

PREVALENCE OF ASYMPTOMATIC VENTRICULAR PREEXCITATION AMONG GEORGIAN ATHLETES

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Ventricular Pre-excitation (Wolff-Parkinson-White syndrome (WPW)) occurs when antegrade conduction from the Atria to the Ventricles takes place preferentially via a congenital accessory pathway (AP) and bypasses the AV node [4]. Diagnosis of WPW is confirmed by characteristic ECG changes, which include a delta wave, short PR interval, and widened QRS complex. Ventricular pre-excitation may be associated with atrio-ventricular re-entrant tachycardia (AVRT) which is usually benign. AP also serves as substrate for Malignant Ventricular Arrhythmias (MVA) when coexisting with atrial fibrillation (AF) [13] and may be responsible for sudden cardiac death (SCD) in certain environmental conditions which alter the physiology of the AP (electrolytes, temperature, pH). Athletic activity accentuates the risk of pre-excitation related SCD [15]. Exercise-related adrenergic activation accelerates AV nodal conduction in both directions, increasing vulnerability to AVRT and the rate of the tachycardia induced. It may therefore increase the risk of a regular tachycardia disorganizing to AF and precipitating Ventricular Fibrillation (VF). AP presents in 1 in 300 young athletic and non-athletic individuals [12]. They are often asymptomatic and potentially lethal arrhythmias can be the first manifestation of the condition, and they have also been reported in patients with intermittent preexcitation and properties of the AP believed to be benign [5,6,10,11]. In the long-term registry of SCD among young athletes in the USA, WPW was found to be responsible for about 2% of deaths due to cardiovascular reasons [17] but this is likely to be an underestimate due to lack of ECG screening [14]. Diagnosing WPW as a cause of SCD is difficult; autopsy examination of the heart cannot reliably identify the existence of AP due to challenges in making a postmortem diagnosis [1,7,9]. Younger age, shorter refractory period of the AP, and multiple APs have been identified as risk factors for arrhythmias. Furthermore, it has been shown that ablation of the AP in these patients may prevent arrhythmic events. Therefore, it may be lifesaving to identify athletes with preexcitation electrocardiogram (ECG). It is not known whether the prevalence of preexcitation is changing over time and recent data about prevalence of preexcitation in the ECG of the athletic population are scarce.

Therefore, the aim of the study was to analyze the prevalence of asymptomatic ventricular preexcitation pattern (VPP) among young athletes when the screening protocol includes both resting and exercise ECGs, and to determine the role of stress ESG testing in the detection of VPP among asymptomatic athletes.

Material and methods: We conducted a cross-sectional retrospective study of 15.187 young Georgian athletes from age 12 to 25, who underwent cardiac preparticipation screening at the TSMU Clinical Center of Sports Medicine and Rehabilitation from September 2010 to September 2019. Of these 15.187 people, we analyzed the medical records of those athletes who had abnormalities during screening and were referred for further evaluation to an electrophysiologist. Arrhythmia specialist requested for athletes with screening abnormalities was in line with ESC and AHA/ACC guidelines. Initial cardiac screening included a health questionnaire, physical examination, anthropometric measurements, 12-lead resting ECG (CARDIETTE, Italy), an ECG recorded during the PWC170 submaximal cycle test (MONARK 928, Sweden), and transthoracic echocardiography (MEDISON SonoAce Pico, South Korea). The main goal of our study was to identify asymptomatic athletes with VPP on resting and/or exercise ECGs (athletes with manifested WPW were excluded from our study). All ECGs were manually checked by a physician. Pre-excited 12-lead ECGs were analyzed during sinus rhythm. The delta wave and QRS polarity were assessed in all 12 ECG leads. Collected data underwent qualitative (questionnaire and medical history) and further quantitative statistical analyses.

Results and discussion. Among these 15.187 athletes, asymptomatic VPP has been found in 25 (0.16%) male athletes (none of them had structural heart or genetic abnormalities).

