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HEALTH STATUS OF MARGINALIZED ROMANI COMMUNITIES IN EASTERN SLOVAKIA

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Introduction

Population health reflects the overall level of the health in a society. The strongest factors influencing population health are the society's economic situation, the lifestyle of its members, the level of health care but also the environmental conditions.

Inside a given population (e.g. Eastern Slovakia) there are different levels of social hierarchy and they also strongly influence the health state of a population. The larger the difference between those on top and those on the bottom in a society, the worse its health appears to be. On the other hand, the health status and the educational level of the population have significant impact on the economic development of the region.

From a medical point of view the marginalized populations represent the most threatened group of the society. The marginalization is a social process of becoming or being relegated to the fringe of society leading finally to social exclusion. Most often it happens because of losing of home, in case of disability, drug- or alcohol addiction or lack of adaptability to the customs of the majority. In Eastern Slovakia, the largest group of marginalized people is constituted by the isolated Romani communities.

The aim of this work is to provide an overview of the health status of marginalized Romani communities in East Slovakia on the basis of examination of selected biochemical parameters. For these purposes Romanies and non-Romani people, living in or outside the segregated communities of Košice region (Eastern Slovakia) were investigated.

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Methodology

Respondents

The study group (N = 855, age 18–55 years; 40% men and 60% women) consisted of Romanies living in segregated communities in surrounding area of Košice (Eastern Slovakia), as well of non-Romani probands, all of them recruited during preventive inspection by their general practitioner. On the basis of ethnic identity, the respondents were divided into three categories as follows:

– 1st category: people from segregated Romani communities, identified as Roma people;
– 2nd category: people living in the vicinity of the segregated Roma communities;
– 3rd category: people outside the segregated Romani communities.

Results of respondents from the 2nd and the 3rd category served as comparative values. Of the initial 855 respondents, 832 fulfilled all criteria and were included in the analysis.

The study protocol was approved by the ethical committee of the Šafárik University, Medical School. Informed consent was given by probands.

Material collection

Participants were given a morning appointment and asked to fast 12 hours before the blood collection. Compliance with this request was confirmed on arrival. A venous blood sample was taken for the measurement of levels of glucose, creatinine, uric acid, total cholesterol and triacylglycerols. Blood was collected in a vacuum system EDTA tube, transported in a cooling pail. Biochemical parameters after serum separation were assayed within 3 hours in biochemical laboratories of Labmed a.s. Košice on ADVIA 2400 Siemens Healthcare using ERBA-Lachema, Roche, Randox commercial kits with external and internal quality control.

Results

Ethnic and age composition of probands

Four hundred forty two subjects of Romani origin formed the 1st category, which consisted of 158 men and 284 women. Three hundred ninety probands were subdivided into the control categories according to inclusion criteria described in the methodology. 151 subjects formed the 2nd category (39% of non-Romanies). 239 probands of the 3rd category presented 61% of the control subjects.

Probands had a mean age of 34.1 years (SD ± 8.36) with a minimum and a maximum of 18 and 55, respectively. The age composition of the probands is shown in Table 1.

Overview of selected biochemical parameters of serum

Serum glucose level

Glucose is the most important monosaccharide of the blood acting as the basic energy source of all cells. Glycaemia is maintained hormonally: while insulin is responsible for lowering the blood glucose concentration; glucagon, adrenaline, cortisol and the growth

factor increase glycaemia. Endogenous glucose is processed mainly in the liver, where it is converted to glycogen or metabolized to energy.

Under physiological conditions, glycaemia is higher postprandial and is lower during starvation, but remains in the range of 4.0–6.25 mmol/l. Pathological increase of glucose occurs in the absence or in defective insulin formation, in the overproduction of insulin antagonists, in hyperthyroidism, diseases of central nervous system or kidneys. Pathological decrease is observed in hormone imbalance due to overproduction of insulin, insufficient antagonist production, inadaequate gluconeogenesis or by innate defects of saccharide metabolism, e.g. in liver type glycogenoses. (Balla, 2007)

Serum creatinine level

Creatinine is a metabolite of creatine, formed through an important intermediate, the creatine phosphate, which serves as a rapidly mobilizable energy source in muscles. By breaking down the creatine phosphate, in addition to the ATP, creatinine is released to the blood. Creatinine is filtered by kidneys to the urine almost without reabsorption. Serum creatinine and its urinary excretion is the basis of glomerular filtration rate calculation.

