STUDIA UBB EDUCATIO ARTIS GYMN., LXII, 2, 2017, pp. 41 - 47
(RECOMMENDED CITATION)
DOI:10.24193/subbeag.62(2).13

EFFECTS OF RECREATIONAL TENNIS PRACTICE ON INFORMATION TECHNOLOGY INDUSTRY EMPLOYEES' FITNESS – A PILOT STUDY

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ABSTRACT. Introduction. This pilot research studies the effects of practicing organized recreational tennis on the fitness values emphasized by the Eurofit for Adults test battery**. Objectives.** Our goal was studying the evolution of the physical fitness of Information Technology (IT) workers in Cluj-Napoca, Romania, before and after implementing a recreational tennis program by administering the Eurofit test battery. A secondary objective was testing the measurement instruments we used. **Method.** Firstly, questionnaires were applied in order to find a number of IT workers willing to involve themselves in the pilot study. Further, 24 subjects (n=24) were measured, using the Eurofit for Adults test battery, repeating the measurements after a six week period in which 20 of the subjects participied in organised tennis lessons, while the rest of 4 carried on their daily activities without being involved in extra physical workout programs. Results were then statistically analysed using SPSS software. **Results.** A total number of 55 IT workers (n=55) of which 26 men and 29 women answered the initial questionnaire saying that they exercise once each two days (M_{men} = 3.58 days a week and M_{women}= 3.72 days a week). Regarding their tennis skill level, most of them declared themselves as novices (M=2.14 out of 10). Regarding the Eurofit test battery results, some improvements were visible in the experimental group after calculating the difference between the initial and final test results means although not all tests showed this. **Conclusions.** These results can stand as a starting point for a more complex research on a larger group of subjects and for a longer time period. Regarding the instruments used, we realised we need to improve their quality, mainly in the case of the hand dynamometers and callipers. Due to some weather condition differences between the measurements days, we plan on replacing the outdoor measurements with the alternative tests offered by the Eurofit manual.

Keywords: *fitness, health, IT, employees, tennis.*

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REZUMAT. Efectele practicării tenisului de câmp recreaţional asupra indicilor formei fizice (fitness) a angajaţilor din industria tehnologiei informaţiei- un studiu pilot. Introducere. Acest studiu pilot cercetează efectele practicării în mod organizat a tenisului de câmp recreaţional asupra indicilor fitness-ului propuşi de bateria de teste Eurofit pentru Adulţi. **Obiective.** Ţelul nostru a fost să studiem evoluţia fitness-ului fizic al angajaţilor din domeniul industriei tehnologiei informaţiei din Cluj-Napoca, România, aplicând bateria de teste Eurofit pentru Adulţi înaintea şi după implementarea unui program de practicare a tenisului de câmp recreaţional. Un obiectiv secundar a fost verificarea instrumentelor de testare folosite. **Metode.** În primă fază au fost aplicate chestionare cu scopul de a găsi un număr de angajaţi din domeniul IT care să dorească să se implice în studiul pilot. În continuare, 24 de subiecţi (n=24) au fost măsuraţi folosind bateria de teste Eurofit pentru Adulţi, repetând măsurătorile după o perioadă de şase săptămâni în timpul cărora 20 dintre subiecţi au participat la lecţii de tenis organizate, în timp ce restul de 4 şi-au continuat rutina zilnică fără să se implice în activităţi fizice suplimentare. Rezultatele au fost apoi analizate din punct de vedere statistic folosind software-ul SPSS. **Rezultate.** Un număr total de 55 de angajaţi din domeniul IT (n=55) din care 26 bărbaţi şi 29 femei a răspuns la un chestionar iniţial, spunând că ei practică exerciţiu fizic o data la două zile ($M_{bărbaţi}$ = 3.58 zile pe săptămână şi M_{femei} = 3.72 zile pe săptămână). În privinţa nivelului de măiestrie în tenisul de câmp, majoritatea s-a declarat ca fiind novice (M=2.14 din 10). În ceea ce înseamnă rezultatele bateriei de teste Eurofit, unele îmbunătăţiri au fost observate în cazul grupului experimental după calcularea diferenţei dintre mediile obţinute la testarea iniţială şi la cea finală. Deşi nu în cazul tuturor probelor. **Concluzii.** Aceste rezultate pot constitui un punct de plecare pentru alte cercetări mai complexe, efectuate pe grupuri mai mari de subiecţi şi pe o durată mai lungă de timp. În ceea ce priveşte instrumentele folosite, am constatat că e nevoie de îmbunătăţirea calităţii acestora, mai ales în cazul dinamometrelor manuale şi a caliperelor. Din cauza unor condiţii meteorologice diferite între zilele de testare, plănuim să înlocuim măsurătorile efectuate în exterior cu cele alternative oferite de manualul Eurofit.

