Correlation Between Physical Fitness and Indicators of Quality of Life of Individuals with Intermittent Claudication

EXERCISE AND SPORTS MEDICINE CLINIC

ORIGINAL ARTICLE

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ABSTRACT

The aim of this study was to investigate the relationship between physical fitness and the indicators of quality of life in individuals with intermittent claudication (IC). Forty-two subjects (65.2 ± 8.3 years) with IC of both genders participated in the study. Exercise treadmill test, to assess claudication distance (CD) and total walking distance (TWD), and one repetition maximum knee extension test were used to evaluate physical fitness. The quality of life indicators were obtained from the Medical Outcome Study Questionnaire Short Form, which is composed of eight domains: physical functioning (PF), physical aspects (PA), pain, general health, vitality (VI), social functioning (SF), emotional aspects (EA) and mental health. For statistical analysis Pearson correlation coefficient was used, with $p < 0.05$. There was a significant correlation between PF and CD and TWD ($r = 0.60$, $p < 0.01$ and $r = 0.49$; $p < 0.01$, respectively), between RP and TWD ($r = 0.46$, $p < 0.01$), between VI and SF and CD ($r = 0.34$, $p = 0.03$ e $r = 0.33$, $p = 0.04$; respectively), and between EA and CD and TWD ($r = 0.43$, $p = 0.01$ and $r = 0.44$, $p = 0.01$; respectively). In conclusion, the results of this study suggest that indicators of quality of life, both related to physical health and emotional health, are correlated with the walking capacity in patients with IC.

Keywords: peripheral arterial disease, exercise, rehabilitation.

INTRODUCTION

Obstructive peripheral arterial disease (OPAD) is generally caused by an atherosclerotic process in the arteries which irrigate the upper and lower limbs[1]. Such obstruction promotes imbalance between oxygen offer and demand in the tissues distal to the arterial obstruction[2]. In Brazil, the prevalence of OPAD is of approximately 10.5% in the population older than 18 years[3].

Likewise the majority of the non-transmissible chronic diseases, OPAD is progressive, so its signs and symptoms aggravate as the disease advances. The first and main OPAD symptom is intermittent claudication (IC). This symptom is characterized by pain, cramps, burning or numbing, which occurs during physical activity practice and that is rapidly alleviated with rest. Since it is a symptom which limits performance of daily life tasks, individuals with OPAD and IC symptoms are less physically active[4,5]. Consequently, these individuals present poorer physical aptitude, evidenced by low tolerance to exertion[4,6,7], muscular atrophy [8,9], strength reduction of lower limbs[10-12] and worsening of indicators of quality of life[13].

Although individuals with IC present decreased physical aptitude and worsening of the indicators of quality of life, which suggest a possible interrelation between these variables, this association is still not clear yet. The understanding on the relation between physical aptitude and quality of life allows comprehending the determinants of quality of life of these individuals, making it possible to support the choice of therapies to be used with these individuals. Thus, the aim of the present study was to verify the relationship between physicla aptitude and the indicators of quality of life of individuals with IC.

METHODS

Sample

42 individuals (29 men and 13 women; 65.2 ± 8.3 years; 72.5 ± 14.0kg; 161.5 ± 7.8cm; 27.8 ± 4.8kgm^2) with OPAD (ankle-arm index = 0.62 ± 0.12) and IC symptoms for over six months voluntarily participated in this study. Inclusion criteria were: presenting stage II of OPAD according to the criteria by Fontaine[16] and being able to walk, for a minimum of two minutes with 3.2km/h velocity. Individuals who had performed revascularization surgery or angioplasty for less than a year and the ones who were able to walk for more than 20 minutes uninterruptedly were excluded from the study.

According to decree 196 from 1996, established by the National Health Board, all individuals were suitably clarified on the aims and procedures of the study and subsequently, these who agreed on participating, signed the Free and Clarified Consent Form. This study was approved by the Ethics in Human Research of the institution in which the work was developed, file 1,370 on December 14, 2005.

Medical Outcome Study Short-Form 36 (SF-36)

The SF-36 data were obtained through an interview, per-

formed by a single evaluator. Each of the SF-36 domains (functional capacity, physical aspects, pain, general health status, vitality, social aspects, emotional aspects and mental health) had their respective scores calculated, which ranged from 0 to 100, where zero corresponds to the worst status and 10 to the best health status.

