

# Blood pressure according to physical activity in 18-74-year-old adults: the French nutrition & health survey (ENNS) 2006-2007

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## Introduction

- High blood pressure is the most frequent and treatable risk factor of cardiovascular diseases. Increasing physical activity is recommended as non pharmacological intervention to reduce high blood pressure.
- We assumed that individuals classified as practicing high physical activity level had more favorable blood pressure (BP) compared to individuals in the low physical activity level category.
- Our objective was to describe BP according to physical activity levels in adults without BP lowering measure consecutive to a diagnosis of high blood pressure (drug medication, diet or increased physical activity).

## Methods

- The French nutrition and health survey (ENNS)<sup>1</sup> was conducted in 2006-2007 including a multistage stratified random sample of 18-74-year-old adults living in continental France. Data were weighted and calibrated on the French census.
- The self-administered short form of the International Physical Activity Questionnaire (IPAQ)<sup>2</sup> was used to assess total physical activity (including leisure time, domestic, gardening, work and transport-related physical activities). As recommended by IPAQ protocol, individuals were classified into 3 IPAQ categories: low, moderate and high.
- Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) were measured on the left arm of seated subjects after a 5 minutes rest and were repeated three times at one minute intervals. The average of the last two measurements was used.
- BP means were adjusted on factors of high blood pressure (see table footnote) by linear regressions (statistical significance:  $p < 0.05$ ).

## Results

- Among 2,058 ENNS participants, analyses were carried out on 1,650 adults (80%) who declared neither drug medication nor lifestyle change to lower BP.
- In men without BP lowering measure, SBP/DBP adjusted means were 125.5/78.1 mmHg in the low-IPAQ category, 125.8/78.4 mmHg in the moderate-IPAQ category and 126.4/77.9 mmHg in the high-IPAQ category. Differences were not statistically significant.
- In women without BP lowering measure, SBP/DBP adjusted means were 116.4/75.4 mmHg, 114.1/74.5 mmHg and 116.5/75.1 mmHg, respectively, without statistical difference between IPAQ categories.
- In the analysis of BP in relation with physical activity and sedentary behaviour, significant interactions were observed for gender, age and body mass index (BMI) categories. Therefore, analyses were stratified according to these categories.
- In both men and women and for all IPAQ categories, SBP/DBP adjusted means increased with BMI and with age (Table). Statistical significance was reached in all categories except for women's DBP in both low- & moderate-IPAQ categories.
- In men, BP variations across IPAQ categories were not significant, whatever the BMI category (Table). Besides, the association between decreasing DBP and increasing physical activity was statistically significant in 18-29-year-old men ( $p = 0.002$ ).
- In women, there was no overall association between BP and physical activity. However, in obese women, adjusted SBP mean was significantly higher in the high-IPAQ category than in the moderate-IPAQ category (Table), without statistically significant linear relationship however when continuous variables were used.

**Table: Adjusted means of blood pressure by IPAQ categories in 18-74-year-old adults without blood pressure lowering measures (drug medication, diet or increased physical activity), according to gender, body mass and age classes.**

SBP / DBP mmHg	Men			Women		
	Non-overweight n=280	Overweight n=258	Obesity n=74	Non-overweight n=663	Overweight n=252	Obesity n=123
IPAQ category*						
Low	123 / 76	128 / 80	133 / 84	112 / 73	121 / 79	127 / 84
Moderate	122 / 75	129 / 81	130 / 83	111 / 72	118 / 76	<b>120</b> / 81
High	119 / 72	132 / 81	130 / 84	112 / 72	121 / 78	<b>133</b> / 85
Linear regression coefficient (x 1000 MET)	-0.48 / -0.52	0.49 / 0.24	-0.56 / 0.01	-0.18 / -0.24	0.30 / 0.19	0.94 / 0.58
P (linear trend test)	0.21 / 0.08	0.18 / 0.35	0.38 / 0.98	0.56 / 0.28	0.53 / 0.54	0.28 / 0.08
IPAQ category**						
Low	117 / 68	127 / 81	136 / 84	109 / 70	114 / 76	130 / 81
Moderate	119 / <b>71</b>	125 / 79	137 / 85	105 / 71	113 / 75	125 / 78
High	114 / <b>66</b>	127 / 81	136 / 84	108 / 69	116 / 76	126 / 78
Linear regression coefficient (x 1000 MET)	-0.50 / <b>-0.79</b>	0.18 / -0.00	-0.36 / 0.06	-0.57 / -0.32	0.43 / 0.22	-0.35 / -0.26
P (linear trend test)	0.35 / <b>0.002</b>	0.59 / 0.99	0.56 / 0.88	0.37 / 0.57	0.21 / 0.30	0.47 / 0.33

\* adjustment on age (years), leisure time (minutes) spent in front of the television, leisure time (minutes) spent in front of computer or videogames, birthplace, education level, marital status, occupation, holiday trip during the last 12 months, area of residence and smoking habits

\*\* adjustment on body mass index, leisure time (minutes) spent in front of the television, leisure time (minutes) spent in front of computer or videogames, birthplace, education level, marital status, occupation, holiday trip during the last 12 months, area of residence and smoking habits

## Conclusion

These results support that, after adjustment for confounding factors and stratified analyses, overall physical activity has no proper effect on the level of blood pressure in 18-74-year-old adults without BP-lowering measure, except to reduce DBP in young men and to increase SBP in obese women. In addition to the cross-sectional design of the study, such findings could be explained by the fact that the declared amount of total physical activity using the IPAQ questionnaire was not specifically limited to physical exercise. Recommendations limited to increasing physical activity without focusing on intense level activities such as anaerobic activities could be insufficient to reduce high BP risk.

## References

- Castetbon K, Vernay M, Malon A *et al*. Dietary intake, physical activity and nutritional status in adults: the French nutrition and health survey (ENNS, 2006-2007). *Br J Nutr* 2009; 102:733-43
- IPAQ website : [www.ipaq.ki.se](http://www.ipaq.ki.se)