RESEARCH LETTER

Incidence of Sports-Related Sudden Death in France by Specific Sports and Sex

Although screening programs prior to participation in sports have been used for many years for young competitive athletes, it has been suggested that screening programs might also be worthwhile in the general population. Description of the incidence of sports-related sudden death by specific sports as well as by sex and age may help inform the debate.

Methods | The study design and population have been described previously. Briefly, this prospective study was performed in France between 2005 and 2010, and was approved under the auspices of the French National Institute of Health and Medical Research as well as the French Ministry of Sports and Health with oral informed consent obtained from survivors. However, consent was not required for nonsurvivors (84.3% of cases). Overall, 60 of 96 administrative districts participated voluntarily, and included a population of approximately 35 million inhabitants. Sports-related sudden death was reported by local emergency medical services and defined as death occurring during or within 1 hour of cessation of sports activity, whether the resuscitation was successful or not.

To maximize case detection, we also used systematic web-based monitoring, which was performed continuously by a specific working group. Data were then obtained from medical records. Only patients between the ages of 15 and 75 years were included in this analysis. In addition, because there is no evidence supporting a triggering effect of light exertion, calculation of incidence of sports-related sudden death only included cases during moderate and vigorous exertion, and was assessed by sex, age range, as well as by the 3 most frequent sports among women in France (cycling, jogging, and swimming).

Level of exercise at the time of sports-related sudden death was assessed by responding emergency medical technicians using a prospectively defined scale (light, <4 metabolic equivalents [METs]; moderate, 4-8 METs; and vigorous, >8 METs). The denominator included overall sports participants and those of specific sports based on the 2000 National French Survey of Sports Practices, a random sample of 6526 people aged 15 to 75 years, with a 68% response rate. All tests were 2-tailed and a P value of less than .05 was considered statistically significant. All data were analyzed using Stata software version 11.0 (StataCorp).

Results | There were 775 sports-related sudden death cases during moderate to vigorous exertion over 5 years. Of these cases, 51% were first reported by emergency medical services and 49% by press report with further confirmation by emergency medical services in the majority of cases (<2% were finally confirmed by web-based monitoring); 42% were women. The mean (SD) age of sudden death in women was 44 (17) years vs 46 (15) years in men (P = .33). The overall mean incidence rate in women was estimated to be 0.51 (95% CI, 0.34-0.68) per million female sports participants vs 10.1 (95% CI, 9.3-10.8) in men (P < .001) (Table). The incidence rate of sports-related sudden death significantly increased with age among men (5.23 for 15-34 years to 14.19 for 55-75 years; P < .001), but not among women (0.43 for 15-34 years to 0.65 for 55-75 years; P = .47) (Table). The overall incidence of sudden death differed by sport for men but not women (Figure). No significant differences were observed among the 60 participating districts regarding the proportion of sports-related deaths among women (P = .88).

Discussion | Compared with men, we found a lower incidence of sports-related sudden death in women and differences by age and sport. The observed sex differences may be a result of variation in the rate of sports participation between men and women. However, because we provided incidence per million participants, this is unlikely to explain such differences. The duration or level of exertion during each session could differ between men and women. An intrinsic risk related to sex could play a role because the age-specific prevalence of coronary heart disease is known to be lower in young and middle-aged women with sudden death. Differ-

<table>
<thead>
<tr>
<th>Age groups, y</th>
<th>No. of Participants</th>
<th>Overall Incidence/ Million Sport Participants/Year (95% CI)</th>
<th>No. of Participants</th>
<th>Incidence/ Million Female Participants/Year (95% CI)</th>
<th>No. of Participants</th>
<th>Incidence/ Million Male Participants/Year (95% CI)</th>
<th>P Valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-34</td>
<td>160</td>
<td>2.96 (2.50-3.42)</td>
<td>11</td>
<td>0.43 (0.18-0.69)</td>
<td>149</td>
<td>5.23 (4.39-6.07)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>35-54</td>
<td>357</td>
<td>6.63 (5.94-7.31)</td>
<td>13</td>
<td>0.49 (0.23-0.76)</td>
<td>344</td>
<td>12.47 (11.15-13.79)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>55-75</td>
<td>258</td>
<td>7.51 (6.60-8.43)</td>
<td>11</td>
<td>0.65 (0.27-1.03)</td>
<td>247</td>
<td>14.19 (12.42-15.96)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Overall</td>
<td>775</td>
<td>5.45 (5.07-5.83)</td>
<td>35</td>
<td>0.51 (0.34-0.68)</td>
<td>740</td>
<td>10.07 (9.34-10.80)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

a Statistical tests used were categorical comparisons and tests for trends.
ent sports activities differ in terms of static vs dynamic components. Thus, the differences in sudden death incidence according to sport may not be surprising, although not previously documented. The extent to which observed differences between sports are related only to specificities of sports activities, or also to characteristics of participants, needs further study.

Strategies for community screening prior to participation in recreational sports activities should consider both the types of sports to be undertaken and the sex of participants. The incidence of sports-related sudden death is probably underestimated in this study. However, we have observed a similar sex ratio of sudden death among districts, making differential reporting unlikely.