Exertion test

The exertion test was performed through a maximal ergospirometric test on treadmill (Inbrasport, model ATL). Therefore, scaled protocol, specific to individuals with IC, with steady velocity of 3.2km/h and increment of two degrees of inclination at every two minutes until exhaustion was used[17]. The individual was told to report the moment pain on the lower limb started, that is, the claudication distance (CD). The total gait distance was also recorded (TGD), which corresponded to the maximal distance the individual could walk.

It is worth mentioning that all individuals had previous familiarization with this protocol, since in the first aid office in which they were recruited the treadmill test performance with this specific protocol is taken previously to the medical appointment.

Muscular strength

Muscular strength was measured by the one repetition maximum test (1-RM). The 1-RM test was unilaterally performed in the knee extension exercise, in both limbs. The test sessions started with warm-up performance (10 repetitions), with approximately 50% of load estimated to the first trial in the 1-RM test. The individuals should perform the knee extension movement until reaching a mark which corresponded to 85º of range of motion. A maximum of five 1-RM trials were performed on each limb.

In order to provide suitable familiarization to the test protocol, this protocol was repeated in four sessions, with minimum interval of 72 hours between them. The load corresponding to 1-RM on each limb was added and used in the data analysis as an indicator of maximal strength of the two lower limbs.

Statistical analysis

Prior to the beginning of the analyses the Shapiro Wilk test was performed to determine the data normality. The Pearson correlation coefficient was applied to analyse the relation between the indicators of quality of life and the ankle-arm index, the CD, the TGD and maximal strength.

The significance level adopted for all analyses was of $p < 0.05$. The data are presented in mean and standard deviation.

RESULTS

Mean and standard deviation of the physical aptitude variables and of the indicators of quality of life of the studied sample are presented in table 1.

Table 2 presents the correlation coefficients between the indicators of quality of life with the indicators of severity of disease and the functional capacity of individuals with IC.

Concerning the domains related to physical health, significant correlation was observed between the functional capacity domain with the CD and TGD ($r = 0.60$, $p < 0.01$ and 0.49, $p < 0.01$, respectively) and between the physical aspects domain with the TGD ($r = 0.46$, $p < 0.01$).

Regarding the domains related to emotional health, significant correlation was observed between the vitality and social aspects domains with the CD ($r = 0.34$, $p = 0.03$ and $r = 0.33$, $p = 0.04$, respectively) and between the emotional aspects domain with the CD and TGD ($r = 0.43$, $p = 0.01$ and $r = 0.44$, $p = 0.01$, respectively).

Table 1. Physical aptitude and indicators of quality of life of the sample.

Variables	Mean ± SD
Physical aptitude	
Claudication distance. m	369.7 (222.4)
Total gait distance. m	593.2 (264.5)
Maximal strength. kg	37.2 (15.9)
Quality of life	
Functional capacity	61.2 (20.1)
Physical aspects	50.7 (41.5)
Pain	60.4 (19.4)
General heath status	64.9 (19.9)
Vitality	61.0 (20.4)
Social aspects	75.3 (26.5)
Emotional aspects	69.8 (39.5)
Mental health	67.6 (20.2)

Table 2. Correlation between the indicators of quality of life with the indicators of severity of the disease and the functional capacity of individuals with intermittent claudication.

	Ankle/arm index	Claudication distance	Total gait distance	1-RM knee extension
Physical health				
Functional capacity	- 0.13 p = 0.48	0.60 p < 0.01*	0.49 p < 0.01*	0.27 p = 0.12
Physical aspects	0.08 p = 0.65	0.29 p = 0.08	0.46 p < 0.01*	0.15 p = 0. 37
Pain	0.10 p = 0.57	0.17 p = 0.29	0.23 p = 0.14	0.08 p = 0.63
General health status	0.04 p = 0.82	0.25 p = 0.13	0.21 p = 0.19	0.30 p = 0.08
Emotional health				
Vitality	- 0.10 p = 0.54	0.34 p = 0.03*	0.22 p = 0.17	0.21 p = 0.21
Social aspects	0.08 p = 0.65	0.33 p = 0.04*	0.24 p = 0.15	0.25 p = 0.15
Emotional aspects	- 0.11 p = 0.52	0.43 p = 0.01*	0.44 p = 0.01*	0.28 p = 0.17
Mental health	- 0.07 p = 0.68	0.09 p = 0.59	0.01 p = 0.97	0.21 p = 0.22

* Significant correlation ($p < 0.05$).

There was not significant correlation between the indicators of quality of life with the severity of the disease and with maximal strength.

