25 - PROPOSAL OF A BODY FAT CLASSIFICATION TABLE, USING JACKSON AND POLLOCK (1980) PROTOCOL WITH COM 3 PLAITS, IN FEMALES FROM ACTIVA FITNESS, IN RIO DE JANEIRO - RJ - BRASIL

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INTRODUCTION

The determination of the body density, body composition, and the information of the true body fat of individuals of both sexes has shown itself a great deal for antrophometrists in the whole world.

The choice of an appropriate protocol for skin plaits, aiming to estimate the right body fat of a certain group of individuals, becomes more and more important each day, when trying to get to a more precise measurement, and also the classification of this percentage in regards to the physical ability and health, mainly when this is used as a model for the systematic physical exercise prescription.

Salém and others (2004) agree with the statement above, stating that the body composition has been used as a parameter for several segments of the physical activity, health and professional performance, and it is of great importance that it is calculated correctly.

According to Pollock and Wilmore (1993), the most recent tendency has been the one of developing more general equations, instead of developing specific equations for certain populations. These generalized equations have been initially developed by Durnin and Wormersley (1974), that developed equations represented by a unique common curve, but that could also be adjusted to take into account the age of the individual.

Afterwards Jackson and Pollock (1978 and 1980) carried on Durnin and Wormersley's work, developing generalized equations for the body fat prediction, including the age as a correction factor, due to the alterations in the ratio of the subcutaneous and intra abdominal fat, the reducing of bone density and the loss of lean mass caused by the ageing.

Based on these skin plaits measurements and the body density calculation mainly, the authors above suggested tables to classify the body fat , with the purpose of establishing qualitative and quantitative parameters related to the body fat, and correlate them with good health and esthetics indicators for the population.

The body fat classification tables proposed by the authors of these protocols of body fat prediction demonstrate great validity for the sample universe in the construction of the body fat protocol. In the other hand, when we analyze populations with cultural, nutritional, genetic and anthropometrical specific characteristics, but with the same age as the sample used in these other studies, we can notice significant differences in regards to the data shown by the tables presented by Jackson and Pollock (1993).

OBJECTIVES

The present study has as its main objective the construction of a normality table of body fat, for using in specific populations of the sample universe in question, with similar characteristics, more precisely, students of GYMs from the North Area of the city of Rio de Janeiro, females, with the ages going from 18 to 55 years old, according to the age of which used in the sample for the construction of this equation.

It is more than important to emphasize that the arising of new body fat classification aims becoming more specifically and precise the prescription of the physical exercise for the individuals that are students in the GYMs in Rio de Janeiro.

MATERIALS E METHODS

For the table construction, a data bank of 577 anthropometrics tests of non-athlete female individuals was used, with ages going from 18 to 55 years old. The tests were performed between October 2005 and April 2006, and the collection of the data performed by the own researcher, as well as by 5 other well trained evaluators, with an error intra and inter-evaluator below 1%, as proposed by Jackson and Pollock (1993).

It should be taken into account the difficulty on standardizing the supra-iliac skin plait, where the errors pre-training were sometimes noticed of being 2,5% above, being corrected to below 1% afterwards, index determined by the literature. The "Gold Standard" evaluator has over 10 years of experience on anthropometrics tests, and was in charge of the intra and inter evaluator trainings.

For the skin plaits collection, a Lange Beta Technology-Santa-Cruz-Maryland compass was used, in attempt to reproduce Jackson and Pollock's three skin plaits protocol for women (1980), using the triceps, supra iliac and abdominal skin plaits. Three measurements were performed in each plait, following the steps mentioned by Fernandes Filho (2003), and the data inserted into Galileu software - Version 3.0, for the body fat calculation. These data were then inserted into Microsoft Excell software and tabulated, and the percentage table was developed, by using SPSS software, Version 14.

The sample used in the table construction is of women (n=577), with ages going from 18 and 55 years old. We should emphasize that the original sample was larger than the one actually used, though, considering the methodological limitation defined by the body fat protocol, which presents a significant degree of rightness in the interval between 18 and 55 years old only (r-0.87), for females, the individuals that presented themselves out of this interval were excluded.

