Original Article: Hydropower plant and its environmental effects

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ABSTRACT

Referring to the need for three factors of capital, materials and machinery and manpower in the implementation of development projects in the country, he said: "The private sector will never accept investment in projects without considering the profit." Engineer Droudian added: "Since water projects are not feasible in the short term, so the capital is locked for a long time and on the other hand, even after operation, the project does not have a good return." Referring to finding a way to improve the efficiency of projects, he said: 94% of the country's extracted water is consumed in the agricultural, industrial and domestic sectors without any restrictions and disproportionate to the efficiency and price of water input, and according to the water market in Iran, efficiency The desired capital will not be realized after the completion of the project. "Many investors and contractors believe that in the implementation of projects by the private sector, projects are expected to be key in hand so that the private sector can put the projects into operation in the shortest possible time, and as a result, the project," he said. Have an acceptable profitability.

Introduction

Regarding dam construction projects that have been implemented and designed from foreign facilities and credits, such as using foreign financing or receiving loans in the last one or two years, he said: Mulla Sadra Dam, Taleghan Dam and Kerman water transfer project are among the water sector projects are obtained from foreign financing and implemented.

He added: "Also, the drainage water network of Alborz dam was received through a loan from the World Bank and the project was implemented. The water sector is being implemented this year.

Referring to the welcome of Iranian contractors to the internal financing plan, Mr. Kiamanesh said: With the re-approval of the executive by-laws of paragraph (s) of Note 3 of the Budget Law by the Cabinet, currently 35 contracting companies have submitted their

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applications to participate in the tender for dam projects. They have suggested that a company will eventually be selected after the tender.

He continued: "This is while the initial negotiations for the use of domestic finance from the credits of paragraph (d) of Note 19 of this year's budget law, the by-laws of which were approved by the cabinet for the first time in May, continued and still the contractors." They have not been invited to participate in the tender.

Engineer Kiafar, a member of the Agriculture, water and natural resources commission of the Islamic Consultative Assembly, also pointed to the importance of the role of water in the country's economic cycle and said: "Since the government's public resources do not provide enough funds for the water sector, Private In this area, the parliament, with the participation of the Deputy Minister of Water Affairs of the Ministry of Energy and the Management and Planning Organization, passed resolutions based on the notes of the General Budget Law.

He added: "In the first step to support and attract investment in the water sector, the law on the formation of private sector investment in water projects was proposed and approved in accordance with Note 3 of the General Budget Law of 2002 and 2003." The head of the water committee of the agriculture, water and natural resources commission of the parliament said: in continuation of this policy, the executive by-law of paragraph (d) of note 19 of the budget law was approved. Of course, the approval of the above-mentioned by-laws and the use of domestic financing to attract private sector investment in the construction and operation of large dams has also been proposed, and for the implementation of dams and quick-return projects, the use of credits of legal notes such as paragraph (b) of note 18, which has been raised in previous years, continues. He also stated: the government has determined its intention to use internal resources to invest in water sector projects by drafting and approving the mentioned by-laws. However, according to many contractors and engineers, investing in the water sector has a high percentage of risk and due to problems such as late return on investment and the problem of "water", a limited number of investors are willing to invest. Are in the water sector. They believe that if the price of water in Iran is realized and the risk of investing in water projects is reduced, including the construction of a dam by the government, the acceptance of the private sector to invest in this sector will increase. According to Droudian, an expert on economic issues, in order to encourage private sector investors to invest in the water sector, the issue of water should be clarified by the government.

Referring to the reasons for the private sector's reluctance to invest in water projects as expected by the government, he said: "However, in the last one or two years, the public sector has generally welcomed government-approved projects based on notes 3 and 19 of the budget law." Evaluated positively, but in general, domestic investors, compared to investments in other sectors, are not willing to accept the implementation of projects and participate in the implementation of projects in the water and dam sector. According to them, the initial obligations of the implementation of the plans are not fulfilled when implemented by the government, and most of the time, the non-fulfillment of the government's obligations has been to the detriment of investors. According to him, in order to invest in the water sector by guaranteeing a return on profits, a private sector investor can be persuaded to accept the investment risk. Also, the implementation of government facilities such as tax exemptions, guarantees of capital security, respect for the rights and property of capital and the payment of long-term loans with low interest rates are among the things that the government must provide for private investors. However, the enactment of the Investment Law in Water Projects and the enactment of the Executive Regulations, notes 3 and 19 of the Budget Law, have largely alleviated the concerns of private sector investors. According to published statistics and information, population growth over the past 40 years has reduced the country's per capita renewable water resources from 7,000 cubic meters to 2,000 cubic meters in recent years, and it is predicted that with the

