

High heart rate at rest signals higher risk of death even in fit healthy people

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A high heart rate (pulse) at rest is linked to a higher risk of death even in physically fit, healthy people, suggests research published online in the journal *Heart*.

A resting heart rate - the number of heart beats per minute - is determined by an individual's level of physical fitness, circulating hormones, and the autonomic nervous system. A rate at rest of between 60 and 100 beats per minute is considered normal.

People who are very physically active tend to have a low heart rate at rest, but the authors wanted to find out if heart rate had any bearing on an individual's risk of death, irrespective of their level of cardiorespiratory fitness.

They therefore tracked the health of just under 3000 men for 16 years, all of whom were part of the Copenhagen Male Study. This was set up in 1970-71 to monitor the [cardiovascular health](#) of middle aged men at 14 large companies in Copenhagen.

In 1971 all participants were interviewed by a doctor about their health and lifestyle, including smoking and exercise, and given a check-up. Their [cardiorespiratory fitness](#) was assessed using a cycling test, set at three different levels of exertion.

In 1985-6, just under 3000 of these original participants were given a further check-up, to include measurements of height, weight, [blood](#)

[pressure](#), [blood fats](#) and [blood glucose](#). Their resting heart rate was also recorded ([ECG](#) and VO2Max).

Sixteen years later in 2001, the researchers checked national Danish registers to find out which of these men had survived. Almost four out of 10 (39%; 1082) of the men had died by 2001.

Unsurprisingly, a high resting heart rate was associated with lower levels of physical fitness, higher blood pressure and weight, and higher levels of circulating blood fats. Similarly, men who were physically active tended to have lower resting heart rates.

But the results showed that the higher the resting heart rate, the higher was the risk of death, irrespective of fitness level.

After adjusting for factors likely to influence the results, a resting heart rate of between 51 and 80 beats per minute was associated with a 40 to 50% increased risk of death, while one between 81 and 90 beats per minute doubled the risk, compared with those with the lowest rate. A resting heart rate above 90 beats per minute tripled the risk.

On the basis of their findings, the authors calculated that every 10 to 22 additional beats per minute in resting heart rate increased the risk of death by 16%, overall.

When smoking was factored in, this showed that every 12 to 27 additional heartbeats per minute increased a smoker's risk by 20%, with a 14% increase in risk for every additional 4 to 24 beats per minute for non-smokers.

The authors say that a great deal of attention has focused on resting heart rate as an indicator of longevity, but that it has not been clear whether a high rate is simply an indicator of low levels of physical fitness.

But they conclude: "We found that irrespective of level of physical fitness, subjects with high resting heart rates fare worse than subjects with lower heart rates. This suggests that a high [resting heart rate](#) is not a mere marker of poor physical fitness, but is an independent risk factor."

More information: www.heart.bmj.com/lookup/doi/10.1136/heartjnl-2012-303375

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