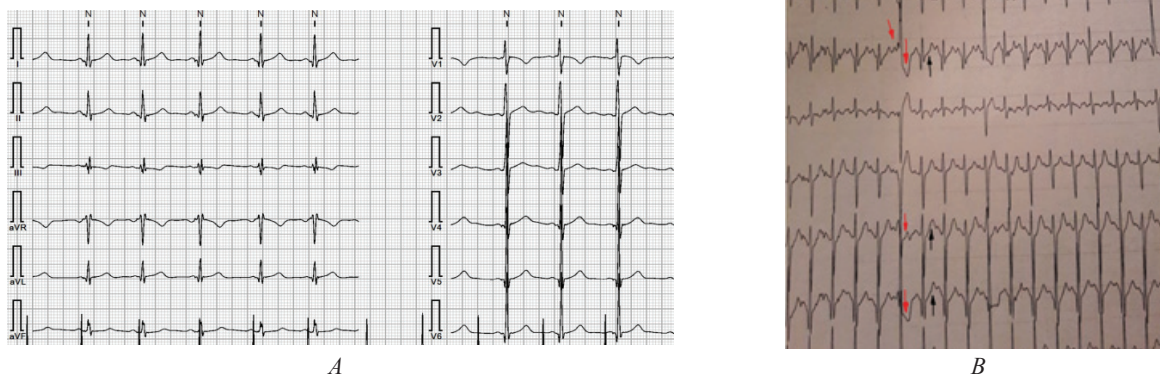


Fig. 1. Panel A represents a resting ECG of a asymptomatic 15 y.o. male soccer and ECG during exercise testing (Panel B), showing an intermittent delta wave (red arrow) with marked horizontal/downsloping ST segment depressions in inferolateral leads (red arrows). Loss of the delta wave is accompanied by complete normalization of the ST segments (black arrows)



Fig. 2. Stress ECG (Panel B) of a 17-year-old male athlete with asymptomatic VPP at baseline (Panel A) shows conversion of persistent VPP to non-persistent (red and black arrows) and then resolution (black arrows) at a Heart Rate (HR) of 138 bpm

Mean age was 16 ± 1.2 years. ECG Mean QRS duration was 124 ± 15 ms. Length of the delta wave was around 40 ms and the mean heart rate was 70 ± 17 beats per minute (bpm). These 25 (0,16%) athletes with asymptomatic VPP (permanent or intermittent) were redistributed according to the clinical criteria into 3 groups: Group 1 included athletes whose ECG signs of VPP were absent at rest (Fig. 1, Panel A), but appeared during exercise (Panel B). Group 2 included athletes whose ECG signs of VPP were at rest but completely disappeared during exercise at low Heart Rate (HR). Group 3 included athletes whose ECG signs of VPP were both at rest and during exercise (Fig. 2). From these 25 asymptomatic athletes 9 (36%) manifested preexcitation during exercise (Group1) (Diagram).

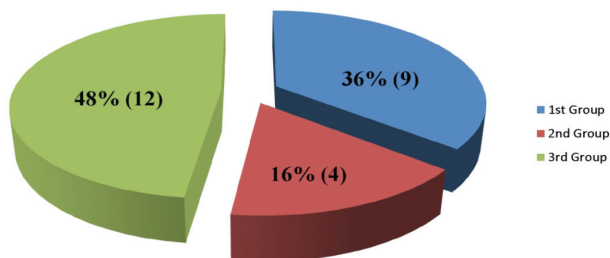


Diagram. Distribution of 25 asymptomatic cases of VPP into 3 groups (abs. and %)

16 (64%) patients had preexcitation during rest: complete normalization of the QRS complex at low HR occurred in 4 (16%) patients (Group 2); exercise produced no change in preexcitation in 7 or partial normalization (Figure 2B) of the QRS complex in 5 (total 12 (48%) - Group 3). All 25 patients at peak exercise demonstrated more than 1 mm flat or down sloping S-T seg-

ment depression. Exercise testing in patients with preexcitation sometimes produces partial or complete normalization of the QRS complex due to enhanced A-V nodal conduction or rate-dependent block of the AP. False positive S-T segment changes always present in patients manifesting preexcitation during exercise testing (Fig. 1 B).