continuation of population growth, per capita resources Water in Iran will be reduced to 300 cubic meters in 1400, which indicates the emergence of critical conditions in the country regarding the water issue. Therefore, paying attention to the expansion of activities in the field of "water sector" of the country is one of the priorities of the government, and since the general budget of the government does not provide enough funds needed for this sector, attention to encouraging the private sector and employment Investments of domestic and foreign investors is the most important task of those involved in this sector.

On the other hand, according to officials, today Iran's technical and engineering capacity to implement water sector projects is comparable to the capacity of foreign companies and contractors. Non-governmental organizations have taken an effective step in developing the activities of this sector, including dam construction. While the average construction life of large dams in the world is estimated at 4 to 5 years, in Iran due to problems due to lack of funding, the construction of large dams takes between 8 to 12 years, which jeopardizes the guarantee of return on investment.

According to the officials and managers of the country's water sector, Iran's design and engineering capabilities in the field of dam construction have been considered by the world during the past years. Will be held.

The International Commission on Large Dams has been established since 1947 with the participation of 82 dam-making countries, and Iran, as a successful country in the construction of large dams, will host the world's major dam-building countries for another two years. According to this report, 77 large dams are currently being implemented as national projects in the country and 165 dams are undergoing their study stages. According to forecasts, if 27 dams with an annual regulated water volume of about 2.5 billion cubic meters will reach the operation stage during the last two years of the third program. Completion of the executive operations of the other dams will be possible by the end of the third plan. Also, according to the officials of the Ministry of Energy, 10 large dams will be put into operation this year and 6 dams will reach the water intake stage. In addition, the executive operation of 20 large dams will begin this year The cube is added to the volume of the country's regulated water.

According to the ministry officials, 8 out of 10 large dams under construction should be put into operation every year. However, it is said that with the operation of 15 reservoir dams in the first three years of the program, 95% of the goals of the third economic, social and cultural development plan in the field of construction of large dams have been achieved. This is an interview with Mike and Coutant from the national department of environmental science (ORNL). The two are seeking to address issues related to the expansion of electricity generation resources from hydroelectric dams. These laboratories are responsible for conducting further evaluation and research, as well as licensing for hydropower projects at the federal energy regulatory commission (FERC).

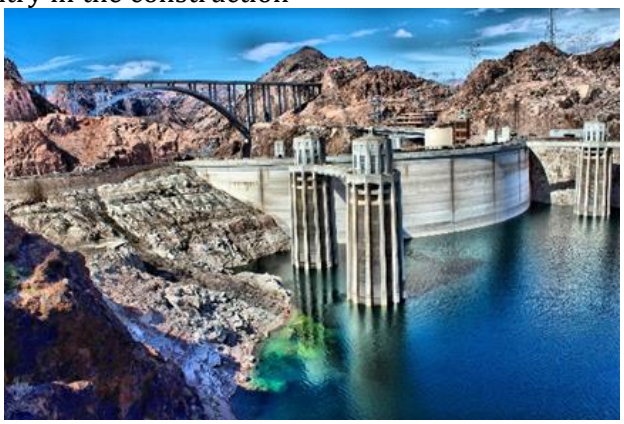

Figure 2: Hydropower hoover dam

In addition, they have conducted research for the US Department of Energy and some other centers on how to avoid or mitigate the environmental impact of these projects, and advise government and federal agencies, as well as the private sector. Mika is in charge of the Hydro Systems Group in the Ecosystems Studies Division and the FERC Project Manager in the Energy and Quantum Divisions is also an ecologist in the Environmental Science Division.

Why is it important for the United States to generate electricity from dams?

Mike: Currently, energy in running water is the easiest, most renewable and cleanest source available for electricity generation in the country. It is important to note that hydropower is the most important renewable energy source for the United States, and biomass, solar, wind, and wind energy are cheaper, more efficient, and more efficient than thermal energy. It is also the cleanest source because it does not emit carbon dioxide, sulfur dioxide, nitrogen oxides or any other air pollution. In addition, it does not produce solid or liquid waste.

