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Evaluation of Ischemic Heart Disease in the Young Population of Georgia

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Abstract

Objective: Study of risk factors (RF) for ischemic heart disease (IHD) in young people is a significant problem in cardiology. Aims: Study and prognosis of ischemic heart disease in Georgian population under 45 years of age. Methods: The study included 107 young patients with coronary heart disease (from 18 to 44 years old), who were treated in the cardiology department of the St. John the Merciful Private Clinic. The average age was (34.68 ± 6.2) years. The control group consisted of 199 healthy volunteers without cardiovascular diseases at the age from 18 to 44 years, the average age was (35.9 ± 5.2) years. In all patients, traditional risk factors were assessed. **Results:** Regression analysis has shown that it increases the risk of ischemic heart disease:

- living in the city - OR=6.90(95%CI:1.28-37.18);
- sleep disturbance - OR=45.62(95%CI:3.52-590.64);
- obesity -OR=24.56(95%CI:4.14-145.66);
- hypertension - OR=40.76(95%CI:8.07-205.92);
- excess intake of saturated fats - OR=79.94(95%CI:10.93-584.43);
- night shift - OR=39.01(95%CI:3.75-405.75);
- early detection of ischemic disease in grade I-II relatives - OR=44.22(95%CI:8.07-242.17)
- decrease - female gender - OR=0.14 (95%CI:0.03-0.70) and married - OR=0.01(95%CI:0.00-0.08);

Conclusion: The ability to predict the risk of developing IHD in young people on the basis of traditional RFs, most of which are modifiable, as well as the study of "new" RFs opens up new perspectives in the formation of a strategic approach to the management of young patients in the presence of high risk.

Keywords: Young adults, IHD, risk factors

Introduction

Patients in whom ischemic heart disease (IHD) manifests itself at a young age differs from the elderly in the structure of risk factors (RF), clinical manifestations, and prognosis of the disease. Recently, in addition to the traditional RFs for the development of IHD, a wider range of signs associated with the early development of acute coronary syndrome has been considered [Ponomarenko IV. et al. 2019]. According to a number of foreign authors, the incidence of acute myocardial infarction among young patients varies from 2 to 10% [Morillas P., et al. 2007]. at a young age, collateral circulation is poorly developed, which complicates the outcome of the disease[Chigogidze, M., et al. 2020].

Whereas cardiovascular disease (CVD) metrics define risk in individuals above age 40 years, the earliest lesions of CVD appear well before this age. Despite the role of metabolism in CVD antecedents, studies in younger, biracial populations to define precise metabolic risk phenotypes are lacking[Murthy, V. L., et al. 2020]. In young patients, AMI often develops against the background of diabetes mellitus (DM) [Popov S.V., et al. 2020]. Proposes that psychosocial factors, such as stress, hypertension or depression, might be associated with the development and progress of CVD, which are independent of other identified psychosocial risk factors [Gilbert-Ouimet, M., et al. 2016].

The most prevalent psychosocial risk factors for CVDs identified were hypertension, stress, social support, depression, anxiety, physical inactivity and low socioeconomic status. Smoking, obesity, family history, quality of life and inappropriate sleep patterns were also considered among the risk factors[Saleem, M., et al.,2020].

We studied the role of genetic predisposition in the development of cardiovascular disease in the Georgian population under 45 years of age. In 19 (21.6%) patients, early detection of ischemic heart disease (under 45 years of age) IHD was observed in first degree relatives[Gogishvili G, et al.2020].

Aims: Study and prognosis of ischemic heart disease in Georgian population under 45 years of age.

Methods: The study included 107 young patients with coronary heart disease (from 18 to 44 years old), who were treated in the cardiology department of the St. John the Merciful Private Clinic. The average age was

(34.68 ± 6.2) years. The control group consisted of 199 healthy volunteers without cardiovascular diseases at the age from 18 to 44 years, the average age was (35.9±5.2) years. In all patients, traditional risk factors were assessed, standard general clinical and biochemical studies were carried out to determine the parameters of lipid metabolism, fasting glucose levels, height and weight were measured with the calculation of body mass index. Patients with IHD underwent electrocardiography, echocardiography.

Statistical analysis: Continuous variables are expressed as mean±SD, and categorical variables as frequencies and %. Continuous variables were compared with the use of the two-tailed independent t test and *Levene's test* of equality of variance. Categorical variables with the use of the Fisher's exact test. Odds ratio – by logistic regression. p value < 0.05 was considered as statistically significant.

All statistical analyses were performed using SPSS version 23.

Results: The distribution of patients according to the age of onset of ischemic heart disease is given in figure 1. As we can see, the disease can be detected at an early age.

