ABO Blood Groups Associated with Heart Attack in Al-Najaf Governorate

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SUMMARY. Background: Caveolin-1 is an integral membrane protein that is the primary component of cell membrane invaginations called caveolae. Caveolin-1 is involved in a number of important cellular functions. Caveolin-1 is extensively expressed in adipocytes, endothelial cells, and smooth muscle cells, all of which are terminally differentiated mesenchymal cells. Caveolin-1 (Cav1) is a scaffolding protein that controls the function of a variety of signalling molecules. Its absence has been linked to the development of numerous cancers. Also it has role in carcinogenesis either tumor promoter or suppressor. Basal cell carcinoma is the most common type of nonmelanoma skin cancer. Aims: This study was done to detect its role in basal cell carcinoma either tumor promoter or suppressor. Materials and methods: Thirty patients were enrolled in this study. Skin biopsies were taken from patients and immune histochemical-staining of caveolin 1 was done. Results: There was statically significant difference between IRS score inside and outside BCC (p=.002).Caveolin 1 was high in BCC. Conclusion: Caveolin 1 expression increased in BCC especially in outer part of tumor reflecting its role in tumor progression.

RESUMEN. Antecedentes: la caveolina-1 es una proteína de membrana integral que es el componente principal de las invaginaciones de la membrana celular llamadas caveolas. La caveolina-1 participa en varias funciones celulares importantes. La caveolina-1 se expresa ampliamente en adipocitos, células endoteliales y células del músculo liso, todas las cuales son células mesenquimales diferenciadas terminalmente. La caveolina-1 (Cav1) es una proteína de andamiaje que controla la función de una variedad de moléculas de señalización. Su ausencia se ha relacionado con el desarrollo de numerosos cánceres. También tiene un papel en la carcinogénesis como promotor o supresor de tumores. El carcinoma de células basales es el tipo más común de cáncer de piel no melanoma. Objetivos: Este estudio se realizó para detectar su papel en el carcinoma de células basales como promotor o supresor de tumores. Materiales y métodos: Treinta pacientes fueron incluidos en este estudio. Se tomaron biopsias de piel de los pacientes y se realizó tinción histoquímica inmune de caveolina 1. Resultados: Hubo una diferencia estadísticamente significativa entre la puntuación del IRS dentro y fuera del BCC (p = .002). La Caveolina 1 fue alta en el BCC. Conclusión: La expresión de caveolina 1 aumentó en BCC, especialmente en la parte externa del tumor, lo que refleja su papel en la progresión del tumor.

INTRODUCTION

A serious consequence of coronary artery disease is myocardial infarction, also known as a heart attack. Atherosclerosis, which occurs when arteries constrict or harden as a result of the accumulation of cholesterol plaque, causes coronary artery disease [1] Blood clots or thrombi that develop on plaque surfaces may cause further constriction. Other risk factors for coronary artery disease include diabetes mellitus, hypertension, dyslipidemia, and ABO blood group phenotypes.[2] Scientists have discovered that blood group phenotypes play a significant hereditary role in some diseases. There is growing evidence that the phenotypes of the ABO blood group and MI are related [2] Studies conducted over the last few decades have revealed a stronger correlation between coronary artery disease and the ABO blood group [3]. There is evidence that an individual's blood type can predict their risk of thrombosis in advance [4]. Both a blood cell surface protein and a Willebrand factor linked with endothelial cells are present in the ABO blood group. The evidence for the association between blood type and coronary artery disease risk is insufficient; and the findings of multiple studies indicate the exact reverse

[5]. Because of its significance and the fact that there is high incidence of coronary artery disease in Iraq, so the current study was conducted to examine this connection in the population of Iraq.

MATERIALS AND METHODS

The study was carried out between October 2022 and January 2023 at the AL Sadr Hospital in Najaf, Iraq. Sixty people in total had verified MI and were considered cases. The patient's clinical record contained the necessary details regarding age and sex, which were documented. The study's participants were split into two groups based on their sex: 27 females (45% of the total) and 33 males (55%). All patients had vein puncture procedures to obtain approximately 2 ml of blood. The analysis of a freshly taken blood sample in order to determine ABO blood group. Blood samples were taken and placed in an EDTA-anticoagulant container. The blood group of each sample of blood was determined using the ABO gel card test.

