
Short communication

Comparative Analysis of Hypertension and Target Heart Damage in Two Ethnic Groups in Macedonia

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Abstract

Introduction. Hypertension (HTA) is one of the most common, non-communicable diseases. HTA is strongly associated with higher cardiovascular diseases incidence, and target organ damage. Left ventricular hypertrophy (LVH) is one of the most frequent target responses to untreated HTA. HTA is number one risk factor for the mortality rate in the world, and significantly increases the risk of myocardial infarction, congestive heart failure and sudden cardiac death. The aim of our study was to compare the prevalence of the hypertensive target heart damage (LVH) in two ethnic groups in Macedonia.

Methods. We performed a cross-sectional study including hypertensive Roma patients (examined group), and equal number of patients with HTA from Macedonian nationality (control group). In both groups we analyzed left ventricular hypertrophy according to ECG signs and recommendations of the American College of Cardiology/American Heart Association. The examined group (EG) was consisted of 431 Roma patients with HTA. All EG subjects from Suto Orizari community were included in the study by the inclusion criteria for access into the study. In all subjects we performed ECG which was the basis to have a representative sample. The controls (CG) comprised an equivalent number of Macedonian patients with HTA. Both groups were matched by sex and age.

Results. ECG findings confirmed significantly higher prevalence of LVH among examined group of patients, compared to control group of subjects; e.g. there was statistically significant association of the cardiac hypertensive target damage (LVH) with nationality.

Conclusions. Uncontrolled and untreated HTA is a possible cause for more intensive target heart damage and higher incidence of LVH in Roma population.

Key words: hypertension, LVH, Roma population

Introduction

Hypertension (HTA) is one of the most common chro-

nic, non-communicable diseases, in the world. The estimation is that more than one billion of people worldwide have HTA, and around 7.1 millions of fatal events are due to untreated HTA. WHO reports that suboptimal systolic blood pressure (>115-120 mm/Hg) is responsible for 62% of the cerebrovascular diseases and for 49% of coronary heart diseases. On the other hand, HTA is one of the most important risk factors for fatal events worldwide [1,2]. HTA is not only the most important cardiovascular risk that decreases the quality of life, but it is also a factor that significantly increases the health expences, too. Recent evidence shows that 33.5% from the US adult population, or 76.4 million people have HTA. Further data report that 80% of them know that they have HTA, and that 71% take antihypertensives, but only 48% have adequate antihypertensive response [3]. Another source says that from the total population in the US over 18, 6.6% don't know they have HTA (>140/90 mm/Hg), and only 64% from the patients who take antihypertensive drugs achieve the preferred blood pressure values [4]. Up to 75% Americans with coronary arterial disease, diabetes, or stroke are hypertensive, but despite they take antihypertensive drugs, only 40% touch optimal blood pressure [5]. The data from the Institute for Public Health in R. Macedonia show that from total the primary health care morbidity in Macedonia, HTA takes very important part because the number of visits due to HTA was 120.942 for male, and 176.991 for female [6]. These indicators show that the "rule of halves" is not suitable any more, and that the patients became more aware of the HTA, and about the importance of the quality of antihypertensive response. Nevertheless, the HTA remains unsatisfactory controlled worldwide.

Left ventricular hypertrophy (LVH) defined as morphologic, adaptive, abnormal increase of the ventricular mass, as a response of the chronic overload of the left ventricle, is detected in 16-19% of the general population. According to other data cardiac hypertrophy is a morphological adaptive increase in myocardial mass in response to chronic work overload and is a common clinical finding affecting 23% of men and 33% of wo-

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men over the age of 59. Pressure or volume overload on the myocardium results in an increase in myocardial wall stress and hypertrophy may be seen as an attempt to normalise wall stress and oxygen demand. Although initially protective, the increased myocardial mass requires an increase in coronary blood flow to keep function [7,8]. HTA and/or chronic myocardial overwork lead to consecutive hypertrophy reaction, in order to normalize the situation with oxygen supply [8]. LVH significantly increases the risk for myocardial infarction, congestive heart failure, and sudden death [8-11]. It is also close related to increased prevalence of arrhythmias, as well as to cardiovascular morbidity and mortality [8,12-14]. In addition, there are many factors that can influence the prevalence of LVH such as: age, sex, values and duration of the HTA, drugs used, comorbidity etc.