Since the creatinine is produced in the muscles, the serum is dependent on the muscle mass. Under physiological conditions, the serum creatinine level is 55–110 μmol/l in men and 45–95 μmol/l in women.

In the case of abnormal renal function, creatinine is not sufficiently excreted to the urine, what is reflected in the increase of serum creatinine level. Increase in serum creatinine occurs in all forms of decreased kidney function but also in acetone intoxication, acute muscle injury and dehydration. Decrease in serum creatinine level may occur in anemia, muscle dystrophy, in higher age and in the 1st and 2nd trimester of pregnancy.

Serum uric acid level

Uric acid is formed as the final breakdown product of purine nucleotides and is excreted to urine. The concentration in the blood is significantly affected by external sources of purines, which occur particularly in meat as also by high fructose intake or rapid weight loss due to acidosis.

Physiological serum uric acid levels are: 200–420 μmol/l in men and 140–390 μmol/l in women. Increased levels may are typical for to gout (arthritis urica) and of the rare inherited Lesch–Nyhan syndrome. Increase in uric acid level and its excretion to urine is often a consequence of the insulin resistant (type 2) diabetes mellitus (Dehghan et al, 2008).

Serum total cholesterol level

Cholesterol is a sterolic compound, a precursor of bile acids, steroid hormones and vitamin D_2. As a constituent of cell membranes, cholesterol is responsible for the proper cell membrane permeability and fluidity, acts in the cell signaling and in the nerve conduction. Cholesterol is synthesized by all cells of a human body – depending on the needs of cells and organ function – mainly in the liver and in relatively high amount in the intestines, adrenal glands and reproductive organs. Some cholesterol is absorbed from the dietary sources and about 50% of the excreted cholesterol is recycled by its reabsorption by the small bowel.

Due to its insolubility in blood, the transport of cholesterol through the circulatory system is provided within the lipoproteins, which determines the start- and the endpoint of the cholesterol transport. Under physiological conditions the organism can compensate the higher cholesterol intake from the dietary sources by reducing its synthetized amount, whereas lower exogenous intake has the opposite effect.

The total cholesterol level is the best described and an important factor in the development of atherosclerosis. The physiological level in serum of adults is in the range 3.5 to 5.2 mmol/l. The relative risk of the ischemic heart disease depending on the concentration of serum total cholesterol is growing exponentially, correlates with the extent and progress of atherosclerosis and therefore can influence the pathogenesis of its development. The pathological accumulation can yield not only in its deposit in atheromas, but also in gallstones.

Serum triacylglycerol level

Triacylglycerols are esters of glycerol with three fatty acids, with a great option of combination, and represent a better source of energy than the carbohydrates or the proteins.

Triacylglycerols are synthesized in cells of fat and liver, in which they can be stored. Dietary as also the endogenous sources of triacylglycerols are transported via the lipoproteins. Physiological range of serum triacylglycerol level of adults is 0.1–2.0 mmol/l, with a physiological increase during pregnancy or after consuming diet rich in sacharides.

Pathological elevation in serum triacylglycerols level can be caused by obesity, high-fat diet, poorly controlled diabetes, or even by genetic defects. High levels of triacylglycerols are responsible for endothelial dysfunction, an early phase of the atherosclerotic process.

Extremely high serum triacylglycerols are a risk factor of acute pancreatitis (Lindbergh, 2009).

Data analysis

Data analysis was performed by statistical evaluation expressed in percent of correlations between the individual parameters reciprocally, as also between the individual categories, using the Pearson correlation coefficient. Results are summarized in Tables 8, 9 and 10. Because of the large number of analyses, a p value < 0.01 was estimated as being statistically significant. Means, medians, ranges, and standard deviations are reported in terms of original distributions. The chi-squared test was used to analyze the significance of differences in the selected biochemical parameter levels, as also the status between Romanies living in and outside the segregated communities (Weber, 1956).

Discussion

The history and the recent situation of Romani people

Romanies are living everywhere scattered around the world, but in the greatest number in Europe and in North and South America (Hancock, 2005). Their history dates back to the period after the resettlement of poor nomads from Indian peninsula in the 9th–13th century. In the first years after they entered Europe, their adoption was hospitable. The situation changed after their excommunication by Catholic Church in 15th century. Persecution culminated during the World War II, but the violent and often not professional assimilation of Romanies after year 1945 did not improved their situation. Romanies were and also now are often labelled as socially retarded people needing basic reeducation in social and hygienic issues (Kumanová et al., 2006).

