SVEIKATOS MOKSLAI / HEALTH SCIENCES
IN EASTERN EUROPE
ISSN 1392-6373 print / 2335-867X online
2020, 30 tomas, Nr.2, p. 86-89
DOI: https://doi.org/10.35988/sm-hs.2020.048

DYSLIPIDEMIA IN PATIENTS WITH TRANSIENT ISCHEMIC ATTACK AND STROKE IN MIDDLE TYUMEN OBLAST

Ilja Lebedev[1], Saidi Sait-Huseinovich Gaibov[1], Jekaterina Zakharchuk[1], Artiom Sominov[1], Julija Andrejeva[2], Brigita Miežienė[3], Natalja Fatkulina[3]

[1]Tyumen State Medical University, Department of Neurology and Neurosurgery, Russian Federation, [2]Klaipeda University, Faculty of Health Sciences, Holistic Medicine and Rehabilitation Department, Lithuania,

[3]Vilnius University, Faculty of Medicine, Institute of Health Sciences, Lithuania

Keywords: dyslipidemia, lipidemic spectrum, TIA, stroke, patient.

Summary

This work provides data and analysis of lipidemic spectrum from 421 patients who had experienced transient ischemic attack (TIA) or stroke and either were residents of Khanty-Mansiysky District or were working via shifts in the region when lesion occurred. We evaluated numerous major lipid criteria, mainly cholesterol blood concentration and lipid spectrums. We also studied correlating data on cerebrovascular accidents prevalence comprised in studied region. Statistical analysis was performed using SPSS v13.0, significance level of $p<0,05$.

Statistical analysis revealed lack of significant difference in average levels of cholesterol, high-density and low-density lipoproteins (HDL and LDL respectively), triglycerides (Tr) between residents and shift-workers. Moreover, those levels of all studied parameters aside from HDL were significantly higher when compared to people from more southern parts on Tyumen region. Most deviant parameter was LDL at rate of 63,5% occurrence of deviation in studied group of patients. We found no links between either gender or age and revealed changes.

Our research shows high incidence of dyslipidemia in studied population. During our study we revealed no significant difference in dyslipidemia between residents and shift-workers who were originally alien to Far North's conditions. Further research of bigger scale is required to either confirm this data or reveal actual difference. Based on our analysis, we could recommend normalization of lipidemic levels in TIA-afflicted cohort of patients to decrease risk of ischemic stroke.

Introduction

The most common cause of ischemic stroke is atherothrombosis. This, in turn, occurs due to atherosclerotic affliction of extra- and intracranial arteries. Ischemic stroke is 4-5 times more frequent than hemorrhagic non-traumatic one, with 70% of ischemic variant being due to atherothrombosis. Understanding patterns of such developments and optimizing lipidemic spectrum of various populations should decrease risks of cardiovascular diseases [1-4].

According to Russian Society of Cardiology (RSC), hypercholesterinemia is one of seven major cardiovascular risks, constituting 25% of premature deaths and 12% of 'lost years of healthy life' in Russia. KOORDINATA project, carried out in Russia, has shown that blood cholesterol level of more than 5,0 mmol/l increases mortality by 1,5 times in patients with arterial hypertension (AH) and ischemic heart disease (IHD) [5, 6].

Correction of dyslipidemia is especially important to prevent cerebrovascular pathology in populations of areas with harsh geoclimatic conditions, because extreme climatic and ecological factors and associated specific social conditions affect atherosclerosis [7].

Aim of the research: to study lipidemic spectrum of Khanty-Mansiysk district's residents who suffered from TIA or ischemic stroke, as well as shift-workers of said region who spent months there.