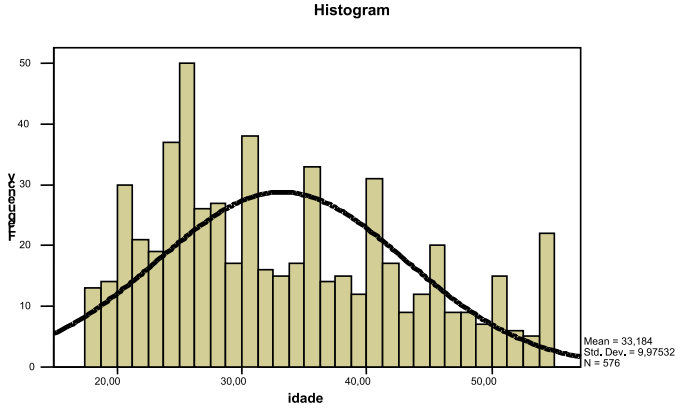
First of all, a Normality Test was applied - Komogorov-Smirnov - for the evaluation of the sample universe, whether it was well placed under a normal distribution curve. In order to do that, we considered a significance level $p < 0,05$ for rejecting the Null Hypothesis (non-equality to a normal curve).

All scientific authenticity criteria were taken in order to develop a reliable normality table, and the results are shown below.

RESULTS AND DISCUSSION

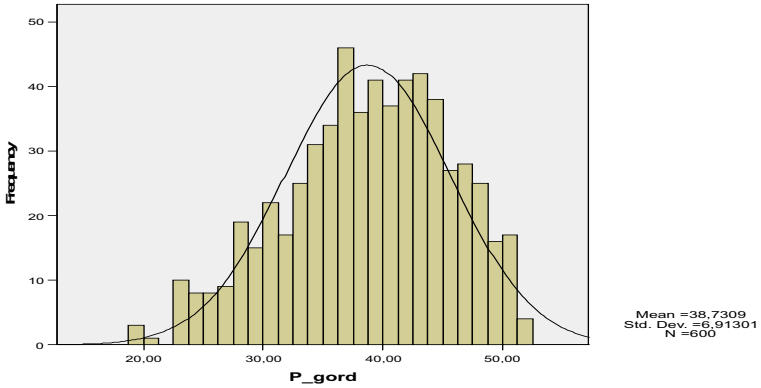
Considering that both continuous variables in this study are Body Fat and Age, a test for checking the normality was applied, which means, whether the respective distributions of frequency were well placed under a normal distribution curve. For doing this, we used the Non-Parametric Test Komogorov-Smirnov.

Sample - Females (n= 577)
Age - KS (sig.p = 2,713 > 0,05), average = 33,0 ± 9,57 years-old
Body Fat - KS (sig.p = 0,238 > 0,05), average = 38,62 ± 6,88



A good sample distribution can be easily seen, except for the ages in the interval between 22 and 27 years old, which did not interfere in the normal distribution of the sample.

In the next picture, we can see the body fat normality test.



From the results presented above, we can notice a normal distribution for the age, and following the same tendency, the body fat has also presented itself a normal distribution, allowing it to be analyzed by parametric tests.

Aiming to build frequency classes according to the age and the body fat for females, a statistics quarts division approach was applied firstly, followed by a more specific percentage division, of which then was distributed in age parts. The results are shown below.

Developing the frequency table, the sample was split into 5 different age classes, as it follows:

Class 1 - 18 to 25 years old
Class 2 - 26 to 35 years old
Class 3 - 36 to 45 years old
Class 4 - 46 to 55 years old
Class 5 - 56 to 65 years old - not used in this study

This table follows the same age division as the one used by Pollock and Wilmore (1993), which was used as a comparative one in this study.

It's important to mention that even knowing that Pollock and Wilmore's table (1993) show a body fat classification data going up to 65 years old, the sample used for developing the skin plaits regression equation is of up to 55 years old, which actually gives the measurement a high level of rightness, only for adults with ages going from 18 to 55 years old.

