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Three-year changes in drinking patterns in Spain: A prospective population-based cohort study

Hosanna Soler-Vila [a,b], Iñaki Galán [a,c], Juan Donado-Campos [a],
Fernando Sánchez-Alfonso [a], José Lorenzo Valencia-Martín [a,d,e], Fernando Morilla [f],
Luz Mª León-Muñoz [a,d], Fernando Rodríguez-Artalejo [a,d,*]

[a] Department of Preventive Medicine and Public Health, School of Medicine, Universidad Autónoma de Madrid/IdiPAZ, C/Arzobispo Morcillo s/n,
Madrid 28029, Spain
[b] Department of Epidemiology and Public Health, Miller School of Medicine, University of Miami, Miami, FL 33136, USA
[c] National Centre for Epidemiology, Instituto de Salud Carlos III, C/Sinesio Delgado, 4, Madrid 28029, Spain
[d] CIBER of Epidemiology and Public Health (CIBERESP), Instituto de Salud Carlos III, Melchor Fernández Almagro, 3–5, Madrid 28029, Spain
[e] Department of Preventive Medicine, Móstoles University Hospital, Calle Río Júcar, 1, Móstoles 28935, Spain
[f] Department of Computer Science and Automatic Control, Universidad Nacional de Educación a Distancia (UNED), Calle Juan del Rosal 16,
28040 Madrid, Spain

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ABSTRACT

Background: This study examined changes in alcohol drinking patterns (DP) and associated variables in a Mediterranean country.

Methods: Changes in DP between baseline (2008–2010) and follow-up (2012–2013) were examined on a Spanish population-based cohort of 2254 adults (18–59 years) using multinomial logistic regression. Heavy consumption was defined as ≥ 40 g/day of alcohol in men (≥ 24 g/day in women) and binge drinking (BD) as the intake of ≥ 80 g of alcohol in men (≥ 60 g in women) on one occasion in the previous month. Six patterns were defined: (1) non-drinkers; (2) ex-drinkers; (3) moderate drinkers without BD (MNB); (4) moderate drinkers with BD (MB); (5) heavy drinkers without BD (HNB); and (6) heavy drinkers with BD (HB).

Results: Overall, 45.2% of participants changed DP during follow-up. Over 24% of non-drinkers and 19.4% of ex-drinkers at baseline qualified as MNB at follow-up. The largest flow was from HNB to MNB (57.1%). Light-drinking patterns experienced the largest gains (ex-drinkers: 37.5% and MNB: 66.7%) by absorbing individuals lost by heavy-drinking patterns (MB: 50.8% and HNB: 48.4%). Men, younger individuals, and current smokers were more likely to report heavy-drinking patterns at one or both assessments. Being married or employed increased the likelihood of reporting light-drinking patterns at both surveys ($p < 0.05$). Improving physical quality of life and exercise were associated with a shift from light- to heavy-drinking pattern during follow-up ($p < 0.05$).

Conclusions: DP in Spain changed over 3 years with a tendency to "regress" toward moderate patterns. Repeated measures of alcohol intake may reduce classification errors and biased results when examining the impact of alcohol on health.

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1. Introduction

Most studies on the frequency of alcohol consumption and on its long-term health effects have used a single measurement of alcohol intake (Kerr et al., 2002; Ronksley et al., 2011). Therefore, these studies assume some stability of alcohol consumption over time. If this assumption were not true, the results of these studies might be affected by a certain misclassification bias, whose influence on the prevalence and health effects of alcohol is difficult to predict.

