

Original Article: Coronary Artery Disease



James Beki

Sustainable Infrastructure, Department of Medicine, Swinburne University of Technology, Melbourne, Australia

Use your device to scan and read the article online



Citation J. Beki, **Coronary artery disease**, *EJCMPR*. 2023; 2(5):203-211.



<https://doi.org/10.5281/zenodo.8263024>

Article info:

Received: 01 Jun 2023

Accepted: 18 August 2023

Available Online:

ID: EJCMPR-2308-1090

Checked for Plagiarism: Yes

Peer Reviewers Approved by:

Dr. Frank Rebout

Editor who Approved Publication:

Dr. Frank Rebout

Keywords:

Coronary, Artery, Systemic Disease, Arthrosclerosis

ABSTRACT

The term coronary artery disease (CAD) is a general term for disease conditions that cause blockage of coronary blood flow. Coronary artery disease is also called coronary heart disease or ischemic heart disease. Major problems arising from abnormal blood flow to the heart muscle include angina pectoris, congestive heart failure, and myocardial infarction. Any factor that affects the blood flow to the coronary arteries can lead to anemia. Manifestations of cardiac anemia occur when the heart needs more oxygen than the amount of oxygen available to the heart. The most common cause of this supply and demand imbalance is persistent stenosis within the coronary artery. In most cases, the reduction in flow is due to structural changes inside the artery, which leads to narrowing of the duct inside the artery. One of the most important of these factors is atherosclerosis or arteriosclerosis. Other causes of embolism, trauma or direct injury, inflammation of the coronary arteries during systemic diseases such as syphilis, lupus, etc. can cause coronary artery stenosis and obstruction, but in 99% of cases it is the cause of obstructive lesions of arteriosclerosis.

Introduction

It is a cause of death and disability in developed countries [1–3]. Derived from the Greek word meaning thickening of the intimate layer of the artery. Atherosclerosis is an arterial obstruction disease [4-6]. Atherosclerotic lesions are characterized by the deposition of fatty substances on the inner layer of the blood vessel wall and an increase in the number of smooth muscle cells in the vascular wall. Atherosclerosis primarily affects the intima of the arterial wall [7-9]. The fat vein appears as

a series of smooth yellow streaks that protrude slightly toward the inner surface of the arterial canal [10-12]. This condition is caused by the deposition of low-density lipoprotein, which is rich in cholesterol. These deposits accumulate in the intima of the artery, inside smooth cells and macrophages [13-15]. Finally, the prominent fibrous plaque appears as a grayish-yellow protrusion on the surface of the artery [16-18].

The license plate is made of three types of materials:

- ✓ Media smooth muscle cells.

*Corresponding Author: James Beki (beki.j.u@gmail.com)

- ✓ Collagen.
- ✓ Lipids accumulated in the intima layer.

The process of atherosclerosis is formed by the appearance of localized plaques called atheroma in the intima and inner part of the media. Atheromas are an obstructive lesion that, in addition to restricting blood flow or clogging the arteries, can cause dilation and aneurysms to increase the diameter of the artery. This condition usually occurs in the aorta and tends to rupture instead of causing stenosis or obstruction [19-21]]. The clinical presentation of atherosclerosis may be chronic, such as angina pectoris, or an acute event such as myocardial infarction may be the first manifestation of atherosclerosis. Rupture of the fibrous lining and plaques activates coagulation factors in the blood and causes thrombosis [22-25]. If the thrombosis is non-obstructive or transient, platelet damage may not cause symptoms, otherwise it can cause ischemic symptoms such as angina pectoris at rest. On the other hand, obstructive thrombosis that remains stable often [26] causes myocardial infarction. There are various theories about how atherosclerosis develops [27-29]. Among them, the theory of reaction against the most agrees. Other theories include endothelial damage (platelet interaction) [30-32], smooth muscle cell proliferation, fibrosis, thrombosis, ulceration, and calcium deposition. Atherosclerosis is a disorder of fat metabolism characterized by the deposition of fat-containing substances during the closure of blood vessels and the proliferation of smooth muscle cells [33-35].

