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Evaluation of the ventilometric parameters of two football teams in different leagues

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Abstract

Introduction: Spirometry testing is a physiological test measuring lung volume and flows. Compared to the other components of the respiratory system, training does not result into significant improvements as for the increase of the expiratory flow. The assessment of the respiratory function may indicate certain disorders of the bronchi and of the lungs, but, on the other hand, it offers little information on the aerobic capacity of the individuals or the effects of physical exercises.

Aim: The purpose of this research was to study the respiratory volumes in two football teams that are part of two different leagues (2nd league, and 5th league, respectively), and to compare these results with the ones at the international level.

Materials and methods: We included in this research two football teams in two different leagues (2nd league, and 5th league, respectively) and, from each team, we chose the players with the highest number of minutes spent playing throughout the championship return phase. In order to perform spirometry, we used a portable spirometer (Spirotube Spirometer, PC Spirometer). The prediction method used by the spirometer software was the one presented by the European Respiratory Society and Kudson.

Results: By comparing the environments of the two groups we can see that, in terms of height and weight, the two samples present close values. According to the results recorded with the help of the spirometer, the value of the forced vital capacity (FVC = 4.50) represents 98% of the normal level, and the Expiratory volume per second FEV1 (FEV1 = 4.50) represents 97% of the normal level. Within the ASU group, the value of the forced vital capacity (FVC = 5.19) represents 95% of the normal level, and the Expiratory volume per second (FEV1 = 4.45) represents 95% of the normal level. As we can see, neither of the groups reaches the normal potential. However, the CS UVT group reaches a higher percentage than the other, although they play their matches in a lower league.

Conclusions: Considering that we could not compare the types of training that the two teams had during the preparation phase, we cannot say whether such trainings had a certain effect on the subjects. Further research should be carried out in order to determine if the type of training had a beneficial effect in the case of the CS UVT group.

***Key words**:* Football, spirometry, FVC, FEV1

Rezumat

Introducere: Testarea spirometrică reprezintă un test fiziologic care măsoară volumul şi debitele pulmonare. În comparaţie cu celelalte componente ale sistemul respirator, antrenamentul nu produce îmbunătăţiri semnificative în ceea ce priveşte creşterea debitelor expiratorii. Evaluarea funcţiei respiratorii poate indica

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anumite afecţiuni ale bronhiilor şi ale plămânilor, în schimb oferă puţine informaţii legate de capacitatea aerobă a indivizilor sau de efectele exerciţiilor fizice,

Scopul lucrării: Scopul acestei cercetări a fost acela de a observa volumele respiratorii în cazul a două echipe de fotbal din cadrul a două ligi diferite (liga a II-a, respectiv liga a V-a), precum şi compararea acestor rezultate cu cele de nivel internațional

Materiale și metode: În cadrul acestei cercetări au fost incluse două echipe de fotbal din două ligi diferite (liga a II-a, respectiv liga a V-a) din fiecare echipă alegându-se jucătorii care au avut cele mai multe minute jucate pe parcursul turului de campionat. Pentru realizarea spirometriei s-a utilizat un spirometrul portabil (Spirometru Spirotube, PC Spirometer). Metoda de predicție utilizată de softul spirometrului a fost cea expusă de European Respiratory Society și Kudson.

Rezultate: Din comparația mediilor celor două grupe putem observa că în privinţa înălţimii şi greutăţii cele două eșantioane prezintă valori apropiate. Conform rezultatelor înregistrate cu ajutorul spirometrului valoarea capacităţii vitale forţate (FVC = 4.50) reprezintă 98% din normal, iar Volumul expirator pe o secundă FEV1 (FEV1 = 4.50) reprezintă 97% din normal În cadrul grupei ASU valoarea capacităţii vitale forţate (FVC = 5.19) reprezintă 95% din normal, iar Volumul expirator pe o secundă (FEV1 = 4.45) reprezintă 95% din normal. Din ce putem observa niciuna din grupe nu atinge potențialul normal. Cu toate acestea grupa CS UVT atinge un procent mai mare decât cealaltă cu toate că își desfășoară meciurile într-o ligă inferioară.