Shortly after a subject's fingertip was cleaned with an alcohol swab, air dried, and punctured, On a spotless glass slide, three droplets of blood were added. Next, one drop of anti-A and one drop of anti-B were added to the blood drops that had already been deposited using the sera vial dropper. Finally, using separate, sanitized wooden toothpicks, the blood and the anti-sera were immediately combined.. The straight or forward grouping test for ABO blood group typing employs anti-A and anti-B test sera.

RESULT

The present study examined 60 patients, ranging in age from 19 to 90 years. The overall blood group map of myocardial infarction patients was as follows: subjects (26.6%) A, subjects (21.7%) B, subjects (15.%) AB, and subjects (36.6%) O.

Further examination of the ABO blood group distribution among MI patients showed that group O+ (33.3%) was the most common and group AB+ (11.7) was the blood type that was least common among Rh+ MI patients (Table 1). A+ blood type was the second most prevalent blood group among MI patients (23.3%) and the least common blood group among Rh negative blood groups (3.4%; Table 1) included A, O, and AB. The blood type antigen distribution of ABO and Rh in MI patients recorded at AL Sadr hospital was then studied. We discovered that out of 60 MI patients, 85% were Rh+ and 15% were Rh-. In the male group, expression of the combined Rh+ individuals was substantially higher. (53% vs. 32% in the female group) (Table 3). Similar to this, there was a 15% decrease in mixed Rh-individuals in MI patients.

Items	Sub-	Study group (Total = 60)	
		Frequency	Percentage
Age / Years	19-36	15	25
	37-54	19	31.7
	55-72	22	36.7
	73-90	4	6.7
Gender	Male	33	55
	Female	27	45
ABO Blood Groups	A-	2	3.3
	A+	14	23.3
	B-	3	5
	B+	10	16.7
	AB-	2	3.3
	AB+	7	11.7
	O +	20	33.3
	O -	2	3.3

Table (1) Statistical distribution of students by their demographic data

Table (1) show statistical distribution of study sample by their socio-demographic data, it explains that the highest percentage of the patients' subgroup is: those with ages between (55-72) years old (36.7 %), male patients (55 %), those O+ blood groups (33.3%).

Time	Age Groups (Years)				Chi Square
	19-36	37-54	55-72	73-90	(P value)
A-		1	1		
	0.00%	5.00%	4.50%	0.00%	
A+	5	4	4	1	
	35.70%	20.00%	18.20%	25.00%	
B-		1	2		
	0.00%	5.00%	9.10%	0.00%	
B+	3	3	4		10.96 -0.96
	21.40%	15.00%	18.20%	0.00%	Non-Significant
AB-		2			
	0.00%	10.00%	0.00%	0.00%	
AB+	1	2	3	1	
	7.10%	10.00%	13.60%	25.00%	
O+	5	6	7	2	
	35.70%	30.00%	31.80%	50.00%	
O-		1	1		
	0.00%	5.00%	4.50%	0.00%	

Table (2) Differences in ABO blood groups' distribution between age groups of myocardial infarction patients

Table (2) is about the differences in ABO blood groups distribution between age groups of myocardial infarction patients. It explains that there is no significant difference (P>0.05) between age groups of myocardial infarction patients regarding the distribution of ABO blood groups (Chi square = 10.96; P value= 0.96).

Time	Male(N0. = 33)	Female (N0. = 27)	Chi Square(P value)
A-	0.00%	2 7.40%	
A+	9 27.30%	5 18.50%	
B-	1 3.00%	2 7.40%	
B+	7 21.20%	3 11.10%	7.49 -0.37 Non-Significant
AB-	0.00%	2 7.40%	
AB+	3 9.10%	4 14.80%	
O+	12 36.40%	8 29.60%	
O-	1 3.00%	1 3.70%	

Table (3) Differences in ABO blood groups distribution between male and female myocardial infarction patients

Table (3.3) is about the differences in ABO blood groups distribution between male and female myocardial infarction patients. It explains that there is no significant difference (P>0.05) between male and female myocardial infarction patients regarding the distribution of ABO blood groups (Chi square = 7.49; P value= 0.37).