The Roma population typically lives in groups and closed communities, which are separated from the majority populations in a number of countries. Results from many articles and reports studying Roma population health and social position notify higher prevalence of infectious and non-communicable diseases, as well as shorter life expectancy that is closely related to the living conditions [15]. The literature review shows that there are only few articles studying the health status in the Roma population, especially target organ damage caused by HTA. We did not find any study on hypertensive target heart damage in the Roma population at all. Thomas, *et al.* suggests that the prevalence of HTA in the US is 73%. Life expectancy for Roma population in the USA is 48-55 years, due to the high prevalence of the sub-diagnosed and sub-treated cardiovascular diseases [16]. Ruprecht, *et al.* concluded that the life surroundings and inadequate lifestyles are main causes for significantly worse health status in Roma population in comparison with majority populations in Europe [17]. Further, higher prevalence of undiagnosed HTA, and other cardiovascular diseases, non-

adequate therapy, complications, and lifestyle are the crucial causes for target heart damage and premature mortality in Roma population [18-21].

The aim of our study was to compare the prevalence of the hypertensive target heart damage in two ethnic groups in R. Macedonia.

Material and methods

We performed a cross-sectional study in PZU Intergin and Health Center Skopje in 18-month-period. The Roma group included 431 randomly selected subjects with HTA from Suto Orizari community. The inclusive criteria were Roma ethnicity and confirmed HTA. The same number of Macedonian subjects with HTA, matched to Roma group by sex, age, type of medications and duration of treatment, was studied as a control.

The HTA diagnosis was confirmed by blood pressure measurement with auscultatory method with a mercury sphygmomanometer (sfigmomanometro a mercurio-Artsana) as follows:

1. Cuff with standard dimensions was used (14x35 cm);
 2. The measurements were taken from either the right or the left arm with the patient in the sitting position. It was performed at least 2 times, with an interval of 2 minutes. The arm with the higher reading was accepted as valid value;
 3. Cuff deflations was done with 2-3 mm/Hg per second;
 4. Measure in the sitting position, after 10 minutes rest.
- We confirmed HTA if the blood pressure value was >139/89 mm/Hg in at least 2 measures per day in at least 4 consecutive days, according to the recommendations in the Cochrane evidence-based medicine guidelines, and/or if patients were treated with antihypertensive therapy no less than 6 months.

All examined subjects underwent ECG with 12 channel ECG machine.



According to the American College of Cardiology/American Heart Association (ACC/AHA) criteria, LVH was considered if the summary of the R (V5/V6)+S (V1/V2) was bigger than 35 mm (Sokolov-Lion index) and/or R wave (V5/V6) was higher than 27 mm.

In order to confirm LVH diagnosed by ECG findings, we performed echocardiography as a gold standard for verification of the existence of LVH. It was done randomly by selection of the every fourth ECG with LVH. From the many comorbidities we took into account anemia (level of hemoglobin), and level of glycemia. The statistical analysis was done by the software package SPSS 18.

Results

The ECG findings of LVH were registered in 156 examinees of the Roma group (36.2%) and in 101 controls (23.4%).

The difference was statistically significant ($P=0.0026$), i.e. the relation between LVH and nationality was significant.

From the group of examinees that performed echocardiography the LVH was not confirmed in 3 subjects from the Roma group, and in 2 controls (Figure 1).

Discussion

Our findings suggest higher prevalence of the LVH among the Roma subjects with HTA in comparison with controls.

The prevalence of LVH increases with the severity of hypertensive disease. Approximately one third to one half of hypertensive patients have LVH. The presence of LVH is a very strong independent risk factor for future cardiac events and all cause mortality [22]. An increase in left ventricle wall stress is the principal mechanical factor in the development of LVH, and blood pressure the most powerful determinant of LV mass. However, some additional hemodynamic factors play important roles in the development and maintenance of LVH [23]. Thus, volume overload also contributes importantly to the development of LVH.

A pattern of LVH evident on the ECG is a precursor of morbidity and mortality from cardiovascular (CV) disease. Echocardiography permits the non-invasive determination of left ventricular mass and the examination of its role as a forerunner of morbidity and mortality [24]. Hypertensive heart disease can also be defined as the response of the heart to the afterload imposed on the left ventricle by the progressively increasing arterial pressure and total peripheral resistance produced by HTA. Although sometimes the response appears to be out of proportion to the level of the arterial pressure, it is mainly the result of the hemodynamic overload. HTA can cause or can be related to various cardiac manifestations, among which the LVH is one of the most important [25].

