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Brief Article

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Concordance between the ideal cardiovascular health score and the Fuster-BEWAT score

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ARTICLE INFORMATION

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The authors declare no competing interests.

Abbreviations
BEWAT: Blood pressure, exercise, weight, alimentation, and tobacco

ABSTRACT

Introduction: The following five indicators of cardiovascular health: blood pressure, physical activity, body mass index, fruit and vegetable consumption and tobacco smoking, may be sufficient to predict cardiovascular risk in healthy individuals through the Fuster-BEWAT score.
Objectives: To compare the results of the Fuster-BEWAT score and the ideal cardiovascular health score to determine health.
Methods: A cross-sectional descriptive study was carried out in the Primary Care Service of the Hospital Manuel Fajardo Rivero in Santa Clara, from January to June 2019, evaluating the cardiovascular health status of 347 healthy individuals without a history of cardiovascular disease, between the ages of 40 and 59 years old. Cohen's kappa coefficient was used to determine the concordance between the ideal cardiovascular health score and the Fuster-BEWAT score.
Results: Low physical activity (79.8%), unbalanced diet (74.9%), and uncontrolled blood pressure were the worst markers found. Only 15.3% of the analyzed men and women met the ideal condition for all markers of the Fuster-BEWAT score and 17.8% of the ideal cardiovascular health score. The concordance obtained between both scores, through Cohen's kappa coefficient (0.935), showed an almost perfect relationship.
Conclusions: Both scores showed similar values. The Fuster-BEWAT score is simpler and does not require analytical results; it can be considered as a first option in contexts where access to laboratory tests is limited.
Keywords: Cardiovascular health, Ideal cardiovascular health score, Fuster-BEWAT Score

Concordancia entre el índice de salud cardiovascular ideal y el índice Fuster-BEWAT

RESUMEN

Introducción: Cinco indicadores de salud cardiovascular: presión arterial, actividad física, índice de masa corporal, consumo de fruta y verdura y fumar tabaco, pueden ser suficientes para predecir el riesgo cardiovascular en individuos sanos a través del índice de Fuster-BEWAT.
Objetivo: Comparar los resultados de los índices de Fuster-BEWAT y el de salud cardiovascular ideal para determinar la salud.
Método: Se realizó un estudio descriptivo transversal en el servicio de Atención

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Authors' contribution
RTC: Idea and design of the research; obtaining, analyzing and interpreting the data, as well as writing the manuscript.
MMF, WSL and JMPM: Obtaining the raw data and helping in writing the manuscript.
DTT and ORC: Analysis and interpretation of data as well as collaboration in writing the manuscript.
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Primaria del Hospital Manuel Fajardo Rivero de Santa Clara, en el período enero-junio de 2019, se valoró el estado de salud cardiovascular de 347 individuos sanos, sin antecedentes de enfermedad cardiovascular con edades comprendidas entre 40 y 59 años. Se usó el índice de Kappa de Cohen para determinar la concordancia entre el índice de salud cardiovascular ideal y el índice Fuster-BEWAT.
Resultados: La escasa actividad física (79,8%), la dieta no balanceada (74,9 %) y la presión arterial no controlada fueron los peores marcadores encontrados. Solo un 15,3% de los hombres y mujeres analizados cumplían con el estado ideal para todos los marcadores del índice de Fuster-BEWAT y 17,8% del índice de salud cardiovascular ideal. La concordancia obtenida entre ambos índices, a través del coeficiente Kappa de Cohen (0.935), demostró una relación casi perfecta.
Conclusiones: Las puntuaciones de los dos índices mostraron valores similares. El índice Fuster-BEWAT es más sencillo y no requiere resultados analíticos; puede considerarse la primera opción en contextos en los que el acceso a análisis de laboratorio es limitado.
Palabras clave: Salud cardiovascular, Índice de salud cardiovascular ideal, Índice de Fuster-BEWAT

INTRODUCTION

Cardiovascular diseases have become the leading cause of death in the world, as well as in Cuba[1]. Ideal cardiovascular health, intermediate and deficient, was defined by the Impact 2020 objectives of the American Heart Association[2], and they have changed the global approach to promoting optimal health and risk control, without focusing only in the prevention and treatment of diseases.

