

## Prevalence of cardiovascular risk factors in Latin America: a review of the published evidence 2010-2015

*Prevalencia de factores de riesgo cardiovascular en América Latina: una revisión de la evidencia publicada de 2010 a 2015*

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### Key words:

Smoking, obesity, cardiovascular risk factor, Latin America.

### Palabras clave:

Tabaquismo, obesidad, factor de riesgo cardiovascular, Latinoamérica.

### ABSTRACT

**Introduction:** There are certain variables that help us to determine the probability of an individual developing cardiovascular disease, those variables are called risk factors. The more risk factors a person has, the more likely of cardiovascular disease. **Objectives:** To determine prevalence of cardiovascular risk factors in Latin America. **Material and methods:** A literature review published during the period 2010-2015, with the participation of Latin American countries, of which items were selected in English and Spanish data bases recognized worldwide as PubMed, OMIM, SCIELO, EBSCO and magazines cardiology and public health of each Latin American country. **Results:** Identified 3,645 articles of which 45 were selected; after examine and evaluate the methodological framework of the 45 articles, the information of these variable allowed did add up the sample of the articles (n = 7,192,262) for conclude than latin american have a higher prevalence of overweight/obesity, physical inactivity, smoking and alcohol intake. **Conclusions:** In the Latin American population there is a high prevalence of cardiovascular risk factors without significant differences by gender.

### RESUMEN

**Introducción:** Existen ciertas variables que nos ayudan a determinar la probabilidad de desarrollo de enfermedades cardiovasculares; estas variables son llamados factores de riesgo. Cuanto más factores de riesgo tenga una persona, mayores probabilidades tendrá de padecer una enfermedad cardiovascular. **Objetivos:** Determinar la prevalencia de los factores de riesgo cardiovascular en Latinoamérica. **Material y métodos:** Una revisión bibliográfica de publicaciones durante el periodo 2010-2015, con la participación de países de Latinoamérica, los cuales fueron seleccionados en inglés y español de bases de datos reconocidas a nivel mundial como PubMed, OMIM, SCIELO, EBSCO y revistas de cardiología y salud pública de cada país latinoamericano. **Resultados:** Se identificaron 3,645 artículos, de los cuales 45 fueron seleccionados; después de examinar y evaluar el marco metodológico de los 45 artículos, la información de estas variables permitió sumar la muestra de los artículos (n = 7,192,262) para concluir que los latinoamericanos tienen una alta prevalencia de sobrepeso/obesidad, sedentarismo, tabaquismo y alcoholismo. **Conclusiones:** En la población latinoamericana hay una alta prevalencia de los factores de riesgo cardiovascular sin diferencias significativas por género.

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### INTRODUCTION

Cardiovascular diseases (CVD) are leading cause of death worldwide. They are associated with both physical and mental disabilities, as well as significant economic costs.<sup>1</sup> It is estimated that about 23.3 million people will die from CVD in 2030, mainly

from heart disease and cerebrovascular accidents, and is expected to remain the leading cause of death. Most can be prevented by acting on CVD risk factors such as consumption of snuff, diet, overweight and obesity, physical inactivity, and controlling arterial hypertension (HTA), diabetes mellitus (DM), and dyslipidemia.<sup>2</sup>

The more risk factors a person presents, the higher the chances are for developing heart disease. Cardiovascular risk factors (CRF) are divided into 2: modifiable and non-modifiable (Table 1). Some risk factors can be changed, treated, or modified and others not. But the control of as many risk factors through changes in lifestyle and/or medication, can significantly reduce cardiovascular risk. According to two epidemiological studies and the INTERSTROKE INTERHEART, it seems clear that the main risk factors associated with the presentation of acute myocardial infarction are obesity, dyslipidemia, smoking, and arterial hypertension.<sup>3</sup>

Cardiovascular diseases were the direct cause of over 4 million deaths in Europe in 2002. 1.9 million in the European Union, accounting for 43% of all deaths of any age in men and 55% in women.<sup>4</sup> For this reason, it is best to avoid or reduce that probability,<sup>5</sup> but it should not be considered as the sole cause, whether as one element among multiple causes that affect cardiovascular health. It is therefore important to know the incidence, morbidity and mortality of cardiovascular diseases.

Studies of noncommunicable diseases in Latin America have largely focused on urban populations and upper middle income coun-

tries.<sup>6</sup> Previous research demonstrates many established cardiovascular disease risk factors in Latin America: aging, hypertension, diabetes/insulin resistance, obesity, dyslipidemia, inactivity, poor diet, and tobacco smoking.<sup>6,7</sup> Men generally show lower levels of awareness, treatment and control of cardiovascular risk factors<sup>8</sup> and smoke more<sup>9</sup> while women are more obese.<sup>10</sup>

## MATERIALS AND METHODS

A review of studies on hypertension, smoking, alcohol intake, overweight and obesity, high cholesterol, physical inactivity and diabetes in Latin America was performed.

Inclusion criteria for selecting articles were: a) studies published during the period 2010-2015; b) the study should have evaluated Latin American countries (Argentina, Bolivia, Brazil, Chile, Costa Rica, Colombia, Cuba, Ecuador, El Salvador, Honduras, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Venezuela, Uruguay, Dominican Republic); c) study population should be over 18 years old; e) study population of at least 500 participants; d) articles published in English or Spanish; f) data for each risk factor should have been divided by gender.

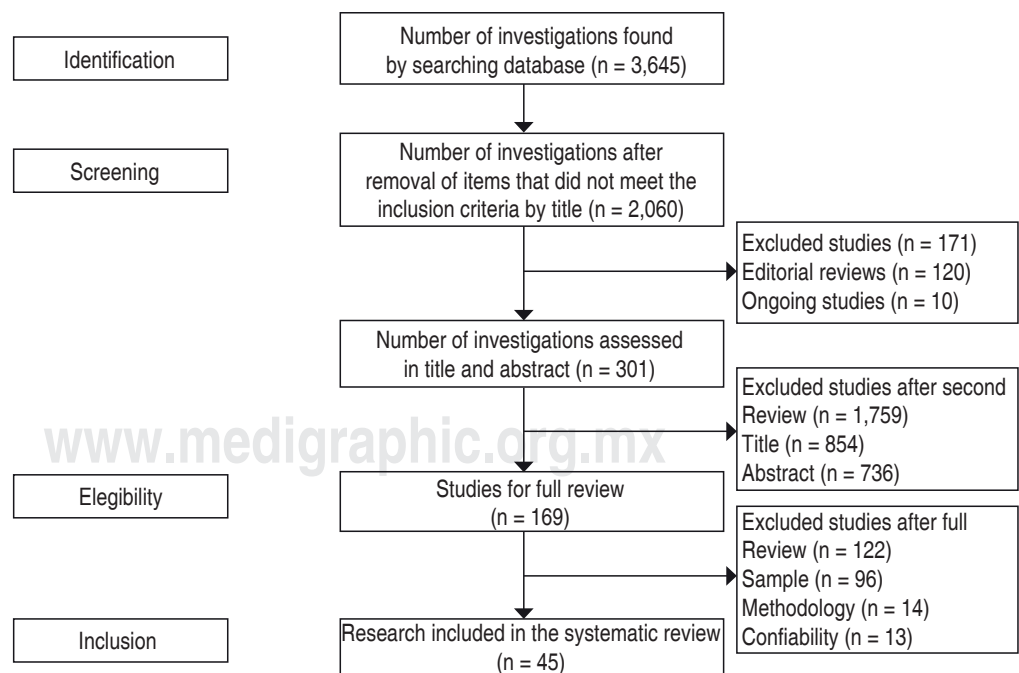


Figure 1.

