ORIGINAL ARTICLE

Cardiovascular risk factors prevalent among elderly performing adapted physical activity

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ABSTRACT

The prevalence of cardiovascular disease risk factors (CVRF) increases linearly with age. Debilitating diseases within the ambit of physical medicine and rehabilitation can promote or aggravate pre-existing comorbidities and CVRFs. A high prevalence of CVRFs was noted in the medical histories of elderly patients receiving regular ambulatory follow up while performing adapted physical activity (APA) as therapy in a rehabilitation center. **Objective:** To evaluate the presence of CVRFs in the elderly who are practicing APA, in order to map the risk profile of this specific population. **Method:** Collection and observational analysis of data found in the medical histories of the elderly (> 60 years) practicing APA, and in regular ambulatory follow up, concerning several CVRFs (Systemic Arterial Hypertension - SAH, *Diabetes Mellitus* - DM, Dyslipidemia - DLP, Smoking; Excess weight/Obesity - EW/Ob, Family history - FH). **Results:** one hundred and ten (n = 110) elderly patients were found (average age 72.9 ± 7.1 years). Information in medical history about smoking, EW/Ob and FH, were only found in 11.8%, 52.7%, and 0%, respectively, and were thus excluded from posterior analysis. The prevalence of SAH, DLP and DM were 69.0%, 46.3%, and 27.2%, respectively. Only 18.2% of these elderly presented no CVRF (SAH, DLP, DM), 34.5% one associated factor, 33.6% two factors, 13.7% three factors. Of those evaluated, 28.2% already presented established cardiopathy. **Conclusion:** A high prevalence of SAH, DLP, DM and established cardiopathy among the elderly practicing regular APA in one rehabilitation center was noted, labeling this sample population with high risk profile. Cardiovascular risk factors of crucial importance like smoking, obesity, and a family history of cardiac disease were not appropriately mapped, with little such information found in the evaluated medical histories. Due to the size and specificity of the present study sample, this result could not express the actual national scope of rehabilitation centers, and should be better investigated in future studies. However, the present data are alarming and must be considered with special attention, since no appropriate map of CVRFs was made.

Keywords: Cardiovascular Diseases, Risk Factors, Motor Activity, Aged

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INTRODUCTION

Brazil will have the sixth largest elderly population projected for 2025 and currently shows numbers already alarming regarding the average of diagnoses per patient of diseases that compromise functionality.[1] Data from the monitoring of outpatients in national tertiary services show 3.5, 4.8, and 6.2 diseases in need of diagnosis and treatment[1] in the ambulatory, domiciled, and institutionalized elderly population, respectively.

This progressive increase of comorbidities, combined with the increasing sedentarism, generates greater and greater numbers of elderly individuals with multiple chronic diseases.[1,2]

Among the most prominent diseases there is atherosclerosis,[3] which (acute or chronically) attacks medium and large caliber arteries which leads to the ischemic suffering of the distal organs and to lesions in the coronary, cerebral, and peripheral regions.

Cardiovascular Risk Factors (CVRF) such as Systemic Arterial Hypertension (SAH), Dyslipidemia (DLP), *Diabetes Mellitus* (DM), excess weight and obesity, smoking, and family history are among the classic risk factors of higher importance for the appearance or exacerbation of atherosclerosis.[4,5]

According to recent studies,[4-8] physical activity acts as a protection factor to prevent atherosclerosis, and helps reduce the glycemic levels and blood pressure, in addition to aiding in weight loss, thus reducing excess weight and obesity, and it is an essential component of programs to fight smoking habits.[4-8]

In this way, the prescription, as well as the maintenance of regular physical activities, (whether structured or not and adapted to one's current functional conditions) becomes an important tool in the fight against atherosclerosis and against the increase of possible vascular events.[7,8]

However, in the ambit of physical medicine and rehabilitation,[9] frequently debilitating diseases of different etiologies are found, and they limit the regular performance of these activities.[10,11]

