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Invited Commentary

Patterns of beverage consumption and risk of CHD among Mexican adults

Over the past decades, the availability of drinks that are high in energy has increased dramatically as well as studies on their role as a risk factor for obesity and diabetes[1]. The most studied beverages are those with a high amount of added sugars, known as sugar-sweetened beverages (SSB). SSB promote low satiety and incomplete compensation for total energy intake[2] as shown in experimental studies and comparing daily energy intake over 2 d, in a large population-based study in Brazil[3]. Energy compensation in this study varied from 0 to 42 % depending on the meal.

Mexico has one of the highest prevalence of obesity. In order to curb the obesity epidemic, in 2014, Mexico passed a law taxing SSB, with a subsequent decrease in the purchase of taxed SSB of 4·2 litres per year and an increase of 12·8 litres of non-taxed beverages. Non-taxed beverages were mainly plain water[4]. In this scenario, it is interesting the analysis of patterns of beverage consumption among Mexican adults presented in a previous issue of the *British Journal of Nutrition*[5] since the majority of studies focused on SSB or specific beverages.

In this analysis[5], the authors found four unrelated patterns of beverage intake, which were associated with the Framingham CHD risk score. Lower risk of CHD score was associated with alcohol or low-fat milk pattern, and higher consumption of soft drinks was positively associated with CHD score risk. Findings reinforce the use of patterns of dietary intake as a useful tool given the complexity of diet and extend the application to the case of beverage intake. Results from the pattern analysis were in line with pieces of evidence on the isolated nutrients and foods that have been associated with CHD. Unfortunately, the paper did not include the intake of 100 % fruit juice, source of polyphenol intake, a component associated with cardiovascular risk. Pure fruit juice is defined as 100 % juice without added sugars or artificial sweeteners, artificial colours or preservatives, but it is high in fructose. Therefore, experts disagree on whether pure fruit juice should be included as a harmful beverage in public health policies[6]. In an analysis of the European Prospective Investigation into Cancer and Nutrition–Netherlands compared with no consumption, pure fruit juice consumption up to seven glasses/week – but not the consumption of ≥8 glasses – was significantly associated with reduced risk of CVD and CHD[7], but in children, a meta-analysis indicated that consumption of pure fruit juice increased weight gain[8].

The group of low-energy drinks was also not explored in the paper published in the *British Journal of Nutrition*[5]. The authors had initially included a group of diet drinks (low-energy drinks), but it was not included in the factorial analysis either explored in the paper, except for Table 2 that shows a significant difference in consumption of low-energy drinks by quintiles of all the beverage patterns. Diet drinks are of great interest, because non-nutritive sweeteners are replacing the sugar in many SSB and although the role of non-nutritive sweeteners appears to depend on the type of sweetener, at least the more used ones were related to an increase in food intake and weight gain[9].

Besides, the soft drink pattern in the study includes homemade sweetened beverages and industrialised sweetened beverages. As expected, homemade and industrialised drinks are inversely related, and the amount of homemade beverages appears to be greater than industrialised ones (Table 2). Thus, the implication of considering this pattern as a soft drink may suggest that homemade drinks are less implicated as a risk.

The study of patterns of beverage consumption among Mexicans[5] is based on baseline assessments of a large sample of civil servants living in Mexico, about 10 000 participants of the Health Workers' Cohort Study. One limitation of the study design is the high percentage of exclusions due to missing values on BMI (*n* 428) and serum cholesterol measurement (*n* 584). The outcome used was the Framingham estimate risk of CHD, which includes serum cholesterol, but exclusion of BMI missing is not justified since it was used as a control variable only in one of the models.

Although most dietary pattern studies have not shown differences by sex, this is not the case in this study, since all beverage patterns are sex-related, particularly the alcohol pattern, as shown in Table 2. These substantial differences by sex would be better explored in the sex-stratified analysis because women are also protected for CHD. Inclusion of other types of dietary pattern such as prudent pattern, meat/fish pattern and refined food pattern should be better qualified as well as the rationale for including them as confounding. Are all these patterns previously described? Moreover, why they should be treated as confounding.

Despite these analytical constraints, the paper clearly shows patterns of beverage intake in this population, which could be explored further in longitudinal analysis and for other outcomes beyond CHD.

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