Flow diagram for the search and selection for studies.

Data bases (PubMed, OMIM, SCIELO, EBSCO) and Cardiology and Public Health journals of each Latin American country were

**Table I. Risk Factors modifiables and non-modifiables.**

Modifiables	No modifiables
Overweight/obesity	Age
Abdominal obesity	Genetic inheritance
Physical inactivity	Race - Ethnicity
Arterial hypertension	Gender
Hypercholesterolemia	IAM History
Smoking	
Alcohol intake	
Diabetes	
Strees and anxiety	
Proper diet	

**Table II. Articles and sample distribution by country.**

Country	Articles*	Selected articles	Sample
México	676 (18.54%)	11	283,078
Colombia	155 (4.25%)	8	21,702
Chile	326 (8.94%)	6	12,726
Brasil	383 (10.50%)	6	6,410
Cuba	67 (1.83%)	3	4,703
Argentina	357 (9.79%)	3	50,236
Guatemala	35 (0.96%)	2	6,804,209
Nicaragua	4 (0.10%)	1	1,355
Panamá	19 (0.52%)	1	3,590
Perú	49 (1.34%)	1	589
Puerto Rico	95 (2.60%)	1	858
Venezuela	117 (3.20%)	1	900
Ecuador	36 (0.98%)	1	1,906
R. Dominicana	2 (0.05%)	0	0
Costa Rica	51 (1.39%)	0	0
Bolivia	14 (0.38%)	0	0
El Salvador	3 (0.08%)	0	0
Honduras	2 (0.05%)	0	0
Uruguay	46 (1.26%)	0	0
Paraguay	8 (0.21%)	0	0
Scielo	1,200	With PUBMED	----
Total	n = 3,645	45	7,192,262

\* Articles searched in the database of PUBMED, SCIELO, OMIM, EBSCO.

used for selection of articles. Search words included: Risk Factors in Latin America, Latin America, Cardiovascular Risk Factors. This search yielded 3,645 results related items CFR in Latin America, of which 2,060 items were excluded in a first filter due to insufficient sample or due to the reviewed risk factors did not meet the primary objective of the investigation. In a subsequent selection filter, 45 articles met all inclusion criteria (Figure 1).

## RESULTS

The literature search yielded 3,645 articles of which 45 studies (Table II) –summing a total population of 7,192,262 participants from different countries in Latin America– were selected. Mexico (18.54%) was the country with the highest number of publications on cardiovascular risk factors, followed by Brazil (10.50%), Argentina (9.79%), Chile (8.94%), Colombia (4.25%) and Puerto Rico (2.60%) countries with fewer publications were Nicaragua, Panama, Guatemala, Peru, Venezuela, Dominican Republic, Costa Rica, Cuba, Ecuador, Bolivia and El Salvador (Table III).

A summary of the included studies is included in Table III. Of those 45 scientific papers, 80% (n = 36) had a larger sample of women versus men with 20% (n = 9) of the articles reviewed.

The most frequent cardiovascular risk factor was arterial hypertension (30 art. – 66.6%), overweight/obesity (28 art. 62.2%), diabetes (25 art. – 55.55%) and smoking (24 art. – 53.3%); moreover, it is important to note that the prevalence of overweight/obesity was 53.8%, sedentarism 38.5%, alcoholism and smoking with the 31% each one, dyslipidaemics 29.4%, diabetes 25.1% at the end hypercholesterolemia and arterial hypertension with 21.6% and 14.1% respectively (Table IV).

## DISCUSSION

The results of this study were from a sample and results obtained in the review of articles selected from the databases.

It is very important the finding of a higher prevalence of risk factors in Latin American women compared with men; like the rise in

Table III. Design and general characteristics of the selected articles.

Name of articles	Journal	Authors	Population	Results of the investigation
Risk factors for cardiovascular and chronic diseases in a coffee-growing population. Colombia <sup>16</sup>	Rev. Salud Pública. 2012; 14 (3): 390-403	Miguel A. González, Rodolfo Dennis	Total 2,516 *W: 1,185 *M: 331	The prevalence of hyperlipidaemia was 62.1%, overweight or obese 42.9%, sedentarism 31.2%, arterial hypertension 26.2%, smoking 21.1%, high alcohol consumption level 2.2%, diabetes 4.6%. The 85% had at least 2 or more risk factors simultaneously The 62.5% were found with overweight/obesity and the 95.5% presented prehypertension
Characterization of the patients in a outpatient clinic of hypertension at one municipality of Risaralda, Colombia, 2005-2012 <sup>17</sup>	Rev. Med Risaralda. 2012; 18 (2)	Miguel Darío Valencia-García	Total 6,030 W: 4,271 M: 1,759	The 60.7% of males and 53.9% of females were overweight or obese according to their BMI <sup>18</sup> , 24.6% of males and 44.6% of females had abdominal obesity when National Cholesterol Education Program guidelines were used, but numbers changed to 62.5% and 67.0% when the International Diabetes Federation guidelines were used. The obesity, either determined by BMI, was associated with higher prevalence of diabetes, hypertension and dyslipidemia
IDEA Study (International Day for the Evaluation of Abdominal Obesity): Primary care study of the prevalence of abdominal obesity and associated risk factors in Colombia <sup>18</sup>	Biomédic. 2012; 32: 610-616	Álvaro J. Ruiz, Pablo J. Aschner	Total 3,795 W: 2,620 M: 1,167	The most prevalent risk factors in people who developed a cardiovascular event were high blood pressure: 16.8%; alcohol dependence: 14.1%, and other risk factor were overweight 33.4%, obese 13.3%, diabetes 4.6%
Self reported cardiovascular disease and association with biopsychosocial factors, Tolima, Colombia <sup>19</sup>	Rev Fac Nac Salud Pública. 2014; 32 (1): 80-87	Sánchez L, Barbosa JM	Total 1,219 W: 738 M: 481	The 40.1% presented overweight, 36.3% obese and the 70.6% obese central. 71% arterial hypertension. Argentina had a statistically higher frequency compared to the Colombian and Venezuelan in obese central, smoking and dislipidemia
MULATA study: Latin American sample of high blood pressure patients. Colombia <sup>20</sup>	Rev Méd Risaralda. 2013; 19 (2): 114-119	Diego Rosselli, Jorge Ospina	Total 2,798 W: 1,502 M: 1,296	The 39.1% presented overweight/obese, 23.3% was smokers and the 72.1% have high alcohol consumption
Prevalence of left ventricular hypertrophy in hypertensive patients. Colombia <sup>21</sup>	Acta Med Colomb 2014; 39: 244-249	Fred Gustavo Manrique, Juan Ospina,	Total 1,275	The study found a prevalence of hypertension, smoking and physical inactivity of 57.1%, 11.8% and 75% respectively in the total population
A population study of cardiovascular risk factors related to lifestyle, electrocardiographic findings and current medication of patients evaluated by the Cardiology service. Colombia <sup>22</sup>	Rev Colomb Cardiol 2012; 19: 61-71	Camilo Alvarado, Mónica Jaramillo,	Total 753 W: 346 M: 407	

Continuous Table III. Design and general characteristics of the selected articles.