2- Risk factors for coronary artery disease:

- ✓ Irreversible risk factors:

A) Heredity: Inherited genetic factors such as high blood pressure, blood sugar, obesity, hyperlipidemia in people with a family history of coronary artery disease are more likely to develop the disease [36-38]. Of course, social factors such as nutrition, economy and other

acquired factors play an intensifying role in this family talent, but inheritance seems to play a more important role [39-41]. Family history is the most important factor in causing atherosclerosis [42].

B) Age: With age, the chance of developing atherosclerosis increases [43-45]. Coronary artery disease is more common in people over 40 years of age [46].

C) Gender: Men are more prone to atherosclerosis than women of childbearing age, but menopause is the same for men and women after menopause [47-49]. Protective factors such as estrogen, the difference between serum lipids and hematocrit in men and women, and smoking in men, more male involvement in the development of this condition (estrogen has an effect on alpha and beta lipoproteins) [50].

D) Race: White men are more likely to die from coronary heart disease than non-white men. In women [51-53], the opposite is true, meaning that black women are more at risk than white women [54].

- ✓ Adjustable risk factors:

A) Major risk factors: high serum lipid level (hyperlipoprotein), hypertension, diabetes, smoking, obesity [55].

B) Minor risk factors: personality type, sedentary or sedentary life, use of oral contraceptive pills, psychological stress [56].

Smoking: is one of the most important risk factors for atherosclerosis [57-59]. Mortality of smokers is 2-6 times higher than non-smokers. The average life expectancy of smokers is 10 years less than other people [60-62]. Cigarettes cause changes in the permeability of the endothelium to LDL, which results in a decrease in blood oxygen and an increase in carboxyhemoglobin [63-65]. Inhalation of

smoke increases the level of carbon monoxide CO in the blood, which combines with hemoglobin 200 times more oxygen than oxygen, so oxygen delivery to the heart is limited [66-68]. Nicotine in tobacco causes the arteries to constrict, as well as increases platelet adhesion and increases the risk of thrombosis. Smoking lowers HDL levels and raises cholesterol. A cigarette butt increases your heart rate by 10 beats and increases your blood pressure by about 10 millimeters of mercury. People who smoke more than 25 cigarettes a day are more prone to diastolic hypertension and hypertension [69].

B) Hypertension: Blood pressure is an important factor, but studies have shown that it accelerates atherosclerosis only if it is associated with hyperlipidemia [70-72]. The severity of the effect of hypertension is directly related to the severity of hyperlipidemia in the development of atherosclerosis [73-75]. Blood pressure accelerates the passage of fats and LDL through intimate endothelial cells and also increases platelet adhesion [76].

C) Elevated serum cholesterol: Hyperlipidemia is an important risk factor for the prevalence of cardiovascular disease due to atherosclerosis equals the risk factor for heredity. In hyperlipidemia, changes in the smooth muscle of the vascular wall provide an introduction to the pathological changes of atherosclerosis [77-79]. LDL plays an important role in the development and progression of coronary artery disease. Clinically high cholesterol or triglycerides in fasting blood can raise the possibility of hyperlipidemia. There are two types of hyperlipidemias [80-82]. In the first, which is usually inherited, and in the second, which is the manifestation of other diseases, such as hypothyroidism, diabetes mellitus and alcoholism [83-85]. A patient with a serum cholesterol level of more than 260 mg is

three times more likely to develop coronary artery disease than a person with a serum cholesterol level of 200 mg [86-88]. Fats is not soluble in water, but are dissolved in water as lipoproteins [89].

D) Hyperglycemic diabetes: Diabetic people develop atherosclerosis at a younger age than non-diabetic people. Hyperglycemia causes more platelets to accumulate and changes in the function of red blood cells, which can lead to thrombosis [90]. High insulin levels (in some types of adult-onset diabetes) can damage the lining cells of blood vessels and help develop atheroma. Diabetes is not the only known risk factor, but most of these people also have obesity and hyperlipidemia, which are risk factors [91].