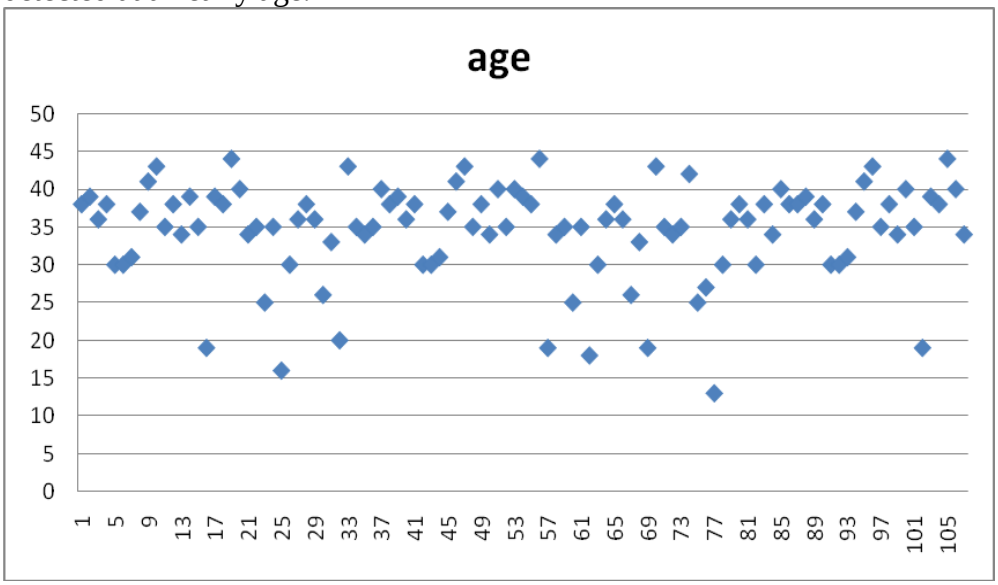

Fig.1: A comparison of the initial characteristics of young patients with healthy individuals of the same age is given in Table 1.

Table 1: Evaluation of factors affecting the patient between individuals with ischemic heart disease and the control group

		Ischemic heart disease N=107	without ischemic heart disease N=199	F	p
		n(%)	n(%)		
Gender	Female	12(11.21)	101(50.75)	61.68	<0.0001
	Male	95(88.79)	98(49.25)	54.76	<0.0001

Bad habits	Frequent consumption of alcohol	42(39.25)	63(31.66)	1.78	0.1833
	Smoking	63(58.88)	119(59.80)	0.02	0.8762
	Hypodynamics	51(47.66)	57(28.64)	11.36	0.0008
	Excess intake of saturated fats	52(48.60)	50(25.13)	18.16	<0.0001
	Sleep disturbance	19(17.76)	3(1.51)	30.06	<0.0001
	Healthy eating regime	12(11.21)	90(45.23)	40.82	<0.0001
Living	City	41(38.32)	25(12.56)	29.76	<0.0001
Comorbid	Obesity	56(52.34)	31(15.58)	54.07	<0.0001
	Dyslipidemia	45(42.06)	58(29.15)	5.25	0.0226
	Gastrointestinal tract	8(7.48)	22(11.06)	1.004	0.3170
	Thyroid gland	4(3.74)	12(6.03)	0.73	0.3921
	Kidney disease	2(1.87)	0(0.00)	3.77	0.0532
	Respiratory diseases	10(9.35)	24(12.06)	0.52	0.4728
	Hypertension	70(65.42)	26(13.07)	123.87	<0.0001
	Diabetes mellitus	12(11.21)	11(5.53)	3.25	0.0724
	Neurological disorders	19(17.76)	6(3.02)	21.44	<0.0001
	Chronic infections	21(19.63)	15(7.54)	10.05	0.0017
Socio-economic factors	Unmarried	88(82.24)	34(17.09)	204.96	<0.0001
	Divorced or widowed	17(15.89)	64(32.16)	9.71	0.0020
	In marriage	2(1.87)	101(50.75)	97.78	<0.0001
	Unsatisfactory economic conditions	5(4.67)	40(20.10)	13.71	0.0003
	Unemployed	21(19.63)	11(5.53)	15.42	<0.0001
living environment	Living near a harmful enterprise	5(4.67)	0(0.00)	9.69	0.0020
	Living near a high voltage transmitter, TV or telephone tower	10(9.35)	8(4.02)	3.58	0.0593
Working Conditions	Industrial dust	5(4.67)	4(2.01)	1.73	0.1898
	Vibration	37(34.58)	9(4.52)	58.27	<0.0001
	Industrial poisons	6(5.61)	8(4.02)	0.40	0.5278
	Stressful work	39(36.45)	5(2.51)	82.14	<0.0001
	Impact of ionizing radiation	4(3.74)	18(9.05)	2.95	0.0871
	Night shift	21(19.63)	5(2.51)	28.48	<0.0001
	Electromagnetic radiation	21(19.63)	4(2.01)	31.56	<0.0001
	Hard physical work	21(19.63)	7(3.52)	23.23	<0.0001
Genetic load	Early detection of ischemic disease in I-II degree relatives	59(55.14)	7(3.52)	169.69	<0.0001

Statistical analysis provided an assessment of the factors affecting the patient between individuals with ischemic heart disease and the control group show us the incidence of the following factors is reliably high in the ischemic

heart disease group: male, living in the city, living near a harmful enterprise, unmarried, unemployed. Obesity, dyslipidemia, hypertension, neurology disorders, chronic infections are reliably high among comorbidity. High frequency among work factors - hard physical work, vibration, night shift, electromagnetic radiation, stressful work. hypodynamics, excess intake of saturated fats, sleep disturbance are reliably high among bad habits. The genetic factor (early detection of ischemic i degree relatives) is characterized by a reliably high frequency.