Name of articles	Journal	Authors	Population	Results of the investigation
Cardiovascular risk factors in participants of a massive program of physical activity. Colombia <sup>23</sup>	Rev. Investigaciones Andina. No. 28 Vol. 16 - 130 p.	Andrés Felipe Hidalgo and José Rafael Tovar Cuevas	Total 3,316 W: 2,216 M: 1,110	The main reported risk factor was present in overweight, with the 40.3%, the 24.6% physical inactivity, 13.4% hyperlipidaemia, 12.6% smoking, 2.9% diabetes, and the 52.2% have two or more risk factors for cardiovascular disease
Prevalence of arterial hypertension, overweight and obesity in urban populations the state of Sinaloa, Mexico <sup>24</sup>	Rev Mex Cardiol 2012; 23 (1): 7-11	Abraham Pacheco, Carlos Corona	Total 1,630 W: 1,047 M: 583	The prevalence of arterial hypertension contemplated in the four cities was of 37.5%. Los Mochis city observed the highest prevalence (39%) in both genders. The obesity was 27.3%, while the overweight was of 45%
Hypertension: prevalence, early diagnosis, control and trends in Mexican adults <sup>25</sup>	Salud Publica Mex 2013; 55 suppl 2: S144-S150	Ismael Campos-Nonato, Lucía Hernández	Total 10,898	The prevalence of hypertension was 31.5%, of which 47.3% were unaware of their condition
Tobacco consumption, mortality and fiscal policy in Mexico <sup>26</sup>	Salud Publica Mex 2013; 55 Suppl 2: S276-S281	Carlos Manuel Guerrero, José Muñoz	Total 198,767	In 2012, 9.2% and 19% of Mexican youths and adults were current smokers. Between 2000 and 2012, smoking prevalence did not change. Mortality attributable to tobacco consumption for four diseases was estimated in 60,000 in 2010
Cardiovascular risk factors associated to poorly controlled glycemia in adults with Diabetes Mellitus. México <sup>27</sup>	Rev Med Hosp Gen Méx 2012; 75 (1): 14-23	Ismael Campos, Antonio González,	Total 3,559 W: 2,391 M: 1,168	The 61.6% suffered from hypertension, 23.4% hypercholesterolemia and 74.6% abdominal obesity. Obesity was positively associated with hypertension and hypercholesterolemia
Cardiovascular risk factors in a Mexican middle-class urban population. The Lindavista Study. Baseline data. Mexico <sup>28</sup>	Arch Cardiol Mex. 2013; 83 (4): 249-256	Alejandra Meaneya, Guillermo Ceballos	Total 2,602 W: 1,534 M: 1,068	Around 50% of the entire group were overweight, while around 24% were obese. 32% smoked; 32% were hypertensive with a 20% rate of controlled pressure. 6% had diabetes, and 14% had impaired fasting glucose; 66% had total cholesterol $\geq$ 200 mg/dL; 62% showed HDL-c <sup>b</sup> levels $<$ 40 mg/dL; 52% triglycerides $\geq$ 150 mg/dL, and 34% levels of LDL-c <sup>c</sup> $\geq$ 160 mg/dL. Half of the population studied had the metabolic syndrome
Diabetes in México. CARMELA Study <sup>29</sup>	Cir Cir 2011; 79: 424-431	Jorge Escobedo, Luisa Virginia,	Total 1,722 W: 889 M: 833	The prevalence of type 2 diabetes was 9.7%. The proportion of patients who were unaware of having diabetes was 26%. The main risk factors related to diabetes were age, abdominal obesity, hypertension, low and high cholesterol lipoproteins and hypertriglyceridemia



Continuous Table III. Design and general characteristics of the selected articles.

Name of articles	Journal	Authors	Population	Results of the investigation
Risk factors associated to diabetes in Mexican population and phenotype of the individuals who will convert to diabetes <sup>30</sup>	Salud Pública México	Clicerio González-Villalpando, Claudio	Un total 732	The prevalence of the diabetes was 32%, hypercholesterolemia and 38.2%, 15.4% overweight/obese
The frequency of risk factors associated with obesity and being overweight in university students from Colima, Mexico <sup>31</sup>	Rev. Salud Pública 2010; 12 (2): 197-207	Benjamín Trujillo, Clemente	Total 821 W: 441 M: 380	27.8% of males were overweight and 14.7% suffered from obesity; this was 17 and 5.2% in females, respectively
Prevalence of dyslipidemia in Mexico city and its association with other cardiovascular risk factors. CARMELA study results <sup>32</sup>	Gaceta Médica de México. 2014; 150: 128-136	Jorge Escobedo-de la Peña, Ramón de Jesús	Total 1,722 W: 899 M: 833	The prevalence of cholesterol $\geq$ 240 mg/dL was 16.4% and 34.1% had values between 200 and 240 mg/dL. Very high values of triglycerides were seen in 2.6% of studied subjects and 29.9% had high values. The prevalence of hypertriglyceridemia was higher in males 43.3% than females 23%
Metabolic syndrome in Mexican adults. Results from the National Health and Nutrition Survey <sup>33</sup>	Salud Pública Mex 2010; 52 suppl 1: S11-S18	Rosalba Rojas, Carlos Aguilar	Total 45,446 W: 19,178 M: 13,770	The prevalence of metabolic syndrome in Mexican adults aged 20 years or older was 36.8, 41.6 and 49.8%, respectively. Women were more affected than men due to the higher prevalence of central obesity
Independent Association of Smoking on Postoperative cardiac events and mortality at 30 days. Brasil <sup>34</sup>	Arq Bras Cardiol 2010; 94 (5): 607-614	Luciane Midory, Fabio Santana	Total 1,072 W: 164 M: 436	The study had the 24.7% actual smokers and 31.2% ex-smokers
Gender distribution of serum uric acid and cardiovascular risk factors: Population Study. Brasil <sup>35</sup>	Arq Bras Cardiol 2012; 98 (1): 13-21	Sergio Lamego Rodrigues, Marcelo Perim	Total 1,346 W: 701 M: 645	The prevalence of the physical inactivity was 73.9%, smoking 23.8%, overweight 34.3%, obese 15.4%
The association between cardiovascular risk factors and anthropometric obesity indicators in university students in São Luís in the state of Maranhão, Brasil <sup>36</sup>	Ciência & Saúde Coletiva, 20(2): 479-490, 2015	Carolina Abreu de Carvalho, Poliana Cristina	Total 968 W: 368 M: 600	The cardiovascular Risk factors in 968 university students was 73.9% physical inactivity, 37.8% Triglycerides, 70.1% hypertension, 47.6% excessive alcohol consumption, 43.4% metabolic syndrome, 9.3% smoking
Metabolic syndrome in workers in a university hospital. Brasil <sup>37</sup>	Rev Port Cardiol. 2012; 31 (10): 629-636	Cássia Eliana, Basei Rossaa, Paulo Ricardo	Total 740 W: 835 M: 451	Waist circumference was high in 55.4%. Overall MS prevalence was 12.8%, 16.2% in males and 11.6% in females. 50.1% of the sample were overweight, 66.6% reported consuming alcohol, only 10% smoked and 64.7% took no regular exercise

Continuous Table III. Design and general characteristics of the selected articles.

