

AEROBIC CAPACITY GROWTH LEVEL AND ITS RELATIONSHIP WITH THE ANTHROPOMETRIC FAT INDEX

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Background: ideal body weight historically is a subject of study that raises more questions than answers. Where among health-care professionals body composition and growth are key components of health in both individuals and populations. While BMI does not accurately reflect body composition. Admit by Michael M. Rothkopf, et al. it's vital for the metabolism physician to know the ranges for BMI in terms of the weight category [1]. Inspected in this study through hypotheses that body fat percent (BPF) more accurate than body mass index (BMI) as a relationship connectivity contributes to the prediction of the aerobic capacity growth level to monitor the football player weight.

Methods: Thus, healthy weight loss (primarily by lowering your body fat percentage) can contribute to an increase in your cardio fitness score. This study was undertaken and aimed to determine the validity of BFP superiority. To archive this proposal, 160 male soccer players under 19 years. Were tested by the cooper test as a physiological parameter to esteem VO₂max, and weight-height to calculate the BMI and body fat as anthropometric measurements.

Results: based on the results obtained and applied statistics the most important finding of our study concerns within: BFP is best predictors of the adjusted healthy aerobic fitness body weight.

Conclusions: the current study supports the hypothesis that body fat percent (BPF) is more accurate than body mass index (BMI) as a relationship connectivity contributes to the prediction of the aerobic capacity growth level to monitor the football player weight.

Keywords: *Body Fat, BMI, aerobic fitness, healthy body weight, soccer players.*

Introduction

According to the similar studies recommendations that BMI is limited by the fact that it does not differentiate between the contribution of muscle, fat or oedema to body weight [2; 3] where WHO standards of BMI are not suitable for the evaluation of body fat [4].

The current study focused on ideal body weight (IBW) which is the optimal weight recommended for optimal health [5] due to body fat which is less metabolically more active than lean body mass the case in athletic performance.

Description by Rosalinda T. League, et al. marked that adjusted weight is used to determine energy diet VO₂max, which is primarily determined by the aerobic capacity of the working [6]. Whereas Joseph G. Murphy, et al. Suggest that the solution is to develop predicted values for VO₂ that account for not only age and sex but also the relation between body weight & height [7] and the distribution of body weight, according to Ronald Klomp [8].

While the most useful measure to assess for extreme weight loss in adolescents is a body mass index (BMI) adjusted [9] as ideal body weight, which can be calculated using [10] Height [11] weight [12; 13]. Though the Health/fitness professionals recommend

the percent of total body weight fat and what amount aspects of physical fitness, and fitness [14].

From the above, this study focus on body fat as predictors of control body weight program to promote health and fitness [15] aimed to evaluate the hypotheses, which subject body fat percent (BPF) as more accurate than body mass index (BMI) in estimating the aerobic fitness.

Reveal in literature review via the importance of aerobic fitness or cardiovascular fitness [17; 18] as a measure of health quality of life [19], helping the practitioner to maintain recommended body weight [20]. Confirmed by Sayyed Mohammad Marandi, et al [21] it seems that aerobic activity (endurance) is one of the best forms of exercise in weight control programs.

Methods

Study design and participants

The data used in this study were obtained from the database of Team 5 Physical Education Institute Laboratory OPAPS for the academic years 2014–2015. In terms of player-related data, 160 male soccer players under 19 years, with experience that exceeds 8 years in the world of soccer from the Algerian championship national territory was examined in parameters (anthropometric and physiological decide for the cur-

rent study) by Team 5 listed in **Table 1**. At the end of the physical preparation for the years 2014–2015, after the agreement with their coach. All examinations were realized for the first weeks before the start of the championship. Whereas expertise the study protocol and methods, we choose the laboratory OPAPS «Institute of Physical Education of our University» who approve it by the professors of football and physiologist training effort.

Procedure and variable assessment

The data collection tool was a structured base on the following tests approved by the professors of football and physiologist training effort.

The maximal aerobic capacity: We have chosen the maximal aerobic capacity based on the formula Test Cooper [16] ($VO_2 \text{ max} = 22.351 \text{ d (km)} - 11.288 \text{ (ml/min/kg)}$). Indicated by John Gormley, et al. That the Cooper 12-minute test, the 1.5-mile test, the Rockport One-Mile Fitness Walking Test and the multi-stage shuttle have a corresponding laboratory $VO_2 \text{ max}$ obtained by the formula [22]. Agreed by Daniel Mayorga-Vega, et al in them accurate is correlated between 90–95 % [23]. Support the Cooper Institute indict that the Cooper test provides a better picture of endurance of maximal aerobic capacity [24] which evaluate aerobic fitness who leads to better health and a higher quality of life [25].

