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Short Communication

Metabolic Control in Patients with Premature Coronary Artery Disease

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Coronary artery disease (CAD) is the leading cause of mortality and disability around the world [1-3]. Although in previous decades the clinical and socioeconomical burden of CAD was mainly seen in older population, premature cardiovascular death and years of life lost due to cardiovascular disease have gradually increased since the end of the last century [1,3]. Besides quality of life is significantly reduced after a premature cardiovascular event, subjects at their fourth decade of life diminish their productive and psychosocial activities that adversely impacts all countries at every socioeconomical level [1,3]. Therefore, adequate secondary prevention of premature CAD will reduce the overwhelming costs to global health economies and reduces the risk for incident and recurrent cardiovascular events [4,5].

In most of the cases, CAD is associated with the chronic formation of lipid-rich plaques on the coronary arteries, that gradually decreases the blood flow to myocardial cells, leading to ischemia, and consequently, necrosis of myocardial tissue [6,7]. Likewise, the most common factors associated with the development of these atherosclerotic plaques are increased and uncontrolled levels of low-density and non-high-density lipoprotein cholesterol (LDL-C and Non-HDL-C, respectively), glucose, and/or blood pressure [4,6,7]. Simultaneous control of these clinical and biochemical factors, added to other environmental risk factors, such as healthy diet, increased physical activity, smoking cessation and achieving normal body mass index (BMI), is known as metabolic control [1,4]. Despite metabolic control is recommended in all adults with high-cardiovascular risk [1], subjects with an incident coronary event at young ages need a stringent control, since premature CAD has shown higher odds to present recurrent cardiovascular events and increased all-cause mortality than those older patients with CAD [7-9].

Prevalence of premature CAD

Although premature CAD is rapidly growing worldwide [1-3], few studies have reported its prevalence in different ethnicities and in large CAD cohorts [8-11]. Likewise, cut-off ages to define premature CAD vary from one study to another [8-10]. Nonetheless, premature CAD is defined as documented history of stable or unstable angina pectoris or acute myocardial infarction, history of percutaneous coronary intervention, coronary artery by-pass grafting surgery, or angiographic demonstration of coronary stenosis > 50%, diagnosed before 55 and 65 years of age in men or women, respectively [12].

Previous data indicates that approximately 4 to 31% of patients with CAD are at their fourth decade of life [8-10]. The wide range of prevalence suggest that premature CAD in under reported worldwide or has been added to the whole CAD population [10]. Although a genomic basis of premature CAD has been proposed [10,13], traditional cardiovascular risk factors have been significantly associated with the onset of CAD in the youth [8,9]. Interestingly, diabetes and dyslipidemia bring more than two-fold risk for premature CAD, and therefore, they represent the major risk factors for this disease [8]. However, it remains uncertain whether or not socioeconomic and psychosocial factors play an important role in the development of cardiovascular disease in young patients. Since subjects at their fourth and fifth decade of life have an extremely productive life, premature CAD directly impacts at the socioeconomic level of most high-, middle- and low-income countries [1,2]. Thus, premature CAD cannot be longer considered as a rare presentation of cardiovascular disease, and recent studies emphasize the need to report its growing incidence in order to implement novel strategies to decrease its clinical and socioeconomical burden [8,9,14].

Secondary prevention and metabolic control in premature CAD

The cornerstone of secondary prevention in CAD is to prevent recurrent events, and to increase expectancy and quality of life in patients with known cardiovascular disease [1,12]. Consequently, several clinical practice guidelines have been developed to address

metabolic control in patients with established CAD [12,15,16]. Nowadays, several societies have proposed LDL-C levels < 55 mg/dL, Non-HDL-C levels < 80 mg/dL, Apolipoprotein B-100 (ApoB-100) levels < 70 mg/dL, blood pressure < 130/80 mmHg, hemoglobin A1c (HbA1c) < 8% (in patients with diabetes), smoking cessation, healthy diet and BMI < 25 kg/m^2, as the strict metabolic control for patients with premature CAD, whom are known to have an extreme cardiovascular risk [1,12,15,16]. However, the achievement of these strict goals has not been widely analyzed in the premature CAD population. In fact, our group of investigation has recently reported that less than 9% and 3% of patients with premature CAD attained strict lipid control (defined as composite control of LDL-C, Non-HDL-C and ApoB-100) and strict metabolic control, respectively [14]. Despite simultaneous lipid or metabolic control in older patients with CAD is on average less than 25% worldwide, compared with our results, patients with premature CAD from our tertiary center of cardiology in Mexico have lower composite control of cardiovascular risk factors than the rest of the world [17-20]. The last suggest that patients with premature CAD need more aggressive medical and pharmacological interventions, added to novel multidisciplinary strategies that would aid the composite control in these patients.