The exact number of Romanies living in Slovakia is not known, in particular because they do not report to the Romani origin. On the basis of the "Summary Report on

Romanies" from 2002, their number in the Slovak Republic was estimated to 365 thousand, with an increase to 515 thousand by 2020 with the current population curve (Kumanová et al., 2006). From a geographical point of view, most of Romanies in Slovakia are living in the south of the Middle- and Eastern Slovakia, mainly in separated and segregated settlements (Kolarcik et al, 2009; Rimárová, 2010; Vano, 2002).

As it is already known from practice, that Romani children at birth are smaller, with a smaller birth weight and are shorter in length. This fact was one of the reasons of comparison of the serological parameters of adult Romanies and non-Romanies living in segregated settlements with those living outside these areas. In the case of findings, that differences between serological parameters do not come from the different living conditions, there would be a possibility of proposing new specifications of serological parameters for Romanies.

Analysis of biochemical parameters in this study

Less than half of the investigated probands had all 5 biochemical parameters (34–48%) in the physiological range (Table 2). Pathological values in all of the parameters have been confirmed only with one person (non-Romani man inside segregated settlement). The largest percentage of the probands reported one pathological value of the investigated parameters (35–49%).

The number of probands with elevated serum glucose level was in most categories low with the exception of the Romani men living in segregated communities (7%), while 27% among them had slightly elevated values (6.2–6.9 mmol/l) and 73% had values corresponding to impaired fasting glucose or diabetes mellitus (more than 6.9 mmol/l).

On the other side the relatively high number of women in the same category with serum glucose less than 4 mmol/l deserves special attention. It can be caused by malnutrition, alcohol consumption or some inherited conditions but regardless of the etiology it represents a serious harm to the reproductive health.

Serum creatinine was in the normal range of most categories and in both sexes. This also a surprising finding because urinary and renal pathological conditions are not rare in these populations.

The low level of uric acid in 27% and 15% of the probands of the 1st category is probably associated with their relative malnutrition. It is in accordance with the old description of gout as a disease of rich people.

Relative malnutrition can be also behind cause of the relatively frequent finding of low (< 3.5 mmol/l) total cholesterol in the probands of the 1st category. Slightly elevated cholesterol was present in 20–31 % of probands, mostly in non-Roma category. Slightly and substantially elevated cholesterol was present in almost half of the nonroma men but only in 26% of the men in the 1st category Serum triacylglycerols show a similar picture because every 6th men and one of ten women had elevated levels regardless of their category.

Conclusion

The 1st category represented by Romanies from separated settlements showed better female representation (64%), while in the other categories the representation of women was relative to the male probands (54% and 53%). This difference was explained by the increased interest of Romani women to participate in the project.

Table 1 shows the age composition of the probands: the range of the age is narrower for the non-Romanies, with an average age of the majority. Wider range of the age is shown in Romanies, with a higher representation of younger respondents. An average age in the categories is the same (34 ± 1). Physiological values of selected parameters were obtained in every category (Table 2), more in non-Romani women (48%), comparable with the Romani women living in the segregated settlements (45%) and the non-Romani men inside these areas (43%). The worst results (34% of probands with physiological values of selected parameters in serum) were observed in Romani men from the segregated settlements.

Physiological values of the serum glucose level was obtained just in 88 % of the Romani women (Table 3), while 10% had less than 4.0 mmol/l serum glucose, usually referred as a consequence of prolonged starvation, medications or alcohol consumption. Similar results were observed in Romani men from the segregated settlements (89% physiological values), in contrast to women with a higher percentage of elevated glycaemia (7%), mainly over 6.9 mmol/l. The difference between serum glucose levels of Romanies and non-Romanies were statistically significantly with a p value of 0.028 and 0.002 at men and women, respectively (Tables 9, 10). Serum creatinine measured in the project was within the physiological values of over 95% and 98% of participating men and women, respectively (Tables 4a–4b). Serum uric acid (Tables 5a–5b) was assessed as the parameter with the highest percentage of pathological values, mainly below 140 μmol/l (9–27%). Serum cholesterol level was impaired in each category (Table 6), but as expected, better values were obtained in the 1st category, with statistically significant difference between men in 1st and 3rd category. Serum triacylglycerols were better in men than in women, with no statistically significant differences (Table 7).

From the results of the correlations of selected biochemical parameters (Table 8) it is obvious, that there is correlation between the serum glucose and the serum triacylglycerol level; between the serum glucose and the serum creatinine level; between the serum creatinine and the serum uric acid level; between the serum uric acid level and the serum triacylglycerol level and between the serum cholesterol and the serum triacylglycerol level.