Ethnic/race background plays a main, but still not completely defined, role in the development of HTA. Ethni-

city/race is incorporated in almost all lists of HTA risk factors, and there are probable some underlying genetic mechanisms that have yet to be clearly recognized. Still, the precise risk contributed by ethnicity is not absolutely agreed upon by major researchers, with some claiming a high stage of risk and some claiming that ethnicity is a factor because it is correlated to other variables that can affect outcome. African-Americans, for example, consistently lead incidence profiles in HTA studies, with about 36% of the population developing HTA at some point. This is compared to about 20% in the Caucasian, Native Americans, and Hispanic populations. African-American populations also tend to develop target organ damage at a higher rate than their Caucasian counterparts, and tend to have poorer outcomes overall. The answer to the question why African-American populations have higher prevalence of HTA the majority of researchers find in a clear genetic rationale for the higher incidence of HTA among them. Some other data suggest that lower place on the socioeconomic steps, poorer health care and less healthy lifestyles lead to HTA at increased rates. At the end, it is clear that some ethnic groups are at increased risk for developing HTA. It is not obvious, however, whether this increased risk is a function of real genetic influences, or whether some social aspects and socioeconomic factors contribute more strongly than genetics [26,27]. The conclusion is that there is a clear connection between HTA and genetics. HTA runs in families, and is more common in some ethnic groups than in others. Both facts point to a genetic cause of some cases of high blood pressure. Identifying the exact genetics of HTA, however, is likely to take time. Many articles, but not all, have confirmed that renin activity is lower than in white people in both hypertensive and normotensive black population [28]. Some other sources suggest different reasons. For example, there is evidence that diastolic heart function is significantly worse in hypertensive subjects of African-Caribbean origin than in white Europeans. This difference in diastolic performance is not due to known confounding variables (genetics or lifestyle differences) [29]. These ethnical/racial differences in health measures are seen clearly in CV risk factors and outcomes for Americans of African descent, or African-Americans, compared with those of European descent, or European-Americans. Compared with European-Americans, African-Americans have higher mortality rates for most CV diseases, including coronary heart disease and stroke [30].

ECG left ventricular hypertrophy contributes more to the risk of CV mortality in African-Americans than it does in whites. Using regression of ECG left ventricular hypertrophy, as a goal of therapy, might be a means to reduce racial differences in CV mortality; however, prospective validation is required [31]. LVH is more prevalent in black than in white subjects with HTA [32]. Roma population is amongst the most depressed social minorities worldwide, suffering profound discrimination

for centuries, often living in extreme poverty, almost always isolated due to deep-seated prejudices and therefore excluded from the regular life that other people take for granted, such as going to school, seeing the medical providers, job applying etc. [33]. The Roma community has all the time been, both excluded and blamed for not wanting to engage with the rest of the society, a paradox, which is shaping the contemporary situation of Roma as it has done throughout their history. This paradox, so often overlooked, has contributed to reinforcing the wheels of Roma history, moving them approximately the vicious circle of discrimination, disadvantage, and exclusion [34]. Lifestyle, genetics, and a lack of routine medical care contribute to a high incidence of chronic conditions such as heart disease, HTA, and diabetes [35]. Medical data on 58 Gypsies in the area of Boston, Massachusetts suggested that HTA was found in 73% [36]. According to Sutherland, *et al.* life expectancy in Roma population is 48-55 yrs, and main reasons are under-diagnosed HTA and diabetes. Ruprecht's results show that similar situation is with Roma ethnicity in Europe.

The results of this study indicate that there is statistically significant difference in the prevalence of the ECG findings suggesting LVH between the Roma group and controls, i.e. there was a significant correlation of the cardiac target damage (LVH) with ethnicity. We could not find studies with identical or analogous content in order to compare and evaluate our findings. Facts that HTA in Roma population become visible earlier, is more severe, and give more target organ damage are reason why LVH is higher in Roma ethnicity. Perhaps uncontrolled and untreated HTA is possible reason for more intensive target heart damage and higher incidence of LVH in Roma population. Ethnicity/race is incorporated in almost all risk factors, and there are probable some underlying genetic mechanisms that have yet to be clearly recognized. Why the Roma population has more HTA and more expressed LVH, perhaps will be the trigger to start a new research, and a topic for some future investigations.

Conclusions

The target heart damage (LVH) is more frequent in the Roma group than in controls. Uncontrolled and under-treated HTA may be a reason for higher LVH prevalence among the Roma subjects with HTA that should be a subject for further investigations.

Conflict of interest statement. None declared.

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