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Daily Nutrition and Physical Fitness in People with Different Blood Group and Rh-Factor

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Abstract

The article verifies to some extent a theory of so-called „blood group dependent diet" postulated by D'Adamo - father and son (DA), which focused worldwide attention, however, it has been severely criticized.

The article aimed not only at gathering data on every day diet and food preferences in people with dif ferent blood group and Rh factor, but also at testing their speed and endurance (600-meter run for women and 1000-meter run for men) - [from younger group X].

[Group X] 103 students of the Jan Kochanowski University Branch in Piotrkow Trybunalski were tested (78 women, 25 men.

[Group Y] Similar studies were carried out on a group of 102 adults (76 women, 26 men), patients of the clinic at the Provincial Hospital of John Paul II in Bełchatów. 47.1% of patients [48 people] had a diagnosed disease (e.g. cardiovascular diseases).

Basically, the distribution of the frequency of blood groups in both study groups [X, Y] was similar, also to that in the entire Polish population.

For group Y physical fitness was not tested, but their serum levels of homocysteine (H) and other thiols [cysteine -C, glutathione -Gl, cysteinylglycine-CG] were measured; the research was carried out at the Department of Environment Chemistry of University in Lodz.

For group X:

1. People with group 0 the least often, and with group AB most often eat brunch.
2. People with group B eat veal and pork more often than others.
3. People with Rh + play sports more often than Rh-.
4. Still, people with Rh- have higher endurance levels than those with Rh +, although they drink alcohol more often.

For group Y:

- 1B/ 86% of people with AB group eat sausages at least once a day, while only 71% with B, 63% with A, and only 54% with group 0.
- 2B/ People with blood type 0 and A use mainly oil and butter but people with group B use little oil, but a lot of lard.
- 3B/ People with blood group A and B prefer the so-called one pot lunches. as opposed to people from group 0 [preferring a typical Polish lunch –in Poland called dinner - with a soup and a main course].
- 4B/ There were no significant differences of levels of thiols in serum of persons with different blood group and Rh factor.

It seems that the outlined research should be continued in spite generally DA theory does not stand up to criticism.

Keywords: *D'Adamo Theory; Blood Type Diet; Blood Groups; Rh (+/-); Endurance; Homocysteine; Thiol Substances*

Introduction

Many of us are looking for a diet that is right for us, and a variety of ways to feel better and stay healthy. There are also more and more theories about the impact of various factors, diet first of all, on our health and physical conditio [1,2]. One of them is the blood group theory by two American doctors - James D'Adamo and his son Peter D'Adamo [DA] [3]. In their opinion, human health is influenced by blood types. They propose specific nutrition recommendations, presenting products recommended and not recommended for people with a given blood type.

In their opinion [3,4], blood groups arose as a result of evolution, namely human migration in search of new sources of food. The oldest blood group is 0, which - according to DA [5], was formed around 40 thousand years BC. In Africa, it was/is related to the life of a hunter--gatherer, whose main food was animal protein. According to DA 25,000 BC Another type of blood appeared in Asia and Europe - group A - agricultural, whose main source of food should be plant products, as little processed as possible. Then, around 15,000 BC. a group B was created related to the nomadic lifestyle [pastoralism], whose diet should be varied and balanced, choosing the best from the kingdom of plants and animals, and also as the only one with a lot of milk and its products. The last group, referred to as the modern, group AB, was created [according to DA] as a result of mixing two groups - A and B around 500 BC, whose diet is a mixture of products recommended for blood groups A and B with slight differences.

In addition to dietary recommendations, DAs suggest appropriate physical exercises and also suggest the frequency and intensity of exercise for owner [3,4]s of each blood group. For example, to people with blood group O, „as former hunters", DA recommends intense exercise to relieve stress and maintain a healthy weight. The owners of group A recommend mainly relaxation techniques.