Ideal cardiovascular health is the simultaneous presence of three ideal health factors (normal cholesterol, normal blood pressure and absence of diabetes mellitus), and four ideal health behaviors (no smoking, normal weight, high physical activity and ideal diet)[2]. Previous studies suggest that people with five, six or seven ideal measures of cardiovascular health have up to ten times lower levels of ischemic heart disease, mortality from cardiovascular disease, stroke and mortality from all causes, compared to those with zero to one ideal measures[2-4].

A study carried out at the *Centro Nacional de Investigaciones Cardiovasculares Carlos III* (Spain), published in the *Journal of the American College of Cardiology*, shows: that the so-called Fuster-BEWAT score, a simple tool based on five cardiovascular health indicators, has the same efficacy when predicting the presence and extent of subclinical atherosclerosis in middle-aged healthy individuals than the ideal cardiovascular health score (ICHS) –the most common tool used today– which also includes cholesterol and glucose values, and therefore, a blood test is necessary[5].

Both tools show a good and comparable predictive value for detecting the degree of subclinical atherosclerosis in healthy individuals. However, with a promotional preventive approach, different studies have addressed the subject, and European countries have regulated and standardized the Fuster-BEWAT score[5], whose main variables (weight, body mass index, blood pressure, diet with fruits and vegetables intake, smoking and physical activity) are the main indicators of cardiovascular risk in primary health care, which do not require many financial resources and, thus, it must be taken into consideration because the results are reliable enough, like the WHO/ICHS tables, among others[6-8].

In Cuba, the scientific bibliography does not seem to register articles that refer to the use of the Fuster-BEWAT score, a reason that motivated the development of this research, with the objective of comparing the results of this score with the ICHS in estimating health levels.

METHOD

Type of study and population

A cross-sectional study was conducted in the Primary Care Service at the *Hospital Universitario Manuel Fajardo Rivero* of Santa Clara (Cuba), in the period January-June 2019. The state of cardiovascular health was assessed in healthy individuals with no history of heart disease, aged between 40 and 59 years, through the use of ISHC and the Fuster-

BEWAT score.

The sample, obtained by simple random probability sampling, was made up of 347 people. To determine the number of patients, a confidence level of 95%, precision of 8% and an expected proportion of 50 % were obtained.

Variables

The variables studied were: age, sex, smoking, body mass index, physical activity, diet, blood pressure, fasting glucose, total cholesterol and cardiovascular health.

The informed consent of the patient was requested and then the form was filled in, where the data of the mentioned variables were included. The body max index was calculated by dividing the body weight in kilograms between the height in meters squared; furthermore, after fasting for 12 hours, a blood sample was obtained from each patient in order to determine blood glucose, total cholesterol, HDL (high-density lipoprotein) cholesterol, LDL (low-density lipoprotein) cholesterol and triglycerides.

Cardiovascular health markers were considered according to the recommendations of the American Heart Association[2] (**Table 1**).

Cardiovascular health status

The seven behaviors and risk factors of the ISHC (exercise, body mass index, diet, smoking, blood pressure, serum cholesterol, and fasting glucose) were classified according to the American Heart Association[2] definitions as poor, intermediate or ideal. Each component was dichotomized as ideal *vs.* non-ideal, and the individuals were classified based on the total number of ideal indicators with: poor (0-2), intermediate (3-5) or ideal (6-7) cardiovascular health.

For the Fuster-BEWAT score, which includes five indicators of cardiovascular health (blood pressure, physical activity, body mass index, fruit and vegetable intake, and smoking habit), it is established that from 0 to 1 the cardiovascular health is poor, between 2 and 3 intermediate, and from 4 to 5, ideal.

Table 1. Cardiovascular health markers according to the American Heart Association[2].