Electricity is the cheapest source of electricity in the United States. Each kilowatt hour of electricity generated in this way requires only 0.6 cents to operate, repair and maintain, while the cost for nuclear and coal-fired power plants is approximately 2 to 2 hours per hour, respectively. In our region, the Tennessee Valley, electricity prices have been low, and the main reason for this is the large share of electricity generated by dams.

At present, hydropower is one of the main components of most global power generation systems. It supplies one-fifth of the energy consumed worldwide and is the second largest source of electricity generation after fossil fuels. In the United States, this energy used to supply 14% of electricity consumption and now supplies 10% of the country's electricity.

US hydropower plants generate the equivalent of 500 million barrels of oil a year. Of course, the share of this energy varies in different parts of the country, for example, in the states around Rocky Mountain, this energy provides 14% of electricity, and in the Pacific Coast, this figure reaches 63%. In the Northwest Pacific, which relies heavily on hydropower, about two-thirds of its electricity is supplied by 58 large and small dams. y purpose is not to introduce hydropower without any problems, but to highlight the importance of these figures.

What is the status of national hydropower resources?

May: Approximately half of U.S. water plant projects are federal and half are non-federal. Non-federal projects receive 50-year agreements from the Federal Energy Regulatory Commission (FERC) that must be renewed at each period. For example, some of the 156 hydropower projects built in 1943 had to be amended to meet the standards before the agreement could be renewed.

Sometimes improvements must be made to protect the environment, which can reduce the free fish population in the area.

Pacific Northwest pointed. In some cases, instead of renewing the agreement, the commission may decide to remove the dam and maintain the free flow of the river to assist free monthly migration. These decisions could lead to a reduction in electricity production and an increase of about eight percent in electricity prices for consumers in the region. Under the agreement between us and the US Department of Energy and the Commission, the ORNL Laboratories provide reform advice that water power plants must implement to obtain an agreement. These laboratories support the development of environmentally friendly power plants.

If the plant is shut down, how will it be replaced?

Mike: In some parts of the United States, where hydropower is used for peak times, the effects of eliminating electricity generation (by renegotiating material) are likely to be more severe than in other regions. In these dams, a large amount of water is stored so that at the peak of consumption, the turbines can be put into operation quickly. Fluctuations in river water levels during these operations have adverse effects on the environment and society.

Due to their current sensitivity to environmental issues, such projects are not allowed to continue. Gas turbine power plants, coal-fired power plants, or storage and incentive programs can be used to reduce energy problems during peak periods.

Coutant: It should be noted that if part of the capacity of the electricity grid is reduced, other parts of the grid can supply it. That's why Canadians are worried about selling hydropower to the United States. It should be noted that the largest external source of electricity for the United States is Qubec Hydro, which sells a great deal of electricity to New England and New York City. It should be noted that large-scale hydroelectric power projects in Canada have severe environmental impacts.

In addition to producing clean electricity, what are the other benefits of hydropower?

Mike: The reservoirs behind such dams have a recreational value because they can be used for fishing, boating, water skiing and swimming. It can be a suitable habitat for fish, pelicans, geese, eagles and sea eagles. In addition, it is a good reservoir for water supply and can help control it during flooding and minimize soil erosion. Usually with the expansion of these dams and power plants, the opportunities for recreation also increase.

What are the negative effects of hydropower projects?

Coutant: Since most hydropower projects have dams, the river settlement is being replaced by a lake settlement. Thus, the habitat of wildlife, land, and organisms of river water is either destroyed or formed as a reservoir that has its own organisms. In the state of Tennessee, we can mention the Little Tennessee River and Tellico Lake. The biggest problem in the Northwest region is the blocking of the downward and upward movement of the fish.

Free fish should be able to migrate from the ocean to the upstream, i.e. spawning areas, to reproduce. The number of Chinook, Sockeye, and coho species, which were once very high in the Northwest, is either on the endangered species list or will soon be on the list. Due to the existence of hydropower plants, these species are at the top of the list. Nevertheless, they are the basis of these federal sanctions, which are responsible for largely reducing the region's free fish population. The Pacific Northwest is home to 16 million to 300,000 wild fish a year. Finally, it should be noted that hydropower generation will be reduced by strengthening environmental protection. Another major problem is the entry of young fish downstream and into the ocean, as passing through the plant turbine will cause their death.