High interest of Romani women to participate in this project, together with their relatively good serological parameters, pointed their improved living conditions, which are probably the result of the projects aimed at the minorities' integration. According to the results the Romani men are probably not the focus of these programs. It is not surprising, that the observed impaired parameters are related with the nutritional options and habits of the Romanies. Despite the obtained results and results of a similar study conducted on urinary parameters (Hubková, 2012) there is still suspicion of a contradiction between real health status and biochemical parameters.

In conclusion, the finding of the project is that Romani men should be incorporated to the Roma Integration Programs in a higher extent, to help improve their health, whereas it was the likely cause of improved health of the Romani women participating in the project.

Table 1

Age composition of the probands

Category	Number of probands	Average age years	Minimum age Years	Maximum age years
1 M	158	34	18	53
1 W	284	35	18	55
2 M	69	34	20	55
2 W	82	35	20	55
3 M	113	33	20	44
3 W	126	33	19	46

Legend: 1, 2, 3 – categories, M and W – men and women.

Table 2

Physiological and pathological values of selected serum parameters

Category	n	Physiological values	Number / % of probands with patological values				
		Numbers (%)	1 patological value	2 patological values	3 patological values	4 patological values	5 patological values
1.M	158	54 (34%)	58 / 37%	38 / 24%	8 / 5%	0 / 0%	0 / 0%
1.W	284	127(44%)	105 / 37%	46 / 16%	6 / 2%	0 / 0%	0 / 0%
2. M	69	30 (43%)	24 / 35%	10 / 15%	3 / 5%	1 / 1%	1 / 1%
2.W	82	31 (38%)	40 / 49%	9 / 11%	2 / 2%	0 / 0%	0 / 0%
3. M	113	42 (37%)	49 / 43%	17 / 15%	4 / 4%	1 / 1%	0 / 0%
3.W	126	61 (48%)	49 / 39%	14 / 11%	2 / 2%	0 / 0%	0 / 0%

Legend: 1, 2, 3 – categories, M and W – men and women.

Table 3

Evaluation of serum glucose

Category	Total number of probands	Number / Percentage of probands with corresponding value of parameter						Average value ± standard deviation
		<4,0 mmol/l		4,0 - 6,2 mmol/l *		>6,2 mmol/l		
1 M	158	6	*4%*	141	*89%*	11	*7%*	5,1 ± 1,3
1 W	284	27	*10%*	250	*88%*	7	*2%*	4,7 ± 0,9
2 M	69	1	*2%*	65	*94%*	3	*4%*	4,9 ± 0,7
2 W	82	6	*7%*	75	*92%*	1	*1%*	4,6 ± 0,7
3 M	113	2	*2%*	109	*96%*	2	*2%*	5,0 ± 0,6
3 W	126	3	*2%*	123	*98%*	0	*0%*	4,8 ± 0,4

Legend: 1, 2, 3 – categories; M, W – men, women.
*physiological range

Table 4a)

Evaluation of serum creatinine in men

Category	Total number of probands	Number / Percentage of probands with corresponding value of parameter				Average value ± standard deviation
		55-110 µmol/l *		>110 µmol/l		
1M	158	152	*96%*	6	*4%*	92 ± 10
2M	69	66	*96%*	3	*4%*	92 ± 14
3M	113	112	*99%*	1	*1%*	92 ± 9

Legend: 1, 2, 3 – categories, M – men.
*physiological range

Table 4b)

Evaluatiuon of serum creatinine in women

Category	Total number of probands	Number / Percentage of probands with corresponding value of parameter				Average value ± standard deviation
		45-95 µmol/l *		>95 µmol/l		
1W	284	279	*98%*	5	*2%*	76 ± 8
2W	82	82	*100%*	0	*0%*	78 ± 7
3W	126	123	*98%*	3	*2%*	80 ± 7

Legend: 1, 2, 3 – categories, W – women.
*physiological range

Table 5a)

Evaluation of serum uric acid in men

Category	Total number of probands	Number / Percentage of probands with corresponding value of parameter						Average value ± standard deviation
		<200 µmol/l		200-420 µmol/l *		>420 µmol/l		
1M	158	42	*27%*	108	*68%*	8	*5%*	266 ± 89
2M	69	6	*9%*	55	*80%*	8	*11%*	320 ± 93
3M	113	15	*13%*	92	*82%*	6	*5%*	298 ± 78