Crossing the age classes mentioned above with the results seen in the Body Fat variable, we denote:

BODY FAT FOR WOMEN

BODY FAT FOR WOMEN					
evel / Age	**18 - 25 Y/O**	**26 - 35 Y/O**	**36 - 45 Y/O**	**46 - 55 Y/O**	**56 - 65 Y/O**
Excellent	**13 to 17%**	**14 to 18%**	**19 to 23%**	**23 to 27%**	**not measured**
Good	**18 to 22%**	**19 to 23%**	**24 to 28%**	**28 to 32%**	**not measured**
er Average	**23 to 28%**	**24 to 30%**	**29 to 34%**	**32 to 37%**	**not measured**
Average	**29 to 34%**	**31 to 37%**	**35 to 39%**	**38 to 41%**	**not measured**
ow Average	**35 to 39%**	**38 to 42%**	**40 to 43%**	**42 to 44%**	**not measured**
Bad	**40 to 45%**	**43 to 46%**	**44 to 46%**	**45 to 47%**	**not measured**
Very Bad	**45 to 46%**	**47 to 49%**	**47 to 50%**	**48 to 50%**	**not measured**

And just to compare, we present Pollock and Wilmore Body Fat Table for Women (1993):

BODY FAT FOR WOMEN					
LEVEL/AGE	18 - 25 Y/O	26 - 35 Y/O	36 - 45 Y/O	46 - 55 Y/O	56 - 65 Y/O
Excellent	13 to 16 %	14 to 16 %	16 to 19 %	17 to 21 %	18 to 22 %
Good	17 to 19 %	18 to 20 %	20 to 23 %	23 to 25 %	24 to 26 %
Over Average	20 to 22 %	21 to 23 %	24 to 26 %	26 to 28 %	27 to 29 %
Average	23 to 25 %	24 to 25 %	27 to 29 %	29 to 31 %	30 to 32 %
Below Average	26 to 28 %	27 to 29 %	30 to 32 %	32 to 34 %	33 to 35 %
Bad	29 to 31 %	31 to 33 %	33 to 36 %	35 to 38 %	36 to 38 %
Very Bad	33 to 43 %	36 to 49 %	38 to 48 %	39 to 50 %	39 to 49 %

CONCLUSIONS

Analyzing the data from both tables, we can conclude that there are differences in all the body fat classification segments, which also generates some kind of trouble in defining the actual ideal body fat for females.

These results corroborate the citations of the American College of Sports Medicine (2003), that attests that there is not and accepted standardization for body fat in all ages, once that for the development of this standardization, lots of samples are needed, and such a study has not being carried out yet, up to now.

The data shown by the American College of Sports Medicine (2003) recommend that, in average, women's body fat should be of about 25% to be considered healthy, but this reference number should be applied only for young adults, once studies with older adults, or even elderly people, have not been carried out yet, and the applicability of these young adults data can not be extrapolated for older people populations.

According to the data obtained by the studied group, we can notice an increase in the body fat according to the age, once that from the first till the last category, the average body fat, or percentage 50 from the classification goes from 29% till 38%, while in the table proposed by Pollock and Wilmore, the average body fat can go from 23% and 32%, numbers that are closer to the ones shown by the American College of Sports Medicine, which suggests the averages to be between 20% and 30% for women.

In the studied individuals with a lower body fat, we can also notice a higher interval difference in comparison to the other table, once the variation of the results going from "excellent" until "average", varies much more in the studied group than in Pollock and Wilmore's table. This demonstrates the importance of creating specific tables for certain groups, once many times the physical activity prescription in GYMs is still based on the body fat of individuals only, due to the lack of structure in the functional evaluation departments.

Another important factor is that these reference tables have been published and in use for at least 10 to 12 years, and it is known that during this time, the tendency of the world population is a significant increase of weight and body fat, as a result of hipocinesis mainly, a contemporary characteristic, which is originated mainly by the high levels of stress and a not very healthy food ingestion.

For Katch, Katch & Mcardle (1996), the minimum parameters for essential body fat for women is 12%, although in the model shown in this study, the average body fat should be of 23,6%. The numbers for body fat should not overcome 30% for being considered as normal. Anything over these numbers would be considered "extra fat".

