

Sudden Death Due to Physical Exercise in the Elderly

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ABSTRACT

Physical exercise has a beneficial effect to the humans. Sudden death in healthy persons engaged in physical exercise is extremely rare since healthy heart is protected from complications. The records of five elderly men who died during or immediately after exercise in the period between 1988–2001 in our region have been given, out of 23 men (and no one woman) aged 14–68 who died due to physical exercise in that time. They have been engaged in tennis, jogging and swimming recreatively. In all of them coronary heart disease has been found by the forensic autopsy. Only one has had arterial hypertension, symptoms of chest pain few years before accident and acute myocardial infarction has been found. The other four have been without symptoms. In three of them myocardial scars have been found of past myocardial infarctions. In all of them the thickness of the left ventricle wall was 15 mm or more (from 15 to 25 mm). It seems that the thickness of the wall of the left ventricle increases cardiovascular risk in persons without symptoms. In Croatia about 7% of the whole population are engaged in recreation. In this population 13% are elderly: 40,950. The reported five deaths due to recreational physical exercise in the elderly reached 1 / 114,660 persons every three years, or 1 / 573,300 persons during fourteen years.

Introduction

The population is becoming older: in 1981 in Croatia 10.8% of the population were 65 or older, and today it reached more than 13%^{1–14}. The age of 65 is usu-

ally taken as the border between the middle age and the elderly. However, it is necessary not to take chronological but biological age, because the process of aging

begins after 30. According to Morse and Smith¹⁵ the older adult population maybe separated into three groups: a) the young old, between 55 and 75 and with maximal capability of 5–7 METs; b) the old, 75 plus end with a maximal capability of 2–3 METs; and c) the athletic old, who, regardless of their chronological age have maintained a high degree of physical fitness and have a maximal capacity of approximately 9–10 METs (a MET, or metabolic unit, is equivalent to 3.5 ml O₂/kg/min, the average oxygen consumption at chair rest).

People who have been engaged in physical exercise have a lower risk of cardiovascular complications than inactive persons: it has been evidenced that physical exercise positively affects the keeping and promotion of health. Physical activity should be controlled, regular and adapted to the health state of the organism. If the principles of physical training are observed, possible complications can be avoided^{16–19}. That is why a medical check up before exercise is essential, as is medical control over persons taking exercise.

In persons with a healthy heart, which is trained and consequently functionally fit, health-related incidents in exercise are very scarce. In this article we are presenting five cases of elderly persons who died during or immediately after physical exercise, in a period of fourteen years.

Patients and Methods

In the period between 1988 and 2001 we noted in our area 23 sudden deaths of men during or immediately after physical exercise. Five of them were aged 65–68 years and were engaged in physical exercise recreatively. Three were engaged in tennis recreatively, one in jogging and one in swimming. One has had chest pain due to coronary heart disease and arterial hypertension and had taken antian-ginal and antihypertensive drugs, and

other four have been without symptoms and without any therapy.

Results

In all five the forensic autopsy was performed. All of them have had coronary atherosclerosis, one have had chest pain temporary and an acute myocardial infarction as a reason of sudden death. Other four have been without symptoms. Three of them have had scars of past myocardial infarctions. All have had the thickness of the left ventricle 15–25 mm. The basic characteristics are given in Table 1.

Discussion

There is no doubt about it that a physical exercise in the elderly promotes health and well being. It has to be controlled, regular and adapted to the condition of the organism, to avoid possible complications. The article deals with the aspects of the interrelationship between physical exercise and potential cardiovascular risks in the elderly. Sudden death in apparently healthy persons in exercise is extremely rare. The data of the five deceased persons during exercise have been reported. In only one a medical record has been found: he has had coronary heart disease with chest pain and ECG changes, and arterial hypertension. The other four persons did not have any cardiovascular symptoms previously and they have been without any medical record in recent years before the accident.

When cardiovascular accidents occur during exercise, the most frequent cause is an organic heart or vascular disease^{15–25}. One should always bear in mind the fact that a great number of persons with coronary disease engage in physical exercise, and only a few have health discomfort. These data are supported by the analysis of the health-related condition of the Croatian population²⁰: the so-called healthy

TABLE 1
CHARACTERISTICS OF MEN DIED SUDDENLY DURING OR AFTER PHYSICAL EXERCISE

Case no.	Age	Symp-toms	Physical finding	Profession/ physical activity	Lethal event	Resuscitation exercise	Forensic autopsy
1	65	angina pectoris	ECG: ST,T changes	sedentary profession / tennis recreatively	July 1988, during a game	yes	CHD, LAD occluded, acute, myocardial infarction front wall, LV 15 mm
2	67	no	normal	physician-surgeon / tennis recreatively	February 1992, during a game	yes	CHD, LAD occluded, myocardial fibrosis, LV 15 mm
3	65	no	no data	sedentary profession / tennis recreatively	June 1998, during a game	no	CHD generalized, past MI posterior wall, LV 25 mm
4	65	no	no data	university professor / jogging	May 2001, during jogging	no	CHD generalized, LV 15 mm
5	68	no	no data	clark / swimming recreatively	August 2001, in a swimming pool	no	CHD generalized critical stenosis of LAD, myocard scar of the anterior wall and septum, LV 16 mm, blood alcohol level 2.19/kg

persons of both genders aged 22 to 41 have 1.7 diagnoses on the average (range 0–7), persons aged 35–54 have 3.6 diagnoses on the average (range 0–9), and those aged 65–84 have 6 diagnoses on the average (range 0–17) with cardiovascular diseases included.