Sometimes, these limitations are of such importance that they reduce not only the physical aptitude and general mobility, but also the capacity to perform daily tasks, drastically increasing the degree of immobility, and favoring the appearance or exacerbation of related comorbidities and risk factors.[9-11]

According to empirical clinical observation, during the outpatient care of patients who had been referred for adapted physical activity (APA) (a physical activities program supervised and adapted to the current functionality, seeking general physical conditioning), either for their advancing age or for the long period of their suffering pathological affliction, these patients frequently present multiple CVRFs, and are subject to greater risks of possible adverse events during this practice.[6,8,11]

OBJECTIVE

The objective of this study was to evaluate the prevalence of cardiovascular risk factors (CVRF) in the elderly referred for the practice of adapted physical activities (APA), in order to map the risk profile of this specific population.

METHOD

The research project for the present study was previously submitted to and approved by the Committee for Ethics in Research of the *Escola Paulista de Medicina - Universidade Federal de São Paulo* (CEP 1220/11; IDnet184268).

Once approved, all the elderly patients (men and women older than 60 years) currently practicing APA were selected through the electronic registration system (SAME) of the rehabilitation center (Lar Escola São Francisco) who were scheduled for clinical-physiatric monitoring in the following outpatient clinics: Acquired Encephalic Lesion (AEL), Cerebral Palsy, Brainstem Lesion, Amputation, Orthopedics (Knee, Hip, Shoulder, Vertebral Column), and Geriatrics.

Once selected, their medical histories were requested in writing from the SAME/*Lar Escola São Francisco*, and the information about the presence of CVRFs (SAH, DM, DLP, Excess weight/Obesity, Smoking, and family history) contained in the notes of the previous ambulatory consultations were considered for analysis.

As inclusion criteria of the CVRFs, the following were considered:

1) SAH: use of anti-hypertensive medication; measuring of arterial pressure higher than 140 x 90 in more than 3 consultations. 2) DM: use of hypoglycemic medication; annotation or copy of exams that show glycaemia higher than 126 mg/dl. 3) DLP: use of hypolipidemic agents; annotation or copy of exams that show dyslipidemia. 4) Excess weight/Obesity: use of anorectic or anti-absorption medications; annotation of the measures of weight, height or BMI (Body Mass Index > 24.9). 5) Smoking: use of anti-smoking medication; annotation of the habit and smoking frequency in the medical history. 6) Family history: annotation about the presence of a family history of cardiovascular diseases, sudden death, or death due to vascular events in young relatives (Women < 65 years old, men < 55 years old).

Given the observational approach of this study, after the collection and tabulation of data, a statistical analysis was made via the Microsoft Excel® advanced data analysis and the Statistica™ 6.0® statistical package (Statsoft Inc, U.S.A.). The data referring to age were shown in averages and standard deviation and the prevalence of CVRFs and cardiovascular disease were shown in percentages.

RESULTS

In accordance with the methodology, collection, and data analysis used and described previously, 110 (n = 110) elderly patients (age average 72.9 ± 7.1 years) were found under regular ambulatory monitoring and practicing APA. As for the gender, 28.2% were males (n = 31) (average age 72.0 ± 6.2 years) and 71.8% (n = 79) were females (average age 73.1 ± 7.5 years), with no statistically significant difference (*Student-t* test) between the genders regarding age.

Fifty-three patients (48.2%) were referred and were placed in the orthopedic pathologies group (minor disabilities), 11 in the AEL group (10.0%), 39 in the geriatrics group (disorders related to aging) (35.5%), and 7 in the amputation group (6.3%). However, for the statistical analyses, the subgroups were considered as only one group.

Only 11.8% of the medical histories (n = 13) contained information on a smoking habit (whether present or absent) as well as the smoking frequency (current or previous in the case of former smokers). Among the 13 elderly smokers documented, 10 presented SAH, 3 DLP, 3 DM, and 6 obesity, concomitantly. Ten smokers presented an associated CVRF and two other patients presented three associated CVRFs. None of the elderly smokers presented any signs of cardiovascular disease.