The blood group genealogy postulated by DA has not been confirmed by scientific studies of molecular and evolutionary genetics. One exception is that indeed the AB group appeared at the latest [maybe and only about 500 years ago] when group A populations from Europe and group B populations from Asia began to mix. The other blood groups are much, much older with B being more recent than A. The oldest group is either group A or one of the forms of group O [6].

The gene that determines human ABO blood type is located on chromosome 9 (9q34.1) and is called ABO glycosyltransferase. The ABO locus has three main allelic forms: A, B, and O. Therefore the combination of alleles that are inherited from parents that determines which glycoproteins (antigens) are found on persons' blood cells and thereby their ABO blood type [6].

As investigations have demonstrated that human [and those in great apes such as chimpanzees] blood groups are very old genetic indicators which have evolved during several million years [6]. It was thought that blood group A emerged in Europe, B in Asia, and O in South America and gradually due to the migration and mixing of the races, became the present situation.

According to another hypothesis [7], the emergence of all blood groups A and B and their subgroups, are resulted from successive mutations, from a basic and common blood group, which is the O group, and have been branched over millions of years. Based on this theory, the old races have O blood group, such as Red Indians of South America, and Eskimos that among them the frequency of O blood group is between 75 - 100%. In most of recent ethnic groups A and B blood groups are dominant.

In another hypothesis [8], the first blood group had been AB blood group, which gradually due to genetic mutations was resulted in A and B and finally O blood groups. But perhaps a million years ago all people have had already type O blood only, which is more resistant against many infectious diseases.

Because group O blood can be received by anyone in a blood transfusion, it was originally thought that this was the ancestral blood type, but more recent work suggests that there are several different mutations that can deactivate the A or B genes to turn them into O.

The emergence and evolution of blood groups in humans is still not clear.

The controversial theory of d, Adamo claims the clear relationships exist between the blood group from one side and the optimal every day diet as well as everybody susceptibilities to different diseases on the other side.And it was found that there might be some links between the blood groups and the frequency of some diseases [9,10]. They probably might result from the localization of some genes related to susceptibility to these diseases somewhere in the vicinity of allelic forms of A and B antigenes, maybe in the chromosome [9]. It has been reported that a polymorphism in gene DOT 1 [12] [the disruptor of telomeric silencing-1 gene] which encodes a methyltransferase that enhances methylation of histone 3 (H3K79) in the renal epithelial sodium channel gene (ENaC) promoter, is associated with blood pressure regulation [11].

No one till now, at least if we look on accessible literaturę, studied the relations between blood group and Rh factor and physical fitness. It was found that the rise of the concentration of homocysteine (H) [„cholesterol of XXI century"] in the blood serum accompanies arteriosclerosis and generally cardiovesicular but also renal and other disorders and diseases [13-16]. So we are convinced that one should evaluate if there might be some relations between groups of blood and the level of homocysteine and other thiol substances. Mind you, all these thiols are strong antioxidants [17]. The papers dealing with the concentration of other serum thiols as glutathione (Gl), cysteine (C)and cysteinylglycine (CG) are not common in spite both glutathione and cysteinylglycine take part in gamma-glutamyl cycle important for transport of aminoacid residues to different cells [18]. No one has shown the levels of those thiols in serum of people with different blood group.

Aim of the Study

The aim of our research was:

- Obtaining information on the daily nutrition, preferences and eating habits of people with different blood groups.
- Examining whether there is any relationship between nutrition and blood type.
- Checking whether there is a relationship between speed and endurance and blood group and Rh factor [younger group X]**.
- And to investigate whether there is a relationship between blood group and Rh factor and serum levels of homocysteine and other thiols [older group-patients-Y]**. No one has studied the last two problems so far.

Characteristics of the studied group

Group X [young people]

The research was conducted on a group of 103 students of the branch in Piotrków Trybunalski of Jan Kochanowski University in Kielce [19]. In the studied group there was an overrepresentation of women as compared to men (78 women, 25 men). The reason for this is that mainly students of pedagogy were studied. As we know, pedagogy is mostly studied by women.

People who had their blood group and Rh factor marked earlier were examined.