E) Obesity: In some sources, important risk factors are mentioned and, in some sources, minor risk factors are mentioned. Obese people are generally more prone to diabetes, hypertension and hyperlipidemia [91]. People who are normal weight but have low back pain are at increased risk for cardiovascular disease. BMI is used to assess obesity. If the BMI is above 30, it is considered a risk factor.

F) Oral contraceptive pills: Prolonged use of these drugs for 10 years is one of the contributing factors to atherosclerosis. These compounds affect blood vessels and coagulation mechanisms. Increases platelet adhesion and increases the chance of vascular thrombosis. These drugs increase the chances of developing atherosclerosis by increasing the proliferation of the intima, sometimes causing hypertension or diabetes in susceptible individuals.

G) High blood uric acid: Increases platelet adhesion and shortens clotting time. For this reason, myocardial infarction is more common in atherosclerotic lesions in gout patients.

H) Alcohol: Although alcohol dilates peripheral arteries and lowers LDL and increases HDL, alcohol is a disorder that affects the metabolism of other substances. Such as lactic acidosis, ketosis, hyperuricemia, and hyperglycemia and also in the long run causes liver cirrhosis, cardiomyopathy and diffuse myocardial fibrosis. Ovarian resection is a significant risk factor for atherosclerosis in postmenopausal women, which eliminates the effects of estrogen and progesterone on the arteries and increases the risk of heart attack. If 10 years have passed since the date of surgery, the effect of the line will increase.

Note: HT (hormone therapy) was formally introduced as a replacement hormone therapy for the elderly to prevent CAD, but research has shown that HT does not play an effective role in preventing CAD. HT reduces the symptoms of menopause and bone fractures due to osteoporosis, but is still under investigation in connection with an increased risk of CAD, breast cancer, deep vein thrombosis, CVA, and pulmonary embolism. As a result, HT should not be started or continued for early prevention of CAD.

Behavioral patterns, personality types, stress and lifestyle: In terms of psychiatry, people in society are divided into two personality groups A and B. Currently, the interface between these two groups is very large. Group A is more susceptible to atherosclerosis. Type a people are precise, hardworking and ambitious people. They have a great sense of responsibility.

Stress: Severe emotional disturbances and emotional turmoil during the day cause the release of catecholamines and the development of transient and sometimes persistent hypertension, which is effective in causing

pathological changes in the vessel wall and atherosclerosis.

Socio-economic status: Taylor et al. Consider socioeconomic status as the most important factor in the development of atherosclerosis. People in low socioeconomic status are more likely to be exposed to CAD for the following reasons: They are obese, they smoke more, they have a diet high in fat and carbohydrates, instead of protein they have high cholesterol levels, they have high blood pressure, supportive systems They have low social status, low level of education, and often a stressful life. These factors increase epinephrine and ACTH levels, increase insulin secretion relative to blood sugar levels, increase cholesterol and triglycerides, and increase coagulation time and increase erythrocyte accumulation. It becomes.

Types of lipoproteins based on protein contents:

A) LDL: HDL or LDL transport to the liver helps to break down, excrete and consume total cholesterol. The ideal goal is to keep the LDL level low and the blood HDL level high. Optimal LDL levels in patients are: less than 160 mg / dl for patients with one or no risk factors, less than 130 mg / dl in patients exposed to two or more risk factors, less than 100 mg / dl for patients CAD or high-risk CAD, less than 70 mg / dl for patients at risk for ACS (acute coronary artery disease). Serum cholesterol and LDL levels can be controlled by diet and physical activity. Depending on the LDL level and the risk of CAD, medication may be prescribed. When LDL production increases, LDL components adhere to vulnerable points in the arterial endothelium. Macrophages digest them and carry them to the walls of the arteries, where the process of plaque formation begins.

HDL: The high level of HDL should be more than 40 mg / dl and the more desirable level should be more than 60 mg / dl. High levels of HDL are

a protective factor for heart patients. Triglyceride is another type of fat that is made from fatty acids and is carried through the blood by lipoproteins. Levels above 200 mg / dl are dangerous. Treatment for high triglyceride is focused on weight loss and increased physical activity, as well as medication, especially when it reaches above 500 mg / dl.