Name of articles	Journal	Authors	Population	Results of the investigation
Prevalence of metabolic syndrome and its association with educational inequalities among Brazilian adults: a population-based study <sup>38</sup>	Braz J Med Biol Res. 2011; 44 (7): 713-719	MF Gronner, PL Bosi, AM Carvalho G	Total 1,116	The metabolic syndrome was present in 45.5% of women and in 45.3% of men. The Low levels of HDL-C were the most prevalent MS component 76.3%. The waist circumference was almost twice more frequent in women with 66.5% than in men 37.4%
Arterial hypertension and its correlation with some risk factors in a small Brazilian city <sup>39</sup>	Arq Bras Cardiol 2010; 95 (4): 502-509	Flávia Miquetichuc, Paulo Brandão	Total 1,168 W: 738 M: 430	The prevalence of overweight was 33.7% and 16.0% obesity, the altered waist circumference was 51.8% and 23.2% smoking. The prevalence of arterial hypertension was 32.7% in greater numbers Among Men (35.8%) than women (30.9%)
Smoking habit prevalence and cardiovascular risk factors in a town located in a rural area of the Buenos Aires province, Argentina <sup>40</sup>	Rev Am Med Resp 2011; 3: 110-116	Maria Del Rosario Landea, Martin Salazar	Total 1,591 W: 1,091 M: 500	The prevalence of current smokers was 32.8 in men and 25.4 in women. In the age group that included people between the ages 15 to 24 years, 41.8% of men and 31.5% of women were current smokers. 24.5% participants were hypertensives, 15.4% diabetics, 25.0% obeses and 22.9% dyslipidaemics; 20.9% had metabolic syndrome and 27.1% of those with cardiovascular disease, were current smokers
Gender Differences in the Treatment of Acute Coronary Syndromes: Results of the Epi-Cardio Registry. Argentina <sup>41</sup>	Rev Argent Cardiol. 2013; 81: 307-315	Javier A. Mariani,† Laura Antonietti,†	Total 8,997 M: 6,422 W: 2,575	The prevalence of arterial hypertension was 62.2%, dyslipidemia 45%, smoking 31.2%, diabetes 20.3%, pre IAM 17.9%
Estimating the burden of cardiovascular disease attributable to modifiable risk factors in Argentina <sup>42</sup>	Rev Panam Salud Pública. 2010; 27 (4)	Adolfo Rubinstein, Lisandro Colantonio	Total 39,648	The cardiovascular risk factor more important in men and women was arterial hypertension, 37.0%, hypercholesterolemia 38.5%
Estimation of the cardiovascular risk by means of boards of the World Organization of the Health. Sanitary Area "Héroe del Moncada". Cuba <sup>43</sup>	Rev Cubana Cardiol Cir Cardiovasc. 2014; 20 (1)	Dra. Nury B. Armas Rojas, Dr. Reinaldo de la Noval García,	Total 902 W: 610 M: 292	The prevalence of factors of risk found in order descending was: high LDL-C, hypertriglyceridemia, hypercholesterolemia, arterial Blood pressure, habit to smoke, obesity by corporal index of mass HDL-C lowers
Total Cardiovascular Risk Assessment and Management Using Two Prediction Tools, with and without Blood Cholesterol <sup>44</sup>	Medic Review, October. 2013; 15 (4):	Porfirio Nordet, Shanthi Mendis	Total 1,286 W: 835 M: 451	Cardiovascular risk factor prevalence in participants. Systolic blood pressure $\geq$ 140 mmHg was the highest 34.3%, followed by smoking 28.7%, fasting blood glucose $\geq$ 7 mmol/L 5.1% and fasting blood cholesterol $\geq$ 6 mmol/L 5.9%

Continuous Table III. Design and general characteristics of the selected articles.

Name of articles	Journal	Authors	Population	Results of the investigation
Prevalence of risk factors of non-contagious diseases. Cuba <sup>45</sup>	Rev. Ciencias Médicas. 2013; 17(2):2-12	Eugenia Torres, Odalys Orraca	Total 2,515	The prevalence of smoking was 23.5%; alcohol drinkers 19.4%, physically active at work and free time 21.7%; fruits and vegetables consumers reached only 13.8% and 15.2% respectively; 77.5% used cooking oil, of out them 58.6% had breakfast; obese 16.7%; hypertensive 34.1% with 9.9% of diabetic people; 11.1% suffered from hypercholesterolemia with hypertriglyceridemia 13.6%
An approach in determining the prevalence of hypertension, cardiovascular risk factors and Lifestyle characteristics in Venezuela <sup>46</sup>	Avances Cardiol. 2014; 34 (2): 128-134	Drs. Roberto López Nouel C, Dollys Hurtado	Total 900 W: 405 M: 495	The prevalence of hypertension was 34.23%. The 17% were unaware, The prevalence of hypercholesterolemia was 18.7%, dysglycemia 38.95%, diabetes mellitus 14.25% and prediabetes by glycosylated Hb 40.7%. The prevalence of hypertension, hypercholesterolemia, dysglycemia and diabetes mellitus was higher in women. Prevalence of obesity by BMI was 29.8%, abdominal obesity 47.9% in men and 46.5% in woman, active smokers 20.7%, sedentary lifestyle 60.7%
Long term follow up of patients consulting in a Chest Pain Unit. Chile <sup>47</sup>	Rev Med Chile. 2010; 138: 1117-1123	Luigi Gabrielli, Pablo Castro	Total 1,168 W: 362 M: 806	The prevalence of arterial hipertensión was 49%, dislipidemia 39%, diabetes mellitus 15%, smoking 33%
Prevalence of metabolic syndrome in Mapuche individuals living in urban and rural environment in Chile <sup>48</sup>	Rev Med Chile. 2014; 142: 953-960	Luis Ibañez, Ruth Sanzana, Carlos Salas	Total 1,077	The prevalence was significantly lower in male MR <sup>d</sup> (13%) compared to other groups (22, 23 and 25% among female MR, female MU <sup>e</sup> and male MU respectively). Also, the prevalence of central obesity and low HDL-cholesterol were significantly lower in male MR. MU are at an increased risk of developing MS compared to MR. This risk increases along with age or body mass index of the population
Association between diabetes mellitus and cardiovascular disease in Chilean adults. Analysis of the national health survey 2009-2010 <sup>49</sup>	Rev Med Chile. 2014; 142: 175-183	Antonio Arteaga, Alberto Maiz	Total 5,416 W: 3,216 M: 2,200	The prevalence of overweight was 34.6%, obesity 25.3%, diabetes 9.37%, smoking by gender was 28.2% in women and 23.8% in men



Continuous Table III. Design and general characteristics of the selected articles.