Blood Group	N	%
A	31	30,1
B	21	20,4
AB	12	11,7
0	39	37,9
To gether	103	100

***Table 1A**: Distribution of blood groups of the studied students [group X].*

Rh	N	%
+	83	80,6
--	20	19,4
To gether	103	100

***Table 1B**: Distribution of the Rh factor among the examined persons [group X].*

Group Y [elderly-patients]

There were studied 102 adults (76 women, 26 men), patients of the clinic at the Provincial Hospital of John Paul II in Bełchatów [20] (40.2% A, 36.3% 0, 16.7% B, 6.9% AB). 47.1% of patients [48 people] had a diagnosed disease (e.g. cardiovascular diseases). In the studied group there was an overrepresentation of women as compared to men (76 to 26).

The reason for the overrepresentation of women among clinic patients is that women visit doctors more often; it could be said that they have a higher degree of medical awareness than men.

For group Y physical fitness was not tested, but their serum levels of homocysteine (H) and other thiols [cysteine-C, glutathione-Gl, cysteinylglycine-CG] were measured [20,21]; the research was carried out at the Department of Environment Chemistry of University in Lodz.

Methods

Group X [young]: The respondents completed a questionnaire consisting of 32 questions, 29 of which were closed. It contains a certificate and the relevant questionnaire [19]. In addition, the respondents were subjected to two fitness tests to check their speed and endurance. The first trial was a 60m run. The second fitness test was a 600m run for women and a 1000 m run for men [19].

Group Y [elderly, patients]: The respondents completed a questionnaire consisting of 37 questions, 33 of which were closed [20] [in most cases the questions were identical to those for group X. The c^2 test was used to verify the obtained data.

For group Y physical fitness was not tested, but their serum levels of homocysteine (H) and other thiols [cysteine-C, glutathione-Gl, cysteinylglycine-CG] were measured at the Department of Environment Chemistry of University in Lodz [headed by prof. Głowacki, successor of Late prof. Bald, world famous researcher of homocysteine and other thiols] using HPLC separation with UV detection with Hewlett Packard device [21]. The reduction with tri-n-butylphosphine, deproteinization with chloric acid (VII) and derivatization with

2-chloro-1-methylpyridinium iodide were carried out [21]. The significance of differences in themean level of thiols [for different blood groups] was verified with the Student's t-test.

Results

I am limiting myself to presenting only those results, the analysis of which showed the existence of statistically significant relationships or on the so-called border of significance [0.05 < p < 0.1].

Group X

Answer	Blood Group									
	A		B		AB		0		Together	
	N	%	N	%	N	%	N	%	N	%
Yes *	10	32,3	8	38,1	9	75	12	30,8	39	37.9
Not **	21	67,7	13	61,9	3	25	27	69.2	64	62,1
Together	31	100	21	100	12	100	39	100	103	100

Table 2: *The relationship between the consumption of brunch and the blood group.*

**Yes, i.e. I eat lunch [or not **].*

χ^2 calculated (df = 3) = 8.28; 0.01 < p < 0.05. χ^2 calc. = 8.28; χ^2 tabular = 7.815 for 3 degrees of freedom. Thus, there is a statistically significant relationship between the blood group and the consumption of lunch.

The least frequent lunch is eaten by people with group 0, so according to D'Adamo, the ancestors of people who had to struggle to get food, and thus did not eat meals often.

Type of lunch	Blood Group									
	A		B		AB		0		To gether	
	N	%	N	%	N	%	N	%	N	%
Classic (soup + main course)	14	45,2	10	47,6	4	33,3	14	35,9	42	40,8
One pot dish	14	45,2	10	47,6	5	41,7	24	61,5	53	51,5
Sandwiches	3	9,6	0	0	2	16,7	1	2,6	6	5,8
Ready meal (casserole, pizza, etc.)	0	0	0	0	1	8,3	0	0	1	1
Classic extended (snack, soup, main course, dessert)	0	0	1	4,8	0	0	0	0	1	1
Together	31	100	21	100	12	100	39	100	103	100

Table 3: *The relationship between the type of lunch/dinner *consumed and the blood type.*

x^2 calc. (df = 12) = 18.70; 0.05 < p < 0.1.

