

Greatly increased risk of stroke for patients who don't adhere to anti-hypertensive medication

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People with high blood pressure, who don't take their anti-hypertensive drug treatments when they should, have a greatly increased risk of suffering a stroke and dying from it compared to those who take their medication correctly.

A study of 73,527 [patients](#) with [high blood pressure](#), published online today (Wednesday) in the *European Heart Journal* [1], found that patients who did not adhere to their medication had a nearly four-fold [increased risk](#) of dying from stroke in the second year after first being prescribed drugs to control their [blood pressure](#), and a three-fold increased risk in the tenth year, compared with adherent patients.

In the year that the non-adherent patients died from a stroke, they had a 5.7-fold higher risk than the adherent patients.

The patients who didn't take their medication correctly were also more likely to be admitted to hospital after a stroke. Their risk of hospitalisation was 2.7-fold higher in the second year after being prescribed anti-hypertensive drugs compared to adherent patients, and nearly 1.7-fold higher in the tenth year. In the year in which they admitted to hospital with a stroke, their risk was nearly two-fold higher than the adherent patients.

The first author of the study, Dr Kimmo Herttua, a senior fellow in the

Population Research Unit at the University of Helsinki, Finland, said: "These results emphasise the importance of hypertensive patients taking their antihypertensive medications correctly in order to minimise their risk of serious complications such as fatal and non-fatal strokes. Non-adherent patients have a greater risk even ten years before they suffer a stroke. We have also found that there is a dose-response relationship, and the worse someone is at taking their antihypertensive therapy, the greater their risk."

The researchers, including [scientists](#) from Finland and University College London, UK, used nationwide registers in Finland that give details of [prescriptions](#), admissions to hospital and deaths. They were able to check how successfully patients took their antihypertensive drugs by tracking the numbers of prescriptions issued to them each year. They considered that patients adhered to their medications if they took them correctly more than 80% of the time. Non-adherence was divided into two groups: intermediate adherence (30-80% adherence), and poor adherence (less than 30%).

Information on the patients' purchases of medication was available from 1995 onwards, and the researchers followed them from 1 January 1995 to 31 December 2007. During this time, out of the 73,527 patients aged 30 or older, 2,144 died from stroke and 24,560 were admitted to hospital with a stroke.

"As far as we know, this study is unique as it is the first study to follow patients over a long period of time, repeatedly checking how correctly they are taking their medications, and linking the trajectory of adherence with the risk of fatal and non-fatal stroke," said Dr Herttua.

Evidence that the degree of non-adherence affected the patients' risk (a dose-response relationship) was found when the researchers looked at how people who adhered correctly to their medications compared to

those in the two categories of non-adherence: "intermediate" and "poor". In the year that a fatal or non-fatal stroke occurred, patients in the "intermediate" and "poor" groups had a 1.7-fold and 2.6-fold increased risk of a non-fatal stroke respectively, and a 3.6-fold and eight-fold increased risk of a fatal stroke respectively, compared to patients with good adherence.

"We also took account of the fact that people's adherence might change over time," said Dr Herttua. "We analysed the year-by-year association between adherence to medication and non-fatal and fatal stroke. For example: if a person who died from [stroke](#) was non-adherent, say, in year four, and adherent in year three prior to his or her [death](#), he or she was involved in increasing the risk of dying among the non-adherents in year four and among the adherents in year three."

The researchers looked at specific classes of antihypertensive drugs. They found that among patients who were taking drugs that acted on the renin-angiotensin system [2] combined with diuretics or beta-blockers, those who were non-adherent had a 7.5-fold increased risk of death and a nearly four-fold increased risk of [hospitalisation](#) in the year that these events occurred, compared to patients who took their medications correctly.

The researchers say that the great strength of this study is its size, linked to excellent registries of relevant data. Possible limitations include that fact that they could not be sure that patients were actually taking their drugs, even though they had collected their prescriptions, and the registries did not give them information on body mass index, smoking, alcohol consumption and resting blood pressure.

More information: [1] "Adherence to antihypertensive therapy prior to the first presentation of stroke in hypertensive adults: population based study", by Kimmo Herttua, Adam G Tabák, Pekka Martikainen,

Jussi Vahtera, Mika Kivimäki. *European Heart Journal*.

[doi:10.1093/eurheartj/ehz219](https://doi.org/10.1093/eurheartj/ehz219)

[2] The renin-angiotensin system is a hormone system that regulates blood pressure and the balance of fluids in the body. Examples of drugs that act on this system include Enalapril, Lisinopril, Candesartan, and Losartan.

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