Marker	Ideal	Intermediate	Poor
Tobacco	Never or stopped > 1 year ago	Stopped < 1 year ago	Current smoker
Body mass index	< 25 kg/m^2	25 - 30 kg/m^2	≥ 30 kg/m^2
Physical activity	≥ 150 minutes/week (min/wk) with moderate intensity or ≥ 75 min/wk rigorous intensity	1-149 min/wk of moderate intensity or 1-74 min/week of rigorous intensity	Less of min/wk previously described
Diet*	4 healthy components	2-3 healthy components	0-1 healthy component
Blood pressure	<120/80 mmHg, no treatment	<120/80 mmHg with treatment, or 120-139 / 80-89 mmHg, no treatment	≥ 140/90 mmHg
Fasting glucose	< 4.20 mmol/L, no treatment	< 4.20 mmol/L with treatment, or 4.20 - 6.11 mmol/L, no treatment	≥ 6.11 mmol/L
Total cholesterol	< 2.9 mmol/L, no treatment	2.9-5.2 mmol/L, with or without treatment	≥ 5.2 mmol/L

* Classification based on five healthy components of the diet[2]:

1. Daily intake of fruits, vegetables and products of plant origin, such as rice, beans, peas, and root vegetables.
2. Little intake of products rich in sugars.
3. Oil as the main source of fat.
4. Intake of fish or chicken at least once a week.
5. Low salt intake.

Statistical analysis

The data were included in the program SPSS version 13, charts and graphs were prepared, and statistical tests were applied, where the frequency distribution predominated. For matching the cardiovascular health concordance obtained through both scores, the Cohen's Kappa coefficient[9] was calculated (**Table 2**).

Table 2. Degree of concordance between the variables evaluated, according to Cohen's Kappa coefficient[9].

Value	Concordance
< 0.00	No concordance
0.00 - 0.20	Insignificant
0.21 - 0.40	Discrete
0.41 - 0.60	Moderate
0.61 - 0.80	Substantial
0.81 - 1.00	Almost perfect

RESULTS

In the study carried out, it was found that the worst markers included physical activity (79.8%) and an unbalanced diet (74.9%) that influenced poor cardiovascular health (**Figure 1**).

In **figure 2** is displayed the distribution of the population according to the ISHC and the Fuster-BEWAT score, which shows that only a 15.3% of men and women analyzed met the ideal state according to the Fuster-BEWAT score, and a 17.8% according to the rate of ideal cardiovascular health, with less risk profile in women and younger individuals.

When comparing the results of both scores, through the Cohen's Kappa coefficient, the value obtained was 0.935; this means that the concordance on assessing the cardiovascular health by both scores was almost perfect, because it is very close to 1.

This research contributed to the preparation of a brochure and a poster, through which the population can obtain updated information on the prevention of cardiovascular diseases and, in addition, they can calculate their own cardiovascular health status. Both resources illustrate, in a simple but very didactic way, key elements for promoting cardiovascular health.

DISCUSSION

This study confirmed that the population evaluated presented a low level of ideal cardiovascular health, with less risk evidence in women and younger individuals. These results are better than those obtained by Del Brutto *et al*[3], Brant *et al*[4] and Benziger *et al*[7], who found a lower prevalence of ideal cardiovascular health, although all agree that younger ages are healthier.

Brant *et al*[4] refer to published studies using the American Heart Association metrics, which have shown that the number of ideal indicators is inversely related to mortality from all causes and cardiovascular diseases. Fernandez-Alvira *et al*[5] show that healthier cardiovascular profiles are associated with lower prevalence and less extension of subclinical disease in healthy individuals, which shows the impact of lifestyles and risk factors on early stages of the disease. These results were obtained by evaluating the presence of a subclinical disease in different territories (atheroma plaques in carotid and iliofemoral arteries, abdominal aorta, and quantification of the calcium level in coronary arteries) using vascu-