There are slight statistical differences between the type of lunch eaten by people with different blood groups, because the value of c^2 calculated. = 18.70 (c^2 p = 7.815 for 12 degrees of freedom) is on the border of statistical significance in the range of 0.05 < p < 0.1. It is possible that with a larger number of respondents, the significance would be strong.

The most important observation from table 3 is a much greater - than for own or other blood groups - preference of young people with group 0 to the so-called one-pot dinners. Interestingly, if we leave for analysis only the most common options [classic, one pot dish'], there is no dependency [! P > 0.3] -so these less frequent types of dishes eaten for dinner are also an important determinant influencing the achievement of [almost] statistical significance.

*We must remind that in Poland still the majority of people eat lunch at 1 - 3.30 pm and this lunch is called "dinner" [at about 6 - 8 pm they eat supper -or in some cases "dinner-supper"].

Kind of meat	Blood Group									
	A		B		AB		0		To gether	
	N	%	N	%	N	%	N	%	N	%
Poul-try	23	65,7	13	44,8	10	66,7	31	64,6	77	60,6
Pork	4	11,4	7	24,1	3	20	4	8,3	18	14,2
Beef	7	20	4	13,8	1	6,6	11	22,9	23	18,1
Veal	1	2,9	5	17,3	0	0	0	0	6	4,7
Fishes	0	0	0	0	1	6,7	2	4,2	3	2,4
To-gether	35	100	29	100	15	100	48	100	127	100

Table 4: *The relationship between the preferred type of meat and the blood group.*

Note: There might be not one but two preferred kinds of meat by some persons.

χ^2 calc. (df = 12) = 23.56; 0.02 < p < 0.025 [ergo p < 0.05].

Group B keepers eat the least poultry [which is mainly eaten by students] and the most, relatively, veal; Group A holders the least pork, and AB beef.

Frequency of Alcohol Consumption	Rh factor					
	+		-		Together	
	n	%	n	%	n	%
Never or almost never (1-2 times a year)	14	16,9	0	0	14	13,5
Rarely (1-3 times a month)	41	49,4	9	45	50	48,5
Quite often (2-3 times a week)	24	28,9	5	25	29	28,2
Often (once a day)	2	2,4	3	15	5	4,9
Very often (several times a day)	2	2,4	3	15	5	4,9
Together	83	100	20	100	103	100

Table 5: *Relationship between alcohol consumption and the Rh factor.*

χ^2 calc. = 14,05; χ^2 tab. = 9.488 for 4 degrees of freedom. There is a statistically significant relationship between the blood group and the type of meat preferred: (df = 4) = 14.05; 0.005 < p < 0.01.

There is a strong statistically significant relationship between the Rh factor and the frequency of alcohol consumption. The most frequently drunk drink was beer.

The frequency of participation in sports activities	Rh factor					
	+		-		To gether	
	n	%	n	%	n	%
Never or almost never (1-2 times a year)	0	0	3	15	3	2,9
Rarely (1-3 times a month)	17	20,5	4	20	21	20,4
Quite often (2-3 times a week)	35	42,2	12	60	47	45,6
Often (daily)	22	26,5	1	5	23	22,4
Very often% (several times a day)	9	10,8	0	0	9	8,7
Together	83	100	20	100	103	100

Table 6: *Relationship between participation in sports activities and the Rh factor.*
c^2calc. = 19.08; c^2tab. = 9.488 for 4 Degrees of Freedom; so p < 0,001.

The probability that the obtained value is due to chance is: p < 0.001, which is very low. It should be recognized that there is a very strong statistically significant relationship between the Rh factor and the frequency of participation in sports activities. Rh-positive students are clearly less likely to participate in sports than those who are Rh-positive. Admittedly, the most - in both groups - exercises 2 - 3 times a week, but among people with Rh- there is a clearly smaller% of people exercising often and very often, and a clearly greater% of people who never or almost never do any sport.