The reference numbers mentioned above are found very close to the ones of Behnke and Wilmore's work (1974), where a healthy woman should have about 12% of essential fat, and about 15% of store fat, coming up to 27% of body fat.

Lohman (1992), differently from Behnke and Wilmore (1974), presents an average standardized body fat of about 23% for women. According to Lohman, women are considered "fat" when their body fat overcomes 32%.

Petroski (1995) found an average body fat of 23,18% for women. The equation used was specific for Brazilians from the south. For Nahas (1989), the ideal body fat is of 20% for women. A woman can be considered "fat" when the body fat overcomes 30%. Finally Guedes & Guedes (1998), corroborate with the statements of the American College of Sports and Medicine (2003), which states that the values are not universally stipulated, although the literature shows the general idea that women with a body fat of over 30% can be considered "fat".

In regards to the body fat normality table construction, we present Pollock and Wilmore's 1993 table as a model for the construction of this, by the fact that it is widely used in the scientific research field, aiming to classify the results in a similar way, but finding considerable differences in the average results obtained.

The greatest limitation found in the use of such tables is the impossibility of generalization, once they are accurate only for relatively homogeneous groups, due to the small sample used in their elaboration.

Considering the results achieved, we can conclude that further studies must be performed, aiming to increase the amount of data that classify the body composition, based on the body fat, as well as considering important that other reference tables are developed and used in certain areas, denoting a better precision in the results obtained for each population studied, and that in the future, researchers develop a single table that could be used nationally.

Finally, we propose the use of this normality table for the prescription of physical activity programs for the population of the referred area, based on more precise data than the ones obtained through calculations compared to reference tables developed with different characteristics populations.

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PROPOSAL OF A BODY FAT CLASSIFICATION TABLE, USING JACKSON AND POLLOCK (1980) PROTOCOL WITH COM 3 PLAITS, IN FEMALES FROM ACTIVA FITNESS, IN RIO DE JANEIRO - RJ - BRASIL

ABSTRACT

This study has the objective of elaborating a body fat normality table (%F) for specific populations, with similar characteristics to the gym students of the North of Rio de Janeiro - RJ, females, and with ages going from 18 to 55 years old. For this purpose, a data base of physical evaluations from Activa Fitness GYM, from Rio de Janeiro - RJ, was used (N=577, being the age average: 33 years old; standard deviation: 9,57 years; average body fat: 38,62%; and standard deviation of 6,88%), by using Jackson & Pollock Protocol (1980), 3 plaits, for estimating the body fat. The results were all tabulated and statistically calculated by using a descriptive statistics. The table was elaborated with its levels classification going from "Excellent" until "Very Bad", as well as percents and body fat classification. We suggest that further studies are made aiming to widen the amount of data that classify the body composition, based on fat percentage, as well as the elaboration of reference tables for specific areas, making the systematized physical exercise prescription easier.

Key-Words: Anthropometry, Normality Table, Skin Plaits

PROPOSITION DE TABLE POUR CLASSIFIER LE POURCENTAGE DE LA GRAISSE CORPOREL, EMPLOYER LE PROTOCOLE DE JACKSON ET POLLOCK (1980) AVEC 3 PLIS DE PEAU EM INDIVIDU DU SEXE FÉMININ DE L'ACTIVA FITNESS, DAUS LA VILLE DU RIO DE JANEIRO - RIO DE JANEIRO - BRÉSIL

RESUMÉ

Cette étude a eu par l'objetif d'élaborer une table de normalité de pourcentage de la graisse (%G) aux populations spécifiques, avec caractéristiques créatude de camarade a l'élèves d'academies gymnastique du Nord de Zone du Rio de Janeiro - RJ, du sexe féminin, les âges étant compris entre 18 e 55 ans. Pour d'une telle manière une base de données a été emploýee d'evaluations de la forme physique active d'academie, ville du Rio de Janeiro - RJ (N=577, étant la moyenne d'âge : 33 ans ; ligne de manoeuvre norme : 9,57 ans ; moyenne de pourcentage de la graisse : 38,62%; et ligne de manoeuvre norme de 6,88%), utiliser le protocole de Jackson et Pollock (1980), trois plis, pour d'evaluation du %G. De telles données avaient été tabulées et calculé d'utiliser statistique description. La table c'etait élaborée comme classification de niveaux se prolonger "d'Excellent" jusque "Trés Mouvais", ainsi comme la classification en percentiles et en pourcentage de la graisse. On te suggère que dans le futur plus études sont exécuté dans le sens pour se prolonger la quantité de données que classifient la composition corporel basé en pourcentage de la graisse, ainsi comme la construction de tables de référence pour région spécifique, faciliter ainsi le manquer d'exercices physique systématiser. Paroles-Clé : Anthropometria, Table de Normalité, Plis de Peau

