigatti, I., Winskill, P., Whittaker, C., Imai, N., Cuomo-Dannenberg, G., Thompson, H., Walker, P.G., Fu, H., and Dighe, A., 2020. Estimates of the severity of coronavirus disease 2019: a model-based analysis. *The Lancet infectious diseases*, 20 (6), pp.669-677.
- [4] Mao, L., Jin, H., Wang, M., Hu, Y., Chen, S., He, Q., Chang, J., Hong, C., Zhou, Y., Wang, D. and Miao, X., 2020. Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. *JAMA neurology*, 77 (6), pp.683-690.
- [5] Zhou, M., Zhang, X. and Qu, J., 2020. Coronavirus disease 2019 (COVID-19): a clinical update. *Frontiers of medicine*, 14 (2), pp.126-135.
- [6] Ahn, D.G., Shin, H.J., Kim, M.H., Lee, S., Kim, H.S., Myoung, J., Kim, B.T. and Kim, S.J., 2020. Current status of epidemiology, diagnosis, therapeutics, and vaccines for novel coronavirus disease 2019 (COVID-19). *Journal of microbiology and biotechnology*, 30 (3), pp.313-324.
- [7] Weiss, S.R. and Navas-Martin, S., 2005. Coronavirus pathogenesis and the emerging pathogen severe acute respiratory syndrome coronavirus. *Microbiology and molecular biology reviews*, 69 (4), pp. 635-664.
- [8] Zeng, Qinghong, Martijn A. Langereis, Arno LW Van Vliet, Eric G. Huizinga, and Raoul J. De Groot. "Structure of coronavirus hemagglutinin-esterase offers insight into corona and influenza virus evolution." *Proceedings of the National Academy of Sciences* 105, no. 26 (2008): 9065-9069.
- [9] Hung, E.C., Chim, S.S., Chan, P.K., Tong, Y.K., Ng, E.K., Chiu, R.W., Leung, C.B., Sung, J.J., Tam, J.S. and Lo, Y.D., 2003. Detection of SARS coronavirus RNA in the cerebrospinal fluid of a patient with severe acute respiratory syndrome. *Clinical Chemistry*, 49 (12), p.2108.
- [10] Skariyachan, S., Challapilli, S.B., Packirisamy, S., Kumargowda, S.T. and Sridhar, V.S., 2019. Recent aspects on the pathogenesis mechanism, animal models, and novel therapeutic interventions for Middle East respiratory syndrome coronavirus infections. *Frontiers in microbiology*, 10, p.569.

- [11] Li, Kun, Christine Wohlford-Lenane, Stanley Perlman, Jincun Zhao, Alexander K. Jewell, Leah R. Reznikov, Katherine N. Gibson-Corley, David K. Meyerholz, and Paul B. McCray Jr. "Middle East respiratory syndrome coronavirus causes multiple organ damage and lethal disease in mice transgenic for human dipeptidyl peptidase 4." *The Journal of infectious diseases* 213, no. 5 (2016): 712-722.
- [12] Li YC, Bai WZ, Hashikawa T. The neuroinvasive potential of SARS-CoV2 may play a role in the respiratory failure of COVID-19 patients. *Journal of medical virology*. 2020 Jun;92 (6):552-5.
- [13] Ong, Sean Wei Xiang, Yian Kim Tan, Po Ying Chia, Tau Hong Lee, Oon Tek Ng, Michelle Su Yen Wong, and Kalisvar Marimuthu. "Air, surface environmental, and personal protective equipment contamination by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from a symptomatic patient." *Jama* 323, no. 16 (2020): 1610-1612.
- [14] Steardo, Luca, Luca Steardo Jr, Robert Zorec, and Alexei Verkhratsky. "Neuroinfection may contribute to the pathophysiology and clinical manifestations of COVID-19." *Acta Physiologica* 229, no. 3 (2020): e13473.
- [15] Li, Y.C., Bai, W.Z. and Hashikawa, T., 2020. The neuroinvasive potential of SARS-CoV2 may play a role in the respiratory failure of COVID-19 patients. *Journal of medical virology*, 92 (6), pp.552-555.
- [16] Netland, Jason, David K. Meyerholz, Steven Moore, Martin Cassell, and Stanley Perlman. "Severe acute respiratory syndrome coronavirus infection causes neuronal death in the absence of encephalitis in mice transgenic for human ACE2." *Journal of virology* 82, no. 15 (2008): 7264-7275.
- [17] Bohmwald, K., Galvez, N., Ríos, M. and Kalergis, A.M., 2018. Neurologic alterations due to respiratory virus infections. *Frontiers in cellular neuroscience*, 12, p.386.
- [18] McGavern, Dorian B., and Silvia S. Kang. "Illuminating viral infections in the nervous system." *Nature Reviews Immunology* 11, no. 5 (2011): 318-329.
- [19] Baig, Abdul Mannan, Areeba Khaleeq, Usman Ali, and Hira Syeda. "Evidence of the COVID-19 virus targeting the CNS: tissue distribution, host-virus interaction, and proposed neurotropic mechanisms." *ACS chemical neuroscience* 11, no. 7 (2020): 995-998.
- [20] Chan, J.F.W., Yuan, S., Kok, K.H., To, K.K.W., Chu, H., Yang, J., Xing, F., Liu, J., Yip, C.C.Y., Poon, R.W.S. and Tsoi, H.W., 2020. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *The Lancet*, 395 (10223), pp.514-523.
- [21] JALIL, A. T., DILFY, S. H., KAREVSKIY, A., & NAJAH, N. (2020). Viral Hepatitis in Dhi-Qar Province: Demographics and Hematological Characteristics of Patients. *International Journal of Pharmaceutical Research*, 12(1). <https://doi.org/10.31838/ijpr/2020.12.01.326>
- [22] Jalil, A. T., Kadhum, W. R., Khan, M. U. F., Karevskiy, A., Hanan, Z. K., Suksatan, W., ... & Abdullah, M. M. (2021). Cancer stages and demographical study of HPV16 in gene L2 isolated from cervical cancer in Dhi-Qar province, Iraq. *Applied Nanoscience*, 1-7. <https://doi.org/10.1007/s13204-021-01947-9>