Therefore, we analyzed rest and exercise ECGs of athletes referred to an arrhythmia specialist and identified 25 athletes among them with asymptomatic VP and found the prevalence of ventricular preexcitation in young male athletes to be 1.6 per 1000 (0.16%). Prevalence data vary between different studies and in different time periods during life. Sano et al. studied the occurrence of ventricular preexcitation in Japanese schoolchildren aged 6–16 years and found a prevalence of 0.11%. Sorbo et al. reported a prevalence of 0.15% in a population of 116,542 18-year-old young males in Italy. In the study of De Bacquer et al., the prevalence of the WPW syndrome was 0.11% in men, varying from 0.06% in the study group aged 25–34 years to 0.31% in the group aged 65–74 years [3]. There are several reasons why prevalence data may vary between different studies and in different time periods during life. It is also known that the preexcitation may disappear during lifetime; in the study of Santinelli et al. 27% of patients had spontaneous disappearance of the delta wave during the follow up [16]. One reason is fibrosis in the AP leading to an impaired conduction observed in life. Further, there are variations in the autonomic nervous system during lifetime. On the opposite, fibrosis of the AV-node may increase the degree of preexcitation and therefore partially explain the findings of the study of de Bacquer [3] with a higher prevalence of preexcitation in the oldest study group. Prevalence also can be affected by the screening protocol. In our study, the screening protocol included a stress ECG testing, which improves the diagnostic

accuracy of a VPP (in our study 9 athletes demonstrated the ECG features of VPP only during catecholamine challenge). Thus, exercise ECG testing has a useful role in detecting intermittent preexcitation if intermittent preexcitation is not observed on a resting ECG (Fig. 1).

On the other hand an abrupt loss of preexcitation at relatively low heart rates during an exercise stress test which was observed in 4 athletes is a highly reliable noninvasive marker of non-rapid AP and a low risk for SCD. According to the 2015 AHA/ACC recommendations “in athletes with asymptomatic preexcitation, it is reasonable to attempt risk stratification with stress testing to determine whether the preexcitation abruptly terminates at low heart rates. If low risk is unclear, it is reasonable to recommend invasive electrophysiological evaluation, with ablation of the bypass tract if it is deemed high risk for SCD because of a refractory period ≤ 250 ms” [18]. Importantly, the guidelines establish EPS as the first-line tool for risk stratification in all individuals with pre-excitation, irrespective of symptoms, class I recommendation for competitive athletes and IIa recommendation for all others [2].

Conclusion. Cardiac screening in the young and athletic cohort may uncover pre-excitation. Evidence of an accessory pathway is significant even if the individual is asymptomatic at the time. The condition is potentially lethal if unrecognized but is amenable to a safe and permanent cure once diagnosed. In our study the prevalence of preexcitation in young male athletes was 1.6 (0.16%). This is comparable with previous findings in athletes. Exercise testing can unmask intermittent ventricular preexcitation in asymptomatic athletes and can be effectively used to stratify risk in asymptomatic athletes with VPP.

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SUMMARY

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The aim of the study was to analyze the prevalence of asymptomatic VPP among young athletes when the screening protocol includes both resting and exercise ECG and determine the role of stress ESG testing in the detection of VPP among asymptomatic athletes. We conducted a cross-sectional retrospective study of 15,187 young Georgian athletes from 12 to 25 who underwent cardiac preparticipation screening at the TSMU Clinical Center of Sports Medicine and Rehabilitation from 2010 to 2019. From these 15187 subjects we analyzed rest and exercise ECGs of athletes referred to an electrophysiologist and identified 25 athletes among them with asymptomatic VPP. All ECGs (rest and exercise) with a diagnosis of asymptomatic VPP were included in the present study (athletes with manifested WPW were excluded from our study). Among these 15,187 athletes, VPP has been