Conclusion

The expansion of hydroelectric dams has, in several ways, negative effects on water quality.

Destroying trees will lead to eroded soil and sediment, which can cause blockages. Leakage of water from dam overflows can cause water to become supersaturated with gases in the air. These gas bubbles are absorbed into the tissues of the fish and can cause disease and eventually death of the fish. Gas-saturated water was a major problem in the Columbia River. They found that the high pressure caused by falling water from the dam (inside the reservoir) causes the atmospheric gases in the water to dissolve and the reservoir to become supersaturated.

Low water quality is causing problems for marine life in the Tennessee Valley because the natural flow of rivers is low in summer and therefore several layers of water are formed, meaning the water is warmer and warmer. Because there is no air supply to the underlying layers, oxygen is reduced in these layers. Because these layers are so cold and so low in oxygen and solution, they cannot live there on a monthly basis.

When water from the lower layers passes through the power plant turbine because it contains a small amount of oxygen and solution, it can make the river downstream uninhabitable.

In addition to the lack of oxygen in the water, the underlying layers make it possible for some of the metals in the surrounding rocks to dissolve more easily in the water, and these

metals are released into the river downstream and create problems.

Mike: Another problem with dams is that even if the water quality is not degraded, it must be said that changes in the natural hydrology of the river can lead to major changes in the settlement. This issue is called instream flow issues. If the amount of water that comes out of the dam and enters the bottom changes seasonally or for a short time, even hours, it should be known that this change will affect the fish and other organisms.