VLDL: Triglycerides are stored as lipids in the tissue. As the triglyceride concentration rises, so does the VLDL. A high-carbohydrate diet and alcohol consumption can increase triglyceride levels. If triglycerides are high without raising serum cholesterol levels, it can be controlled by diet.

Conclusion

Of these, LDL, which is approximately 50% cholesterol, is most associated with cardiovascular disease. HDL is a protective agent. Atherothrombotic plaque is the least likely to form with this type of lipoprotein. In another classification by electrophoresis, two groups of lipoproteins are considered: high-density alpha lipoprotein or HDL and low-density beta-lipoprotein such as chylomicrons, VLDL, and LDL. Group B is the most effective group in the development of atherosclerosis and coronary artery disease. HDL is also called favorable lipids. If the metabolism is disturbed and the amount of xanthoma lipoprotein is increased, yellow deposits form on the skin due to fat deposition, but these lesions can be removed with medication.

References

[1] F Safari, H Safari, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022** 1 (2), 150-154 [[Google Scholar](#)], [[Publisher](#)]
 [2] M Irajian, V Fattahi, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2023** 2 (3), 43-52 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]

[3] SA. Mahkooyeh, et al., *Eurasian Chemical Communications*, **2022**, 338-346, [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [4] S. Saedi, A. Saedi, MM Ghaemi, MM Fard, *Eurasian J. Sci. Technol*, **2022** 2, 233-241 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [5] SA. Mahkooyeh, S. Eskandari, E. Delavar, M. Milanifard, FE. Mehni, *Eurasian Chemical Communications*, **2022** 338-346 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [6] MM. Fard, et al., *Journal of Chemical Reviews*, **2019** 3 (3), 181-195 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [7] M. Milanifard, *GMJ Medicine*, **2021** 5 (1), 391-395 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [8] 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. [[Google Scholar](#)], [[Publisher](#)],
 [9] F. Delborty, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022**, 1, 100-109 [[Google Scholar](#)], [[Publisher](#)], [[Crossref](#)],
 [10] K. Hashemzadeh, M. Dehdilan, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022** 1 (5), 41-50 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [11] M. Irajian, V. Fattahi, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022** 1 (5), 76-86 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [12] N. Mohsen, H. Jaber, M. Maryam, S. Elham, J. Amin, *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2022**, 1 (5), 99-110 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [13] M. Nabiuni, et al., *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, **2023** 2 (5), 1-15 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [14] M. Najafi, et al., *Brain Sciences*, **2023** 13 (2), 159 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
 [15] M. Nabiuni, J Hatam, *Iranian Journal of Neurosurgery*, **2023** 9, 15-15 [[Google Scholar](#)], [[Publisher](#)]