found in 25 (0.16%) male athletes (none of them had structural heart or genetic abnormalities). Mean age was 16 ± 1.2 years. From these 25 asymptomatic athletes 9 (36%) manifested pre-excitation during exercise (Group 1). 16 (64%) patients had pre-excitation during rest: complete normalization of the QRS complex occurred in 4 (16%) patients (Group 2); exercise produced no change in preexcitation in 7 or partial normalization of the QRS complex in 5 (total 12 (48%) - Group 3). The prevalence for asymptomatic VPP is 0.16% (1.6 per 1000 young athletes). Cardiac screening in the young athletic cohort may uncover pre-excitation. Evidence of an AP is significant even if the individual is asymptomatic at the time. The condition is potentially lethal if unrecognized but is amenable to a safe and permanent cure once diagnosed. Exercise testing can unmask intermittent ventricular preexcitation in asymptomatic athletes and can be effectively used to stratify risk in asymptomatic athletes with VPP.

Keywords: Wolff-Parkinson-White, pre-excitation, risk stratification, athletic participation, sudden cardiac death, athlete.

РЕЗЮМЕ

РАСПРОСТРАНЕННОСТЬ ФЕНОМЕНА ПРЕДВОЗБУЖДЕНИЯ ЖЕЛУДОЧКОВ У ГРУЗИНСКИХ СПОРТСМЕНОВ

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Целью исследования явился анализ распространенности бессимптомного предвозбуждения желудочков у молодых спортсменов, когда протокол скрининга включает ЭКГ в покое и во время нагрузки, и определение роли стресс-теста в диагностике предвозбуждения желудочков у бессимптомных спортсменов.

В ходе ретроспективного исследования проанализированы результаты обследования 15187 грузинских спортсменов в возрасте от 12 до 25 лет, прошедших кардиологический скрининг в Клиническом центре спортивной медицины и реабилитации Тбилисского государственного медицинского университета с сентября 2010 г. по сентябрь 2019 г. Спортсмены с манифестируемым синдромом Вольфа-Паркинсона-Уайта были исключены из исследования. Феномен предвозбуждения желудочков (ФПЖ) выявлен у 25 (0,16%) спортсменов-мужчин в возрасте $16 \pm 1,2$ года, ни у одного из них структурных сердечных или генетических патологий не выявлено. Из 25 бессимптомных спортсменов у 9 (36%) ФПЖ выявлен только во время стресс-теста (группа 1). Полное исчезновение ФПЖ и нормализация комплекса QRS отмечены у 4 (16%) пациентов (группа 2). У 12 (48%) спортсменов (группа 3) имелись ЭКГ признаки ФПЖ и в покое и во время нагрузки, из них физическая нагрузка не оказывала влияния на наличие ФПЖ у 7 спортсменов и вызывала частичную нормализацию комплекса QRS у 5. Распространенность бессимптомного предвозбуждения желудочков среди юных спортсменов составила 1,6 (0,16%) на 1000 обследованных. Выявление ЭКГ признаков ФПЖ имеет большое значение, даже если в данный момент у спортсмена нет клинических проявлений. Состояние потенциально

смертельно, если не распознано, однако поддается безопасному излечению после постановки диагноза и стратификации риска внезапной сердечной смерти (ВСС). Включение теста с физической нагрузкой позволяет, с одной стороны, выявить бессимптомных спортсменов, у которых ЭКГ признаки интермиттирующего преждевременного возбуждения желудочков проявились только во время стресс ЭКГ теста, с другой стороны, он может быть использован в качестве неинвазивного метода стратификации риска ВСС.

რეზიუმე

ასიმპტომური პარკუჭთა პრეევზიტაციის გავრცელება ქართველ სპორტსმენებში

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თბილისის სახელმწიფო სამედიცინო უნივერსიტეტი, ¹სპორტული მედიცინის და რეაბილიტაციის კლინიკური ცენტრი; ²ფიზიკური მედიცინის დეპარტამენტი; ³შპს „კლინიკა რუსთავი“, რუსთავი, საქართველო