Research object and methods

Khanty-Mansiysk – capital of homonymous district located in Far North and representing middle part of bigger Tyumen Oblast. According to official data, average annual

Correspondence to: Julija Andrejeva, e-mail: julavento@gmail.com

population of said district was 82 400 as of 2007. According to district's stroke register, there were 522 cases of cerebrovascular accidents (CVA) during studied period. 381 of those were ischemic strokes, 96 – hemorrhagic stroke, 45 – TIAs. To evaluate severity of dyslipidemia we carried out spectral analysis of blood samples from 421 patients (208 males and 213 females) within first 48 hours after CVA. 364 patients (86,5%) were residents of studied district; other 57 (13,5%) were shift-workers from other regions. Average age was 61,7±0,8 years for females, which was significantly higher than 57,7±0,8 in males.

We evaluated cholesterol blood concentration, as well as its transportation forms – HDL and LDL, as well as Tr levels in acute period of any CVA (first 48 hours). Statistical analysis was performed via SPSS v13.0 at significance of $p<0,05$.

Results of the research

Assessment of studied parameters revealed increase in all of them, except for HDL, which was decreased; comparison was made with levels recommended by RSC. Minimal deviation was found in Tr levels, whilst maximum – in LDL. Comparison of average lipidemic spectrum levels between genders revealed significantly higher cholesterol and lower HDL in males; differences in LDL and Tr were insignificant (tab. 1).

Comparison between residents and shift-workers revealed no significant differences. To evaluate difference between received averages of studied patients and higher margin of recommended levels, we used percentage-based analysis of various changes in studied parameters. Most commonly deviant parameter was LDL (in 63,5% of patients), while Tr levels deviation was most infrequent (39,2%). Rate of deviation for all lipidemic parameters was the same in both genders (tab. 2).

Statistical analysis of every parameter in structure of various CVA showed significant difference of HDL levels in ischemic stroke ($p<0,004$). Gender-based analysis revealed highest increase of cholesterol and LDL from all lipids in both males and females. Lowest increase was detected in HDL in both genders with ischemic stroke, while Tr increase was significantly higher only in males with ischemic stroke, and significantly higher in females with all forms of CVA.

Table 1. Parameters of lipidemic spectrum in patients with CVA (M±m, mmol/l)

Parameter	All patients				Males		Females	
	Average value	N	Min value	Max value	Average value	N	Average value	N
Cholesterol	5,44±0,08	383	2,10	18,05	5,27±0,11*	193	5,60±0,10	190
HDL	1,11±0,03	323	0,19	3,12	1,02±0,04*	161	1,20±0,04	162
LDL	3,53±0,07	318	1,20	7,87	3,41±0,09	161	3,64±0,10	157
Tr	1,75±0,06	344	0,39	10,70	1,73±0,09	178	1,76±0,09	166

* - significant difference between values for males and females ($p<0,05$)

Table 2. Deviation of lipidemic spectrum parameters from normal values in patients with CVA (%)

Parameter	Cholesterol	HDL	LDL	Tr
Both genders	61,4	57,0	63,5	39,2
Males	55,4	57,8	59,6	38,2
Females	67,4	56,2	67,5	40,4

Table 3. Significance levels of parameters' differences in paired comparison for various CVA types

Parameter	Hemorrhagic stroke	Ischemic stroke	TIA
Cholesterol	n/a	n/a	n/a
HDL	$p<0,05$	$p<0,05$	n/a
LDL	n/a	$p<0,05$	n/a
Tr	n/a	n/a	n/a

Table 4. Values of lipidemic spectrum parameters based on age in patients with CVA (years)

Parameter	20-39	40-49	50-59	60-69	70+
Cholesterol	5,07±0,42	5,48±0,14	5,73±0,16	5,28±0,14	5,18±0,12
HDL	1,06±0,17	1,17±0,08	1,10±0,05	1,09±0,05	1,12±0,05
LDL	3,51±0,41	3,41±0,16	3,68±0,13	3,46±0,14	3,41±0,12
Tr	1,70±0,24	1,9±0,14	1,85±0,12	1,79±0,03	1,45±0,09

Average age of patients with TIA (53,0±12,4 years for males, 55,5±10,6 for females) who had the highest values of cholesterol and LDL, was the lowest between all patients with CVA in our study. Paired comparison of individual biochemical parameters in various types of CVA revealed significantly higher increase in average LDL in cases of TIA in comparison with cases of ischemic stroke. HDL levels were significantly and dramatically higher in patients with hemorrhagic strokes when compared to ischemic ones. Other differences proved to be insignificant (tab. 3).