DISCUSSION

The results of the present study evidenced that, in individuals with IC, the indicators of quality of life, both related to physical health and those related to emotional health, are related to physical aptitude, especially with gait capacity. On the other hand, the severity of the disease and the levels of muscular strength were not related to the indicators of quality of life.

Individuals with IC present worse scores in the indicators of quality of life related to health in comparison to the control individuals without the disease and paired by age[18]. Moreover, among the individuals with IC, the higher the severity of symptoms of the disease, the worse are the scores in the indicators of quality of life[19]. This evidence corroborates the results of the present study, in which significant direct relation was observed between the indicators of quality of life, both those related to physical health and those related to emotional health, with the locomotion capacity of the individuals with IC. These results are similar to the ones observed by Izquierdo-Porrera *et al*.[20] who have also evidenced significant correlation between the TGD and the functional capacity domains (r = 0,43) and physical aspects (r = 0.33) in individuals with IC. These results may be explained by the limiting characteristic of the IC symptoms, which seem to reflect on the individual's perception on his walking capacity.

Individuals with IC present muscular atrophy[9,21] and lower strength levels in the lower limbs compared to individuals without the disease[22], which, according to a previous study, could be associated with the lower functional capacity of these individuals[23]. However, in the present study significant correlation between the maximal strength and the indicators of quality of life has not been observed in individuals who claudicate. Until the present moment no study in the literature assessed the relation between the indicators of quality of life and the levels of muscular strength in individuals with IC. However, in studies with healthy individuals and with other non-transmissible chronic diseases, a relation between the levels of isometric maximal strength in the handgrip exercise and the indicators of quality of life was evidenced[24]. The controversy between the present study and the one mentioned above may be attributed both to the characteristics of the individuals and the strength test protocol used, which were different between studies. Moreover, since the OPAD symptomatology is caused by insufficiency of blood flow to the active musculature, it is possible that the impact of the disease in a test with only one repetition is not as evident as if a localized muscular endurance protocol in which the blood flow to the musculature is a factor which limits performance in the test had been used.

The results of the present study evidenced correlation between locomotion capacity and the indicators of quality of life related to emotional health. The correlation between the CD and the vitality and social aspects domains suggests that individuals with IC earlier IC symptom during gait are those who present lower disposition to perform daily tasks and greater functional capacity to perform social activities. In fact, the functional limitation imposed by the disease causes the individuals to avoid physical activities and do not feel the claudication symptoms. Such situation causes hence decrease of social activities and leads to the disease aggravation and its comorbidities due to physical inactivity.

Moreover, the correlation observed between the emotional aspects domain with CD and TGD suggests that the functional limitation imposed by the disease can also have emotional impact to performance of daily tasks. Although the mechanism involved in this relation has not been investigated, it is possible that the worse emotional health of the more limited individuals is mediated by stress. In fact, in a study which analysed the emotional impact of the IC symptoms, it was observed that individuals with higher functional limitation present higher negative stress perception[25], possibly caused by the reduction of the physical activity levels which on its turn promotes wellness sensation and decrease of the depression, stress and anxiety symptoms[26-28].

In the present study significant correlation has not been observed between the indicators of quality of life and severity of disease. It is worth mentioning that, although the AAI provides an indication on the severity of the disease, especially concerning the hemodynamics of the limb affected by the disease, this index presents weak correlation with functional limitation of the individuals with IC[29]. Thus, the results of the present study, suggest that the functional limitation has stronger impact on the indicators of quality of life compared to the hemodynamics of the limb affected by the disease.

The results of the present study provide important data for the clinical practice. Since the gait capacity (CD and TGD) was directly related to the indicators of quality of life, individuals with better physical aptitude are those who present better indicators of quality of life. Consequently, it is possible that interventions which increase the gait capacity of the individuals with IC could also bring benefits to the quality of life of these individuals. Nevertheless, this hypothesis needs to be corroborated in longitudinal studies.

This study presents some important limitations. First, a control group without the disease which made it possible to identify the specific effect of the disease in the indicators of quality of life was not included. Second, the study only included individuals with OPAD who presented IC symptoms in the gait test and who were able to walk between two and 20 minutes, which limits the extrapolation of results to individuals in other stages of the disease. Finally, the study had a transversal outlining, and the determination of the impact of the alterations in the assessed variables in the quality of life improvement could not be determined.

CONCLUSIONS

The results of this study suggest that the indicators of quality of life, both related to physical health and those related to emotional health, present correlation with the gait capacity of individuals with IC.

All authors have declared there is not any potential conflict of interests concerning this article.

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