Sudden death occurs everywhere, but reports in a literature dealing with cardiovascular complication due to physical exercise in the elderly are exceptional^{22,23}. The records on the five men who died during recreative exercise show the following: all of them had coronary artery disease with significant stenoses; all of them obviously died due to malignant ventricular arrhythmias on exertion, and one of them of a ventricular arrhythmia due to acute myocardial infarction.

All the five reported deceased had thickened wall of the left ventricle (15–25 mm), which is obviously a risk for cardio-

vascular complications due to exercise. If the thickness of the wall exceeds 15 mm exercise should not be recommended without cardiological examination, echocardiography and stress test. The relative risk of cardiovascular complications seems to be higher in exertion than at rest^{1–18,20–24}. It is estimated that for example in cross-country skiing the risk is 14.5 times higher than during the rest. The analysis of the results shows that the risk in all exercise is 4.5, in non-strenuous exercise it is 3.3, whereas it is three times higher in strenuous exercise: 9, in all population groups^{18–21}. The risk for cardiovascular complications is higher in exertion than at rest.

In Croatia about 7% of the whole population are engaged in recreational physical activity²⁶. In this population 13% are elderly: 40,950 persons. The reported five deaths in the elderly reached 1/114,660 persons in every three years or 5/575,300

persons in fourteen years. The frequency of fatal cardiovascular complications differs in the literature: 1/7,620 joggers in Rhode Island²⁷, and 1/18,000 healthy men²⁸, 12/62,000 men aged 50–69 in jogging, 63/31,000 men aged 50–69 years engaged in cross-country skiing in Finland¹⁹. In the literature there is lack of evidence for those parameters in the elderly: 65 years of age or more.

In conclusion, when cardiovascular incidents occur during exercise in the elderly, the most frequent cause for sudden death is coronary heart disease. All five men reported in this article died suddenly. It reached 1/114,660 of the whole elderly population every three years or 5/573,300 persons in a period of fourteen years. All of those five persons have had

coronary heart disease. One of them only had chest pain and other four were without symptoms. In one only an acute myocardial infarction has been found, and the other four have had critical coronary stenosis and the reason for lethal event was probably malignant ventricular arrhythmia. The left ventricular hypertrophy was found in all five men, indicating increase of risks for cardiovascular events. A medical check up before exercise is essential especially in the elderly, as is medical control over those persons taking exercise. The criteria for the decision that is to undergo medical examination and a pre-exercise load test are specified as persons over 30 years even without any cardiovascular symptoms.

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IZNENADNA SMRT TIJEKOM TJELESNOG VJEŽBANJA U STARIJOJ DOBI

S A Ž E T A K

Izneseni su podaci petorice muškaraca dobi 65–68 godina koji su tijekom ili nakon rekreativne tjelovježbe umrli na našem području u razdoblju od 1988. do 2001. godine, od ukupno 23 osobe dobi 14–68 godina umrlih naglo za vrijeme ili nakon tjelovježbe. U Hrvatskoj 7% stanovništva bavi se rekreacijskom tjelovježbom, a od toga je 13% populacije tzv. starije dobi, tj. 40.950 osoba. Prikazanih 5 muškaraca starije dobi čiji je ishod tijekom ili nakon rekreativne tjelovježbe bio letalan, iznosi 1 letalni ishod na 114.660 osoba starije dobi u trogodišnjem razdoblju, odnosno, 5 letalnih ishoda na 573.300 osoba starije dobi u četrnaestogodišnjem razdoblju. Samo je jedan od prikazanih pet muškaraca prethodno imao stenokardije i uzimao terapiju, a ostala četiri nisu imali tegoba i nisu bili na medicinskim pregledima. U svih pet sudsko medicinskom obdukcijom nađena je koronarna bolest, u jednog s poznatom koronarnom bolesti nađen je akutni infarkt miokarda prednje stjenke i septuma, u ostale četvorice, iako nisu imali kardijalnih tegoba, nađene su stenoze koronarnog krvožilja, kritične na pojedinim mjestima, a u trojice nađeni su ožiljci nakon preboljelih infarkta miokarda. Sva su petorica imali zadebljanu stjenku lijeve klijetke 15–25 mm, što je dodatno povećavalo opasnost nastanka navedenih kardiovaskularnih komplikacija. Kako bi se izbjegle kardiovaskularne komplikacije, napose u osoba biološki starije dobi potreban je internistički-kardiološki pregled prije tjelovježbe, uključujući EKG, ehokardiografiju i pokus opterećenjem, kao što su potrebni i kontrolni pregledi tih osoba.