Endurance	Rh factor					
	+		-		Together	
	n	%	n	%	n	%
Very good	16	19,3	2	10	18	17,5
Pretty good	30	36,1	12	60	42	40,8
Poor	26	31,3	2	10	28	27,1
Very weak	11	13,3	4	20	15	14,6
Together	83	100	20	100	103	100

Table 7: *Analysis of the relationship between endurance and rh factor in the examined persons.*

c^2calc. (df = 3) = 6.26; p> 0.05; c^2tab. = 7.815 for 3 degrees of freedom [for p = 0,05]. There is no correlation here, but 0.05 < p < 0.1; therefore, it is assumed that there is a dependence on the border of statistical significance. It can be assumed that with a larger number of respondents this relationship would be significant. Note that among people with Rh.

We have a kind of overrepresentation of people with very low endurance - if not then we would probably have a highly significant relationship between endurance and Rh factor [with the indication of Rh-people as having higher endurance.

The measure of endurance was the time obtained in the middle run [800 m for men, and 600 m for women], ie endurance effort [or rather not speed]. It is worth noting that there is no relationship between speed [short runs] and the Rh factor. There is also no relationship between endurance and speed - both sexes - and blood type.

Group Y [elderly]

How often do you eat cold cuts?	Blood group									
	A		B		AB		0		To gether	
	n	%	n	%	n	%	n	%	n	%
Quite often (2-3 times a week)	15	36,6	5	29,4	1	14,3	17	45,9	38	37,3
Often (daily)	21	51,2	12	70,6	4	57,1	19	51,4	56	54,9
Very often (several times a day	5	12,2	0	0	2	28,6	1	2,7	8	7,8
Together	41	100	17	100	7	100	37	100	102	100

Table 8: *The relationship between the consumption of cold cuts and the blood group (Question 4).*

χ^2 cal. = 11.06; χ^2tab. = 16.919 for 6 Degrees of Freedom; 0.05 < P < 0.1. When 0.05 < p < 0.1, it is Assumed that There is a Dependence on the Border of Statistical Significance.

86% of people with AB group eat sausages at least once a day, while only 71% with B, 63% with A, and only 54% with group 0. Is it possible that with the development of mankind [assuming that the blood groups were formed in the order: 0, A, B, AB, as postulated by D'Adamo] there was a significant increase in the frequency of consuming cold cuts [sausages and so on]?

What fats you use mostly?	Blood Group									
	A		B		AB		0		To gether	
	n	%	n	%	n	%	n	%	n	%
Butter	22	33,8	9	27,3	2	14,2	22	28,5	55	29,1
Margarine	16	24,6	9	27,3	6	42,9	18	23,4	49	25,9
Lard	1	1,6	12	36,4	0	0	4	5,2	17	9
Oil	26	40	3	9	6	42,9	33	42,9	68	36
Together	65	100	33	100	14	100	77	100	189	100

Table 9: *The relationship between the type of fat used and the blood group (Question 14).*

Note: Some persons answered that they preferred not one kind of fat !! so total amount of answers is 189 not 102 [Number of respondents].

χ^2 cal. = 45.53; χ^2tab. = 16.919 for 9 degrees of freedom [for p = 0, 05]: p < 0.001. It should be recognized that there is a strong statistically significant relationship between the blood group and the type of fat consumed.

People with blood type 0 and A use mainly oil and butter, these with AB group use most often margarine and the least often butter but people with group B use little oil, but a lot of lard.

What's your dinner?	Blood Group									
	A		B		AB		0		Together	
	n	%	n	%	n	%	n	%	n	%
Classic (soup + main course)	13	31,7	4	23,5	6	85,7	21	56,8	44	43,1
One pot dish	28	68,3	13	76,5	1	14,3	16	43,2	58	56,9
Together	41	100	17	100	7	100	37	100	102	100

Table 10: *The relationship between the type of dinner eaten and the blood group (Question no. 21).*

χ^2 cal. = 12.81; χ^2tab. = 7.81 for 3 degrees of freedom[for p =0.05], but what is more: 0.005 < p 0.01. There is a strong statistically significant correlation between the type of dinner consumed and the blood group in patients [older group Y].