Concluzii:. Având în vedere faptul că nu am putut compara tipurile de atrenament pe care cele două echipe le-au avut în faza de pregătire, nu putem afirma dacă acestea au avut un anume efect asupra subiecților. Cercetări ulterioare ar trebui efectuate pentru a determina dacă tipul de antrenament a avut un efect benefic în cazul grupei CS UVT.

***Cuvinte cheie**:* Fotbal, spirometrie, FVC, FEV1

Introduction

Spirometry testing is a physiological test measuring the volume of air that an individual inhales or exhales in relation to time, with the main measurable value being the volume or flow. [1].

The training plan is used to train the athletes, throughout macrocycles, in order to reach their physical, psychological, ethnic and tactical potential [2].

Compared to the other components of the respiratory system, training does not result into significant improvements as for the increase of the expiratory flow, in the case of athletes trained without performing a specific training of the inspiratory muscles [3]. The assessment of the respiratory function may indicate certain disorders of the lungs, but, on the other hand, it offers little information on the aerobic capacity of the individuals or the effects of physical exercises.

There are multiple studies that have not detected any statistical differences in terms of forced vital capacity (FVC) between preteens and fighters, distance runners and the adult population who does not exercise [4].

Aim of the research

The purpose of this research was to study the respiratory volumes in two football teams that are part of two different leagues (2nd league, and 5th league, respectively). Thus, we proposed to make an assessment of the ventrilometric parameter values obtained for the two football teams playing in different leagues of Timisoara, but also to compare these results with the ones at the international level.

Materials and methods

We included in the study 11 players from the CS UVT team, with an average age of 25.09 years, and 11 players from the ASU team, with an average age of 23.63 years.

Subjects were assessed during the championship return phase after having completed winter preparation. We included in this research two football teams in two different leagues (2nd league, and 5th league, respectively) and, from each team, we chose the players with the highest number of minutes spent playing throughout the championship. In order to perform spirometry, we used a portable spirometer (Spirotube Spirometer, PC Spirometer), using a disposable mouthpiece for each subject. The forced vital capacity (FVC) represents the total amount of air that can be exhaled after a deep breath. The expiratory time should be maintained for approximately six seconds in order to obtain an interpretable result. The forced expiratory volume in one second (FEV1) represents the volume of air exhaled in the first second from the beginning of the protocol. The peak expiratory flow (PEF) is the maximum air flow achieved during a complete and forced expiration. The Tiffeneau index or the bronchial permeability index represents a ratio between the FEV1 and VC. This index can show the degree of obstruction or restriction at the lungs level [5]. The protocol for the assessment of the respiratory capacity was carried out according to the procedures suggested by Tudorache and Oancea [1, 4]. Only the expirations meeting the criteria of the European Respiratory Society/American Thoracic Society were taken into account (6). The prediction method used by the spirometer software was the one presented by the European Respiratory Society and Kudson [7].

Results

Following having carried out the tests, the data were recorded in tables, and with the help of the SPSS (Statistical package for Social Sciences) software, we performed their statistical-mathematical interpretation.

Table I. Results of the spirometry testing for the CS UVT team

No.	Age	Î (cm)	G (kg)	FVC	FEV1	PEF
1	22	176	75	5.61	4.66	8.41
2	22	182	73	6.01	4.72	8.72
3	41	177	78	4.5	3.85	6.78
4	22	171	66	5.46	5.02	8.03
5	25	176	78	5.75	4.8	12.6
6	23	176	65	4.17	3.56	7.1
7	24	168	67	5.14	4.29	8.81
8	24	178	77	6.18	5.28	7.81
9	26	184	79	5.18	4.11	6.67
10	20	182	72	5.05	4.39	7.78
11	27	183	87	5.86	4.84	9.79

The table above presents the data obtained for the CS UVT team within the spirometry testing procedure, with a normal distribution of data. The CS UVT group consists of 11 players (N=11), with an average age of 25.09 years (±5.64), average weight of 74.27 kg (±6.58 kg), and average height of 177.54 cm (±5.02 cm). All subjects consented to their data being used and to participating in this research.