Time	Myocardial infarction (No.=60)	Healthy (No.=20)	P value
A-	2 3.30%	2 10.00%	
A+	14 23.30%	3 15.00%	
B-	3 5.00%	3 15.00%	
B+	10 16.70%	2 10.00%	11.49 -0.11 Non-Significant
AB-	2 3.30%	1 5.00%	
AB+	7 11.70%	1 5.00%	
O +	20 33.30%	4 20.00%	
O -	2 3.30%	4 20.00%	

Table (4) Differences in ABO blood groups' distribution between myocardial infarction patients and healthy control subjects

Table (4) is about the differences in ABO blood groups distribution between myocardial infarction patients and healthy control subjects. It explains that there is non-significant difference (P>0.05) between myocardial infarction patients and healthy control subjects regarding the distribution of ABO blood groups (Chi square = 7.49 ; P value= 0.11).

DISCUSSION

The World Health Organization's 2020 World Health Rankings survey indicates that coronary heart disease (CHD) was the leading cause of death in Iraq. This disease was to blame for 36,594 fatalities in Iraq, or 24.98% of all deaths. Diabetes was the fourth greatest cause of death, while stroke was the second, according to the same WHO survey.[6]

Plaques clog the coronary arteries in coronary heart disease, significantly lowering the regular supply of oxygen to the heart muscles. Angina pectoris is one of the major problems that may arise from this illness if it is not treated promptly. Moreover, emboli may develop and obstruct or restrict normal blood flow within a coronary artery, which may ultimately lead to a heart attack or myocardial infarction (MI) [7] As per the findings of researchers, coronary artery disease can be predicted by the phenotypes of the ABO blood group [6] Therefore, the current study was done to assess the association between myocardial infarction and the ABO blood group. The current study examined 60 patients in total, ranging in age from 19 to 90 years, with the oldest age group being 60 to 90 years. According to the current study, there is a substantial link between blood type and myocardial infarction. However, according to the findings of Zohre Mahmoodi 1 and Morteza Salarzaei 2017, persons with blood types O and A were more at risk. [8] Our research indicates a link between blood type B and a lower incidence of MI than blood type A, a finding that was supported by a study by Nydegger UE et al. [9]. Moreover, numerous studies conducted since the middle of the 1960s have revealed that blood type B has higher levels of intestinal alkaline phosphatase, an enzyme produced in the small intestine. This enzyme has been given to blood group B persons by nature so they can take advantage of higher protein levels. This enzyme is present at lower levels in blood group A. According to recent studies, blood group A people are more likely to have greater cholesterol and more heart attacks because they have trouble breaking down dietary fat.[10] In accordance with our findings,