Legend: 1, 2, 3 – categories, M – men.
*physiological range

Table 5b)

Evaluation of serum uric acid in women

Category	Total number of probands	Number / Percentage of probands with corresponding value of parameter						Average value ± standard deviation
		<140 µmol/l		140-390 µmol/l *		>390 µmol/l		
1W	284	42	*15%*	240	*84%*	2	*1%*	204 ± 64
2W	82	8	*10%*	73	*89%*	1	*1%*	219 ± 64
3W	126	12	*9%*	112	*89%*	2	*2%*	221 ± 62

Legend: 1, 2, 3 – categories, W – women
*physiological range

Table 6

Evaluation of serum cholesterol in mmol/l

Category	Total number of probands	Number / Percentage of probands with corresponding value of parameter								Average value ± standard deviation
		<3,5		3,5-5,2*		5,2-6,2		>6,2		
1.M	158	15	9%	102	65%	31	20%	10	6%	4,7 ± 1,0
1.W	284	21	8%	180	63%	60	21%	23	8%	4,8 ± 1,0
2.M	69	2	3%	40	58%	12	17%	15	22%	5,1 ± 1,2
2.W	82	1	1%	43	53%	27	33%	11	13%	5,2 ± 0,9
3.M	113	3	3%	58	51%	35	31%	17	15%	5,2 ± 1,0
3.W	126	2	1%	74	59%	39	31%	11	9%	5,1 ± 0,9

Legend: 1, 2, 3 – categories; M, W – men, women.
*physiological range

Table 7

Evaluation of serum TAG in mmol/l

Category	Total number of probands	Number / Percentage of probands with corresponding value of parameter				Average value ± standard deviation
		0,1-2,0*		>2,0		
1.M	158	129	82%	29	18%	1,5 ± 1,3
1.W	284	256	90%	28	10%	1,2 ± 0,8
2.M	69	57	83%	12	17%	1,4 ± 1,2
2.W	82	73	89%	9	11%	1,1 ± 0,7
3.M	113	95	84%	18	16%	1,3 ± 0,7
3.W	126	115	91%	11	9%	1,2 ± 0,6

Legend: 1, 2, 3 – categories; M, W – men, women.
*physiological range

Table 8

Corellations of selected biochemical parameters

correlation coefficient	Serum glucose	Serum creatinine	Serum uric acid	Total serum cholesterol	Serum triacyl-glycerols
Serum glucose	1,00	0,21*	0,15	0,15	0,39*
Serum creatinin	0,21*	1,00	0,48*	0,11	0,15
Serum uric acid	0,15	0,48*	1,00	0,18	0,28*
Total serum cholesterol	0,15	0,11	0,18	1,00	0,35*
Serum triacylglycerols	0,39*	0,15	0,28*	0,35*	1,00

*statistically significant corellation over 0,2 at n = 832

Table 9

Estimation of statistically significant differences in serum parameters between the categories

p value	Serum physiological values	Serum glucose	Serum creatinine	Serum uric acid	Serum total cholesterol	Serum triacyl-glycerols
1M:2M	0,182	0,235	0,845	0,002***	0,346	0,862
1M:3M	0,612	0,028*	0,136	0,008***	0,029*	0,603
1W:2W	0,266	0,385	0,226	0,306	0,074	0,768
1W:3W	0,489	0,002***	0,675	0,240	0,371	0,719

Legend: 1, 2, 3 – categories; M, W – men, women.
statistically significant p value at $p < 0,05$ (*); $p < 0,025$ (**); $p < 0,01$ (***) and $p < 0,001$(****)

Table 10

A chi-squared distribution of serum parameters between the categories

χ^2	Serum physiological values	Serum glucose	Serum creatinine	Serum uric acid	Serum total cholesterol	Serum triacyl-glycerols
1M:2M	1,78	1,41	0,04	9,21***	0,89	0,03
1M:3M	0,26	4,80*	2,22	7,02***	4,77*	0,27
1W:2W	1,24	0,75	1,46	1,05	3,20	0,09
1W:3W	0,48	9,78***	0,18	1,38	0,80	0,13

Legend: 1, 2, 3 – categories; M, W – men, women.
Sampling distribution of the test statistic: $p < 0,05$ at $\chi^2 > 3,84$ (*); $p < 0,025$ pre $\chi^2 > 5,02$ (**); $p < 0,01$ at $\chi^2 > 6,63$ (***); $p < 0,001$ at $\chi^2 > 10,8$ (****)

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