Table II. Results of the spirometry testing for the ASU Politehnica team

No.	Age	Î (cm)	G (kg)	FVC	FEV1	PEF
1	21	178	86	6.02	5.25	10.97
2	29	175	68	4.53	3.83	8.54
3	15	188	85	5.44	4.72	7.78
4	22	179	74	6.59	4.99	7.75
5	25	178	75	5.17	4.74	9.51
6	17	173	69	4.31	3.62	5.67
7	19	184	79	6.13	4.99	7.71
8	31	173	69	4.55	3.76	6.88
9	31	173	72	4.48	4.17	8.05
10	29	179	68	5.07	4.57	8.38
11	21	175	65	4.87	4.35	5.77

The values obtained for the ASU group are similar to the ones of the first group, their average age being of 23.63 years (±5.69 ani), average weight of 73.63 kg (4.79 kg), and average height of 177.72 cm (±4.79 cm).

In order to check whether data distribution is normal, the SPSS statistics software was used to calculate the standardized value of the Z-score, and the Shapiro Wilks test. The null hypothesis applied for the Shapiro – Wilks normality test, according to which the data are normally distributed, is accepted in all cases p> 0.05.

Table II. Independent T test

Team	N	X	SD	SEM	
CS UVT	11	25.09	5.64	1.70	Age
ASU	11	23.63	5.69	1.70	
CS UVT	11	177,54	5.02	1.51	Height
ASU	11	177.72	4.79	1.44	
CS UVT	11	74.27	6.58	1.98	
ASU	11	73.63	7.04	2.12	Weight
ASU	11	7.91	1.52	0.40	

In the table above (Table III) we can see the averages of the two samples. By comparing the averages of the two groups we can see that the height and weight values of the two samples are quite close.

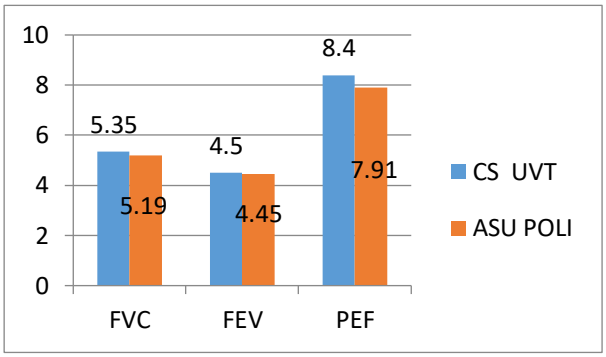

Figure 1. Values of the lung volumes measured in the 2 football teams - CS UVT and ASU POLI

According to the results registered using the spirometer, the value of the forced vital capacity (FVC = 4.50) represents 98% of the normal level, and the Expiratory volume per second FEV1 (FEV1 = 4.50) represents 97% of the normal level.

Within the ASU group, the value of the forced vital capacity (FVC = 5.19) represents 95% of the normal level, and the Expiratory volume per second FEV1 (FEV1 = 4.45) represents 95% of the normal level. As we can see, neither of the groups reaches the normal potential. However, the CS UVT group reaches a higher percentage than the other, although they play their matches in a lower league.

Discussions

For this study, we have selected three spirometry variables to be assessed. The study showed that the normal averages and percentages were higher than in the case of the team playing in an inferior league. Although some studies show significant differences between football players and the active population, in our case, they have not been identified [8].

Also, the results of our research are similar to other studies in the field. A study carried out on a sample of 20 football players revealed that, after a period of preparation, spirometry values did not change significantly, given that they did not follow a specific training plan for the development of respiratory muscles [9]. Compared to other international football players, the athletes included in the study

have recorded similar values. A study conducted within a football league in Iraq shows that they recorded lower values for the forced vital capacity and forced expiratory volume per second (N = 35, FVC = 90.2%, and FEV1 = 92.6). Regarding the peak expiratory flow, they recorded 10% higher values compared to the athletes from Romanian leagues (Iraq, N = 35, PEF = 98.6%, CS UVT, N = 11, PEF = 89%, and ASU, N = 11, PEF = 81%) [10]. At the European level we can see that, the results obtained by us are similar to those of the players from the first league in Croatia (FVC = 100, FEV1 = 103.57) [11]. We have also noted that the Romanian players are shorter than those in Iraq and Croatia.

Conclusions

Considering that we could not compare the types of training that the two teams had during the preparation phase, we cannot say whether such trainings had a certain effect on the subjects. Further research should be carried out in order to determine if the type of training had a beneficial effect in the case of the CS UVT group.

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