Although Illiteracy, undertreatment, and low socioeconomical status have been the major factors associated with the poor achievement of metabolic control in older patients with CAD, findings from our group of study have not shown the same associations [17-20]. Moreover, in our findings we reported that obesity and reduced physical activity play a major role for poor metabolic control achievement, more than adverse sociodemographic characteristics can explain [In press]. Whether or not these associations can be seen in the whole premature CAD population remains uncertain, and studies are needed to know independent prognostic factors in these patients in order to settle novel strategies to address higher metabolic control.

Failure to achieve metabolic control in premature CAD

Over the last decades, life expectancy in CAD survivors have growth since more effective pharmacological and therapeutic strategies haven been developed [2,3]. However, the more the patient with stable CAD lives, secondary prevention goals attainment decreases [4,21]. This time-dependent observation has been related to both non-modifiable and modifiable characteristics of the coronary patients [9,21]. Since age, sex and disease evolution are non-modifiable risk factors, limited use of lipid-, blood pressure- and glucose-lowering drugs, as well as poor adherence to medical treatment, seem to partially explain the failure to achieve metabolic control worldwide [21,22]. As mentioned above, results from our group of investigation have found that medical inertia, along with low pharmacological compliance, could play a key role for the poor achievement in lipid goals [In press]. Lipid-lowering treatment adherence < 85% and low prescription of high-intensity statins were found to be independent associated with poor lipid control in our population with premature CAD [14]. These results are in line with other studies that have shown that patient beliefs and behavior to poor risk-factor control decreases statin adherence, because stable CAD might have long asymptomatic periods where patients start or return to unhealthy lifestyles that lead them to recurrent events and comorbidities [10,21,22,25]. Thus, even in the golden years of the PCSK-9 (proprotein convertase subtilsin-kexin type 9) inhibitors, strategies addressed to improve compliance to generic forms of high-intensity statins would be the first step to take, before introducing more extensive drugs added to the polypharmacy of these subjects [14,21,22].

Weight reduction in patients with obesity helps medical treatment to reduce atherogenic lipoproteins, blood pressure and to improve glycemic control [22]. Kotseva., *et al*. suggested that, control of multiple cardiovascular risk factors was positively associated with the willingness to lose weight in very high-risk patients with obesity in a large survey in Europe [22]. Interestingly, results from our group of investigation showed that composite control of LDL-C, Non-HDL-C, blood pressure and HbA1c is associated with a BMI < 25 kg/m^2 [in press]. Overall, these results support the hypothesis that patients with premature CAD have a poor balance within energy consumption and expenditure, mainly driven by unhealthy diets and sedentarism/low physical activity, which in turn emphasize the need to harden weight reduction through programs that promote healthier lifestyles [14].

Strategies to achieve metabolic control in premature CAD

Data across different studies that have analyzed multiple cardiovascular risk factor control in secondary prevention conclude that the current approach to these patients is suboptimal [17-25]. Much of the scientific data produced in the last 20 years to manage stable CAD has been mainly based on novel lipid-, glucose-, and blood pressure-lowering drugs, instead of trying stringent lifestyle interventions among these subjects. Although novel drugs have promising advantages from the current ones widely available [21-23], ministries of health and global governments should address the interventions of multidisciplinary teams of healthcare professionals that could treat the patients from all angles [14,22]. These teams should include nutritionists, dietitians, dentists, cardiovascular physiotherapists, psychologists, and different physician specialists, that would address all different aspects of life that adversely impact on patients with premature CAD [14,21,22].

In conclusion, data from the last years reveal that among patients with premature CAD many have unhealthy lifestyles in terms of low-quality diets, poor physical activity, and persistent smoking. These unhealthy lifestyles adversely impact the metabolic control of subjects that have survived an acute coronary event at young ages. Despite the high use of cardioprotective drug therapies the majority of patients did not achieve the composite control of all clinical, biochemical and behavioral risk factors. Further studies designed to evaluate the effectiveness of novel preventive programs that include multidisciplinary teams are needed in order to analyzed better options on cardiovascular risk factors target achievement for patients with premature CAD. This could help to diminish the increasing clinical and socioeconomical burden of premature CAD.

Bibliography

1. Benjamin Emelia J., *et al*. "Heart Disease and Stroke Statistics-2019 Update: A Report From the American Heart Association". *Circulation* 139.10 (2019): e56-e528.

2. GBD. "Mortality and Causes of Death Collaborators. "Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death (2015): 1980-2015: a systematic analysis for the Global Burden of Disease Study 2015". *Lancet* 388.10053 (2016): 1459-1544.

3. Murray Christopher JL., *et al*. "Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010". *Lancet* 380.9859 (2012): 2197-223.