- [23] Widjaja, G., Jalil, A. T., Rahman, H. S., Abdelbasset, W. K., Bokov, D. O., Suksatan, W., ... & Ahmadi, M. (2021). Humoral Immune mechanisms involved in protective and pathological immunity during COVID-19. *Human Immunology*. <https://doi.org/10.1016/j.humimm.2021.06.011>
- [24] Moghadasi, S., Elveny, M., Rahman, H. S., Suksatan, W., Jalil, A. T., Abdelbasset, W. K., ... & Jarahian, M. (2021). A paradigm shift in cell-free approach: the emerging role of MSCs-derived exosomes in regenerative medicine. *Journal of Translational Medicine*, 19(1), 1-21. <https://doi.org/10.1186/s12967-021-02980-6>
- [25] Saleh, M. M., Jalil, A. T., Abdulkereem, R. A., & Suleiman, A. A. (2020). Evaluation of Immunoglobulins, CD4/CD8 T Lymphocyte Ratio and Interleukin-6 in COVID-19 Patients. *TURKISH JOURNAL of IMMUNOLOGY*, 8(3), 129-134. <https://doi.org/10.25002/tji.2020.1347>
- [26] Turki Jalil, A., Hussain Dilfy, S., Oudah Meza, S., Aravindhan, S., M Kadhim, M., & M Aljeboree, A. (2021). CuO/ZrO₂ nanocomposites: facile synthesis, characterization and photocatalytic degradation of tetracycline antibiotic. *Journal of Nanostructures*.
- [27] Sarjito, Elveny, M., Jalil, A., Davarpanah, A., Alfakeer, M., Awadh Bahajjaj, A. & Ouladsmame, M. (2021). CFD-based simulation to reduce greenhouse gas emissions from industrial plants. *International Journal of Chemical Reactor Engineering*, 20210063. <https://doi.org/10.1515/ijcre-2021-0063>
- [28] Marofi, F., Rahman, H. S., Al-Obaidi, Z. M. J., Jalil, A. T., Abdelbasset, W. K., Suksatan, W., ... & Jarahian, M. (2021). Novel CAR T therapy is a ray of hope in the treatment of seriously ill AML patients. *Stem Cell Research & Therapy*, 12(1), 1-23. <https://doi.org/10.1186/s13287-021-02420-8>
- [29] Jalil, A. T., Shanshool, M. T., Dilfy, S. H., Saleh, M. M., & Suleiman, A. A. (2021). HEMATOLOGICAL AND SEROLOGICAL PARAMETERS FOR DETECTION OF COVID-19. *Journal of Microbiology, Biotechnology and Food Sciences*, e4229. <https://doi.org/10.15414/jmbfs.4229>
- [30] Vakili-Samiani, S., Jalil, A. T., Abdelbasset, W. K., Yumashev, A. V., Karpishev, V., Jalali, P., ... & Jadidi-Niaragh, F. (2021). Targeting Wee1 kinase as a therapeutic approach in Hematological Malignancies. *DNA repair*, 103203. <https://doi.org/10.1016/j.dnarep.2021.103203>
- [31] NGAFWAN, N., RASYID, H., ABOOD, E. S., ABDELBASSET, W. K., AL-SHAWI, S. G., BOKOV, D., & JALIL, A. T. (2021). Study on novel fluorescent carbon nanomaterials in food analysis. *Food Science and Technology*. <https://doi.org/10.1590/fst.37821>
- [32] Marofi, F., Abdul-Rasheed, O. F., Rahman, H. S., Budi, H. S., Jalil, A. T., Yumashev, A. V., ... & Jarahian, M. (2021). CAR-NK cell in cancer immunotherapy; A promising frontier. *Cancer Science*, 112(9), 3427. <https://doi.org/10.1111/cas.14993>
- [33] Abosaooda, M., Wajdy, J. M., Hussein, E. A., Jalil, A. T., Kadhim, M. M., Abdullah, M. M., ... & Almashhadani, H. A. (2021). Role of vitamin C in the protection of the gum and implants in the human body: theoretical and experimental studies. *International Journal of Corrosion and Scale Inhibition*, 10(3), 1213-1229. <https://dx.doi.org/10.17675/2305-6894-2021-10-3-22>
- [34] Jumintono, J., Alkubaisy, S., Yáñez Silva, D., Singh, K., Turki Jalil, A., Mutia Syarifah, S., ... &

