

Increased rates of myocardial infarction and deaths in men after sexual activity

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ARTICLE INFO

Article history:

Received 11 January 2012

Accepted 21 January 2012

Available online 14 February 2012

Keywords:

Myocardial infarction

Death

Sexual activity

Case-crossover

Physical activity

Autopsy

Episodic physical activity has been shown to be a trigger for acute cardiac events like myocardial infarction (MI) [1–6] and sudden cardiac death (SCD) [7–9] in a dose-dependent and gender-independent [10] fashion. Sexual intercourse is a particular form of episodic physical activity. Since men have been shown to be physically more active during sexual intercourse than women [11], we hypothesized that this might result in a greater number of cardiac events in men.

We searched MEDLINE, EMBASE, and CENTRAL in December 2011. All case-crossover studies investigating sexual activity as a trigger of cardiac events were identified using a 2-level search strategy. We first used keywords including case-crossover study; myocardial infarction; acute coronary syndrome; sudden cardiac death; sexual intercourse; and sexual activity. Thereafter, relevant studies were identified through a manual search of secondary sources including references of initially identified articles and a search of reviews and commentaries. Studies considered for inclusion met the following criteria: case-crossover study on MI or SCD; study population had unrestricted access for patients of both genders; the investigated trigger was sexual intercourse/sexual activity within 2 h prior to the cardiac event. We extracted the number of subjects in each study and the number of subjects that had sexual intercourse/sexual activity 2 h prior to MI/SCD, and calculated the percentage of males and females thereof, as well as odds ratios (OR) and 95% confidence intervals (CI). If data was not available in the original publication we contacted the corresponding authors. We further searched the literature on autopsy-studies on cardiac fatalities after sexual activity.

Chi-square statistic with Yates correction and odds ratio using the approximation of Woolf were performed using GraphPad InStat 3.00, GraphPad Software, San Diego California USA.

The authors of this manuscript have certified that they comply with the Principles of Ethical Publishing in the International Journal of Cardiology [12].

Our search strategy revealed three relevant studies on MI [1,13,14], but none on SCD triggered by sexual activity (Table 1). In summary, these studies show that 37 of 1596 males (2.3%), but only 3 of 441 females (0.7%) suffered a MI within the first 2 h after sexual activity ($P=0.045$). Calculated cumulative OR was 3.47 (1.06 to 11.30).

Contrary to our hypothesis and the data shown in Table 1, Masoomi et al. reported a higher risk among women than men [15]. However, whereas we and others only consider sexual activity as being causative for an event if they occur within 2 h prior to an event, these authors assessed a hazard-period of 12 h, a period too long to reliably identify a single and responsible trigger.

Culic et al. performed a meta-analysis of mostly observational studies and reported that heavy physical activity preceded the onset of MI more often in men than in women (8.7% vs 1.7%; OR, 6.2; 3.8–10.2) [16]. However, Dahabreh and Paulus criticized [17], that these data are susceptible to Simpson's paradox since the analyses reported do not appear to have been stratified by study. Furthermore, the self-matched aspect of the case-crossover design was not appropriately taken into account. They also refrained from performing analyses on group level summary measures of patient characteristics, such as the proportion of men in each study, because they are prone to ecological bias. Some of these concerns are also true for our observations. However, a solid case-crossover study that is powered to answer gender specific questions has not yet been published. It can therefore only be speculated that the increased risk for men suffering a MI triggered by sexual activity is due to men being physically more active during and exhausted by sexual intercourse and subsequently more susceptible to the dose dependent trigger "physical activity".

Four autopsy-studies were initiated to determine the risk of sudden death after sexual activity. A study in Berlin/Germany was performed from 1956 to 1976 in which 30 (1.7%) of 1722 autopsies were described as unexpected deaths during sexual activity. Only 2 cases were women and 23 cases were preceded by extramarital intercourse [18]. A Japanese study investigated 8275 autopsies from 1959 to 1965 and found 67 coital deaths, of which 65 were male and 47 occurred during or after extra-marital sexuality [19]. A larger study performed in Frankfurt/Germany (1972–2004) revealed 68 (0.22%) of about 32,000 natural deaths to have happened during sexual activity [20–22], of which 5 occurred in women but 63 in men. The most frequent cause of death was MI ($n=28$; 41.2%). The annual incidence of sudden cardiovascular death during sexual activity was estimated by these authors to be 1.9 per 1000 autopsies for men and 0.16 per 1000 autopsies for women. Interestingly, the majority of fatalities occurred outside a steady relationship, mostly with prostitutes. A Korean study [23] of 1379 autopsies between 2001 and 2005 reported 14 subjects to have died after sexual intercourse, of which 9 were males and 5 were females; in 10 cases the partners were non-marital partners or prostitutes. These results of 43,067 autopsies identified 179 coital deaths (0.42%) mainly due to cardiac causes like MI of which 165 (92.2%) were male [24]. Although autopsy studies have to be interpreted with caution, these autopsy-studies further underline the higher probability for males to suffer from cardiac casualties during or after sexual activity.

Studies presented above support the notion that intercourse with an extramarital partner might be physically more exhaustive and

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Table 1
Increased rates of myocardial infarctions in men but not in women after sexual activity.

	Subjects [n]	Age [years]	Male subjects [n]	Exposed men [n] (%)	OR, (95% CI)	Female subjects [n]	Exposed women [n] (%)	OR (95% CI)
Muller et al.	858	63 ± 12	704	25 (3.6%)	2.7 (1.8–4.0)	154	2 (1.3%)	1.3 (0.3–5.2)
Möller et al.	659	60 ± 7	506	5 (1.0%)	1.3 (0.5–3.4)	153	0 (0%)	–
Baylin et al.	470	57 ± 11	386	7 (1.8%)	– ^a	134	1 (0.7%)	– ^a
Total	2037		1596	37 (2.3%)	–	441	3 (0.7%)	–

Cumulative OR: 3.5; (1.1–11.3); P = 0.045 (Chi-square)

^a Baylin et al. did not report gender specific ORs.

might have a greater effect on heart rate and blood pressure than intramarital sexual activities, which might result in the reported increased rate of cardiac events and deaths.

Several mechanisms have been previously suggested. Indeed, intensive physical exertion, including sexual activity, does induce a cascade of physiologic changes that leads to an increased sympathetic activity, particularly in untrained individuals, accompanied by an increased heart rate, blood pressure, platelet aggregation and coronary vasomotor tone, which might trigger rupture of vulnerable atherosclerotic plaques, resulting in MI.

Given the protective value of regular physical activity against cardiac diseases and events, it might be speculated that superior physical fitness might also protect against coital deaths.

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