References

[1] A. Yarahmadi, K. Kamrava, A. Shafee, M. Milanifard, M. Aghajanpour, Mohebbi A., *J. Pharm. Res. Int.*, **2019**, 1-6. [Crossref], [Google Scholar], [Publisher]
[2] T.S.H. Abadi, M. Askari, K. Miri, M.N. Nia, *Iran. J. Military Med.*, **2020**, *22*, 526-233. [Crossref], [Google Scholar], [Publisher]
[3] M. Abbasi, A. Nakhostin, F. Namdar, N. Chiniforush, M. Hasani Tabatabaei, *J. Lasers Med. Sci.*, **2018**, *9*, 82-86. [Crossref], [Google Scholar], [Publisher]
[4] A. Alipour, A. Ghadami, Z. Alipour, H. Abdollah Zadeh, *J. Health Psychol.*, **2020**, *8*, 163-175. [Crossref], [Google Scholar], [Publisher]
[5] N. Alrabadi, S. Shawagfeh, R. Haddad, T. Muktesh, S. Abu Hammad, D. Al-rabadi, R. Abu Farha, S. AlRabadi, I. Al-Faouri, *J. Pharm. Health Serv. Res.*, **2021**, *12*, 78-86. [Crossref], [Google Scholar], [Publisher]
[6] M. Aminzadeh, R. Mohebi far, Y. Azamines, M. Faraji, *J. Health*, **2015**, *6*, 169-179. [Crossref], [Google Scholar], [Publisher]
[7] N. Asadi, F. Salmani, S. Poorkhajuie, M. Mahdavifar, Z. Royani, *J. Psychiatry Clin. Psychol.*, **2020**, *26*, 306-319. [Crossref], [Google Scholar], [Publisher]
[8] S. Azizi Aram, S. Bashar poor, *Quarterly J of Nursing Management*, **2020**, *9*, 8-18. [Crossref], [Google Scholar], [Publisher]
[9] B. Mahmoodiyeh, S. Etemadi, A. Kamali, S. Rajabi, M. Milanifard, *Ann. Romanian Soc. Cell Biol.*, **2021**, *25*, 2559–2572. [Crossref], [Google Scholar], [Publisher]
[10] B. Shakiba, N. Torabi, R. Alimoradzadeh, R. Maghsoudi, *Journal of Iranian Medical Council*, **2022**, *5*, 227-228. [Crossref], [Google Scholar], [Publisher]
[11] M. Barzideh, A. Choobineh, S. Tabatabaei, *Occup. Med.*, **2012**, *4*, 17-27. [Crossref], [Google Scholar], [Publisher]
[12] D.C. Beachboard, J.M. Anderson-Daniels, M.R. Denison, *J Virol*, **2015**, *89*, 2080-2089. [Crossref], [Google Scholar], [Publisher]
[13] M.G.S. Borba, F.F.A. Val, V.S. Sampaio, M.A.A. Alexandre, G.C. Melo, M. Brito, M.P.G. Mourão, J.D. Brito-Sousa, D. Baía-da-Silva, M.V.F. Guerra, L.A. Hajjar, *JAMA network open*, **2020**, *3*, e208857. [Crossref], [Google Scholar], [Publisher]
[14] F. Afkar, S. Golalipour, M. Akanchi, S.M. Sajedi, A. Zandi Qashghaie, *NeuroQuantology*, **2022**, *20*, 632-642. [Crossref], [Google Scholar], [Publisher]
[15] F. Zabihi, M.A. Abbasi, R. Alimoradzadeh, *Ann. Romanian Soc. Cell Biol.*, **2021**, *25*, 2573–2579. [Crossref], [Google Scholar], [Publisher]
[16] F. Karimzadeh, S.M. Sajedi, S. Taram, F. Karimzadeh, *J. Prosthet. Dent.*, **2021**. [Crossref], [Google Scholar], [Publisher]
[17] Y. Furuta, B.B. Gowen, K. Takahashi, K. Shiraki, D.F. Smee, Barnard D.L., *Antiviral Res.*, **2013**, *100*, 446-454. [Crossref], [Google Scholar], [Publisher]
[18] M.J. Gadlage, J.S. Sparks, D.C. Beachboard, R.G. Cox, J.D. Doyle, C.C. Stobart, M.R. Denison, *J. Virol.*, **2010**, *84*, 280-290. [Crossref], [Google Scholar], [Publisher]
[19] E. Ghaibi, M.R. Soltani Manesh, M. Bushra, Z. Gilani, K. Salimi Nabi, F. Zarif, *Eurasian Journal of Chemical, Medicinal and Petroleum Research,* **2022**, *1*, 49-57. [Crossref], [Google Scholar], [Publisher]
[20] E Ghaibi, M.R. Soltani Manesh, H. Jafari Dezfouli, F. Zarif, Z. Jafari, Z. Gilani, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022**, *1*, 33-39. [Crossref], [Google Scholar], [Publisher]
[21] K. Goyal, P. Chauhan, K. Chikara, P. Gupta, M.P. Singh, *Asian J. psychiatry*, **2020**, *49*, 101989. [Crossref], [Google Scholar], [Publisher]
[22] R.L. Graham, A.C. Sims, S.M. Brockway, R.S. Baric, M.R. Denison, *J. Virol*, **2005**, *79*,