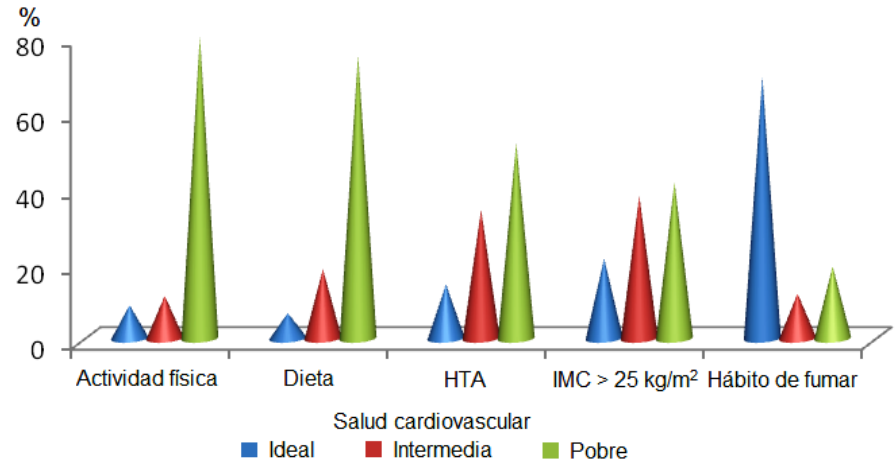

Figure 1. Distribución de la población según marcadores de salud cardiovascular. HTA, hipertensión arterial; IMC, índice de masa corporal.

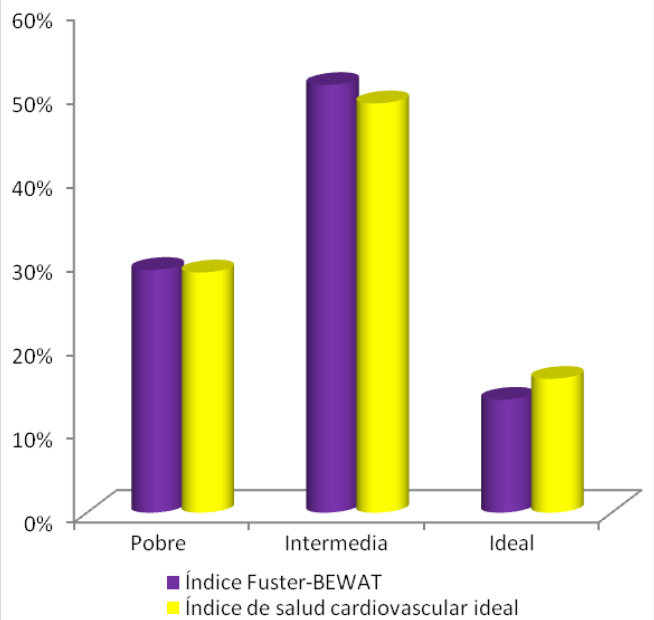

Figure 2. Distribución de la población según los índices de Fuster-BEWAT y el de salud cardiovascular ideal.

lar ultrasound techniques and computed axial tomography.

When evaluating the behavioral factors –physical activity, smoking, body mass index and diet–, the physical activity presented a lower prevalence of adjustment, followed by diet and body weight. In the opinion of this research's authors, this does not imply that analytics should be dispensed, but it is feasible to use this score as an educational method, with which each person can make an estimate of their risk level. These elements could influence prevention and self-care; for example, although evaluating the diet in Cuba is very difficult, there is no better control over it than what the individual himself can do.

Due to the scope of this problem and the complexity of its causes, which include cultural, social, political and health factors, the strategy to fight cardiovascular disease on a global scale must be equally sophisticated and comprehensive. As exposure to cardiovascular risk factors begins at an early age, this strategy must be expanded and adjusted throughout the individual's life[10-11].

The possibility of dispensing with blood tests to assess cardiovascular risk may be an advantage in regions or situations with limited health resources. It is, therefore, a more practical and economical option for promoting cardiovascular health, but not only that, it is also possible to use this Fuster-BEWAT score for education in non-health environments, such as schools, institutes or universities, or even as a tool to promote the adoption of healthy habits, since it allows to raise awareness among individuals from the direct benefits of a change in lifestyle.

The knowledge of the population´s cardiovascular health status is paramount in order to implement strategies aimed at reducing the prevalence of these diseases[12-15]. Despite having excellent human resources in Cuba and a health care system where health promotion and disease prevention are basic pillars, it was found that only a minority of the population studied had healthy lifestyles and habits. Therefore, it is necessary to focus efforts not only on the treatment of cardiovascular disease and prevention, but also on the promotion of adequate health and primary prevention, which is essential.

CONCLUSIONS

When comparing the results of the Fuster-BEWAT scores and that of ideal cardiovascular health in the study population, an almost perfect concordance (using Cohen's Kappa coefficient) was found; this shows that the Fuster-BEWAT score, which is simpler and does not require blood tests, can be considered the first in socioeconomic contexts where the access to laboratory tests is limited.

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