Derkho, M. (2021). Effect of Cystamine on Sperm and Antioxidant Parameters of Ram Semen Stored at 4° C for 50 Hours. Archives of Razi Institute, 76(4), 923-931. <https://dx.doi.org/10.22092/ari.2021.355901.1735>

[35] Raya, I., Chupradit, S., Kadhim, M. M., Mahmoud, M. Z., Jalil, A. T., Surendar, A., ... & Bochvar, A. N. (2021). Role of Compositional Changes on Thermal, Magnetic and Mechanical Properties of Fe-PC-Based Amorphous Alloys. Chinese Physics B. <https://doi.org/10.1088/1674-1056/ac3655>

[36] Chupradit, S., Jalil, A. T., Enina, Y., Neganov, D. A., Alhassan, M. S., Aravindhana, S., & Davarpanah, A. (2021). Use of Organic and Copper-Based Nanoparticles on the Turbulator Installment in a Shell Tube Heat Exchanger: A CFD-Based Simulation Approach by Using Nanofluids. Journal of Nanomaterials. <https://doi.org/10.1155/2021/3250058>

[37] Mohaddeseh Rahbaran, Ehsan Razeghian, Marwah Suliman Maashi, Abduladheem Turki Jalil, Gunawan Widjaja, Lakshmi Thangavelu, Mariya Yurievna Kuznetsova, Pourya Nasirmoghadas, Farid Heidari, Farogh Marofi, Mostafa Jarahian, "Cloning and Embryo Splitting in Mammals: Brief History, Methods, and Achievements", Stem Cells International, vol. 2021, Article ID 2347506, 11 pages, 2021. <https://doi.org/10.1155/2021/2347506>

[38] Jalil, A.T.; Ashfaq, S.; Bokov, D.O.; Alanazi, A.M.; Hachem, K.; Suksatan, W.; Sillanpää, M. High-Sensitivity Biosensor Based on Glass Resonance PhC Cavities for Detection of Blood Component and Glucose Concentration in Human Urine. Coatings 2021, 11, 1555. <https://doi.org/10.3390/coatings11121555>

[39] Chupradit, S.; Ashfaq, S.; Bokov, D.; Suksatan, W.; Jalil, A.T.; Alanazi, A.M.; Sillanpää, M. Ultra-Sensitive Biosensor with Simultaneous Detection (of Cancer and Diabetes) and Analysis of Deformation Effects on Dielectric Rods in Optical Microstructure. Coatings 2021, 11, 1564. <https://doi.org/10.3390/coatings11121564>