Eloi Marijon, MD
Wulfran Bougouin, MD
Marie-Cécile Périer, MPH
David S. Celermajer, PhD, FRACP
Xavier Jouven, MD, PhD

Figure. Mean Incidence Rates of Sports-Related Sudden Death According to Sex Among the 3 Most Practiced Sports Among Women

<table>
<thead>
<tr>
<th>Sport</th>
<th>Women</th>
<th>Men</th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycling</td>
<td>0.1</td>
<td>0.5</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Jogging</td>
<td>0.3</td>
<td>0.8</td>
<td>0.4</td>
<td>0.8</td>
</tr>
<tr>
<td>Swimming</td>
<td>0.5</td>
<td>0.9</td>
<td>0.6</td>
<td>0.9</td>
</tr>
</tbody>
</table>

All incidence rate comparisons between women and men by sport yielded P values of less than .001. The overall comparison among the 3 sports yielded a P value of less than .001; for men, the comparison yielded a P value of less than .001; and for women, the comparison yielded a P value of .30. The error bars indicate 95% confidence intervals.

* Rates are per million sport participants per year.

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Investigators and Coordinators: Frédéric Degroote, MD (district 2, Alise); Michel Tashan, MD (district 5, Hauts-Alpes); Dominique Grimaud, MD (district 6, Côte d’Azur); Véronique Vig, MD (district 13, Bouches-du-Rhône); Daniel Bonieux, MD (district 14, Calvados); Rémy Loyant, MD (district 16, Charente); Francis Mounios, MD (district 17, Charente-Maritime); François Bandaly, MD (district 18, Cher); Marc Freysz, MD (district 21, Côte-d’Or); Christian Hamon, MD (district 22, Côtes-d’Armor); Michel Gautron, MD (district 24, Dordogne); Marie-Céline Maillot, MD (district 25, Doubs); Claude Zamour, MD (district 26, Drôme); Nicolas Letellier, MD (district 28, Eure-et-Loir); Claude Lazou, MD (district 29, Finistère); Jean-Louis Ducasse, MD (district 31, Haute-Garonne); Jean-Maurice Guez, MD (district 32, Gers); Michel Thicome, MD (district 33, Girondes); Pierre Benatia, MD (district 34, Hérault); Louis Soulat, MD (district 36, Indre); Jacques Fuscudari, MD (district 37, Indre-et-Loire); Katell Berthelot, MD (district 38, Isère); Antoine Elisseef, MD (district 39, Jura); Rachel Ricard, MD (district 40, Landes); Solo Randriamandahafa, MD (district 41, Loir-et-Cher); Thomas Guerin, MD (district 42, Loire); Valerie Debierre, MD (district 44, Loire-Atlantique); Sophie Narcisse, MD (district 45, Loiret); Marc Chassing, MD (district 48, Lozère); Alain León, MD (district 51, Manche); Jacques Milleron, MD (district 52, Haute-Manche); Michel Vedel, MD (district 55, Meuse); Françoise Charland, MD (district 56, Morbihan); Nordine Bennacer, MD (district 59, Nord); Thierry Ramaheron, MD (district 60, Oise); Luce Hapka, MD (district 62, Pas-de-Calais); Jacques Meyniel, MD (district 63, Puy-de-Dôme); Isabelle Pouyanne, MD (district 64, Pyrénées-Atlantiques); Jérôme Khazaka, MD (district 65, Hautes-Pyrénées); Jean-Claude Bartier, MD (district 67, Bas-Rhin); Bruno Goulesque, MD (district 68, Haut-Rhin); Pierre-Yves Gueugniaud, MD (district 69, Rhône); Tourif El Cadi, MD (district 70, Haute-Saône); Bruno Girardet, MD (district 71, Saône-et-Loire); Christophe Savio, MD (district 72, Sarthe); Daniel Jannière, MD (district 75, Paris); Bertrand Dureuil, MD (district 76, Seine-Maritime); Jean-Yves Le Taranc, MD (district 77, Seine et Marne); Clotilde Cazenave, MD (district 78, Yvelines); Christine Ammirati, MD (district 80, Somme); Marie-Gabrielle Vaissière, MD (district 81, Territorial office); Jean-Jacques Raymond, MD (district 83, Var); Philippe Olivier, MD (district 84, Vaucluse); Hubert Netteler, MD (district 88, Vosges); Monique Duche, MD (district 89, Yonne); Adel Kara, MD (district 90, Territoire-de-Belfort); Michel Baer, MD (district 92, Hauts-de-Seine); Frédéric Adnet, MD (district 93, Seine-Saint-Denis); Chantal Vallier, MD (district 94, Val-de-Marne); Cédric Ramaut, MD (district 95, Val-d’Oise).


COMMENT & RESPONSE

Efficacy of Sublingual Immunotherapy

To the Editor The primary objective of the systematic review by Dr Lin and colleagues was “to review the clinical efficacy and safety of sublingual immunotherapy delivered as an aqueous