While Wener W. K. Hoeger, et al confirm that $VO_2 \text{ max}$ is affected by genetics, training, gender, age, and body composition [26].

Weight and height: Height (m) and weight (kg) were each measured in the standing position [27] to calculate the body mass index $BMI = \text{weight (kg)} / \text{height(m}^2\text{)}$ [28] where Goto Y, et al confirms that the $VO_2 \text{ peak}$ is associated with biological status after controlling for height and weight [29]. Whereas ideal body weight is the body weight for a given height that

is statistically associated with the greatest longevity [30], which can be estimated either by reviewing the medical record for the body weight [31] and calculated mathematically by dividing weight in kilograms by the square of height in meters [32]. Whereas this formula represents the calculi of BMI where Vishwanath Sardesai (2011) confirms some football players, maybe overweight because of their increased lean body mass, but not obese or overfat [33]. Since BMI is not a perfect measure, it does correlate strongly with percent body fat according to Lauren M Rossen, et al [34] we use The formula proposed by Deurenberg, et al. $\text{body Fat} = (1,2 \times BMI) + (0,23 \times \text{age}) - (10,8 \times \text{Sex}) - 5,4$ [35] as inexpensive and convenient means for our coaches and players.

Statistical Analyses

Data analysis was performed using SPSS22.0 for Windows (32–bit). Data obtained from the tests showed a normal distribution and homogeneity, presented as a mean \pm standard deviation, Shapiro-Wilk test and Levene's test. Regression analyses were conducted to analyse the combined of the variables chosen to study where the relationship between the variables was analysed by Pearson correlations (r).

Results

The characteristics of the study sample are presented in Table1. All the variables accept normality based on Shapiro-Wilk test and the Variance homogeneity based on Levene's test. Although our sample range between fair and good levels $VO_2 \text{ max}$, according to normative data for $VO_2 \text{ max}$ [36]. The Mean \pm SD of all the variables shows the Good level of fitness and physiological characteristics of the participants. Admitted by $vo_2 \text{ max}$ norms proposed by Peter R. J. Reaburn (2014) $VO_2 \text{ max}$ soccer: $36.3 \pm 11.3 \text{ ml/kg/min}$, [37]. For BFP or% Fat our sample range in normal class, according to Raul Garrido-Chamorro, et al [38]. Since

Table 1

Presents the Baseline characteristics of the participants Physiological and Anthropometric characteristics of the total group

	N	Min	Max	Mean \pm S. D	Shapiro-Wilk		Levene's test	
	Stat	Stat	Stat	Stat	Stat	Sig	Stat	Sig.
Weight	160	50.48	79.93	64.38 \pm 6.22	0.98	0.06	1.80	1.81
Height		156.00	192.00	174.71 \pm 6.26	0.99	0.17	0.27	0.29
Vo2MAX		43.96	49.39	45,54 \pm 1.99	0.99	0.47	3.16	0.37
%Fat		12.00	18.00	13,30 \pm 2,21	0.99	0.19	1.17	0.29
BMI		18.77	24.06	21.15 \pm 1.84	0.99	0.14	2.14	0.15

the BMI our players range from 18.5 to 24.9 = normal weight Body Mass Index (BMI), according to Marie A. Boyle [39].

All the correlations in Table 2 are strongly significant at $p \leq 0.05$ and 0.01. However, Vo2MAX is a strongly positive correlate with Height in the opposite of other variables tested in the current study. On the other hand, Height and Weight is strongly negative correlate with % Body Fat and BMI in opposite BMI & body fat.

Through the Table 3, model method ENTER our regression analyses confirmed the hypotheses that body fat percent (BPF) more accurate than body mass index (BMI). Shown in the present via the strong and significant positive association between Vo2max and % Fat as Predictors of a healthy body aerobic fitness. Whereas the program Excluded Weight, Height, BMI from the regression.

Discussion

Based on the statistical applied. Our results confirm:

• **Body Fat is the best predictor of the maximum aerobic capacity than BMI.**

Where our result tables 2 and 3 lines with N Koutlianos confirmation that age, gender factor was more effective than BMI [40]. Support by Laxmi CC [41] in effects of increasing BMI on cardiorespiratory

fitness case sports studies and total adiposity case the medical studies, according to Tauseef Nab, et al [42]. Sustenance by Peter Slinger through VO2MAX formula, which their calculi based on age, sex, and height [43]. From the proof, we agree on one hand that further studies are needed to implement the actual findings associated with this hypothesis. Where in other, we invite our metabolic physician to develop an equation, which takes the account of ranges for BMI in terms of the weight category [1] as new anthropometric equations to determine the change in body Weight [44] fat-free mass, total body water and body fat [45]. Confirmed by Allen L, Prentice A [46] that the body mass index (BMI) is considered to be one of the most objective anthropometric indices when it permits the correction of body weight for height. The case of this study, where %Fat is the only predictors of the levels of Vo2max. State by Connie Henke Yarbro, et al [47] to esteem the adjusted body weight [48] we need to detect the excess body weight in the form of fat as a distinct disadvantage body gain in training program, which largely depends on the individual's aerobic capacity [49].

