Prevalence of risk factors of non-transmissible chronic diseases: the impact of 16 weeks of soccer training at nutritional status and physical aptitude indexes in society soccer practitioners

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ABSTRACT

The study objective is to identify the prevalence of risk factors (RF) to non-transmissible chronic diseases (NTCD) in society soccer practitioners and the impact of 16 weeks of soccer training in the nutritional status (NS) and the physical ability index. **Methods:** Sample: 45 individuals (38.6 ± 7.4 years), divided in two groups: experimental (G1 = 22) and control (G2 = 23). The G1 was submitted to a training program of three sessions by week in alternated days with 90 minutes (min) duration. The G2 participated once a week, in soccer game, with 90 min duration. The research variables contemplated RF for NTCD, anthropometric indicators, biochemical analysis and physical ability index. Data analysis counted on descriptive and inferential statistics by SPSS 13.0. **Results:** The major risk factors prevalence's pointed to: the overweight (65.0%), cancer family history (57.5%) and cardiac disease (55.0%) and hypertriglyceridemia (32.5%). The G1 presented body mass ($p = 0.007$), waist circumference ($p = 0.010$), body mass index ($p = 0.007$) and fat percentage ($p = 0.004$), reduction, fact no observed in G2. In both of the groups, total cholesterol analysis, triglycerides and fasting glucose, didn't demonstrative significant reduction during the observation period ($p > 0.05$). G1 got better indexes of maximum oxygen consumption ($p = 0.011$), muscular resistance ($p = 0.000$) and flexibility ($p = 0.000$), what did not happen in G2. **Conclusion:** The soccer players presented high prevalence of RF to NTCD. In general terms, G1 got satisfactory changes in NS and physical ability index during 16 weeks period, conditions that weren't identified in G2.

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INTRODUCTION

Human behavior has been facing changes with the technological era, especially in the health-related aspects, where a transition in the epidemiological profile with the reduction of the infectious and parasitic diseases can be observed. What we find then, is a prevalence of the non-transmissible chronic diseases (NTCD)[1]. According to the survey on the world health from 2002, among the main risk factors (RF) to the development of non-transmissible pathologies are namely: sedentarism, obesity, hypertension, high cholesterol level, smoking and eating habits[2].

Within this context, the recognition of combative actions to inadequate and health risk behaviors has been the target of massive attention of several specialists. Studies in the health field[3-4] with emphasis on the use of protocols or physical exercises programs have been published in order to optimize the physical ability index.

Considering the several methods and physical exercises programs, team sports, especially soccer, have been standing out not only for its popular feature, but also for the beneficial aspects provided in the physical performance, mainly due to its practice implication of intermittent exercises of variable intensity as well as involving aerobic and anaerobic activities, being considered hence, a complete exercise[5].

The Sports Sciences have also been demonstrating growing interest for soccer, being this team sport the most studied in the world, scientifically speaking[6]. Due to such fact, works have been published[6-7] in order to discuss and clarify issues related to this sport. However, most of the research essentially emphasizes the phenomena related to high performance sport. Therefore, despite its popularity, very little has been produced in the research field on soccer in relation to amateur practitioners who practice soccer as recreation, for leisure and improvement in the physical conditioning.

Recently, a sport which has been widely practiced in companies, clubs and associations is the society soccer (field with reduced dimensions) The practitioners are individuals from several professional areas, who in their majority, usually have an inadequate frequency practice (between one and two times a week) and without professional orientation. Moreover, they have a sedentary profile, age group around 40 years, and usually ingest alcohol after the games. In this perspective, the soccer practice under adequate orientation, with emphasis on scientific parameters of variables organization, such as: intensity, duration and training frequency, even with leisure as main characteristic, will be able to have straight relation with the improvement of health quality of its practitioners.

Thus, according to the premises previously exposed related to the RF in amateur practitioners, and due to the existence of only a

few experimental studies showing evidence on the epidemiological aspects related to such physical activity, the issue that guided this study was to identify the prevalence of RF for non-transmissible chronic diseases and the impact of 16 weeks of soccer training in indices of nutritional status and of the physical ability of society soccer practitioners.