Several studies have examined the stability of alcohol consumption and most, but not all (Graff-Iversen et al., 2013; Sesso et al., 2000), have reported substantial changes in alcohol intake across time (Doll et al., 1994; Ilomäki et al., 2009; Karlamangla et al., 2006; Kerr et al., 2002; Moore et al., 2005; Rehm et al., 2008;

Wannamethee and Shaper, 1988). In general, these studies found that young age, self-rated health, change in marital, employment or smoking status, and higher baseline alcohol intake were associated with greater changes in short-term consumption. As these findings are based on data from Northern European countries and the United States in the last decades of the previous century, their results may not apply to XXI century Mediterranean countries, characterized by different cultural traits and drinking patterns. Further, increasing preference for spirits over wine in Southern Europe (especially among the young), greater acceptance of public drinking in Spanish parks (Hughes et al., 2011), and recent smoking bans (Kasza et al., 2012) throughout Europe may have impacted how drinking patterns evolve in the short term and the socio-behavioral variables associated with such change. And, most importantly, these studies focused on the average consumption of alcohol or on heavy episodic drinking, without considering complex drinking patterns (e.g., coexistence of average moderate consumption of alcohol with sporadic binge drinking).

Therefore, in this paper we analyze data from the recently conducted ENRICA study to examine the stability of drinking patterns in the adult population of Spain at two time points, three years apart. The analyses also identify socio-demographic, behavioral and health status variables associated with changes in alcohol consumption. To our knowledge, this is the first longitudinal study ascertaining changes in alcohol consumption patterns and their associated characteristics in a Mediterranean country at the population-level.

2. Methods

2.1. Study design and participants

The design and methods of the ENRICA study have been reported in detail elsewhere (Rodríguez-Artalejo et al., 2011). Briefly, this was a cross-sectional study conducted from 2008 to 2010 among 12,948 individuals representative of the non-institutionalized Spanish population aged 18 years and older. Because the low frequency of some drinking behaviors among older adults (e.g., binge drinking, consumption of spirits) precludes a meaningful characterization of all drinking patterns, we selected 9130 individuals aged 18–59 years with complete socio-demographic data at baseline (Soler-Vila et al., 2013)

Approximately 3 years later (November 2012 through January 2013), we used random stratified sampling to select a subgroup of individuals to be re-interviewed for an update on their alcohol consumption. The stratification was based on drinking behavior reported at baseline. Specifically, all ex-drinkers, all heavy drinkers, and any participant reporting at least one event of binge drinking in the last month were selected. We also included a random sample of non-drinkers and moderate drinkers.

All study participants provided informed consent. The study protocol was approved by the clinical research ethics committee of the University Hospital La Paz in Madrid (Spain).

2.2. Measures

2.2.1. Patterns of alcohol consumption.
At baseline, information on average alcohol consumption was collected as part of a diet history developed from that in the EPIC-cohort study (EPIC Group of Spain, 1997a, 1997b). At follow-up, the alcohol data were obtained with a frequency-quantity questionnaire. In both surveys, the questions were similar and included detailed information on the type of beverage and amounts consumed in the preceding 12 months. Information on binge drinking (BD) corresponded to the previous 30 days and was collected with the same question in both surveys.

Average heavy drinkers were defined as those reporting an alcohol intake ≥40 g/day in men and ≥24 g/day in women (World Health Organization, 2000). Individuals reporting lower amounts were deemed average moderate drinkers. Non-drinkers included abstainers and occasional moderate drinkers (participants reporting consuming moderate amounts of alcohol less frequently than an average of every 15 days). BD was defined as the intake of ≥80 g of alcohol in men (≥60 g in women) on a single occasion in the preceding 30 days (Strategy Unit Alcohol Harm Reduction Project, 2003). This definition is comparable to the consumption of 5 (4 for women) or more drinks in one occasion when accounting for the different alcohol content of the U.S. standard unit (14 g) versus Spain (10 g; Bobak et al., 2004; Centers for Disease Control and Prevention, 2012; Gmel et al., 2010; Valencia-Martín et al., 2008).