Name of articles	Journal	Authors	Population	Results of the investigation
Cardiovascular risk factors in a group of health care workers. Chile <sup>50</sup>	Rev Med Chile. 2012; 140: 602-608	Verónica Kramer, Marcela Adasme	Total 888 W: 674 M: 214	19% of participants had high blood pressure, 30% hypercholesterolemia, 6% diabetes, 41% smoked, 88% were sedentary and 26% had a family history of cardiovascular diseases. 5% of participants did not have any risk factor, 20% had one risk factor, 32% had two and 43% had three or more
Physical activity and cardiovascular risk factors among Chilean young men and women. Chile <sup>51</sup>	Rev Med Chile. 2010; 138: 1209-1216	Antonio Arteaga, Patricia Bustos	Total 983 W: 556 M: 427	The triglyceridos and arterial hypertension was higher in men than women. The obesity, low level of HDL-c and central circumference was higher in women than men
Clinical characteristics of patients with Acute Myocardial Infarction and no significant coronary artery lesions. GEMI Study (2011-1013). Chile <sup>52</sup>	Rev Chil Cardiol. 2014; 33: 165-172	Rodrigo Maldonado, Andrea Madariaga, Melgar	Total 3,194 W: 1,268 M: 1,926	Compared to the group with significant lesions, the prevalence of hiperlipidemia 30.2 versus 42.8%, diabetes mellitus 14.7 versus 28.9%, and smoking habit 40.5 versus 61.3%. This group had a higher prevalence of non ST elevation acute myocardial infarction
Prevalence of cardiovascular risk factors in the population in Guatemala <sup>53</sup>	Rev Guatem Cardiol. 2012; 22 (2): 3-19	Ismael Guzmán, Cesar García	Total 6,802,741	It is estimated that the population of Guatemala over 19 year presents: 98.81% impairment of HDL, altered preprandial glycemia 64.14%, 53.75% overweight and obesity, hypertriglyceridemia 39.09%, LDL high 29.36%, hypertension 13.33%, hypercholesterolemia 21.24%; 47.63% family background and personal 32.26%. They were identified as high risk to 588,491 people (8.7%), medium risk 313,729 (4.6%), low Risk to 4,467 (0.1%) without risk 5,896,054 (86.7%)
Chest pain associated with heart Ischemic in emergency department Internal medicine hospital Roosevelt. Guatemala <sup>54</sup>	Rev Guatem Cardiol. 2013; 23 (2): 49-52	Pedro Suasnavar Gustavo Sotomora	Total 1,468 W: 833 M: 635	The main cardiovascular risk factors were diabetes mellitus 39% and arterial hypertension 33%
Sex Differences in Risk Factors for Cardiovascular Disease. Perù <sup>55</sup>	Revista PLoS ONE. 7(4): e35127	Antonio Bernabé-Ortiz, Catherine Pastorius B	Total 589 W: 307 M: 282	Women were more likely to be obese and have metabolic syndrome than men, explaining the greatest variability for obesity and metabolic syndrome but not for hypertension
Association between adiposity indices and cardiometabolic risk factors among adults living in Puerto Rico <sup>56</sup>	Public Health Nutr. 2011; 14 (10): 1714-1723	Cristina Palacios, Cynfhia Pérez	Total 858 W: 564 M: 294	According to BMI classification, 37.7% were overweight and 41.3% were obese, whereas 22.5% were normal weight and 1.9% were underweight; more men were overweight, whereas more women were obese. The prevalence of high blood pressure was 45.6%, that of high fasting glucose levels (> 100 mg/dL) was 49.8%

Continuous Table III. Design and general characteristics of the selected articles.

Name of articles	Journal	Authors	Population	Results of the investigation
Prevalence of Hypertension and Associated Risk Factors in Six Nicaraguan Communities <sup>57</sup>	Ethn Dis. 2012; 22 (2): 129-135	Timothy S. Laux, BA	Total 1,355 Adults	The prevalence of hypertension was 22.0%. Blood pressure was controlled in 31.0% of male hypertensives and 55.1% of female hypertensives. Older age and higher body mass index were strongly associated with hypertension. Women who completed primary school had a lower risk of hypertension compared to those with no formal education. Diabetes mellitus was found in 1.2% of men and 4.3% of women. Male sex was independently associated with decreased risk of diabetes. Of the participants, 7.3% (262/3590) were aware of having diabetes and 2.2% (78/3590) were unaware. The estimated prevalence of diabetes mellitus was 9.5% (340/3590) and increased in proportion to increasing age. The logistic regression revealed relationships between diabetes and age, sex, area of residence and sociocultural groups. 77.9% of the people aware of having diabetes received treatment and 53.4% have not stabilized the disease
Prevalence, sociodemographic distribution, treatment and control of diabetes mellitus in Panama <sup>58</sup>	Diabetology & Metabolic Syndrome 2013, 5:69	Anselmo J Mc Donald, Jose A Montenegro	Total 3,590	Prevalence of CVD <sup>f</sup> risk factors varied by Hispanic/Latino background; obesity and current smoking rates were highest among Puerto Rican participants (for men, 40.9% and 34.7%; for women, 51.4% and 31.7%, respectively), hypercholesterolemia prevalence was highest among Central American men (54.9%) and Puerto Rican women (41.0%). Large proportions of participants (80% of men, 71% of women) had at least 1 risk factor. Age and sex-adjusted prevalence of 3 or more risk factors was highest in Puerto Rican participants (25.0%) and significantly higher ( $p < .001$ ) among participants with less education (16.1%), those who were US-born (18.5%), those who had lived in the United States 10 years or longer (15.7%), and those who preferred English (17.9%)
Prevalence of Major Cardiovascular Risk Factors and Cardiovascular Diseases Among Hispanic/Latino Individuals of Diverse Backgrounds in the United States <sup>59</sup>	JAMA. 2012; 308 (17): 1775-1784	Martha L. Daviglus, Gregory A. Talavera	Total 15,079	Women was had higher hypertension than men 81.5% versus 68.3% and diabetes 38.2%
There is a difference in the evolution acute and late in women with myocardial infarction? <sup>60</sup>	Rev Ecuat. Cardiologia. 2015; 1 (1)	Castillo, Maria Arruda, Guilherme	Total 1,906 W: 545 M: 1,352	

\*M = Men; W: Women

<sup>a</sup>BMI = Body mass index; <sup>b</sup>HDL-c = High density lipoprotein control; <sup>c</sup>LDL-c = Low density lipoprotein control; <sup>d</sup>MR = Mapuche rural; <sup>e</sup>MU = Mapuche urban; <sup>f</sup>CVD: Cardiovascular diseases.

Table IV. Relationship between sample and percentage of cardiovascular risk factors.