PROPUESTA DE UNA TABLA CLASIFICATIVA DE PORCENTAJE DE GRASA CORPORAL, UTILIZANDO EL PROTOCOLO DE JACKSON Y POLLOCK (1980) CON 3 QUIEBRAS CUTANEAS, EN INDIVIDUOS DEL SEXO FEMENINO DE ACTIVA FITNESS, EN LA CIUDAD DE RIO DE JANEIRO - RJ - BRASIL

RESUMEN

Este estudio tiene como objetivo crear una tabla de normalidad del porcentaje de grasa (%G) para las populaciones específicas, con características semejantes a los alumnos de los gimnasios de la Zona Norte del Rio de Janeiro - RJ, del sexo femenino, con edades comprendidas entre 18 a 55 años. Por lo tanto, fue utilizado una base de datos con las evaluaciones de del Gimnasio Activa Fitness, de la ciudad de Rio de Janeiro - RJ (N=577, teniendo un promedio de edad: 33 años; desvío padrón: 9,57 anos; promedio del porcentaje de grasa: 38,62%; y desvío padrón de 6,88%), utilizando el protocolo de Jackson y Pollock (1980), 3 quiebras, para la estimativa do %G. Los datos fueron tabulados y calculados estadísticamente utilizando una estadística descriptiva. La tabla fue hecha teniendo como clasificación de niveles extendiéndose de "Excelente" hasta "Muy Horrible", así como la clasificación en presentís y en porcentaje de grasa. Sugerimos que se hagan más estudios futuros para ampliar la cantidad de datos que clasifican la composición del cuerpo, basados en los porcentajes de grasa, así como la elaboración de tablas de referencia para las regiones específicas, facilitando la prescripción del ejercicio físico sistematizado.

Palabras-Llaves: Antropometría, Tabla de Normalidad, Quiebras Cutáneas

PROPOSTA DE TABELA CLASSIFICATIVA DO PERCENTUAL DE GORDURA CORPORAL, UTILIZANDO O PROTOCOLO DE JACKSON E POLLOCK (1980) COM 3 DOBRAS CUTÂNEAS, EM INDIVÍDUOS DO SEXO FEMININO DA ACTIVA FITNESS, NA CIDADE DO RIO DE JANEIRO - RJ - BRASIL

RESUMO

Este estudo teve por objetivo elaborar uma tabela de normalidade de percentual de gordura (%G) para populações específicas, com características semelhantes a alunos de academias de ginástica da Zona Norte do Rio de Janeiro - RJ, do sexo feminino, com idades compreendidas entre 18 e 55 anos. Para tanto, foi utilizado um banco de dados de avaliações da academia Activa Fitness, da cidade do Rio de Janeiro - RJ (N=577, sendo a média de idade: 33 anos; desvio padrão: 9,57 anos; média de percentual de gordura: 38,62%; e desvio padrão de 6,88%), utilizando o protocolo de Jackson e Pollock (1980), três dobras, para estimativa do %G. Tais dados foram tabulados e calculados estatisticamente utilizando-se estatística descritiva. A tabela foi elaborada tendo como classificação de níveis estendendo-se de "Excelente" até "Muito Ruim", assim como a classificação em percentis e em percentual de gordura. Sugere-se que futuramente mais estudos sejam realizados no sentido de ampliar a quantidade de dados que classificam a composição corporal baseados no percentual de gordura, assim como a construção de tabelas de referência para regiões específicas, facilitando assim a prescrição do exercício físico sistematizado.

Palavras-Chave: Antropometria, Tabela de Normalidade, Dobras Cutâneas.