METHODS

The study adopted a descriptive experimental model, with a quantitative focus. The guideline was pre and post-test from randomly chosen groups, determining the degree of change produced by the training[8].

Population and sample

Population: Employees and visitors from the sports field from the Centro Federal de Educação Tecnológica da Paraíba (CEFET – PB), who usually practice field soccer. Sample: 45 subjects with age range between 26 and 57 years (38,6 ± 7,4 years), probabilistically selected from the registration list. The subjects were randomly divided in two groups: Experimental (G1 = 22) and Control (G2 = 23), distributed according to profile in chart 1.

CHART 1
Study profile

	Group	Pre-test	Treatment	Post-test
G1	Experimental	O1	X	O2
G2	Control	O3	–	O4

Where: G1 – Experimental treatment (X); G2 – With no intervention (–).

Investigated variables

The established focus for the observation consisted of epidemiological variables (identification of the prevalence of RF for NTCD), anthropometrical indicators, biochemical analyses and analysis of the physical ability, considering the following indices health-related: oxygen consumption ($\dot{V}O_{2max}$), muscular resistance (MR) and flexibility.

Instruments for data collection

Concerning the data collection related to the RF, a structured questionnaire was used consisting of open questions related to smoking, usual hypertension and family chronic pathologies cases.

Anthropometrical indicators: In order to measure the body mass (BM) and the height (HT), a Camry digital scale was used (capacity of 150 kg and division in 100 g) and Sanny portable stadiometers (200 cm and precision in 0,1 mm) respectively. The Body Mass Index (BMI) was calculated through the division of the BM by HT (in meters) to the square[9]. In order to analyze the abdominal circumference (CIRCAB), a Sanny anthropometrical measuring tape was used (resolution of 150 cm), considering risk factors, values higher than 102 cm. In order to estimate the fat percentage (%G), the skin folds method was used (SF), following the protocol by Jackson and Pollock[10] and using the generalized equation for the male sex. The SF were measured on the right hemibody, using a Sanny adipometer (average pressure of 10/mm^2 and division of 0,1 mm) with the individual in orthostatic position with relaxed muscles. **Biochemical analyses:** They were obtained through standardized blood exams, being analyzed the total cholesterol concentrations, triglycerides and glucose, after the resting period and eight to ten hour-fasting. The reference values followed the patterns adopted by the Brazilian Society of Cardiology[11]. **Physical ability indices:** The cardiorespiratory ability ($\dot{V}O_{2max}$) was estimated through the running test in 12 minutes (COOPER)[12] in order to evaluate the physical ability. The test was conducted on a 400 meters athletics track, using a Fox blow whistle and a BioSystem timer. The MR was evaluated through a maximal abdominal flexions test. The standardization followed the protocol by Pollock and Wilmore[12], using: an exercising mat, a blow whistle and a timer. The dorso-lumbar mobility was measured, through the sitting and reaching test, using a standard wooden seat in order to assess flexibility[13].

Procedure for the study's conduction

First step: Began with a contact, followed by the CEFET direction authorization for the study's conduction in the institutions premises. Afterwards, with the possession of a registration list, the test criteria was explained to the volunteers: to have a 'sedentary' or 'insufficiently active' profile, identified through an instrument named 'International Questionnaire of Physical Activity' – short version[14]; to answer a physical ability questionnaire – PAR-Q[15] without any positive answer. The subjects were informed about the procedures, possible discomfort, risks and benefits of the study, before signing a free and clarified consent form, according to the regulations for Research in Humans and following the criteria of the Health Research Ethics according the Resolution 196 of the National Health Committee from 1996[16]. The second step (pre-test) consisted of anthropometrical measuring, blood tests and physical ability tests. After 16 weeks of observation, the post-test of these indicators were conducted. The evaluations were conducted by the same trained evaluator and collaborators, and using the same validated and calibrated instruments. The laboratory tests were conducted in just one laboratory, suggested by the researchers, properly equipped, credentialed and sited in the João Pessoa city.