4. Farkouh Michael E., *et al*. "Risk factor control for coronary artery disease secondary prevention in large randomized trials". *Journal of the American College of Cardiology* 61.15 (2013): 1607-1615.

5. Brown Todd M., *et al*. "Achievement of optimal medical therapy goals for U.S. adults with coronary artery disease: results from the REGARDS Study (Reasons for Geographic And Racial Differences in Stroke)". *Journal of the American College of Cardiology* 63.16 (2014): 1626-1633.

6. Hansson Göran K. "Inflammation, atherosclerosis, and coronary artery disease". *The New England Journal of Medicine* 352.16 (2005): 1685-1695.

7. Bäck M., *et al*. "Regulation of atherosclerotic plaque inflammation". *Journal of Internal Medicine* 278.5 (2015): 462-482.

8. Poorzand Hoorak., *et al*. "Risk factors of premature coronary artery disease in Iran: A systematic review and meta-analysis". *European Journal of Clinical Investigation* 49.7 (2019): e13124.

9. Mohammad Ameen Mosa., *et al*. "Prevalence and risk factors of premature coronary artery disease in patients undergoing coronary angiography in Kurdistan, Iraq". *BMC Cardiovascular Disorders* 15 (2015): 155.

10. Cole Jason H and Laurence S Sperling. "Premature coronary artery disease: clinical risk factors and prognosis". *Current Atherosclerosis Reports* 6.2 (2004): 121-125.

11. Lloyd-Sherlock Peter., *et al*. "Reducing the cardiovascular disease burden for people of all ages in the Americas region: analysis of mortality data, 2000-15". *The Lancet Global Health* 7.5 (2019): e604-e612.

12. Jellinger Paul S., *et al*. "American Association Of Clinical Endocrinologists And American College Of Endocrinology Guidelines For Management Of Dyslipidemia And Prevention Of Cardiovascular Disease". *Endocrine Practice: Official Journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists* 23.2 (2017): 1-87.

13. Villarreal-Molina Teresa., *et al*. "The ABCA1 gene R230C variant is associated with decreased risk of premature coronary artery disease: the genetics of atherosclerotic disease (GEA) study". *PloS One* 7.11 (2012): e49285.

14. Martínez-Sánchez Froylan D., *et al*. "Prevalence of lipid control and factors associated with its poor attainment in patients with premature coronary artery disease". *Nutrition, Metabolism and Cardiovascular Diseases* (2020).

15. Whelton Paul K., *et al*. "2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines". *Journal of the American College of Cardiology* 71.19 (2018): e127-e248.

16. American Diabetes Association. "10. Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes-2019". *Diabetes Care* 42.1 (2019): S103-S123.

17. Yusuf Salim., *et al*. "Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study". *Lancet* 364.9438 (2004): 937-952.

18. Fan Wenjun., *et al*. "Composite cardiovascular risk factor target achievement and its predictors in US adults with diabetes: The Diabetes Collaborative Registry". *Diabetes, Obesity and Metabolism* 21.5 (2019): 1121-1127.

19. Schroeder Emily B., *et al*. "Simultaneous control of diabetes mellitus, hypertension, and hyperlipidemia in 2 health systems". *Circulation Cardiovascular Quality and Outcomes* 5.5 (2012): 645-653.

20. Rarau Patricia., *et al*. "Socio-economic status and behavioural and cardiovascular risk factors in Papua New Guinea: A cross-sectional survey". *PloS One* 14.1 (2019): e0211068.

21. Blom Dirk J., *et al*. "The challenge of multiple cardiovascular risk factor control outside Western Europe: Findings from the International cholesterol management Practice Study". *European Journal of Preventive Cardiology* (2019): 2047487319871735.

22. Kotseva Kornelia., *et al*. "Lifestyle and impact on cardiovascular risk factor control in coronary patients across 27 countries: Results from the European Society of Cardiology ESC-EORP EUROASPIRE V registry". *European Journal of Preventive Cardiology* 26.8 (2019): 824-835.

23. Bertoni Alain G., *et al*. "Suboptimal control of glycemia, blood pressure, and LDL cholesterol in overweight adults with diabetes: the Look AHEAD Study". *Journal of Diabetes and Its Complications* 22.1 (2008): 1-9.

24. Jaffiol C., *et al*. "Impact of socioeconomic status on diabetes and cardiovascular risk factors: results of a large French survey". *Diabetes and Metabolism* 39.1 (2013): 56-62.

25. Kitkungvan Danai., *et al*. "Low-density lipoprotein cholesterol target achievement in patients at high risk for coronary heart disease". *Journal of Clinical Lipidology* 4.4 (2010): 293-297.

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