- [16] M. Nabiuni, S Sarvarian, *Neurosurgery Quarterly*, **2014** 24 (2), 94-97 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [17] M. Nabiuni, S Sarvarian, *Global spine journal*, **2014** 1 (1), 019-021 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [18] F Rokhtabnak, S Sayad, M Izadi, SD Motlagh, P Rahimzadeh, *Anesthesiology and Pain Medicin* **2021** 11 (5) [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [19] S Sayad, M Panahi, R Nekouian, S Sayad, *Journal of Preventive Epidemiology*, **2020** 4 (2), e16-e16 [[Google Scholar](#)], [[Publisher](#)]
- [20] S Pirirani, H Soleimankhani, A Motamedi Shalamzari, S Sayyad, *Biannual Journal of the Iranian Psychological Association*, **2019**, 13(2), 99-108 [[Google Scholar](#)], [[Publisher](#)]
- [21] S Masoumi Jouibari, M Barahman, M Panahi, A Nikoofar, S Sayad, *Yafteh*, **2021**, 23, 161-169 [[Google Scholar](#)], [[Publisher](#)]
- [22] S Sayad, M Abdi-Gamsae, et al., *Asian Pacific Journal of Cancer Prevention: APJCP*, **2021**, 22 (8), 2717 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [23] FB Ah Jalali, S Hassani, A Zare, T Ziaadini, *The Seybold Report*, **2014** 18 (04), 1634-1653 [[Google Scholar](#)], [[Publisher](#)]
- [24] F Beiranvandi, Z Kuchaki, A Zare, E Khoshdel, A Jalali, *Journal of Pharmaceutical Negative Results*, **2022**, 4417-4425 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [25] FB SS Seyedian, A Akbar shayesteh, Elsevier, **2018**, 2526-2530 [[Crossref](#)], [[Publisher](#)]
- [26] SS Beladi Mousavi, et al., *Jundishapur Scientific Medical Journal (JSMJ)*, **2014** 13 (1), 11-20 [[Crossref](#)], [[Publisher](#)]
- [27] M Jalessi, MS Gholami, et al., *Journal of Clinical Laboratory Analysis*, **2022** 36 (1), e24150 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [28] N Khayer, M Jalessi, A Jahanbakhshi, A Tabib khooei, M Mirzaie, *Scientific Reports*, **2021** 11 (1), 20943 [[Google Scholar](#)], [[Publisher](#)]
- [29] H Dabiri, BM Soltani, S Dokanehiifard, A Jahanbakhshi, M Khaleghi, *Cell Journal (Yakhteh)*, **2021** 23 (4), 421 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [30] S Bijari, A Jahanbakhshi, P Hajishafiezharamini, P Abdolmaleki, *BioMed Research International* **2022** [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [31] E Kola, J Musa, A Guy, I Kola, E Horjeti, V Filaj, M Alimehmeti, *Medical Archives*, **2021** 75 (2), 154 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [32] L Berdica, E Kola, D Nakuci, E Horjeti, M Alimehmeti, *Cardio-Oncology*, **2023** 9 (1), 1-4 [[Google Scholar](#)], [[Publisher](#)]
- [33] E Kola, A Gjata, I Kola, A Guy, J Musa, et al., *Radiology Case Reports*, **2021** 16 (11), 3191-3195 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [34] J Musa, E Horjeti, A Guy, K Saliaj, D Shtiza, E Ceka, D Musa, L Rakovica, *Journal of Pediatrics, Perinatology and Child Health*, **2020** 4 (3), 52-57 [[Google Scholar](#)], [[Publisher](#)]
- [35] J Musa, L Rakovica, L Hallunovaj, E Horjeti, *Archives of Clinical and Medical Case Reports*, **2020** 4, 774-778 [[Google Scholar](#)], [[Publisher](#)]
- [36] E Kola, L Berdica, et al., *ASMS*, **2020** 4 (5), 45-48 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [37] E Kola, A Gjata, I Kola, et al., *Radiology Case Reports*, **2022** 17 (3), 1032 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [38] E Kola, I Kola, M Brati-Dervishi, et al., *Journal of Surgery and Research*, **2020** 3 (2), 140-146 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [39] D Nakuci, E Kola, E Horjeti, I Kola, B Shaipi, J Musa, A Guy, M Alimehmeti, *Archives of Clinical and Medical Case Reports*, **2020** 4 (5), 760-765 [[Google Scholar](#)], [[Publisher](#)]
- [40] SM Bagheri, S Hassani, A Salmanipour, *GSC Advanced Research and Reviews*, **2022** 11