The frequencies of the factors: unsatisfactory economic conditions, in marriage and divorced or widowed - are satisfactory high in the control group.

By regression analysis, we determined the risk factors and odds ratio of developing IHD at a young age (Table 2):

Table 2: Odds ratio of developing IHD at a young age

	p	OR	95% C.I.for OR	
Female gender	0.0170	0.14	0.03	0.70
Married	<0.0001	0.01	0.00	0.08
Living in the city	0.0250	6.90	1.28	37.18
Sleep disturbance	0.0030	45.62	3.52	590.64
Obesity	<0.0001	24.56	4.14	145.66
Hypertension	<0.0001	40.76	8.07	205.92
Excess intake of saturated fats	<0.0001	79.94	10.93	584.43
Night shift	<0.0001	39.01	3.75	405.75
Early detection of ischemic disease in grade I-II relatives	<0.0001	44.22	8.07	242.17
Constant	<0.0001	0.00		

Regression analysis has shown that it increases the risk of ischemic heart disease: living in the city, sleep disorders, overweight, Excess intake of saturated fats, hypertension, genetic factors, stress, and from working conditions - night shifts.

Regression coefficients: female gender - B=-1.94$\pm$0.81; married - B=-4.69$\pm$1.08; living in the city - B=1.93$\pm$0.86; sleep disturbance - B=3.82$\pm$1.31; obesity - B=3.20$\pm$0.91; hypertension - B=3.71$\pm$0.83; excess intake of saturated fats - B=4.38$\pm$1.02; night shift - B=3.66$\pm$1.20; early detection of ischemic disease in grade I-II relatives - B=3.79$\pm$0.87. constant=-13.65+3.13 The risk assessment can be as follows:

Prediction can be made using the logistic regression equation, which has the following form:

$$Z=-13.65-1.94*X1-4.69*X2+1.93*X3+3.82*X4+3.20*X5+3.71*X6 +4.38*X7+3.66*X8+3.79*X9 \quad (1)$$

Where X is the value of the factor equal to 1 or 0, P is the probability of developing the disease. To predict the outcome of treatment, determine the presence of a prognostic factor, if the subject has a prognostic sign, we put 1 in the regression equation, if not - 0. We add the results and put them in formula (2):

$$P=1/1+e^{-z} \quad (2)$$

As a result, we get the probability of developing coronary heart disease for a particular patient in accordance with his prognostic characteristics.

Discussion

In a large and longitudinal cohort study involving more than 2.5 million young adults, Kim SM, et al. found that early-onset diabetes and prediabetes increased the CVD incidence and all-cause mortality risk after the 10 year follow-up period. Furthermore, early recovery of hyperglycemia could reduce the subsequent 10 year CVD risk and all-cause mortality [Kim SM, et al. 2020]. According to this study, the incidence of diabetes is higher in the CHD group compared to the control group, although this difference is not statistically significant.

The findings of this study indicate that increased cholesterol levels were associated with high CVD risk in young adults. Furthermore, young adults with decreased cholesterol levels had reduced risk for CVD[Jeong, S. M., et al. 2018]. According to this paper, Excess intake of saturated fats is a risk factor for IHD.

According to some studies, Tobacco smoking is an important independent risk factor for acute myocardial infarction in young adults[Hbejan, K. et al. 2011], with similar strength of association for both genders. According to this study, this factor is not reliably different from control during IHD.

Nonoptimal levels of LDL and HDL cholesterol during young adulthood are independently associated with coronary atherosclerosis 2 decades later [Pletcher, M. J., et al., 2020]. A high prevalence of CVD risk factors was evident at a young age among Indians compared with high and upper middle income countries, with rural rates catching up with urban estimates[Vasan, S. K., et al. 2020].

Premature coronary artery disease is characterized by an unfavorable lipid profile [Pineda J. et al.2009;]. According to research, dyslipidemia is characterized by a reliably high frequency.

Evidence was found for a relationship between IHD and effort-reward imbalance, injustice, job insecurity, or long working hours. [Eller, N. H., et al. 2007]. This article shows that the frequency of employment characteristics in the IHD group is reliably high, night shift while increasing the risk of IHD.

Conclusion

The ability to predict the risk of developing IHD in young people on the basis of traditional RFs, most of which are modifiable, as well as the study of "new" RFs opens up new perspectives in the formation of a strategic approach to the management of young patients in the presence of high risk.

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