Reference	Sample	Overweight/ obesity	HTA*	Diabetes	Hyperchol**	Smoking	Sedentiarism	Alcohol drinkers	Dyslipidaemics
González et al <sup>16</sup>	n = 2,516	1079-42.8%	1079-42.9%	115-4.6%	---	530-21.1%	785-31.2%	55-2.2%	1559-62.1%
Valencia et al <sup>17</sup>	n = 6,030	3768-62.4%	5758-95.5%	---	---	---	---	---	---
Ruiz et al <sup>18</sup>	n = 3,795	2120-56%	---	2484-65.4%	---	---	---	---	---
Sanchez et al <sup>19</sup>	n = 1,219	571-46.8%	205-16.8%	56-4.6%	---	---	---	173-14.1%	---
Rosselli et al <sup>20</sup>	n = 2,798	2137-76.3%	1958-71%	---	---	---	---	---	---
Mannique et al <sup>21</sup>	n = 1,275	498-39.1%	---	---	---	297-23.3%	---	919-72.1%	---
Alvarado et al <sup>22</sup>	n = 753	564-75%	430-57.1%	---	---	89-11.8%	---	---	---
Hidalgo et al <sup>23</sup>	n = 3,316	1336-40.3%	---	96-2.9%	---	417-12.6%	815-24.6%	---	444-13.4%
Pacheco et al <sup>24</sup>	n = 1,630	1178-72.2%	611-37.5%	---	---	---	---	---	---
Campos et al <sup>25</sup>	n = 10,898	---	3432-31.5%	---	---	---	---	---	---
Guerrero et al <sup>26</sup>	n = 198,767	---	---	---	---	56052-28.2%	---	---	---
Campos et al <sup>27</sup>	n = 3,559	---	2192-61.6%	---	833-23.4%	---	---	---	---
Meaney et al <sup>28</sup>	n = 2,602	1925-74%	823-32%	156-6%	---	823-32%	---	---	---
Escobedo et al <sup>29</sup>	n = 1,722	---	---	167-9.7%	---	---	---	---	---
Gonzales et al <sup>30</sup>	n = 732	112-15.4%	---	234-32%	279-38.2%	---	---	---	---
Trujillo et al <sup>31</sup>	n = 821	257-31.3%	---	---	---	---	---	---	---
Escobedo et al <sup>32</sup>	n = 1,722	---	---	---	861-50%	---	---	---	---
Rojas et al <sup>33</sup>	n = 45,446	34811-76.6%	35629-78.4%	15224-33.5%	24040-52.9%	20905-46%	---	---	---
Midory et al <sup>34</sup>	n = 1,072	---	---	---	---	265-24.7%	---	---	---
Lamego et al <sup>35</sup>	n = 1,346	669-49.7%	678-70.1%	---	---	320-23.8%	994-73.9%	---	---
Abreu et al <sup>36</sup>	n = 968	---	---	---	---	90-9.3%	715-73.9%	461-47.6%	---
Basei et al <sup>37</sup>	n = 740	370-50.1%	---	---	---	74-10%	---	493-66.6%	---
Gronner et al <sup>38</sup>	n = 1,116	797-71.4%	661-59.2%	148-13.2%	---	107-20.2%	---	---	852-76.3%
Miquetichue et al <sup>39</sup>	n = 1,168	580-49.7%	382-32.7%	---	---	270-23.2%	---	---	---
Landa et al <sup>40</sup>	n = 1,591	292-25%	286-24.5%	180-15.4%	---	679-58.2%	---	---	267-22.9%
Mariani et al <sup>41</sup>	n = 8,997	---	5596-62.2%	1826-20.3%	---	2807-31.2%	---	---	4048-45%
Rubinstein et al <sup>42</sup>	n = 39,648	---	14669-37%	---	15264-38.5%	---	---	---	---
Armas et al <sup>43</sup>	n = 902	222-24.6%	272-30.1%	79-8.7%	237-26.2%	255-28.2%	---	---	458-50.7%
Nordet et al <sup>44</sup>	n = 1,286	---	441-34.3%	66-5.1%	---	369-28.7%	---	---	---
Marimón et al <sup>45</sup>	n = 2,515	420-16.7%	857-34.1%	248-9.9%	---	591-23.5%	---	488-19.4%	---
López et al <sup>46</sup>	n = 900	268-29.8%	308-34.2%	128-14.2%	168-18.7%	---	---	---	---
Gabrielli et al <sup>47</sup>	n = 1,168	---	572-49%	175-15%	---	385-33%	---	---	455-39%
Ibañez et al <sup>48</sup>	n = 1,077	754-70%	---	---	---	---	---	---	---
Arteaga et al <sup>49</sup>	n = 5,416	3244-59.9%	---	507-9.37%	---	1430-26.4%	---	---	---

**Continuous Table IV. Relationship between sample and percentage of cardiovascular risk factors.**

Reference	Sample	Overweight/ obesity	HTA*	Diabetes	Hyperchol**	Smoking	Sedentarism	Alcohol drinkers	Dyslipidaemics
Kramer et al <sup>50</sup>	n = 888	---	168-19%	53-6%	266-30%	364-41%	231-26%	---	---
Arteaga et al <sup>51</sup>	n = 983	494-50.3%	58-5.9%	52-5.3%	258-26.2%	---	---	---	657-66.8%
Maldonado et al <sup>52</sup>	n = 3194	---	---	923-28.9%	---	1957-61.3%	---	---	964-30.2%
Melgar et al <sup>53</sup>	n = 6802741	3656473-53%	904764-13.3%	---	1444902-21.2%	---	---	---	1997284-29.3%
Suasnavar et al <sup>54</sup>	n = 1.468	---	484-33%	572-39%	---	---	---	---	---
Bernabe et al <sup>55</sup>	n = 589	124-21%	77-13.1%	---	245-41.6%	59-10%	173-20.7%	460-78.1%	341-57.9%
Palacios et al <sup>56</sup>	n = 858	677-79%	391-45.6%	427-49.8%	---	---	---	---	---
Laux et al <sup>57</sup>	n = 1.355	---	298-22%	75-5.5%	---	---	---	---	---
Donald et al <sup>58</sup>	n = 3.590	---	---	341-9.5%	---	---	---	---	---
Daviglus et al <sup>59</sup>	n = 15.079	6785-45%	---	---	7690-51%	4825-32%	---	---	---
Castillo et al <sup>60</sup>	n = 1.906	---	1368-71.7%	728-38.2%	---	---	---	---	---
Total (n = 7,192,262)		3.722.525	984.447	25.060	1.495.043	93.960	3.713	3.049	2.007.329

\* Arterial hipertension.  
\*\* Hypercholesterolemia.

obesity in women. These data are similar to most items of risk factors aimed at determining the prevalence of obesity in women vs men.

In other studies conducted it has been reported that diabetes is associated with overweight and obesity in both men and women;<sup>11-13</sup> In the present study, we observed the same relationship when the information of the selected items filtered.

The CARMELA study of 2011 (Multiple Cardiovascular Risk Factor Evaluation in Latin America)<sup>13</sup> undertaken in Mexico City, Bogota and Santiago de Chile yielded similar results regarding risk factors such as abdominal obesity and metabolic syndrome citing a higher prevalence of women compared with men.

The INTERHEART<sup>14</sup> study was of greater magnitude due to realized 52 countries on five continents, with more than 29,000 individuals between cases and controls, which showed that factors most common risk (smoking, dyslipidemia, hypertension, diabetes, central obesity, stress, moderate alcohol intake, regular physical activity and intake of fruits and vegetables) accounted for 90% of the risk attributable to men and 94% of the risk for women.

Snuff consumption, alcohol intake, physical inactivity, obesity, overweight, high cholesterol and diabetes were the most studied in the FRC reviewed articles. The results of this study are similar or different to those reported in previous years on cardiovascular risk factors;<sup>15</sup> hence the importance of updating the epidemiology of cardiovascular risk factors that affect men and women in Latin America; to develop recommendations and strategies to reduce the incidence of these risk factors in the future.