უცვარი კარდიული სიკვდილი (უსკ) შეიძლება იყოს ასიმპტომურად მიმდინარე პარკუჭთა პრეევზიტაციის პირველი კლინიკური გამოვლინება. ახალგაზრდა ასაკი, მამრობითი სქესი, დამატებითი გამტარი გზა, მრავლობითი გამტარი გზის არსებობა და სპორტული აქტივობა ითვლება უსკ-ს რისკ-ფაქტორად. პარკუჭთა ასიმპტომური პრეევზიტაციის მქონე სპორტსმენების დროულმა ეკგ დიაგნოსტიკამ შესაძლოა უსკ-ის პრევენციას შეუწყოს ხელი. უახლესი მონაცემები სპორტსმენთა პოპულაციაში პარკუჭთა ასიმპტომური პრეევზიტაციის გავრცელების შესახებ მწირია. სკრინინგის პროტოკოლს შესაძლოა გააღებინა მკონდეს შემთხვევათა გამოვლენაზე და, შესაბამისად, პრევენციულობაზე.

კვლევის მიზანს წარმოადგენდა ახალგაზრდა სპორტსმენებში პარკუჭთა ასიმპტომური პრეევზიტაციის გავრცელების შეფასება სკრინინგის ისეთი პროტოკოლით, რომელიც მოიცავს როგორც მოსვენების, ასევე, სტრესს ეკგ-ს, და დატვირთვის სტრეს ტესტის როლის განსაზღვრა პარკუჭთა ასიმპტომური პრეევზიტაციის გამოვლენაში.

შესწავლილია 15187 სპორტსმენთა გეგმიური სამედიცინო შემოწმების შედეგები, რომლებიც ჩატარდა თსსუ-ს სპორტული მედიცინის და რეაბილიტაციის კლინიკური ცენტრის ბაზაზე 2010-2019 წწ. გამოკვლეულ სპორტსმენთა ასაკი იყო 12-25 წ. შესწავლილ 15187 სპორტსმენს შორის ასიმპტომური პრეევზიტაცია გამოვლინდა 25 (0,16%) მამაკაც სპორტსმენს, რომელთა ასაკი იყო $16 \pm 1,2$ წელი. არცერთ მათგანს არ აღენიშნებოდა გულ-სისხლძარღვთა სისტემის გენეტიკური დაავადება და/ან სხვა თანმხლები პათოლოგია. კვლევიდან გამოირიცხნენ სპორტსმენები სიმპტომური პრეევზიტაციით (WPW სინდრომი). კლინიკური კრიტერიუმების მიხედვით გამოვლენილი 25 ასიმპტომური ათლეტი 3 ჯგუფად განაწილდა: 1 ჯგუფი - სპორტსმენები, რომლებსაც მოსვენებით მდგომარეობაში აქვთ ნორმალური ეკგ, ხოლო დატვირთვის სტრეს ტესტის დროს გამოვლინა გარდამავალი პრეევზიტაცია - 9 (36%); 2 ჯგუფი - სპორტსმენები მოსვენებით მდგომარეობაში პარკუჭთა პრე-

გეზიტაციით, რომელიც სრულად ქრება სტრეს ეკგ-ს დროს - 4 (16%). 3 ჯგუფი - სპორტსმენები, რომლებსაც მოსვენების ეკგ-ზე აღენიშნათ პარკუჭთა პრეგზიტაცია და სტრეს ტესტის ელექტროკარდიოგრამაზე რჩება მისთვის დამახასიათებელი სურათი - 12 (48%). გამოვლენილი 25 ასიმპტომური პრეგზიტაციის შემთხვევა შეადგენს კვლევაში მონაწილე სპორტსმენთა

0,16%-ს ანუ პრევალენტობა არის 1.6 1000 სპორტსმენზე. კარდიული წინასაშეჯობრო სკრინინგი, რომელიც მოიცავს მოსვენებით და დატვირთვის ეკგ-ს შეიძლება ჩაითვალოს ასიმპტომურად მიმდინარე, მაგრამ უკს-ის რისკის მქონე პარკუჭთა პრეგზიტაციის დიაგნოსტიკისა და უკს-ის რისკის სტრატეგიკაციის არაინვაზიურ საშუალებად.

EVALUATION OF THYROID DISEASE DETECTION AMONG FEMALE POPULATION WITH BREAST PATHOLOGIES IN KVEMO KARTLI REGION (GEORGIA)

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Despite providing continuous research, treatment and preventive activities, breast and thyroid diseases (TD) still remain a major public health challenge. Severe clinical forms, complications, and high mortality rate of these diseases are of great interest to general practitioners and/or researchers [1].