Only 52.7% (n = 58) of the analyses showed annotations on the presence or absence of obesity, excess weight, or even annotations on height, weight, and BMI. The presence of measurements for the BMI calculation (weight and height) was restricted specifically to a small portion of the patients who

also received care in the Nutrition department of the mentioned center.

Of the 58 obese people found in the sample of the elderly practicing APA, 38 were hypertensive, 12 were diabetic, 26 were dyslipidemic, 10 presented associated CVD, and 6 were reported smokers. In association with CVRFs, 13 were only obese, 21 had at least one associated CVRF, 17 had two factors, and seven presented association with three factors.

As for the presence (or absence) of a family history positive for cardiovascular diseases, there were no annotations of that in the medical histories.

Due to the insufficiency of data in the medical histories and to the possible consequent error in the analysis and interpretation of the prevalence (whether present, absent, or that the information was not annotated) of smoking, excess weight, obesity, and family history in the sample evaluated, these factors were excluded as CVRFs from the later analyses.

Despite not being a specific CVRF, cardiovascular disease (cardiopathy) was found in the medical history annotations of 28.1% of the elderly (n = 31).

Thus, the CVRFs analyzed in this study, present in 100% of the medical history annotations were SAH, DM, DLP, and the association of these factors, as well as the presence of already established cardiovascular disease. The respective prevalences are shown below, in Table 1.

Twenty elderly (18.2%) presented no associated CVRF, 34.5% (n = 38) presented one factor, 33.6% (n = 37) presented two factors, and 13.7% (n = 15) presented three associated factors.

When there were two associated CVRFs, 100% of the sample (n = 37) was hypertensive, 13 patients were diabetic (35.2%), and 24 were dyslipidemic (64.8%). The association SAH/DM and SAH/DLP was prevalent in 37.8% (n = 14) and in 62.2% (n = 23), respectively. In the sample evaluated, there was no presence of the DM and DLP association as a CVRF.

Among the elderly who already presented associated cardiovascular disease, 74.2% were hypertensive, 41.9% were diabetic, 54.8% were dyslipidemic, 54.8% were reported as obese, and 19.4% presented a history of smoking.

Given the age variation (minimum of 60 and maximum of 92, in years), a correlation analysis was subsequently made (*Pearson* correlation) seeking to verify whether the increase in age would increase the prevalence of CVRFs, however, no positive correlation ($R^2 = 0.03$) with statistical significance was found.

Finally, we see that in the present study there was no statistically significant association between gender and any specific CVRF, as well as any association between the CVRFs analyzed.

DISCUSSION

In the clinical ambit, the appropriate stratification of risk is of fundamental importance to identify individuals at high risk of having vascular events, due to the presence of CVRFs, but that present no typical symptomatology.[12]

Among the "Risk Scores" already known, the Framingham (ERF) can predict the risk of infarction and death in 10 years, without even presenting a previous diagnosis of cardiopathy. In this score (ERF) the gender, age, levels of total cholesterol and HDL, pressoric levels, and smoking habit are used to calculate the prediction.[13]

Associated with the above-mentioned factors and components of the ERF, the associated presence of DM is an important aggravator for the early onset of diverse vascular events.[14] According to Calle et al.,[15] the association of obesity is also considered as another important risk factor for the possible early onset of vascular events and for the increased risk of all-cause mortality.

According to the ERF, a family history with early onset of cardiovascular disease or of cardiac events in first degree relatives (parents and grandparents) (men < 55 years, and women < 65 years), can also be an aggravating risk factor for CVD and death.[16]

In this context, the first consideration about the present study is that the medical histories analyzed were incomplete regarding the appropriate mapping of the CVRFs and aggravators, hindering the evaluation and prediction of CVD, vascular events, and potential death for the elderly referred to the physical activities program.