## CONCLUSIONS

In the Latin American population there is a high prevalence of cardiovascular risk factors, which each day increase their prevalence in the population without age or gender discrimination; the investigations revised in this article shows its high prevalence and equality between men and women. Moreover, it is important to note that overweight/obesity, physical inactivity, smoking and alcohol consumption are the 4 main CRF affecting the population Latin American without significant differences by gender.

These findings highlight the importance of healthy lifestyles and performing exercises regularly during the week, in particular a low calorie diet and consistent exercise program, for enhance caloric expenditure and prevention of cardiovascular diseases. It requires further research to consolidate about the effects and Alterations in cardiovascular risk factors in Latin American population and how exercise can reverse These abnormalities And Also That the exercise and Its recommendations gonna be promoted by health professionals.

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### REFERENCES

- Sánchez R, Ayala M, Baglivio H, Velásquez C, Burlando G, Kohlmann O, Jimenez J. On behalf of the Latin American Expert Group. Latin American guidelines of hypertension. *J Hipertens*. 2009; 27: 905-922.
- World Health Organization. Cardiovascular diseases [Internet]. 2015 [updated January 2015]. Available from: [http://www.who.int/topics/cardiovascular\\_diseases/en/](http://www.who.int/topics/cardiovascular_diseases/en/)
- López-Jaramillo P, López J. Lecciones aprendidas de dos grandes estudios epidemiológicos de enfermedades cardio-cerebro-vasculares en las que ha participado Colombia. *Rev Col Cardiol*. 2010; 17 (5): 195-199.
- Maroto J, De Pablo C, Rehabilitación Cardiovascular. Madrid: Ed. Medica Panamericana. Chapter 1, Cardiac rehabilitation; p.3.
- Illaraza H, Alvarez M, Mendoza, B. Rehabilitación Cardiaca y Prevención Secundaria. Libro 5 Ciudad de Mexico: Intersistemas Editores; 2004.
- Chan JM, Rimm EB, Colditz GA et al. Obesity, fat distribution, and weight gain as risk factors for clinical diabetes in men. *Diabetes Care*. 1994; 17: 961-969.
- Acota-Cázares B, Escobedo-de la Peña J. High burden of cardiovascular disease risk factors in Mexico: An epidemic of ischemic heart disease that may be on its way? *Am Heart J*. 2010; 160 (2): 230-236.
- Goldhaber-Fiebert JD, Goldhaber-Fiebert SN, Andorsky DJ. Male involvement in cardiovascular preventive healthcare in two rural Costa Rican communities. *Prev Med*. 2005; 40 (6): 690-695.
- Champagne BM, Sebrie EM, Schargrotsky H, Pramparo P, Boissonnet C, Wilson E. Tobacco smoking in seven Latin American cities: the CARMELA study. *Tobacco Control*. 2010; 19 (6): 457-462.
- Kabagambe EK, Baylin A, Campos H. Nonfatal acute myocardial infarction in Costa Rica: modifiable risk factors, population-attributable risks, and adherence to dietary guidelines. *Circulation*. 2007; 115 (9): 1075-1081.
- Schargrotsky H, Hernandez-Hernandez R, Champagne BM et al. CARMELA: assessment of cardiovascular risk in seven Latin American cities. *Am J Med*. 2008; 121 (1): 58-65.
- Colditz GA, Willett WC, Rotnitzky A et al. Weight gain as a risk factor for clinical diabetes mellitus in women. *Ann Intern Med*. 1995; 122: 481-486.
- Pramparo P, Boissonnet C, Schargrotsky H. Evaluación del riesgo cardiovascular en siete ciudades de Latinoamérica: las principales conclusiones del estudio CARMELA y de los subestudios. *Revista Argentina de Cardiología*. 2011; 79 (4): 337-382.
- Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F et al. INTERHEART Study Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet*. 2004; 364 (9438): 937-952.
- Deen D. Metabolic syndrome: time for action. *Am Fam Physi*. 2004; 69: 2875-2882.
- González M, Dennis R, Devia J et al. Factores de riesgo cardiovascular y de enfermedades crónicas en población caficultora. *Rev Salud Pública*. 2012; 14 (3): 390-403.
- Valencia M, Aguilar O, Rodriguez A. Caracterización de los pacientes en una consulta de hipertensión arterial de un municipio de Risaralda, Colombia, 2005-2012. *Rev Med Risaralda*. 2012; 18 (2): 122-128.
- Ruiz A, Aschner P, Puerta M, Cristancho R. Estudio IDEA (International Day for Evaluation of Abdominal Obesity): prevalencia de obesidad abdominal y factores de riesgo asociados en atención primaria en Colombia. *Biomédica*. 2012; 32: 610-616.
- Sanchez L, Barbosa J, Arias S. Morbilidad cardiovascular por autoreporte y su asociación con factores biopsicosociales, Tolima, Colombia. *Rev Fac Nac Salud Pública*. 2014; 32 (1): 80-87.
- Rosselli D, Ospina J, Rueda J. Estudio MULATA: muestra latinoamericana de pacientes con tensión arterial elevada. *Rev Med Risaralda*. 2013; 19 (2):114-119.
- Manrique F, Ospina J, Herrera G. Prevalencia de hipertrofia ventricular izquierda en pacientes hipertensos. *Acta Med Colomb*. 2014; 39: 244-249.
- Alvarado C, Jaramillo M, Matijasevic E, Rendón I et al. Estudio poblacional de factores de riesgo cardiovascular relacionados con el estilo de vida, hallazgos electrocardiográficos y medicación actual de pacientes valorados por el servicio de Cardiología. *Rev Colomb Cardiol*. 2012; 19: 61-71.
- Hidalgo A, Tovar J. Factores de riesgo cardiovascular en participantes de un programa masivo de actividad física. *Investigaciones Andina* 2014; 16 (28): 949-962.
- Ureña A, Corona C, Osuna M, Jimenez S. Prevalencia de hipertensión arterial, sobrepeso y obesidad en poblaciones urbanas del estado de Sinaloa, México. *Rev Mex Cardiol*. 2012; 23 (1): 7-11.
- Campos I, Hernandez L, Rojas R, Pedroza A, Medina C, Barquera S. Hipertensión arterial: prevalencia, diagnóstico oportuno, control y tendencias en adultos mexicanos. *Salud Publica Mex*. 2013; 55 (Suppl 2): S144-S150.