Experimental protocol

Submitted the G1 group to the participation of a soccer training program (STP), with frequency of three weekly sessions in alternated days, with 90 minutes duration, under the supervision of a professional specialist in Soccer Sciences. The G2 group participated in a soccer game once a week, with a duration of about 90 minutes, with no Professional orientation, in the premises of the same institution. The participation frequency was adopted as exclusion criterion and those who presented three consecutive absences for any reason, were eliminated from the study. During the experimental period, five subjects gave up; two from the G1 and three from the G2 (G1 = 20 and G2 = 20). The research occurred between August and December, 2004, with frequency of 89,2%. The PTF was always conducted at night, in a field with society soccer dimensions (80X64 meters). The training sessions considered the current physical ability indices of the volunteers and the soccer physiological characteristics. They consisted of four phases: 1) Warm-up; 2) Aerobic exercises (runs, trottings, calisthenic exercises, with the aim to improve the cardiovascular system ability to carry oxygen to the muscles used during the game) and anaerobic (jumps, movings, localized exercises with the body weight, kicks and fast runs of 10 to 50 meters); 3) Recreational game; 4) Relaxing and return to normal rhythm. Flexibility was trained through active and passive stretching, performed individually and in pairs, in the warm-up and return to normal phases. The exercises duration varied from 10 to 30 seconds, two to three repetitions of each movement being performed The study protocol was approved by the Ethics Committee of the Centro de Ciências da Saúde (CCS) from the Federal University of Paraíba (UFPB).

Data analysis

Consisted of descriptive analysis (average and standard deviation) and inferential, the Odds Ratio being used (OR) for ratio of chances between RF and the groups (G1/G2), with reliability interval (RI) of 95%. The t Student probability test was applied for the paired data, through the SPSS software version 13.0. A value of p

< 0,05 was hence established for the degree of rejection of the nullity hypothesis.

RESULTS

Table 1 summarizes the RF identified in the soccer practitioners and describes the results of the simple logistic regression between RF and the groups (G1/G2). The greater prevalence points to overweight (65,0%), cancer family history (57,5%) cardiopathies (55,0%) and hypertriglyceridemia (32,5%); In the observation of the chances ratio (OR) no significant differences were observed (p < 0,05) between the groups in the exposure to the RF. In table 2 the averages and the standard deviation and pre and post-test of the anthropometrical indicators are described. The comparison of the averages and standard deviation of the biochemical analyses can be observed in table 3. The averages and standard deviation of the physical ability indices are presented in table 4.

DISCUSSION

The current research identified the prevalence of RF for NTCD in amateur soccer players. The expression RF refers to a concept that has become increasingly important in the epidemiology investigation field. Such diseases are usually characterized by a multifactor etiology and by the incipient knowledge state on the etiological and physiopathological mechanisms that lead to the occurrence and development of such diseases, damaging the production of a systematic and coherent intervention in public health[17]. There is a consensus that several chronic pathologies may be prevented and controlled with the monitoring of some risk conditions, since they facilitate the identification of previous signs that when modified, may diminish or even revert the evolution process of dysfunctions[18]. The investigated groups presented homogeneous characteristics before the intervention, once no significant difference was observed between G1 and G2 (p > 0,05) in relation to the RF for NTCD in this phase. However, both groups presented high prevalence of RF, with higher values for overweight, cancer family history, cardiopathies and hypertriglyceridemia. Such information is a serious concern, since besides being mentioned in other publications, they are associated to several non-transmissible pathologies[1-2,19]. Mena *et al.*[20] in a study with the aim to experience the cardiovascular RF in diabetic patients, identified previous cases of hypertension, high triglycerides, smoking, overweight and obesity. In another work, Ducan *et al.*[21] found the following risk conditions: general sedentarism (47%), smoking (40,0%), obesity (18%), hypertension (14%) and excessive alcohol ingestion (7%). The findings of this study corroborate with the presence of some risk factors and components found by these authors. The training impact