Cholesterol concentration evaluation in different age groups revealed significant increase in patients aged 50-59. Said concentration was lower in the next age group (60-69) (p=0,04), and kept decreasing in following groups, reaching lowest points in youngest and oldest patients (tab. 4).

Other parameters changed insignificantly with age. HDL insignificantly yet steadily increased over age, diving slightly in 60-69 group and peaking at 70 years of age. LDL levels peaked at 40-59 group and almost did not deviate in younger patients. Tr was increased most in patients under 49, followed by steady decrease correlating with age.

Discussion

Importance of dyslipidemia as a risk factor for CVA, ischemic stroke specifically, is based on the key role it plays in atherosclerotic pathogenesis and high occurrence rate. According to epidemiologic studies in Khanty-Mansiysk region, 53,3% of people who experienced CVA had dyslipidemia, making it the second most prevalent cardiovascular risk, first being AH (91,5%). Our study revealed that LDL is most commonly increased in studied patients. Average levels of said parameter were also most deviant from normal. Our data corresponds with other studies from other northern regions of Russia. We discovered that cholesterol and LDL are equally increased in both genders after TIA, while HDL is decreased in both after ischemic stroke. However, proportions of different lipid fractions in various CVA types were different in males and females.

Study of cholesterol concentration in 9835 residents of Novosibirsk (1985-1995) aged 25-64 revealed increase over 5,2 mmol/l in 57,0% of studied people. Similar data was acquired in our research (5,0 mmol/l and up seen in 61,4% of patients). LDL concentration higher than 3,4 mmol/l was found in 53,0% in Novosibirsk study, while we had 63,5% of patients with said concentration higher than 3,0 mmol/l; this data is also comparable if one considers difference in threshold concentration and scale of study. However, hypertriglyceridemia (Tr>1,7 mmol/l) was significantly less common in Novosibirsk study when compared to ours: 18% and 39,2% respectively. Hypoalphacholesterinemia (HDL<1,0 mmol/l) was also significantly higher in our patients (57,0% and 16,0% for Novosibirsk). Those differences could be caused by difference in research scale, as well as differences in diet dictated by Far North's limited and somewhat unstable food supply chain.

Manners et al. suggest that there is a significant environmental component to ACV. According to their research, patients from more northern parts of USA often have dyslipidemic tendencies due to dietary habits (increased consumption of highly-fat food and decreased consumption of fresh fruit and vegetables – struggle for highly energy-efficient food). This is further exacerbated by problems associated with expediting and supplying faraway regions with fresh groceries, pushing people to buying more effective – both in terms of cost and availability – products, even if they could be detrimental for health in a longer perspective [7].

According to Thompson et al., there is also a chance that patient who suffered from CVA is receiving some form of anti-lipidemic therapy, most commonly including statins. Those proved to be quite effective; however, numerous studies suggest their side-effect being increased chance of cerebrovascular damage. Thus, this could lead to a 'vicious cycle', in which patients with CVA takes statins to control dyslipidemia in pursuit of decreasing cerebrovascular risk, at the same time increasing it due to damaging side-effect of statins [8]. Although possible, there are also numerous research disproving said theory. Therefore, we could not draw final conclusions as of now, however, this discourse should be followed closely for future reference and, probably, changes in therapy for dyslipidemic patients.

Conclusions

1. We discovered significantly increased values of lipids in studied group which correlates with statistical data from other northern regions.

2. Our analysis revealed no significant difference in dyslipidemic profile between natives and accustomed aliens, i.e. shift-workers.

3. Previous points suggest influence of geographical and environmental components in northern patients with CVA.

4. Based on forementioned points, we suggest stricter control over lipidemic levels in afflicted habitants of said regions to prevent or decrease risk of cerebrovascular accidents.