The prevalence of smoking verified in this study was 11.8%, with various medical histories lacking the correct annotations for the absence of the habit, as well as the smoking frequency when the habit was confirmed (current or former smokers). Data on the adult population of São Paulo show smoking prevalence above 30%, values well above those verified in the present study.[17] The appropriate mapping of this CVRF is very important, since it increases the incidence and lethality of the cardiovascular disease.[18]

According to the study by Piegas et al.,[5] smoking less than 5 cigarettes/day increases the relative risk of acute myocardial infarction 2.07 times, and smoking more than 5 cigarettes/day, this risk increases 4.9 times. Thus, with the correct evaluation of this CVRF, referring patients to stop-smoking programs may be more easily recommended by the physician conducting their rehabilitation.

Population studies point out a growing epidemic of excess weight and obesity, with alarming data above 30 and 60%, respectively.[19] The weight and height measurements are the basis for the calculation of BMI (body mass index), used by the World Health Organization (WHO) as a standard in the classification of excess weight and obesity.[20] According to the Nurses Health Study,[21] BMI measurements of 27 to 29 increase the relative risk of death 1.6 times, of 29 to 32 it rises to 2.1 times, and when the BMI is above 32 the risk goes to 2.2 times, when compared to individuals who have a BMI below 19. Thus, since the presence of excess adipose tissue predisposes systemic metabolic alterations that favor the early onset of CVD, the routine medical evaluation of the anthropometric measurements (weigh

Table 1. Prevalences of CVRFs, association and cardiovascular disease

	N	%
SAH	76	69.0
DM	30	27.2
DLP	51	46.3
CVRF associated		
0	20	18.2
1	38	34.5
2	37	33.6
3	15	13.7
CVD associated		
no	79	71.8
yes	31	28.2

CVRF: cardiovascular risk factors; CVD: cardiovascular disease; SAH: systemic arterial hypertension; DM: *diabetes mellitus*; DLP: dyslipidemia

and height, as well as the calculation of BMI) is fundamental.[20] Once the excess weight and obesity are mapped, referrals to nutritional, endocrinological, and psychotherapeutic monitoring must follow in parallel. In this study, only a little more than half of the medical histories analyzed showed data on weight and height, and a significant portion of the patients reported as obese also presented multiple associated CVRFs.

Previous studies on the importance of cardiac diseases in the family history as a factor increasing the risk of developing cardiovascular diseases already indicated increases of more than two times for the risk of current onset, with the presence of cardiac history in first degree relatives.[22]

The FRICAS[23] national multicenter study highlighted the importance of this knowledge after a univariate analysis that associated a family history of coronary disease with a predisposition to myocardial infarction. In the present study, no information on the presence or absence of CVD in the family history was found, which again hinders the appropriate stratification of risk and of possible preventive and therapeutic interventions. In this way, it is suggested that in light of the current knowledge, the mapping of cardiac diseases in the family history before the participation in an exercise program must be a requirement.

The SAH was the CVRF most prevalent in this study and its 69% (Table 1) presence in the elderly sampling is in line with those samples referred to in previous data for the population of São Paulo, of more than 45% in women older than 50 years and of more than 61% in men older than 50 years.[24] Arterial pressure is closely correlated with the risk of coronary disease onset (increase of 3.67 times in women and 4.38 in men),[25] as their values increase, the risk of death also increases.[26]

An important point is the regular verification of arterial pressure control (measured in outpatient clinic or soon before the exercise session), since a portion of those reported as hypertensive do not achieve satisfactory control and, the higher the pressure, the higher the ERF score, translating into a higher risk of future CVD.[5,12] Combined with that, there is a cardiovascular overload to the exercises (Double Product: the systolic arterial pressure times heart rate), which has a component influenced directly by the blood pressure and, thus, patients with levels above the norm should be restricted in performing the exercise session, in view of the increased potential risk of adverse events.[6,10,11]

The verification of the appropriateness of this control of the patients analyzed, through outpatient measurements or before the exercise session, is outside the objective of this study, nevertheless, we consider it an important factor to be investigated in future studies.