13399-13411. [Crossref], [Google Scholar], [Publisher]
[23] H. Alizadeh Otaghvar, K. Afsordeh, M. Hosseini, N. Mazhari, M. Dousti, *Journal of Surgery and Trauma*, **2020**, *8*, 156-160. [Crossref], [Google Scholar], [Publisher]
[24] H. Alizadeh Otaghvar, S. Moghaddam, A. Molaei, *J. Med. Chem. Sci.*, **2021**, 369-375. [Crossref], [Google Scholar], [Publisher]
[25] H. Jahandideh, A. Yarahmadi, S. Rajaieh, A.O. Shirazi, M. Milanifard, A. Yarahmadi, *J. Pharm. Ree. Int.*, **2020**, *31*, 1-7. [Crossref], [Google Scholar], [Publisher]
[26] H. Mirfakhraee, S. Golalipour, F. Ensafi, A. Ensafi, S. Hajisadeghi, *NeuroQuantology*, **2022**, *20*, 5118-5126. [Crossref], [Google Scholar], [Publisher]
[27] H. Mirjalili, H. Amani, A. Ismaili, M.M. Fard, A. Abdolrazaghnejad, *J. Med. Chem. Sci.*, **2022**, *5*, 204-214. [Crossref], [Google Scholar], [Publisher]
[28] H.A. Otaghvar, R. Rezapour-Nasrabad, M.A. Ebrahimzadeh, M. Yaghoubi, A.R. Khalatbary, D. Nasiry, A. Raoofi, A. Rostamzadeh, *J. Wound Care*, **2022**, *31*, S36-S44. [Crossref], [Google Scholar], [Publisher]
[29] H. Xu, L. Zhong, J. Deng, J. Peng, H. Dan, X. Zeng, T. Li, Q. Chen, *Int. J. Oral Sci.*, **2020**, *12*, 8. [Crossref], [Google Scholar], [Publisher]
[30] Y.A. Helmy, M. Fawzy, A. Elaswad, A. Sobieh, S.P. Kenney, A.A. Shehata, *J. Clin. Med.*, **2020**, *9*, 1225. [Crossref], [Google Scholar], [Publisher]
[31] E.A. Holmes, R.C. O'Connor, V.H. Perry, I. Tracey, S. Wessely, L. Arseneault, C. Ballard, H. Christensen, R.C. Silver, I. Everall, T. Ford,A. John, T. Kabir, K. King, I. Madan, S. Michie, A.K. Przybylski, R. Shafran, A. Sweeney, C.M. Worthman, L. Yardley, K.Cowan, C. Cope, M. Hotopf, E. Bullmore, *Lancet Psychiat.*, **2020**, *7*, 547-560. [Crossref], [Google Scholar], [Publisher]
[32] A.R. Hosseini Khalili, J. Thompson, A. Kehoe, N.S. Hopkinson, A. Khoshbaten, M.R. Soroush, S.E. Humphries, H. Montgomery, M. Ghanei, *BMC Pulm. Med.*, **2008**, *8*, 15. [Crossref], [Google Scholar], [Publisher]
[33] A. Johnson, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, 2023, 2, 1-9. [Crossref], [Google Scholar], [Publisher]
[34] J.P. Montani, V.B. Vliet, *Angiotensin*, Springer, 2004, *163.1*, 3-29. [Crossref], [Google Scholar], [Publisher]
[35] B. Shakiba, N. Torabi, R. Alimoradzadeh, R. Maghsoudi, *Journal of Iranian Medical Council*, **2022**, *5*, 227-228. [Crossref], [Google Scholar], [Publisher]
[36] H. Kalantari, A.H.H. Tabrizi, F. Foroohi, *Gene Rep.*, **2020**, *21*, 100910. [Crossref], [Google Scholar], [Publisher]
[37] I. Karampela, M. Dalamaga, *Arch. Med. Res.*, **2020**, *51*, 741-742. [Crossref], [Google Scholar], [Publisher]
[38] R.N. Kirchdoerfer, A.B. Ward, *Nat. Common.*, **2019**, *10*, 2342. [Crossref], [Google Scholar], [Publisher]
[39] K. Lo Han, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, 2022, *1*, 64-70. [Crossref], [Google Scholar], [Publisher]
[40] K. Lo Han, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022**, *1*, 1-9. [Crossref], [Google Scholar], [Publisher]
[41] M. Abbasi, A. Nakhostin, F. Namdar, N. Chiniforush, M. Hasani Tabatabaei, *J. Lasers Med. Sci.*, Spring, **2018**, *9*, 82-86. [Crossref], [Google Scholar], [Publisher]
[42] M. Milanifard, G. Hassanzadeha, *J. Contemp Med. Sci.*, **2018**, *4*, 26-29. [Crossref], [Google Scholar], [Publisher]
[43] M. Yavari, S.E. Hassanpour, H.A. Otaghvar, H.A. Abdolrazaghi, A.R. Farhoud, *Arch. Bone Jt Surg.*, **2019**, *7*, 258. [Crossref], [Google Scholar], [Publisher]
[44] S. Mahmoodi, M. Hesabi, A. Emami sigaroudi, E. Kazemnejad leili, A. Monfared, JHNM, **2015**, *25*, 63-72. [Crossref], [Google Scholar], [Publisher]
[45] M.B. Abhari, P.F. Afshar, R. Alimoradzadeh, H. Mirmiranpour, *Immunopathol. Persa*, **2019**, *6*, e10-e10 [Crossref], [Google Scholar], [Publisher]
[46] M. Mileski, U. Pannu, B. Payne, E. Sterling, R. McClay, *Healthcare*, **2020**, *8*, 114-134. [Crossref], [Google Scholar], [Publisher]
[47] M.M. Fard, *GMJ Med.*, **2021**, *5*, 391-395. [Crossref], [Google Scholar], [Publisher]
[48] N. Shahkarami, M. Nazari, M. Milanifard, R. Tavakolimoghadam, A. Bahmani, *Eurasian Chem. Commun.*, **2022**, *4*, 463-472 [Crossref], [Google Scholar], [Publisher]