Thyroid dysfunction has a significant impact on human health status, due to its negative effect on thyroid hormones, cardiovascular, neurological, digestive systems, physical development, and/or cellular metabolism. Nodular goiter is considered as the most common thyroid pathology. Ultrasonographic evaluation have revealed the prevalence of thyroid nodules in 19–68% of women as well as among the elderly population. Chronic autoimmune thyroiditis, as the main cause of hypothyroidism in countries with high iodine intake, ranks second most common among thyroid diseases. The incidence rate of this pathology depends on the geographical location and is 30-150 cases per 100,000 populations per year; this pathology is 4-10 times more common in women in comparison with men. It should be emphasized that hypothyreosis is one of the most common thyroid pathologies (only 1-2% of the population) in countries with sufficient iodine intake levels. The incidence rates vary within 0.2-5.3% in Europe and 0.3-3.7% - the US, respectively. Over the recent past decade, the incidence of thyroid cancer (TC) has been increasing globally, especially among the female population [7].

According to the data suggested by the NCDC (National Center for Disease Control and Public Health), thyroid gland cancer is the second most frequent among the cancers of all localization registered in women in Georgia. Actually, alongside the reduction in the number of cancers of all localizations, the new incidence rate for thyroid cancer of all localization registered in women as well as among all age groups increased from 10% to 15% [9,10].

Breast and thyroid cancers are two malignancies with highest incidence rate in women. Frequently these cancers occur metachronously, women with breast cancer are at risk for developing thyroid cancer, suggesting a possible correlation and common etiopathogenesis [2,3,4,5,9]. No study, accurately recording the risk factors for thyroid pathologies in women with breast pathology, has been conducted in any specific region of Georgia and Kvemo Kartli is no exception. A number of aspects related to the regional peculiarities (existence of various ethnic groups, active

involvement of industrial production in the economic development of the country, nutritional characteristics/dietary habits, differences in access to cultural, religious, health services, various endemic diseases, in particular iodine and other micronutrient deficiencies, diseases caused by heavy metal exposure, etc.). In view of the above, making effort to investigate the prevalence of thyroid cancer in women with breast pathology even in certain groups of the population, is very useful and of particular importance

Aim of the study - to investigate the prevalence of thyroid diseases in women, 35-65 of ages diagnosed with breast pathology in the Kvemo Kartli region and to assess the epidemiological situation;

The objectives of the study: to promote the early detection and prevention of thyroid cancer in the Kvemo Kartli region; to reduce the morbidity and mortality rates of breast and thyroid diseases; to evaluate the access and/or barriers to healthcare services to optimize women's health and health care needs.

Material and methods. Cross-sectional (prevalence) research was held in several medical institutions in Rustavi with a high number of patients "Aversi Clinic" in Rustavi, Rustavi Ltd "Family Doctor", Ltd. "Ecomed", Rustavi JSC N1 and Diagnostic Center N2 Diagnostic Center Given that, according to the World Health Organization, the risk of developing breast cancer increases with age and reaches its highest rate between ages of 60-69, the study population was women belonging to the 36-65 age group who have applied to a medical facility from January to June 2021.

Sample Size: The sampling frame is based on the Georgian Census Database. Considering that 85294 women in the indicated age group live in the Kvemo Kartli region and, according to the literature, the prevalence of breast cancer in the female population is 15%, the error in the formula used to determine the 95% reliability ($Z=1.96$) was set at 5% ($\epsilon=0.05$), the prevalence of the main indicators was considered to be 15% ($P=0.15$); Design effect – 1.5, response rate 80%. 194 respondents were defined as the required sample size ($n=Z^2 P(1-P)/\epsilon^2$). Respondents were interviewed by a doctor using a specially designed questionnaire. The study did not share any personal information of respondents. Prior to the survey, the importance of the survey was explained to the respondents and each of them has signed a consent to participate in the survey. Database analysis was car-