Lee et al's study[11] found that patients with coronary artery disease and MI had significantly greater blood group A levels than participants in the B group. Results from the previous study and a number of other reports suggested that people with blood group A or its subgroups may have a greater risk of ischemic heart disease.[12] According to Akhund, patients with blood group A were more likely to experience myocardial infarction and angina pectoris than those with blood group O.[13] is in conflict with our finding. According to research by Von Beckerath, carrying the O1 allele is linked to a lower risk of myocardial infarction, with homozygosity offering the best defense.[14] Mitchell found that cardiovascular mortality rates were greater in communities where the blood group O (was more prevalent).[15] Stakishaitis et al. shown that the A and B blood types are one of the hereditary risk factors involved in the development of atherosclerosis.[16] The study of [17] found no correlation between blood group B and myocardial infarction, however this study found a 22% correlation, which was larger than that found in the earlier study. This might be the most compelling proof that there was a link between group B and MI in our study set. The incidence of MI was found to be associated with blood type O, aside from the blood group's noticeably higher rate compared to other blood groups, this result agreement with [17]. The association between the distribution of blood groups and cardiovascular risk factors is evident in the distribution of sex, with males with the O blood group having a substantially higher distribution than women. While the average age of MI patients was higher in older age groups, we believe that this could be attributed to the fact that MI generally tends to occur in older age groups. According to Stakishaitis et al., women with blood group B have an increased risk of developing coronary atherosclerosis. In women, the blood group O may operate as a preventative antiatherogenic agent. In the population of Lithuania, having blood type A is not a risk factor for atherosclerosis in women.[18] Whincup discovered that among individual patients, those with group A blood had a higher incidence of ischemic heart disease than those with other blood types.[19] According to our findings, only 15% of MI patients were Rh-, whereas around 85% of patients were Rh+. These findings indicate some sort of resistance to MI occurrences among Rh- people as they demonstrate a decrease in the number of Rh- Myocardial Infarction patients when in contrast to the Rh+ chosen patients. Currently, it is unclear why there has been such a substantial decline in MI incidence among Rh- people and what this means. Similar to what we saw in female participants, we discovered a statistically significant combined rise blood group antigens Rh+ in MI male patients. These findings point to a potential connection between the higher occurrences of MI in male patients and the presence of Rh antigen. Larger investigations are required to determine the cause of the substantial combined increase in Rh+ antigen among MI patients. This study's findings are consistent with those of [20], which found that blood group A Rh positivity was more common (24%) and blood group AB positivity was less common (11.8%) among his sample population. According to one study, subjects with A blood had a significantly higher risk of IHD compared to those with the other blood types [20], and another suggests that while AB blood reduces the risk of CHD, O blood raises the risk due to lower HDL-c levels [21] which is consistent with our findings. However, the findings of Zohre Mahmoodi and Morteza (2017) in Tehran, which are in agreement with our findings, show that coronary artery disorders are more prevalent in O blood group members than in other blood groups [22]. According to a study by Lee et al. (2012) conducted in Taiwan, people with blood type A are more likely than people with other blood types to experience cardiac arrest and coronary artery disease [11].

CONCLUSION

1 - The study found a correlation between blood types and myocardial infarction, although blood type O was associated with a higher risk.

2 - Compared to the other blood groups, people with the Rh+ blood type have much higher rates of myocardial infarction, according to our findings. Individuals who are Rh-, on the other hand, displayed a marked decline in MI occurrences.

3 - These findings imply that Rh- persons may exhibit some level of resistance to MI occurrences.

4 - These findings suggested a potential link between the increased occurrences of MI in male patients and the presence of the Rh+ antigen.

RECOMMENDATION

To determine the reason for the apparent higher cardiovascular risk in those with the blood group O, more research is required. Finding out more about the risks associated with each non-O blood group (A, B, and AB) may help to explain the causes in more detail. In the future, blood group risk assessment for cardiovascular prevention should take into account cholesterol, age, sex, and systolic blood pressure in addition to these other factors. The treatment threshold for conditions like dyslipidemia or hypertension might be lowered for those with blood types AB and B, for instance. If the increased cardiovascular risk in carriers

of blood types other than O may be treatable, more research is required to confirm this."infarction. More research is required on ABO blood types in Iraqi populations due to the significance and high incidence of coronary artery disease, the relationship between myocardial infarction and ABO blood groups, and in order to get more reliable and thorough data.

REFERENCES

1. Muhammad K. S., Mazura Bt. Bahari, N M, and Aishah K.2009. Association of ABO Blood Group B with Myocardial Infarction. Journal of the College of Physicians and Surgeons Pakistan 2009, Vol. 19 (8): 514-517

2. Nydegger UE, Wuillemin WA, Julmy F, Meyer BJ, Carrel TP. Association of ABO histo-blood group B allele with myocardial infarction. Eur J Immunogenet 2003; 30:201-6.

3. Sari I, Ozer O, Davutoglu V, Gorgulu S, Eren M, Aksoy M. ABO blood group distribution and major cardiovascular risk factors in patients with acute myocardial infarction. Blood Coagulation & Fibrinolysis. 2008;19(4.-231:(3)

4. Nydegger U, Wuillemin W, Julmy F, Meyer B, Carrel T. Association of ABO histo-blood group B allele with myocardial infarction. International Journal of Immunogenetics. 2003;30(3):201-6.