The second most prevalent CVRF found among the elderly practicing APA was dyslipidemia (46.3%) (Table 1). According to a study involving the ERF, although total cholesterol levels increase the chance of developing CVD, approximately 80% of the cases of myocardial infarction analyzed presented such levels within normal limits.[27] Thus, the analysis of fractions of cholesterol has become a better factor for the risk analysis,[27] and according to Azevum et al.,[28] the LDL (> 100 mg/dl) and HDL (< 40mg/dl) fractions are strong predictors related to the onset of DAC, with an increase of relative risk of 2.75 and 0.53, respectively.

Diabetes Mellitus has come to vigorously increase its prevalence in the general population and it linearly follows increasing age.[29,30] Studies show increases of more than 70% in individuals over the age of 30.[29,30] In this study, which involved only elderly patients, the prevalence of DM found was 27.2%. In addition to this disease being a burden on the health system, previous studies have shown that diabetic men and women had their risk of developing CVD doubled and tripled, respectively.[27] According with an MRFIT study,[26] diabetic men presented three times the risk of death.

The regular practice of exercises for this population must be monitored appropriately, for when this control and medication guidance is not present, important glycemic alterations may happen during the exercises, increasing the potential risk of adverse events (either hyper or hypoglycemia).[10,11] Furthermore, special attention must be given by the team of professionals who conduct these activities, for it is possible that elderly, diabetics, and especially women - in view of a possible cardiovascular event (acute myocardial infarction) - may not present the typical symptoms or may even present equivalent uncommon ischemic symptoms.[10,11]

In this study, no positive correlation between age increase and the increase in the number of comorbidities (CVRF) was observed. However, the sample was composed exclusively of individuals aged over 60 years, which may have limited the power of this evaluation.

According to the data above, only 18.2% of the elderly who participated in activities at the rehabilitation center presented no associated CVRF (SAH, DM, DLP), although this value may be still overestimated, since obesity was not appropriately mapped in this study. More than 80% of the sample had some disease, considered in this study as a CVRF and, again, this value may be overestimated (given the exclusion of obesity in the analyses) or even aggravated by smoking.

Although the association of CVRF had a high prevalence (33.6% with two, and 13.7% with three associated CVRFs), it was not possible to evaluate the prevalence of metabolic syndrome, since obesity was not appropriately mapped. The presence of the metabolic syndrome alone radically increases the development of CVD and increases the general all-cause mortality.[30]

Despite the search for patients afflicted with CVD being outside the initial objectives of this study, of the elderly already participating in the APA program at the rehabilitation center, an alarming 28.2% were already reported to be cardiac patients.

Although the studied population has a high risk potential for developing CVD and for presenting adverse events during the practice of exercises, the recommendation for physical activity, even in a cardiac population should not be limited.[6,10,11] According to internationally known entities such as the ACSM (American College of Sports Medicine), an appropriate pre-participation evaluation should be made (by specialists or even through the request for complementary exams), since the regular practice of physical activities acts in the fight against and control of almost all the CVRFs presented, and also reduces the development of CVDs in approximately 34%.[8,31-34]

Although the verification of an appropriate pre-participation evaluation in the APA is outside the objectives of this study, this mapping must be made at a later opportunity.

Still in line with the ACSM directives,[8] since we are dealing with an elderly population that presents multiple CVRFs, and with a portion of the group already having CVD in progress, it is prudent to train the team with action plans and procedures for clinical cardiovascular urgencies and emergencies.

CONCLUSION

The high prevalence of SAH, DM, DLP, and cardiopathy already established in the elderly practicing APA regularly in a rehabilitation center was verified. Cardiovascular risk factors of great importance such as smoking, obesity,

and history family of CVD were not appropriately mapped, with such information missing in the medical histories evaluated.

Due to the size and specificity of the sample in the present study, these results may not represent the current reality of the rehabilitation centers nationally, which must be better investigated in future studies. However, the data presented is alarming and must be considered with special attention, since there was inappropriate mapping of all the CVRFs.

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