Group A and B owners prefer dinner in the form of the so-called a one-pot dish, and the owners of group AB [And, to a much lesser extent, group 0] prefer a classic dinner. However, this type of distribution of preferences is characteristic for the group of older people [40+]. On the other hand, in young people - students [group X] - as shown in table 3 - only among the owners of group 0 there is a clear preference for ... one-pot dishes.

Celery vegetables (celery, leek, parsley) are more often preferred by people with blood type A, while cruciferous vegetables (cabbage, cauliflower, broccoli) are least often eaten by people with blood type AB, who, in turn, most often prefer beans [0.05 < p < 0.1-on the border of significance]. However, the owners of all blood groups [the elderly] like most [not necessarily the most common] carrots, beets, tomatoes and peppers, followed by lettuce, cucumbers and spinach.

Student's t test showed no significant differences between homocysteine levels in „certainly sick" and „healthy" people. Nevertheless, this level in the group of patients was higher (although not significantly). The ratio of homocysteine to cysteine concentrations (in%) in the blood plasma was also higher than for the „healthy" group of patients (although not significantly). The level of homocysteine in the Rh (+) group is higher than in the Rh (-) group, but the difference is insignificant.

Blood group	N	Thiol Substance			
		Glutathione (Gl)	Homocysteine (H)	Cysteine (C)	Cysteinylglycine (CG)
A	6	5,57	11,1	179,1	31,88
B	5	5,53	8,55	174,8	25,71
AB	2	6,83	12,47	217,4	34,36
0	7	6,29	9,65	168,5	24,04
Together	20	6	10,44	1847,9	29
Standard deviation δ	-------- ----	0,62	1,71	22,07	4,92

Table 11: *Mean values of the level of homocysteine and other thiols in the blood serum of the respondents [Group Y, elderly, patients].*

Student's t test showed no significant differences between the level of homocysteine and other tested thiols in people with different blood groups. Table 11 shows the preliminary data - for a group of 20 only - but a subsequent study on the entire Y group [102 persons] confirmed no differences depending on blood group [or Rh] [22]. On the other hand [let's treat it as a pilot study] people suffering from heart disease and others have a higher concentration of homocysteine, and especially a higher ratio of homocysteine concentration to cysteine. However, the difference is not significant [23].

Discussion

In general, the frequency [in%] of people with different blood group was almost the same for the younger group X and the older group Y; it was also close to the distribution for the entire population of Poland [0 and A about 40% each, B 12%, and AB 8%]. However, there is an overrepresentation of group B in both groups X and Y [also A, and the decreased frequency of A in the group of students [group X].

For the group of older people [Y], there was not fully statistically significant relationship between the blood group and education [0.05 < p < 0.1]; However, it is „on the verge of statistical significance" and it can be assumed that with a higher sample size it will turn out to be fully significant.. It therefore seems that people with higher education have group A much less frequently, and group B [and AB] much more often than the whole population. This would also explain the overrepresentation of group B among the surveyed students [group X].

There was not dependence of BMI and blood group [groupY-older].

It seems that D'Adamo's theory is false, even wrong, as there are hardly any differences in the nutrition and food preferences of people with different blood groups [24,25]. However, there are slight differences mainly in the consumption of second breakfast, as well as the preferred meat by a given blood group. The type of dinner consumed is also borderline statistically significant.

For group Y of the elderly [40+, but mostly 50+] there are dependencies regarding the type of fat consumed, the type of dinner consumed, preferred vegetables and the frequency of consuming cold cuts by people with different blood groups. The differences between groups X [students; 19 - 30 years old] and Y result not only from changes with the eating age, but also because half of the people in group Y were, however, sick [diagnosed].