- (3), 101-105 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [41] SH AH Maleki, A Gholami, M Mohammadi, A Farhiudian, Journal of pharmaceutical Negative Results, **2022** 13 (10), 4137-4158 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [42] S Hassani, M Rikhtehgar, A Salmanipour, GSC Biological and Pharmaceutical Sciences, **2022** 19 (3), 248-252 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [43] V Tajiknia, S Hassani, H Seifmanesh, A Afrasiabi, H Hosseinpour, J. Obstetrics Gynecology and Reproductive Sciences, **2021** 5 (9) [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [44] A Jalali, S Hassani, S Albuzyad, A Moaddab, M Rajabzadeh, Pakistan Heart Journal, **2023** 56 (2), 906-919 [[Google Scholar](#)], [[Publisher](#)]
- [45] SAK AH Jalali, AH Maleki, S Hassani, E Khoshdel, The seybold Report Journal, **2023** 18 (05), 999-1022 [[Google Scholar](#)], [[Publisher](#)]
- [46] MR AH Jalali, S Hassani, S Albuzyad, A Moaddab, The seybold Report Journal, **2023** [[Google Scholar](#)], [[Publisher](#)]
- [47] FB AH Jalali, S Hassani, A Zare, T Ziaadini, The seybold Report Journal, **2023** 18 (04), 1634-1653 [[Google Scholar](#)], [[Publisher](#)]
- [48] A Ghasemzadeh, N Zabandan, AH Mohammadalizadeh, S Habibollahi, E Alamoutifard, MJ Namazi, M.R Soltani, Journal of Archives of pharmacy practice. **2020**;1:119 [[Google Scholar](#)], [[Publisher](#)]
- [49] SM Shushtarian, M Reza soltani, MJ Namazi, Journal of Advanced pharmacy Education & Research. **2020**;10:(s2) [[Google Scholar](#)], [[Publisher](#)]
- [50] S Moshar, MR Soltani, MJ Namazi, Journal of Advanced pharmacy Education & Research. **2020**; 10:(s2) [[Google Scholar](#)], [[Publisher](#)]
- [51] S Habibollahi Khaled hamid, M Eghbalnejad Mofrad, SMA Alavi, MJ Namazi, Journal of Advanced pharmacy Education & Research. **2021**;10 185-187 [[Google Scholar](#)], [[Publisher](#)]
- [52] SAY Ahmadi; et al, Formerly Current Pharmacogenomics Journal. **2020**, 17(3): 197-205 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [53] S Sayad; et al, Archive of Oncology Journal. **2020** ;26(1): 6-9 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [54] M.E Akbari; et al, International Journal of Cancer Management. **2016**;9(6) [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [55] S Sayad; et al, Annals of Research in Antioxidants Journal. **2019**; 4(2) [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [56] M Karoobi; et al, Journal of Plastic, Reconstructive & Aesthetic Surgery. **2023** [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [57] M Farbod; et al, Klinicka Onkologie: Casopis Ceske a Slovenske Onkologicke Spolecnosti Journal. **2022**, 35(3):181-189 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [58] S Sayad; et al, Asian Pacific Journal of Cancer Prevention: **2021**; 22, 2717-2722. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [59] M.E Akbari; et al, International Journal of Breast Cancer, **2017** [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [60] Z Shormeij; et al, Iranian Journal of Cancer Prevention, **2018** 9 e5747 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [61] L Berdica, E Kola, D Nakuci, E Horjeti et al, Journal of cardio-oncology. **2023** 9(1) 1-4 [[Google Scholar](#)], [[Publisher](#)]
- [62] E Kola, J Musa, A Guy, I Kola, E Horjeti, V Filaj, M Alimehmeti, Journal of Medical Archives. **2021** 75(2) 154 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [63] E Kola; et al, J Clin Rev Case Rep. **2019**; 4(6):1-4 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]