Limitations

The major limitation of this study measures on the basis of field tests where the suitable methods of body

Table 2

Presents the correlations between the variables tested in the current study

		Weight	Height	Vo2MAX	BMI	% Fat
Weight	Pearson Correlation Sig. (2-tailed)	1	0.486**	-0.434**	0.705**	0.683**
Height		0.486**	1	0.318**	-0.274**	-0.282**
Vo2MAX		-0.434**	0.318**	1	-0.738**	-0.750**
%Fat		0.705**	-0.274**	-0.738**	1	0.982**
BMI		0.683**	-0.282**	-0.750**	0.982**	1

** Correlation is significant at the 0.01 level (2-tailed).

Table 3

Presents the Results of regression model 1 analyses relating VO2max and the variables tested in the current study

Model ENTER	R	R2	Adjusted R2	Coefficients	T	P	F	P
1	0.75a	0.56	0.56	(Constant)	85,40	0.00	203,68	0.000b
				% Fat	-14,27	0.00		

a. Dependent Variable: Vo2MAX.

b. Predictors: (Constant), % Fat.

Excluded Variables: Weight, Height, BMI.

composition and the VO₂max accuracy determination recommended laboratory practice (BIA, DEXA, CT, and MRI) case body fat (Sensor Medics Vmax Metabolic Stress Testing Systems or BOD POD GS Body Composition Tracking System (COSMED)) as clinical measurement of oxygen consumption.

Conclusion

Our finds confirmed the hypothesis that body fat percent (BPF) is more accurate than body mass index (BMI) as a relationship connectivity contributes to the prediction of the aerobic capacity growth level to monitor the football player weight. Admit in present study via the correction that permits the diagnostic of relation height and adjusts body composition correlate to demand program training. Admit in the case of this study via formulas that permit the esteem of percent fat mass as a better predictor for VO₂max than BMI more significant among the training program, which largely depends on the individual's aerobic capacity.

Acknowledgements

The authors would like to acknowledge players and coaches also professors of football and physiologist training effort Physical Education Institute Laboratory OPAPS, University of Mostaganem, Algeria.

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Поступила в редакцию 5 мая 2018 г.

Для цитирования: Zerf Mohammed Aerobic capacity growth level and its relationship with the anthropometric fat index / Zerf Mohammed, Mohamed Hadjar Kherfane, Sidi Mohamed Koutchouk // Физическая культура. Спорт. Туризм. Двигательная рекреация. — 2018. — Т. 3, № 2. — С. 64–69.

Аэробная активность (выносливость) и её связь с антропометрическим индексом жира

Идеальный вес тела исторически является предметом исследования, которое вызывает больше вопросов, чем ответов. Среди медицинских работников состав и рост тела являются ключевыми компонентами здоровья как у отдельных лиц, так и среди населения, хотя ИМТ неточно отражает состав тела. Как было отмечено М. М. Роткопфом и др., жизненно важно, чтобы врач по метаболизму знал диапазоны ИМТ в терминах весовой категории. Нами выдвинута гипотеза о том, что процент жировых отложений (ПЖО), более точный, чем индекс массы тела (ИМТ) в качестве прогнозирования уровня роста аэробной ёмкости для контроля веса футболиста.

Методы: Как считают многие, здоровая потеря веса (в основном за счёт снижения процента жировых отложений) может способствовать увеличению работы сердечно-сосудистой системы. Наше исследование направлено на определение достоверности превосходства ПЖО в повышении аэробной активности (выносливости) и её связи с антропометрическим индексом жира. В исследовании приняло участие 160 футболистов до 19 лет. Было проведено тестирование на взаимодействие в качестве физиологического параметра, чтобы оценить VO_{2max} и весовую массу для расчёта ИМТ и жира в организме в качестве антропометрических измерений.

Результат: на основе полученных данных и прикладной статистики установлено, что ПЖО является лучшим предиктором (индикатором) для прогнозирования уровня роста аэробных способностей и контроля веса футболиста.

Выводы: текущее исследование подтверждает гипотезу о том, что ПЖО более точен, чем ИМТ в качестве связующего звена, что способствует прогнозированию уровня роста аэробных способностей для контроля веса футболиста.

Ключевые слова: *жир тела, индекс массы тела, процент жировых отложений, аэробика, здоровый вес тела, футболисты.*

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