It should be assumed that with a larger and differentiated in terms of sex and age, the research group, there may be other differences in the nutrition of people with different blood groups. However, the demonstrated dependencies do not confirm the theory of James and Peter D'Adamo that people with a given blood group should eat „these" foods and „others" should be avoided. Hence it can be said that this theory is not true [24,25].

There are also other arguments questioning the truth of the blood group theory, namely: 1/ No evidence for one or another effect of various food products. 2/ Blood groups existed much earlier [compare earlier parts of text] [6-8].

Studies in group Y show some slight, non-significant differences in [serum] thiol levels, not depending on blood group or Rh factor, but between healthy and sick people [especially cysteinylglycine levels and the ratio of cysteine and homocysteine concentrations. separate paper. One should remind both glutathione and cysteinylglycine take part in so called gamma glutamyl cycle of transport of aminoacid residues to the different cells [18].

Further research on nutrition as well as on biochemical, physiological and pathological differences in people with different blood groups should be carried out, as this may contribute to the development of specific dietary or therapeutic guidelines in the future.

The theory that people with different blood groups should practice specific disciplines or sports exercises also seems wrong. The analysis of the respondents' fitness tests showed no differences between the speed and endurance of people with different blood groups. Moreover, the sports disciplines preferred by the respondents do not coincide with those offered by D'Adamo to the owners of particular blood groups.

An interesting and new aspect is the emergence of differences between people with positive and negative Rh factor. Quite strong relationships regarding the consumption of alcohol or participation in sports by people with positive and negative Rh factor may indicate that there are more differences between these people. The endurance of people with a different Rh factor is also at the border of statistical significance. Therefore, further research in this direction is worthwhile.

D'Adamo's blood group theory seems to be false, as the daily nutrition and food preferences of people with different blood groups are almost the same. However, some associations of blood group and Rh factor with personal characteristics [endurance, drinking of alcohol], including certain elements nutrition [and possibly biochemical differences] dictate that research into these problems should be continued. Mind you, there are even quite convincing relationship between blood group [in ABO and other less known systems] and susceptibility

to SARSCoV-2 infection and the course of Covid19 disease. An overall consensus has emerged whereby blood group O appears associated with a lower risk of COVID-19, while non-O blood types appear detrimental.

Conclusion

Group of X students:

1. People with blood group AB eat lunch more often than people with other groups. People with group 0 eat breakfast least often
2. People with blood group 0 prefer the so-called one-pot, and people with blood groups A and B on the same classic dinner with a one-pot dinner.
3. Owners of blood group B eat veal and pork more often than owners of other groups. People with blood group A, AB and 0 eat poultry more often, moreover people with group 0 and A prefer beef.
4. Rh negative people consume alcohol more often than Rh positive people.
5. People with a positive Rh factor are more likely to play sports than people with a negative Rh factor.
6. Rh differences („+", „-") are an absolute novelty in the literature (!).
7. There are no differences in aerobic and anaerobic fitness between holders of different blood groups.
8. People with a negative Rh factor have better endurance than people with a Rh positive factor

Group Y [patients; 40+]:

1. As many as 86% of group AB, 71% of group B, 63% of group A eat cold cuts at least once a day, and only 54% of group 0
2. People with blood type 0 and A use mainly oil and butter, these with AB group use most often margarine and the least often butter but people with group B use little oil, but a lot of lard.
3. Unlike young people [compare conclusion 1 b]] people 40+ [group Y] with blood group A and B prefer the so-called one-pot, and people with blood group 0, also a classic or one-course dinner.
4. Celery vegetables (celery, leek, parsley) are more often preferred by people with blood type A, while cruciferous vegetables (cabbage, cauliflower, broccoli) are least often eaten by people with blood type AB, who, in turn, most often prefer beans.
5. The differences between the content of homocysteine and some of its derivatives (containing sulfur) in people with different blood groups and Rh factor are not significant. On the other hand, people with heart disease (heart disease and others) have a higher concentration of homocysteine, especially a higher ratio of homocysteine to cysteine. However, the difference is not significant.

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