Is uncontrolled hypertension a contraindication for leisure time physical activity? [Letter to the Editor]

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Is uncontrolled hypertension a contra-indication for leisure time physical activity?

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Abbreviations

Physical activity (PA)

Cardiovascular disease (CVD)

Systolic blood pressure (SBP)
To The Editor:

Some evidence has suggested physical activity (PA) is associated with increased risk of cardiovascular disease (CVD) death and major vascular events in participants with highly elevated systolic blood pressure (SBP). The findings are somewhat counterintuitive given that regular aerobic exercise is known to have beneficial vascular effects in hypertensive patients. This topic has been rarely explored in large nationally representative samples. Our objective was to examine the association between PA and CVD death among participants with highly elevated resting SBP in a large general population sample of British adults.

Participants were recruited from 11 survey years of the Health Survey for England and the Scottish Health Survey. Local research ethics committees approved each survey and all participants gave written informed consent. Nurses measured SBP three times after seated rest using an automated machine (Omron HEM-907 blood pressure monitor) and an average of the second and third recordings was used. PA in the four weeks prior to interview was assessed by a validated questionnaire. Individual participant data were linked with the British National Health Service Central Registry to record mortality. Data for survivors were censored to 12/31/2009 (Scottish survey) or 3/31/2011 (English survey). Cox proportional hazards models were used to estimate associations of PA with mortality after stratifying the sample into three SBP categories (<140mmHg; 140<160 mmHg; ≥160 mmHg), as in previous studies. All deaths in the first two years of follow-up were removed to guard against reverse causation. All analyses were performed using SPSS version 22 (IBM Inc.).
The sample comprised 42,693 adults aged 40 years and above (57.7±11.9 years, 45.4% men). Highly elevated levels of SBP (≥160 mmHg) were recorded in 12.7% of the cohort. There were 5,743 deaths from all causes during 401,093 person-years of follow-up. We observed an inverse dose-response association between PA and risk of death across all levels of SBP after adjustment for covariates (Table). There were 1,804 CVD deaths, and similarly, PA was associated with lower risk of CVD across all levels of SBP (Table). There were 410 stroke deaths. Compared to the inactive, no adverse risks of stroke were observed for the sufficiently active category in participants with SBP <140 mmHg (HR=0.47, 95% CI, 0.21, 1.09), 140<160 mmHg (0.62; 0.27, 1.42), or ≥160 mmHg (0.96; 0.48, 1.91), in models adjusted for covariates described in Table.

We found no evidence of adverse risk in adults with highly elevated SBP undertaking regular exercise. In a recent cohort study there was a 3% increased risk of major vascular events per 4 MET-h/d of activity in participants with resting SBP more than 160mmHg.¹ Our study focused on leisure time PA whereas in the study in China up to 75% of total activity was occupational. We had insufficient deaths to sub-type stroke, and previous data suggested a J-shaped association between PA and hemorrhagic stroke.⁵ The sample consisted of largely Caucasian adults from the general British population thus results cannot be generalised to other ethnic groups. In conclusion, these data suggest that participation in leisure time PA was not associated with increased risk of mortality in participants with uncontrolled hypertension.
References


Table. Association between physical activity and mortality stratified by systolic blood pressure level.

<table>
<thead>
<tr>
<th>Physical activity&lt;sup&gt;a&lt;/sup&gt; stratified by SBP</th>
<th>N</th>
<th>All deaths&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Hazard Ratio (95% CI)</th>
<th>CVD deaths&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Hazard Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP&lt;140 mmHg</td>
<td></td>
<td></td>
<td>All cause mortality</td>
<td></td>
<td>CVD mortality</td>
</tr>
<tr>
<td>Inactive</td>
<td>14,426</td>
<td>1713</td>
<td>1.00 (Ref)</td>
<td>494</td>
<td>1.00 (Ref)</td>
</tr>
<tr>
<td>Low active</td>
<td>6,984</td>
<td>301</td>
<td>0.67 (0.59, 0.76)</td>
<td>72</td>
<td>0.67 (0.52, 0.86)</td>
</tr>
<tr>
<td>Sufficiently active</td>
<td>4,958</td>
<td>144</td>
<td>0.56 (0.47, 0.66)</td>
<td>35</td>
<td>0.56 (0.40, 0.80)</td>
</tr>
<tr>
<td>SBP 140 &lt;160 mmHg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactive</td>
<td>7,181</td>
<td>1539</td>
<td>1.00 (Ref)</td>
<td>487</td>
<td>1.00 (Ref)</td>
</tr>
<tr>
<td>Low active</td>
<td>2,248</td>
<td>230</td>
<td>0.76 (0.66, 0.87)</td>
<td>64</td>
<td>0.70 (0.54, 0.92)</td>
</tr>
<tr>
<td>Sufficiently active</td>
<td>1,435</td>
<td>125</td>
<td>0.79 (0.66, 0.95)</td>
<td>30</td>
<td>0.62 (0.43, 0.90)</td>
</tr>
<tr>
<td>SBP≥160 mmHg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactive</td>
<td>4,038</td>
<td>1433</td>
<td>1.00 (Ref)</td>
<td>530</td>
<td>1.00 (Ref)</td>
</tr>
<tr>
<td>Low active</td>
<td>909</td>
<td>178</td>
<td>0.79 (0.67, 0.92)</td>
<td>63</td>
<td>0.77 (0.59, 1.00)</td>
</tr>
<tr>
<td>Sufficiently active</td>
<td>487</td>
<td>76</td>
<td>0.68 (0.54, 0.86)</td>
<td>27</td>
<td>0.68 (0.46, 1.01)</td>
</tr>
</tbody>
</table>

Models adjusted for: age, sex, smoking (never; ex-smoker; <10/d cigarettes, 10-19/d, ≥20/d), frequency of alcohol intake (5 or more per week; 1 – 4 per week; 1 – 2 per month; once every few months; ex-drinker; never), physician diagnosed cardiovascular diseases, body mass index.

<sup>a</sup>‘Low active’ (some physical activity but less than 150 min/wk of moderate to vigorous intensity); ‘sufficiently active’ (at least 150 min/wk of moderate to vigorous intensity).

<sup>b</sup>Diagnoses for the primary cause of death were based on the International Classification of Diseases, Ninth (ICD-9) and Tenth (ICD-10) Revisions. <sup>c</sup>Codes corresponding to CVD mortality were 390-459 for ICD-9 and I01-I99 for ICD-10.