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Original research

Television viewing duration and blood pressure among 18–74-year-old adults. The French nutrition and health survey (ENNS, 2006–2007)

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ABSTRACT

Objectives: To describe Blood Pressure (BP) according to the time spent viewing television and examine whether the associations between television viewing and systolic and diastolic BP differed depending on sex, age and BMI.
Design: The French health and nutrition survey (ENNS) was conducted in 2006–2007 on a multistage stratified random sample of 18–74-year-old adults.
Methods: Systolic (SBP) and diastolic BP (DBP) were assessed using three measurements. Among subjects without BP-lowering drugs and lifestyle measures, adjusted means of SBP and DBP were estimated for each television viewing category (<3 h and ≥3 h).
Results: Among 2050 ENNS participants, 81.2% declared neither drug medication nor lifestyle change to lower BP. In women without BP-lowering measure, viewing television 3 h/day or more increased significantly SBP and DBP adjusted means (+2 mmHg) compared to women who spent less than 3 h/day in front of the television. These associations were stronger in obese or 35–54-year-old women. In men, no relationship between DBP and television-viewing has been observed. Though, SBP was positively associated with television-viewing in non-overweight, 18–29 or 55–74 year-old men.
Conclusions: These results show that the association between television viewing duration and BP must be evaluated differently between gender, age group and BMI category.

1. Introduction

High blood pressure (BP) is the most frequent and treatable risk factor of cardiovascular and related diseases.[1] Based on the French health and nutrition survey (Etude nationale nutrition santé, ENNS), the prevalence of high BP was 31% in 18–74-year-old adults living in mainland France.[2] Recommendations to prevent and to decrease high BP have been disseminated throughout European[3] and American guidelines.[4,5] These guidelines emphasize, among non-pharmacological interventions, increasing physical activity and reducing time spent in sedentary behaviours such as television viewing, sitting during transport or at work, etc. While increased physical activity has been shown to be associated with decreased BP in both men and women,[6–8] time spent viewing television has been found positively associated with BP in observational studies.[9,10] However, the findings from studies examining the association between television viewing and BP were different according to age and sex.[11–13] Some studies have reported adverse effects in women, but not in men,[14] others in both gender.[15] Some studies have found associations with SBP, but not with DBP.[14] Moreover, age and Body Mass Index (BMI) modified the strength of the relation between television viewing duration and BP.[14,15] Given these results, it was important to clarify the role of these covariates in relation to BP.

The main objectives of the present study were to describe BP according to time spent viewing television among adults aged

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18–74 years included in ENNS and to examine whether the associations between television viewing and systolic and diastolic BP differed depending on sex, age and BMI.

2. Methods

ENNS was a cross-sectional survey conducted from February 2006 to July 2007, based on a multistage stratified random sample of an 18–74-year-old non-institutionalized population living in continental France. The participation rate was 60%. Among the 3115 adults included in the dietary component of the study, 2388 were involved in the health examination part. Methods of design and recruitment have been described elsewhere.[2] The study design included a food consumption survey and a health examination. It was approved by the Ethical Committee (Hôpital Cochin, Paris, no. 2264) and the French Data Protection Authority (*Commission nationale de l'informatique et des libertés*, CNIL, authorization no.905481).

Physical activity and sedentary lifestyle data were collected at home during face-to-face interviews. The French short-form of the International physical Activity Questionnaire (IPAQ)[16] was used. Physical activity measures concerned durations and number of days in which the subject spent more than 10 min of three types of physical activity: walking, moderate-intensity, and vigorous-intensity activities in 4 domains simultaneously (occupation, commuting, domestic and garden, and leisure-time).

The sedentary lifestyle variables concerned leisure-time spent in front of a television and a computer or a videogame. These variables being not included in the IPAQ short-form, specific questions were added to collect this information. Data were collected in hours and minutes, by day, separately for week days and weekend days. All these questions referred to the daily mean for the last 7 days.[17]

Systolic BP (SBP) and diastolic BP (DBP) were measured at a health examination center of the French National Health Insurance System or at home, by trained physicians, nurses or dieticians, using standardized protocols and the same device (OMRON® M5-I). BP measurements were taken on the left arm of seated subjects after a 5 min rest; they were repeated three times at 1 min intervals. A second run of three measurements was carried out if a difference of 10 mmHg or more was observed between the second and third measurements. Final SBP and DBP were defined as the average of the last two BP measurements.[3]