Cuvinte-cheie: *fitness, sănătate, IT, angajaţi, tenis de câmp*

Introduction

This research aims to study the effects of practicing organized recreational tennis on the Eurofit test battery fitness indexes of Information Technology (IT) Industry workers in Cluj-Napoca, Romania, as other authors show that productivity, quality of life (Baciu, 2006; Bocu, Lupu, Tache, & Laza, 2001) and a better health (Pescatello & DiPietro, 1993) are linked to a good physical fitness. Our actions try to identify if a partnership between IT companies and physical education

and sports specialists could lead to an improvement of physical and health related fitness and thus also increasing work productivity. Probably, a demonstration of the viability of such a training program could convince companies in Romania and why not, in other countries, to implement similar actions, having health improvement and the increase of physical education and sports specialists jobs as an outcome.

Sustaining the above said, Meerding, Jzelenberg, Koopmanschap, Severens, & Burdorf (2005) enphasizes the correlation between health problems and loss of productivity among employees. (Dutheil, et al., 2013) shows that sports training helped the loss of visceral fat tissue, improved the thickness of the carotid-intima-media thickness and the Framingham score, all being markers for heart illness risks.

Objectives

This pilot study was a starting point in mapping the terrain of research in corporate sports activities in Cluj-Napoca and our main objectives were: implementing the ITennis project, an organised tennis training program, targeting IT workers in Cluj-Napoca and observing the influence of the participation in this project on the Eurofit for adults test batteryFurthermore we wanted to analyze the methodology and means of research in order to improve the procedures we will use in our future studies. Presenting the results to the scientific community as well as to the boards of the participying companies Is another of our objectives.

Materials and Methods

In order to select the participants in the study we disseminated Google Docs Forms through the internal newsletter of IT companies in Cluj-Napoca, with their acceptance. We then used the information filled in the questionnaire by 55 IT employees to find out their age, gender, level of physical activity, level of skill in tennis, weekly timetable availability and contact information.

Based on the answers, and mainly on the availability of the subjects, we selected a 24 of them to also participate in the second phase of the project. We then applied the Eurofit test battery twice for each participant at a 6 week interval, during which 20 of the subjects were involved in a recreational tennis practice program consisting in two one hour tennis lessons a week, in groups of four players, assisted by a coach, while the rest of 4 continued their daily activities without being involved in extra physical workout programs. During the measurement, all participants were evaluated in the same order of the test, at the approximately same time of the day, in an airy room and on the outdoor running track (the 2 km walking test). In order to evaluate the subject using the

test battery we needed to use the following instruments, as recommended by the Eurofit manual: weighing, a height measuring device, tape measure, calliper, goniometer, ruler, hand dynamometer, timer and other miscellaneous pieces of equipment (gym bench, duct tape, rubber plates etc.). For the statistical analysis of the data, we used the SPSS software.

Results

The initial questionnaires had a number of 55 respondents (n=55) of which 26 male and 29 female, all of them being employed in the IT industry in Cluj-Napoca, Romania. The average age of the respondents was 28.85 (M_{men}=29.69 years, M_{women}=28.1).

Regarding daily physical activity and tennis skill, the respondents stated that they exercise once each two days (M_{men} = 3.58 days a week and M_{women}= 3.72 days a week) and that their tennis skill level is low (M=2.14 out of 10). The Eurofit test battery results show some improvements were visible in the experimental group (EG) (n=20) after calculating the difference between the initial and final test results averages in tests like the vertical jump (M=1.85 cm), Body Mass Index (BMI) (0.06 kg/m^2), waist-to-hip ratio (0.07), sit-and-reach test (4.25 cm), single-leg balance (0.6 tries), plate-tapping (1.37 sec), hand grip test (7,97 kg).