[49] N. Shahkarami, M. Nazari, M. Milanifard, R. Tavakolimoghadam, A. Bahmani, *Eurasian Chem. Commun.*, **2022**, *4*, 463-472 [Crossref], [Google Scholar], [Publisher]
[50] N. Zaimzadeh, S. Ziaie, N. Mohammadzadeh, H. Alizadeh Otaghvar, A. Mottaghi, *Razi J. Med. Sci.*, **2018**, *25*, 59-68. [Crossref], [Google Scholar], [Publisher]
[51] N. Zaimzadeh, S. Ziaie, N. Mohammadzadeh, H. Alizadeh Otaghvar, et al., *Razi Journal of Medical Sciences*, **2018**, *25*, 87-96. [Crossref], [Google Scholar], [Publisher]
[52] F. Najafi, F. Kerjasama, E. Gangoozehi, *Iran. J. Rehabilitation Res. Nursing*, **2018**, *4*,
[57] Mirmiranpour, P. Hashemi, S. Pezeshki, S.S. Salehi, *J. Neurology & Neurophysiol.*, **2019**, *10*, 1-5. [Crossref], [Google Scholar], [Publisher]
[58] R. Alimoradzadeh, M. Mokhtare, S. Agah, *Iran. J. Ageing*, **2017**, *12*, 78-89. [Crossref], [Google Scholar], [Publisher]
[59] R. Alimoradzadeh, M.A. Abbasi, F. Zabihi, H. Mirmiranpour, *Iran. J. Ageing*, **2021**, *15*, 524-533. [Crossref], [Google Scholar], [Publisher]
[60] F. Rebout, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022**, *1*, 20-32. [Crossref], [Google Scholar], [Publisher]
[61] F. Rebout, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022**, *1*, 58-63. [Crossref], [Google Scholar], [Publisher]
[62] H.A. Rothan, S.N. Byrareddy, *J. Autoimmune.*, 2020, *109*, 102433. [Crossref], [Google Scholar], [Publisher]
[63] S.H. Salehi, K. As'adi, S.J. Mousavi, S. Shoar, *Indian J. Surg.,* **2015**, *77*, 427-431. [Crossref], [Google Scholar], [Publisher]
[64] N. Samiei, H.K. Ghane, Y. Khaled, *SVOA Dentistry*, **2021**, *2*, 254-257. [Crossref], [Google Scholar], [Publisher]
[65] P. Serrano, M.A. Johnson, A. Chatterjee, B.W. Neuman, J.S. Joseph, M.J. Buchmeier, P. Kuhn, K. Wüthrich, *J. Virol.*, 2009, 83, 12998-13008. [Crossref], [Google Scholar], 53-59. [Crossref], [Google Scholar], [Publisher]
[53] S.Z. Nazardani, S.H. Nourizadeh Dehkordi, A. Ghorbani, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2023**, *2*, 10-16. [Crossref], [Google Scholar], [Publisher]
[54] A. Nurmeksela, S. Mikkonen, J. Kinnunen, T. Kvist, *Res. Sq.*, **2020**, *1*, 1-22. [Crossref], [Google Scholar], [Publisher]
[55] P. Dini, B. Shakiba, R. Alimoradzadeh, N. Torabi, M.W.C. Watch, *J. Affect. Disord.*, **2021**, *281*, 502. [Crossref], [Google Scholar], [Publisher]
[56] R. Alimoradzadeh, H. [Publisher]
[66] S.P. Smieszek, B.P. Przychodzen, M.H. Polymeropoulos, *Int. J. Antimicrob. Agents*, **2020**, *55*, 106004. [Crossref], [Google Scholar], [Publisher]
[67] A.J. Stoessl, K.P. Bhatia, M. Merello, *Mov. Disord. Clin. Pract.*, **2020**, *7*, 355-356. [Crossref], [Google Scholar], [Publisher]
[68] M. Zbuzant, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022**, *1*, 10-19. [Crossref], [Google Scholar], [Publisher]
[69] M. Zbuzant, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022**, *1*, 40-48. [Crossref], [Google Scholar], [Publisher]