We classified participants into six mutually exclusive categories based on alcohol consumption: (1) non-drinkers; (2) ex-drinkers; (3) moderate drinkers with no binge drinking (MNB); (4) moderate drinkers with binge drinking (MB); (5) heavy drinkers with no binge drinking (HNB); and (6) heavy drinkers with binge drinking (HB; Valencia-Martín et al., 2008). For the multivariate analyses, drinking patterns were grouped into light-drinking (non-drinkers, ex-drinkers, and MNB) or heavy-drinking (MB, HNB, and HB). Each participant was assigned a "$T1$–$T2$ drinking pattern" based on the drinking behavior reported at baseline ($T1$) and at follow-up ($T2$). Thus, someone who reported MNB (light-drinking) at $T1$ but MB (heavy-drinking) at $T2$ would be classified as a "light $T1$ and heavy $T2$" participant, reflecting the increase in risk level of their drinking pattern between the two surveys.

2.2.2. Socio-demographic, behavioral and health status variables.
At baseline we assessed sex, age, level of education, occupation, marital and employment status, and tobacco smoking with widely used questionnaires. We also used validated instruments to ascertain physical activity in leisure time, expressed in metabolic equivalents-METs (Pols et al., 1997), and sedentary behavior as approximated by the number of hours of TV watching per week (Martínez-González et al., 2005). Moreover, we assessed food consumption with a diet history (EPIC Group of Spain, 1997a, 1997b), and accordance with the Mediterranean diet was summarized with the 14-item MEDAS scale (Schröder et al., 2011). Health-related quality of life was collected with the SF-12 questionnaire, and represented by their physical (PCS) and mental (MCS) component summaries (Schmidt et al., 2012; Vilagut et al., 2008). Finally, individuals reported the following physician-diagnosed diseases: hypertension, diabetes mellitus, cardiovascular disease, and cancer at any site.

Weight and height were measured with standardized procedures (Gutiérrez-Fisac et al., 2012). Body mass index (BMI) was calculated as weight in kg divided by squared height in m, and grouped into three categories: normal (18.5–24.9 kg/m^2), overweight (25–29.9 kg/m^2), and obesity (≥30 kg/m^2).

Information was updated at the follow-up survey for all variables but marital status and diet; and weight was self-reported. Change variables were calculated based on the corresponding $T1$ and $T2$ values. For continuous variables, we chose cut-points reflecting clinically significant thresholds or the median in the study sample at baseline.

2.3. Statistical analysis

First, we calculated the percentage of each drinking pattern at $T1$ and $T2$. Since aggregate data may obscure the extent of changes in individual's drinking over time, we then examined the flow of study participants across drinking categories from $T1$ to $T2$. Finally, the associations of socio-demographic and behavioral variables with individuals' changes in drinking patterns from $T1$ to $T2$ were summarized by sex- and age-adjusted relative risk ratios (RRR), and their 95% confidence interval (CI), obtained from multinomial logistic regression. The dependent variable consisted of four $T1$–$T2$ drinking categories: increased drinking (light $T1$ and heavy $T2$); decreased drinking (heavy $T1$ and light $T2$); heavy drinking at both time-points (heavy $T1$ and $T2$); and the reference category defined as light drinking at both time-points (light $T1$ and $T2$). The independent variables were the socio-demographic, behavioral and health status variables at $T1$ as well as changes in these variables from $T1$ to $T2$ (except marital status and the MEDAS scale which were not measured at $T2$). All variables were modeled as categorical using dummy terms. Although some authors use the term odds ratio (OR) to refer to the exponentiated coefficient or RRR resulting from multinomial logistic regression, they are not exactly equivalent; nevertheless, the interpretation of an RRR is close to that of an OR (Hosmer and Lemeshow, 2000; Platt et al., 2010). Statistical significance was set at two-sided $p < 0.05$. Analyses were performed with STATA version 11.1 (StataCorp. LP, College Station, 2010).

3. Results

3.1. Description of the sample

Among the 2917 subjects invited, 2261 (77.5%) accepted to participate in the follow-up study. The response rate did not vary by drinking behavior. Of this initial sample of participants at both baseline and follow-up we excluded 6 individuals for lack of follow-up data on education and 1 individual for lack of data on occupation. Thus, the main analyses were conducted on 2254 individuals (1165 men and 1089 women). The sample was evenly distributed across the three age groups, about half completed secondary level education and one third had university-level degrees. The majority (66.5%) reported non-manual occupations.