Information on date of birth, sex, birthplace, marital status and education level were collected through face-to-face interviews using standardized questionnaires. Weight and height were measured using identical devices and according to standardized procedures.[18] Participants were also asked if they had made at least one holiday trip lasting four nights or more in the past twelve months. This variable has been shown to be strongly associated with household income in a previous French study.[19] Interviews also included questions on smoking habits and alcohol consumptions. Data on previously diagnosed hypertension, cardiovascular diseases (CVD) co-morbidities (hypercholesterolemia or diabetes), and ongoing BP-lowering medication, physical activity practice and diet change due to such diagnoses were collected through a self-administered questionnaire which was checked and corrected by interviewers at home.

Leisure-time spent in front of a television was used as continuous (in hours) and categorized as <3 h and ≥3 h (the closest exact number of hours above the median and the mean has been retained as cut-off). Leisure-time spent in front of screen (computer or videogame) was also used for adjustment as continuous (in hours).

The IPAQ scores for walking, moderate-intensity, and vigorous-intensity activities were presented as the estimation of energy expenditure in metabolic equivalent-minutes per week (MET-minutes/week). According to IPAQ scoring protocol[20] and using time spent in each activity, MET-minutes/week were computed and used for adjustment.

Some covariates were recoded into categorical variables such as age (18–29, 30–54, and 55–74 years), birthplace (France, including French overseas territories, and others), marital status (single, living with a partner, widowed/divorced) and education level (primary school, secondary school, high school, university). Due to their effect on BP, BMI (weight in kg/height^2 in m^2), smoking habits (never, current, former) and alcohol consumption (as continuous in grams/day) were considered as potential confounders. BMI were used to classify subjects in overweight (BMI ≥ 25) and obese (BMI ≥ 30).

Among 2388 (876 men and 1512 non-pregnant women) 18–74-year-old participants of the ENNS health examination part, 338 (14.2%) were excluded due to: incomplete BP measures (132 subjects), unavailable physical activity or sedentary lifestyle data (193 subjects) and missing information on socio-demographic characteristics (13 subjects). Finally, analyses were carried out on 2050 subjects (770 men and 1280 women). Subjects who reported previous high BP and who underwent drug medication and lifestyle changes (diet or increased physical activity) in order to lower their BP were categorized apart and excluded to analyze the relation between television and BP.

A set of weightings was calculated based on the number of eligible individuals in the household, multiplied by the inverse of the probability of dwelling selection in the stratum. Then, calibration was made separately for each gender according to national census data on age, diploma and whether the household included or did not include at least one child. The final weighting also included the period of data collection.[2]

Analyses were carried out using STATA® V.12. To account for the complex sampling design, the Stata command "svyset" was used. Among subjects without BP-lowering drugs and lifestyle measures, adjusted means of SBP and DBP (and standard error) were estimated by regressions for each television viewing category (<3 h and ≥3 h). Regression models were also performed using television viewing duration as a continuous variable. Designed-based Pearson test for categorical variables, and adjusted Wald test and linear trend test for continuous variables, were used to assess statistical significance at alpha < 5%. Interactions between television viewing and gender, BMI, age and physical activity (MET) were observed at threshold of alpha < 5%.

3. Results

Among the 2050 subjects of the sample, 1642 individuals (81.2%, weighted data) declared neither drug medication nor lifestyle change to lower BP (82.8% in men; 79.5% in women). Except for gender, birthplace and alcohol consumption, significant differences were observed between the two subsamples with or without BP-lowering measures. Subjects reporting BP-lowering measures (n = 408) were older than subjects without BP-lowering measures (58 *vs* 42 years-old, $p < 10^{-3}$). They were more frequently married, less educated and less currently smokers. They had higher BMI (28.7 *vs* 25.0, $p < 10^{-3}$), higher BP (SBP: 137 *vs* 121, $p < 10^{-3}$; DBP: 84 *vs* 77, $p < 10^{-3}$). Subjects reporting BP-lowering measures spent more time in front of the television than those without BP-lowering measures (202 *vs* 150 min/day, $p < 10^{-3}$). They were also less physically active (2089 *vs* 2459 MET-minutes/week, $p = 0.01$).

Further analyses were carried out on subjects without BP-lowering measures (n = 1642). Table 1 shows significant differences between women and men in this population for marital status, smoking habits, alcohol consumption, BMI, SBP and DBP.