TABLE 1
Distribution of the risk factors for NTCD

RF	%Total	G1		G2		OR	RI 95%	p
		n	%	n	%			
Overweight	65,0	12	60,0	14	70,0	0,64	0,17-2,38	0,507
Obesity	12,5	2	10,0	3	15,0	0,63	0,09-4,24	0,633
CIRCAB > 102,0 cm	12,5	2	10,0	3	15,0	0,63	0,09-4,24	0,633
Smoking	12,5	2	10,0	3	15,0	0,63	0,09-4,24	0,633
PAS (Usual) > 140 mm/Hg	22,5	7	35,0	2	10,0	4,84	0,86-27,2	0,058
PAD (Usual) > 90 mm/Hg	7,5	2	10,0	1	5,0	2,11	0,17-25,3	0,548
Total cholesterol > 240 mg/dl	10,0	1	5,0	3	15,0	0,19	0,01-2,14	0,151
Fasting glucose > 110 mg/dl	7,5	2	10,0	1	5,0	2,11	0,14-21,3	0,665
Triglycerides > 150 mg/dl	32,5	4	20,0	9	45,0	0,30	0,06-1,88	0,217
Obesity family history	30,0	5	25,0	7	35,0	0,61	0,15-2,42	0,490
Cardiopathies family history	55,0	10	50,0	12	60,0	0,52	0,19-2,33	0,667
Diabetes family history	17,5	3	15,0	4	20,0	0,70	0,13-3,65	0,677
Cancer family history	57,5	12	60,0	11	55,0	1,22	0,35-4,30	0,749

* p < 0,05 (Significant)

TABLE 2
Anthropometrical indicators – Comparison of the averages and standard deviation (SD) of the pre and post-test in both groups

Anthropometrical variables	Average ± SD		
G1	**Pre-test**	**Post-test**	**p**
BM (kg)	77,1 ± 8,3	76,2 ± 7,9	0,007*
CIRCAB	92,0 ± 7,6	91,3 ± 7,2	0,010*
BMI (kg/m²)	26,3 ± 3,1	25,9 ± 2,9	0,007*
%G	17,5 ± 5,0	16,4 ± 4,9	0,004*
Absolute fat (kg)	13,7 ± 4,7	12,8 ± 4,5	0,005*
Lean mass (kg)	63,4 ± 5,4	63,5 ± 5,4	0,545
G2	**Pre-test**	**Post-test**	**p**
BM (kg)	77,2 ± 14,8	78,2 ± 15,0	0,069
CIRCAB	92,6 ± 10,2	92,9 ± 10,0	0,327
BMI (kg/m²)	26,5 ± 3,1	26,8 ± 3,2	0,064
%G	18,8 ± 4,3	19,7 ± 4,3	0,070
Absolute fat (kg)	14,9 ± 5,4	15,8 ± 5,5	0,067
Lean mass (kg)	62,3 ± 10,2	62,4 ± 10,1	0,353

* p < 0,05 (Significant)

TABLE 3
Biochemical analyses – Comparison of the averages and SD of the pre and post-test between the two groups

Biochemical variables	Average ± SD		
G1	**Pre-test**	**Post-test**	**p**
Total cholesterol (mg/dl)	181,5 ± 31,4	180,0 ± 24,1	0,460
Triglycerides (mg/dl)	138,9 ± 79,3	121,5 ± 50,7	0,504
Basal glucose (mg/dl)	93,4 ± 8,8	88,2 ± 9,5	0,156
G2	**Pre-test**	**Post-test**	**p**
Total cholesterol (mg/dl)	195,0 ± 37,2	198,3 ± 41,6	0,502
Triglycerides (mg/dl)	143,6 ± 70,6	157,8 ± 107,1	0,526
Basal glucose (mg/dl)	85,0 ± 7,2	89,1 ± 10,3	0,145

* p < 0,05 (Significant)

TABLE 4
Physical ability indices – Comparison of the averages and SD of the pre and post-test between the two groups

Physical ability	G1			G2		
	Average ± SD			Average ± SD		
	Pre-training	Post-training	p	Pre-training	Post-training	p
$\dot{V}O_{2\ max.}$ (ml/kg.$^{-1}$)	41,18 ± 7,6	43,28 ± 7,3	0,011*	37,05 ± 4,3	37,66 ± 4,9	0,261
Completed distance in 12 minutes (m)	2.357 ± 344,9	2.451 ± 331,6	0,043*	2.171 ± 195,1	2.199 ± 222,7	0,263
RML (rep.)	34,3 ± 9,6	38,2 ± 8,9	0,000*	32,6 ± 8,6	32,9 ± 9,8	0,622
Flexibility (cm)	30,1 ± 7,8	33,0 ± 8,5	0,000*	24,6 ± 7,5	24,9 ± 8,0	0,500