References

1. Gusev E.I., Skvortsova V.I. Cerebral ischemia. M: Medicina 2001; 328.
2. Tool J.F. Vascular diseases of cerebrum. 6th ed. GEOTAR-Media 2007; 608.

3. Skvortsova V.I., Evselman M.L. Ischemic stroke. Orel 2006; 296.

4. Diagnostics and correction of dyslipidemia to prevent and treat atherosclerosis. Russian guidelines. IV edition. M 2009; 79.

5. Bogdanov A.I., Kravtsov Y.I. Epidemiology and risk factors for ischemic stroke in Middle Priob'e - prospective study. Neurological Journal 1998; 3:2:39-42

6. Lakhan S.E., Kirchgessner A., Hofer M. Inflammatory mechanisms in ischemic stroke: therapeutic approaches. J Trans Med 2009; 17:7:97
https://doi.org/10.1186/1479-5876-7-97

7. Manners, J., Steinberg, A. and Shutter, L., Early management of acute cerebrovascular accident. Current Opinion in Critical Care, 2017; 23(6):556-560.
https://doi.org/10.1097/MCC.0000000000000462

8. Thompson, P., Panza, G., Zaleski, A. and Taylor, B., Statin-associated side effects. Journal of the American College of Cardiology 2016; 67(20):2395-2410.
https://doi.org/10.1016/j.jacc.2016.02.071

PACIENTŲ, PATYRUSIŲ GALVOS SMEGENŲ INSULTĄ, DISLIPIDEMIJA VIDURIO TIUMENĖS SRITYJE

I. Lebedev, S.S. Gaibov, J. Zakharchuk, A. Sominov, J. Andrejeva, B. Miežienė, N. Fatkulina

Raktažodžiai: dislipidemija , lipidų spektras, insultas, pacientas.

Santrauka

Šiame darbe pateikiami 421 paciento, patyrusio išeminį smegenų insultą, lipidinio spektro tyrimo duomenys ir rezultatai. Tiriamieji gyveno Khanty-Mansiysky regione, Rusijoje, arba dirbo pamaininį darbą šiame regione.

Tyrimo metu buvo įvertinta nemaža lipidų kriterijų, daugiausia cholesterolio koncentracija kraujyje ir lipidų spektras. Taip pat buvo tiriama koreliacija tarp smegenų insultų atvejų ir tiriamojo regiono. Statistiniai duomenys buvo apdorojami taikant SPSS 13 programos paketo versiją, statistinio reikšmingumo lygis yra $p<0,05$.

Tyrimo duomenys parodė, kad nėra statistiškai reikšmingo skirtumo tarp vidutinių cholesterolio reikšmių ir didelio ar mažo tankio lipoproteinų (DTL ir MTL atitinkamai), trigliceridų (Tr) reikšmių tarp regiono gyventojų ir pamaininį darbą dirbančių darbuotojų. Be to, visi šių tiriamųjų parametrų lygiai, be MTL, buvo statistiškai reikšmingai aukštesni lyginant su asmenimis, gyvenančiais labiau pietiniame Tiumenės regione. Didžiausią nuokrypio lygį tiriamųjų pacientų grupėje turėjo mažo tankio lipoproteinai (MTL) -63,5 % atitinkamai. Mes neradome sąryšio tarp pacientų lyties ar amžiaus ir nustatytų pokyčių.

Mūsų tyrimas parodė aukštą dislipidemijos paplitimą tiriamųjų asmenų populiacijoje. Tyrimo metu nenustatėme statistiškai reikšmingo dislipidemijos paplitimo lygio skirtumo tarp gyventojų ir pamaininį darbą dirbančių asmenų, kurie gyvena Tolimoje Šiaurėje. Reikia didesnės imties tyrimo, kad patvirtintume šį skirtumą. Remiantis mūsų tyrimo gautais duomenimis, rekomenduojame normalizuoti lipidų lygį smegenų infarktą patyrusių pacientų kohortoje, kad sumažėtų išeminio insulto atvejų.

Adresas susirašinėti: julavento@gmail.com

Gauta 2020-01-23