26. Guerrero C, Muñoz J, Saenz B, Reynales L. Consumo de tabaco, mortalidad y política fiscal en México. *Salud Publica Mex.* 2013; 55 (Suppl 2): S276-S281.
27. Campos I, Gonzales A, Barquera S. Factores de riesgo cardiovascular asociados a obesidad y descontrol glucémico en adultos con diabetes mellitus. *Rev Med Hosp Gen Méx.* 2012; 75 (1): 14-23.
28. Meaney A, Ceballos G, Gutierrez G et al. Cardiovascular risk factors in a Mexican middle-class urban population. The Lindavista Study. Baseline data. *Arch Cardiol Mex.* 2013; 83 (4): 249-256.
29. Escobedo Jorge, Buitron Luisa, Cenobio Jesús. Diabetes en México. Estudio CARMELA. *Cir Cir.* 2011; 79: 424-431.
30. Gonzales C, Dávila C, Zamora M et al. Risk factors associated to diabetes in Mexican population and phenotype of the individuals who will convert to diabetes. *Salud Publica Mex.* 2014; 56: 317-322.
31. Trujillo B, Vasquez C, Almanza J et al. Frecuencia y factores de riesgo asociados a sobrepeso y obesidad en universitarios de Colima, México. *Rev Salud Pública.* 2010; 12 (2): 197-207.
32. Escobedo J, Ramón J, Schargrodsky H, Champagne B. Prevalencia de dislipidemias en la ciudad de México y su asociación con otros factores de riesgo cardiovascular. Resultados del estudio CARMELA. *Gac Med Mex.* 2014; 150: 128-136.
33. Rojas R, Aguilar C, Jimenez A et al. Metabolic syndrome in Mexican adults. Results from the National Health and Nutrition Survey 2006. *Salud Publica Mex.* 2010; 52 (Supl 1): S11-S18.
34. Midory L, Santana F, Arruda M. Asociación independiente del tabaquismo a los eventos cardiacos postoperatorios y a la mortalidad a 30 días. *Arq Bras Cardiol.* 2010; 94 (5): 607-614.
35. Lamego S, Perim M, Pires D et al. Distribución por género del ácido úrico sérico y factores de riesgo cardiovascular: estudio poblacional. *Arq Bras Cardiol.* 2012; 98 (1): 13-21.
36. de Carvalho CA, Fonseca PC, Barbosa J et al. The association between cardiovascular risk factors and anthropometric obesity indicators in university students in São Luís in the State of Maranhão, Brazil. *Cien Saude Colet.* 2015; 20 (2): 479-490.
37. Basei Rossa CE, Avancini CPR, Manfroi WC. Metabolic syndrome in workers in a university hospital. *Rev Port Cardiol.* 2012; 31 (10): 629-636.
38. Gronner MF, Bosi PL, Carvalho AM, Casale G et al. Prevalence of metabolic syndrome and its association with educational inequalities among Brazilian adults: a population-based study. *Braz J Med Biol Res.* 2011; 44 (7): 713-719.
39. Miquetichuc F, Brandão P, Gondim M, Tronco E et al. Hipertensión arterial y su correlación con algunos factores de riesgo en ciudad brasileña de pequeño tamaño. *Arq Bras Cardiol.* 2010; 95 (4): 502-509.
40. Landea M, Salazar M, Marillet A et al. Prevalencia de tabaquismo y factores de riesgo cardiovascular en el casco urbano de una localidad rural de la Provincia de Buenos Aires. *Rev Am Med Resp.* 2011; 3: 110-116.
41. Mariani J, Antonietti L, Tajer C et al. Diferencias de género en el tratamiento de síndromes coronario agudos: resultados del registro Epi-Cardio. *Rev Argent Cardiol.* 2013; 81: 307-315.
42. Rubinstein A, Colantonio L, Bardach A et al. Estimación de la carga de las enfermedades cardiovasculares atribuible a factores de riesgo modificables en Argentina. *Rev Panam Salud Publica.* 2010; 27 (4): 237-245.
43. Armas N, Noval R, Dueñas A et al. Estimación del riesgo cardiovascular mediante tablas de la Organización Mundial de la Salud. Área de salud "Héroes del Moncada". *Rev Cubana Cardiol Cir Cardiovasc.* 2014; 20 (1).
44. Nordet P, Mendis S, Duelas A et al. Total cardiovascular risk assessment and management using two prediction tools, with and without blood cholesterol. *MEDICC Rev.* 2013; 15 (4): 36-40.
45. Marimón E, Odaly O, Caridad Maria et al. Prevalencia de factores de riesgo de enfermedades no transmisibles. *Rev Ciencias Médicas.* 2013; 17 (2): 2-12.
46. López R, Hurtado D, López L, Acosta J et al. Una aproximación a conocer la prevalencia de hipertensión arterial, factores de riesgo cardiovascular y estilo de vida en Venezuela. *Avances Cardiol.* 2014; 34 (2): 128-134.
47. Gabrielli L, Castro P, Corbalan R et al. Seguimiento alejado de pacientes evaluados en una Unidad de Dolor Torácico. *Rev Med Chile.* 2010; 138: 1117-1123.
48. Ibañez L, Sanzana R, Salas C et al. Prevalencia de síndrome metabólico en individuos de etnia Mapuche residentes en zonas rurales y urbanas de Chile. *Rev Med Chile.* 2014; 142: 953-960.
49. Arteaga A, Maiz A, Rigotti A, Cortes V. Asociación entre diabetes mellitus y patología cardiovascular en la población adulta de Chile: estudio de la Encuesta Nacional de Salud 2009-2010. *Rev Med Chile.* 2014; 142: 175-183.
50. Kramer V, Adasme M, Bustamante J et al. Agregación de factores de riesgo cardiovascular y conciencia de enfermedad en trabajadores de un hospital universitario. *Rev Med Chile.* 2012; 140: 602-608.
51. Arteaga A, Bustos P, Soto R et al. Actividad física y su asociación con factores de riesgo cardiovascular. Un estudio en adultos jóvenes. *Rev Med Chile.* 2010; 138: 1209-1216.
52. Maldonado R, Madariaga A, Lopez C et al. Caracterización clínica de pacientes con Infarto Agudo al Miocardio sin lesiones coronarias significativas. Estudio GEMI 2011-2013. *Rev Chil Cardiol.* 2014; 33: 165-172.
53. Melgar I, Garcia C, grupo cardiotesis et al. Prevalencia de factores de riesgo cardiovascular en la población de Guatemala. *Rev Guatem Cardiol.* 2012; 22 (2): 3-19.
54. Suasnavar P, Sotomora G. Dolor precordial asociado a cardiopatía isquémica en el servicio de urgencias de medicina interna del hospital roosevelt. *Rev Guatem Cardiol.* 2013; 23 (2): 49-52.
55. Bernabe-Ortiz A, Benziger CP, Gilman R et al. Sex differences in risk factors for cardiovascular disease: The PERU MIGRANT study. *PLoS ONE.* 2012; 7 (4): e35127.
56. Palacios C, Perez C, Guzman M et al. Association between adiposity indices and cardiometabolic risk factors among adults living in Puerto Rico. *Public Health Nutr.* 2011; 14 (10): 1714-1723.

57. Laux TS, Bert PJ, González M et al. Prevalence of Hypertension and Associated Risk Factors in Six Nicaraguan Communities. *Ethn Dis.* 2012; 22 (2): 129-135.
58. Mc Donald PAJ, Montenegro GJA, Cruz GCE et al. Prevalence, sociodemographic distribution, treatment and control of diabetes mellitus in Panama. *Diabetol Metab Syndr.* 2013; 5: 69.
59. Daviglus ML, Talavera GA, Avilés-Santa ML et al. Prevalence of major cardiovascular risk factors and cardiovascular diseases among hispanic/latino individuals of diverse backgrounds in the United States. *JAMA.* 2012; 308 (17): 1775-1784.
60. Castillo M, Calero MS, Oliveira G et al. ¿Existe diferencia en la evolución aguda y tardía en mujeres con infarto del miocárdio? *Rev Ecuat Cardiología.* 2015; 1 (1):

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