5. Wu O, Bayoumi N, Vickers M, Clark P. ABO (H) blood groups and vascular disease: a systematic review and meta-analysis. Journal of Thrombosis and Haemostasis. 2008;6(1):62-9.

6. WHO (2020) World health rankings. Iive longer live better. May 2020.

7. M Parvaiz Farshori*, Yasir Ghareeb Ibrahim(2017) Frequency of expression and the distribution of ABO and Rh, blood group antigens in the myocardial infarction (MI) male patients of the Hail region in Saudi Arabia. J Integr Cardiol, Volume 3(4): 1-5

8. Mahmoodi Z, Havasian MR, Afshari J, Salarzaei M. Comparison of the Time Interval between the Onset of Clinical Symptoms and Receiving Streptokinase in Patients with Acute Myocardial Infarction (AMI) at Amir Hospital in Zabol, Iran, 2013. Int J Adv Res Biol Sci. 2017;4(5):95-100 9-Nydegger UE, Wuillemin WA, Julmy F, Meyer BJ, Carrel TP. Association of ABO histo-blood group B allele with myocardial infarction. Eur J Immunogenet 2003; 30:201-6.

10. Stakishaĭtis D, Ivashkiavichene L, Narvilene A. Atherosclerosis of the coronary arteries and the blood group in the population of Lithuania. Vrachebnoe delo. 1991(8):55-7.

11. Lee H-F, Lin Y-C, Lin C-P, Wang C-L, Chang C-J, Hsu L-A. Association of blood group A with coronary artery disease in young adults in Taiwan. Internal Medicine. 2012;51(14):20.-1815

12. Garrison RJ, Havlik RJ, Harris RB, Feinleib M, Kannel WB, Padgett SJ. ABO blood group and cardiovascular disease: the Framingham study. Atherosclerosis 1976; 25:311-8

13. Gill JC, Endres-Brooks J, Bauer PJ, Marks WJ, Montgomery RR (1987) The effects of ABO blood group on the diagnosis of von Willebrand disease. Blood 1691-1695.

14. Von Beckerath N, Koch W, Mehilli J, Gorchakova O, Braun S, Schömig A, et al. ABO locus O1 allele and risk of myocardial infarction. Blood Coagul Fibrinolysi 2004; 15:61-7.

15. Michell JR. An association between ABO blood groupdistribution and geographical differences in death-rates. Lancet 1977; 1:295-7.

16. Stakishaitis DV, Ivashkiavichene LI, Narvilene AM. Atherosclerosis of the coronary arteries and blood group in the population of Lithuania. Varch Delo 1991; 8:55-7.

17. Muhammad Kamil Sheikh, Mazura Bt. Bahari, Narazah Mohd Yusoff and Aishah Knight 2008. Association of ABO Blood Group B with Myocardial Infarction. 514 Journal of the College of Physicians and Surgeons Pakistan 2009, Vol. 19 (8): 514-517

18. Stakisaitis D, Maksvytis A, Benetis R, Viikmaa M. Coronary atherosclerosis and blood groups of ABO system in women (own data and review). Medicina Kaunas 2002; 38:230-5

19. Whincup PH, Cook DG, Phillips AN, Shape AG. ABO blood group and ischaemic heart disease in British men. BMJ 1990; 300:1679-82.

20. Sharif S, Anwar N, Farasat T, Naz S (2013) Group frequency in ischemic heart disease patients in Pakistani population. Pak J Med Sci 30: 593-595.

21. Biswas S, Ghoshal PK, Halder B, Mandal N (2013) Distribution of ABO blood group and major cardiovascular risk factors with coronary heart disease. Biomed Res Int 2013: 782941

22. Zohre Mahmoodi 1 , Morteza Salarza 2017 The relationship between ABO blood group and acute myocardial infarction in patients referring to AmiralmumiinHospital in Zabol in 2016. Int. J. Adv. Res. Biol. Sci. (2017). 4(8): 40-44