- [64] K Heshmat-Ghahdarjani, et al, Current Problems in Cardiology Journal. **2023** 48(8) 101739 [Crossref], [Google Scholar], [Publisher]
- [65] A Rezazadeh Roudkoli, et al, Journal of preventive Epidemiology. **2022** 7(1) [Google Scholar], [Publisher]
- [66] F HYSENI; et al, The Importance of Magnetic Resonance in Detection of Cortical Dysplasia, Curr Health Sci Journal. **2021**; 47(4): 585–589 [Crossref], [Google Scholar], [Publisher]
- [67] J Musa;et al, Arch Clin Med Case Rep Journal, **2021** 5 640-648 [Google Scholar], [Publisher]
- [68] M Valilo Zinat Sargazi; et al, Molecular Biology Reports Journal. **2023** 50 5407–5414 [Crossref], [Google Scholar], [Publisher]
- [69] S Sotoudehnia Korani; et al, Journal of Preventive Epidemiology, **2022**,7(1) [Google Scholar], [Publisher]
- [70] F Sada;et al, Challenging clinical presentation of Zinner syndrome, Radiology Case Reports. **2023** 18(1) 256-259 [Crossref], [Google Scholar], [Publisher]
- [71] E Harizi; et al, Radiology Case Reports ۲۰۲۲ 17 (11) 4152-4155 [Crossref], [Google Scholar], [Publisher]
- [72] I Ahmetgjekaj; et al, Radiology Case Reports. **2023** 18 (3) 1364-1367 [Crossref], [Google Scholar], [Publisher]
- [73] D Aghamohamadi., M.K. Gol., Int J Womens Health Reprod Sci, **2020**. 8(2): p. 227-31. [Google Scholar], [Publisher]
- [74] D Alvandfar., M. Alizadeh, M. Khanbabayi Gol, The Iranian Journal of Obstetrics, Gynecology and Infertility, **2019**. 22(9): p. 1-7.[Crossref], [Google Scholar], [Publisher]
- [75] K Hashemzadeh., M. Dehdilani, and M.K. Gol, Crescent Journal of Medical & Biological Sciences, **2019**. 6(4). [Google Scholar], [Publisher]
- [76] M Khanbabaei Gol., et al., The Iranian Journal of Obstetrics, Gynecology and Infertility, **2019**. 22(5): p. 52-60. [Crossref], [Google Scholar], [Publisher]
- [77] M Khanbabayi Gol., F. Jabarzade, V. Zamanzadeh, Nurs Midwifery J, **2017**. 15(8): p. 612-9. [Google Scholar], [Publisher]
- [78] A Mahmoodpoor et al., Indian Journal of Critical Care Medicine. **2016**; 20(11): 653. [Crossref], [Google Scholar], [Publisher]
- [79] R Movassagi et al., Pakistan journal of medical sciences. **2017**; 33(5): 1117 .[Crossref], [Google Scholar], [Publisher]
- [80] A Fathi, et al., International Journal of Adhesion and Adhesives, **2023**, 122, 103322 [Crossref], [Google Scholar], [Publisher]
- [81] R Monirifard, M Abolhasani, et al., J Iran Dent Assoc **2019**; 31 (4):182-188 [Crossref], [Google Scholar], [Publisher]
- [82] E Ghasemi, AH Fathi, S Parvizinia., J Iran Dent Assoc **2019**; 31 (3):169-176 [Crossref], [Google Scholar], [Publisher]
- [83] HQ. Alijani, A. Fathi, et al. Bioref. **2022**. [Crossref], [Google Scholar], [Publisher]
- [84] T Barakati, R. Khodadadi, et al., Turkish Online Journal of Qualitative Inquiry, **2021**, 12, 11401-11410. 10p. [Google Scholar], [Publisher]
- [85] A. Aminian, et al., Nanomedicine Research Journal, **2022**, 7(2), 107-123. [Crossref], [Google Scholar], [Publisher]
- [86] M Maalekipour, M Safari, M Berekatain, A Fathi, International Journal of Dentistry, **2021**, Article ID 3178536, [Crossref], [Google Scholar], [Publisher]
- [87] A Fathi, Ebadian, S Nasrollahi Dezaki, N Mardasi, R Mosharraf, S Isler, S Sadat Tabatabaei, " International Journal of Dentistry, vol. 2022, Article ID 4748291, 10

pages, 2022. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]

[88] A. Fathi, et al., Dent Res J (Isfahan). **2023** 18; 20: 3. [[Google Scholar](#)], [[Publisher](#)]

[89] A.H Fathi; S. Aryanezhad; E Mostajeran; U Zamani Ahari; S.M Asadinejad. The Iranian Journal of Obstetrics, Gynecology and Infertility, **2022**, 25(2), 90-100. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]

[90] M Abolhasani, et al., J Iran Dent Assoc **2021**; 33, 51-57 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]

[91] B. Ebadian, A Fathi, Sh Tabatabaei, International Journal of Dentistry, **2023**, Article ID 3347197, 15 [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]

This journal is a double-blind peer-reviewed journal covering all areas in Chemistry, Medicinal and Petroleum. EJCMPR is published quarterly (6 issues per year) online and in print. Copyright © 2022 by ASC ([Amir Samimi Company](#)) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.