* p < 0,05 (Significant)

in the body composition was satisfactory in the decrease of the body mass, having possibly influenced in the better distribution of the body fat (CIRCAB) and decrease of the BMI. The %G presented positive influence after the treatment period as well. It is widely reported in the literature that physical exercise helps in the burn of adipose mass[22], probably due to its derived positive energetic balance to the decrease of fatty mass[23-24]. Gain of lean mass (LM) was not observed. It is possibly caused by the fact that physical activities predominantly aerobic, sacrifice amino acids present in the muscular fibers, favoring the decrease of the fatty mass, compromising though, the increase of the muscular mass[25]. In other studies it is also reported[26-27] that the predominantly aerobic training does not alter the density and the composition of the fat-free mass. Increase in the anthropometrical indicators which did not participate in the treatment was observed. Such situation may be attributed to the minimum involvement of this group with the physical exercises practice (once a week). Other studies with experimental model also demonstrate that the physical exercises practice reflects positive effects, especially in the morphological dimensions of the body composition[28-29]. In the biochemical analyses no changes between the initial period and the post-test were observed. However, the tendency found showed distinct situation between the groups. The G1 showed remarkable decrease in the values before and after the experiment while the G2 presented an increase in the total cholesterol, triglycerides and glucose values. King *et al.*[30] in a similar research, proposed walks and runs during 24 months, not observing substantial alterations on the lipidic profile, though. Other studies showed similar results[31], which can be explained due to the lipidic and glycemic control dependence not only to the physical effort practice, but also to the nature of the endocrine system, the individual's nutritional status, the eating habits, besides the family, professional and social environments, among others[32]. The physical ability presented increase of the $\dot{V}O_{2max.}$, muscular resistance and flexibility, conditions observed in the G1 soccer players. Such performance was not found in G2, though. In this study, the physical abilities related to health were chosen, considering that the majority of the amateur soccer players predominantly seek the improvement of the physical ability. There is evidence[31,33] that the training programs with exercises conducted at least three times per week for periods longer than six weeks, presented satisfactory responses in the physical performance, especially in the aerobic ability[32]. In the case of the suggested protocol to G1, a training program was used with the purpose to reach an improvement in the nutritional status and in the physical ability related to health, considering the routine sedentary status in which the selected individuals were in. The G2 individuals, who participated in soccer games only once a week (recreational playing), continued with the sedentary or insufficiently active characteristic during the observation period, and did not present any improvement in the same indicators. Despite the methodological limitations, such as the disregard of important influencing variables (food ingestion and the practice of other sports activities outside the study environment), the findings of this experiment together with information from other literatures, corroborate with the hypothesis that the physical preparation in soccer may contribute to the success in the athletes' performance and in the improvement in the physical ability in amateurs[34], especially due to the physiological demand which happens in the body indices, as well as a great repertoire of physical exercises for the human movements.

CONCLUSION

The soccer players presented high prevalence of RF to NTCD. The soccer training program impact was effective in the decrease of the anthropometrical indicators of G1, which did not happen in the G2. Concerning the nutritional status, the biochemical analyses did not present improvement during the 16 weeks period. However, the G1 showed tendency to decrease in these lipidic indices, which did not occur in G2. In the observation of the physical ability, G1 presented optimization in the health condition in all physical abilities analyzed. G2 did not succeed in these indices during the same period.

Thereby, considering that no direct intervention in the eating habits was experienced in G1, the results showed satisfactory changes in the investigated variables. Finally, further research should be developed with a larger number of individuals to better characterize the physical training effects in the nutritional conditions and physical ability. It is also suggested that a new work should be developed in the experimental protocol with a mixed experimental group where participation in the physical training and food intervention would play a role.

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