At the same time, in the control group (CG) (n=4), progress was smaller: sit-and-reach (0.625 cm), plate tapping (0.46 sec) or inexistent as in the case of the single leg balance test. Regresses being noted in tests like the vertical jump (-1 cm), BMI (-0.15 kg/m^2), waist-to-hip ratio (-0.0125) and hand grip test (-4,175 kg). It is curious though that both groups had an increase of body fat estimate percentage average, and that both groups had an increase of the Fitness Index and $VO_{2\ max}$ average.

Table 1. Average difference between performances of EG and CG

Test	Group	N	M	SD	Std. Error Mean
Vertical jump	Experim.	20	1,8500	4,91266	1,09850
	Control	4	-1,0000	1,82574	,91287
BMY	Experim	20	,0630	,43765	,09786
	Control	4	-,1500	,12910	,06455
Body fat estimate	Experim	20	-2,45	2,743	,613
	Control	4	-2,75	1,708	,854
Waist-to-hip ratio	Experim	20	,0070	,01809	,00405
	Control	4	-,0125	,00957	,00479

Test	Group	N	M	SD	Std. Error Mean
Sit and reach	Experim	20	4,2500	3,29872	,73762
	Control	4	,6250	,47871	,23936
Single leg balance	Experim	20	,6000	1,23117	,27530
	Control	4	,0000	,81650	,40825
Plate tapping	Experim	20	1,3720	1,07989	,24147
	Control	4	,4600	,22993	,11496
Hand grip	Experim	20	7,9750	10,20165	2,28116
	Control	4	-4,1750	3,69538	1,84769
Fitness index	Experim	12	4,4225	13,07736	3,77511
	Control	2	6,2716	4,56119	3,22525
VO_2max	Experim	12	1,5000	4,63694	1,33857
	Control	2	2,2800	1,51321	1,07000

Discussion

Over the years, several physical fitness evaluation test batteries have been developed. The first to create tests administered to large populations were the North Americans at the middle of the 20th century, followed by the Europeans with the Eurofit test battery in the 1970's. Since then many other means of evaluating physical fitness appeared, however Eurofit became the most used test battery in Europe at the beginning of the 3rd millennium (Jurimae & Volbekiene, 1998).

The test-retest reliability of the eurofit test battery has been studied by Tsigilis, Douda, & Tokmakidis (2002) on a total of 98 undergraduate students in Greece. In the above-mentioned study, all Eurofit motor fitness tests and anthropometric measurements were obtained twice with one week between the two measurements. Intraclass correlation coefficient indicated satisfactory coefficients above .70 for most tests. The only exception was the plate-tapping test, which yielded a low value (R=.57). These findings indicated that the Eurofit test battery yielded reliable data for undergraduate students.

As expected, regular physical activity improves fitness indexes, but apparently the quantity, quality and type of movement involved, influences the indexes more or less. Studies (Erikoglu, Guzel, Pense, & Erikoglu Orer, 2015) using the Eurofit test battery for measuring physical fitness have shown statistically significant differences between active soccer players and sedentary counterparts in flamingo balance, throwing health ball, 20 meter shuttle run performance and predicted VO2 values ($p<.05$) although no significant difference in sit and reach, vertical jump, sit-up for 30s, and touching the discs performances was found.

Conclusions

A look at the recorded results shows a slight improvement of the average performances of the EG participants is visible, in contrast to the CG which only has a few small positive modifications, although the relatively small number of subjects may not accurately represent the physical fitness of all IT workers in Cluj-Napoca.

When referring to the measurement instruments and means we used, we concluded that the hand dynamometers and callipers seemed not to be of the best quality. A solution in this case would be the acquisition of a hydraulic hand dynamometer and a higher quality calliper in order to have results that are more objective in the future measurements. Also, because of the weather differences between measurement days, like exterior temperature and precipitations, we noticed that the 2 km walking test has some limitations and disruptive factors, so in the future we might choose the alternative aerobic endurance test (20 m Shuttle Run Test) offered by the Eurofit manual, as it can easier take place indoors.

This study could be the starting point for larger, longer and better-planned future work. Overall, the ITennis project is a first step towards developing the knowledge of the relatively newly formed research terrain in Romania: the intersection between private corporate institutions like IT companies and Physical Education and Sports Science.

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