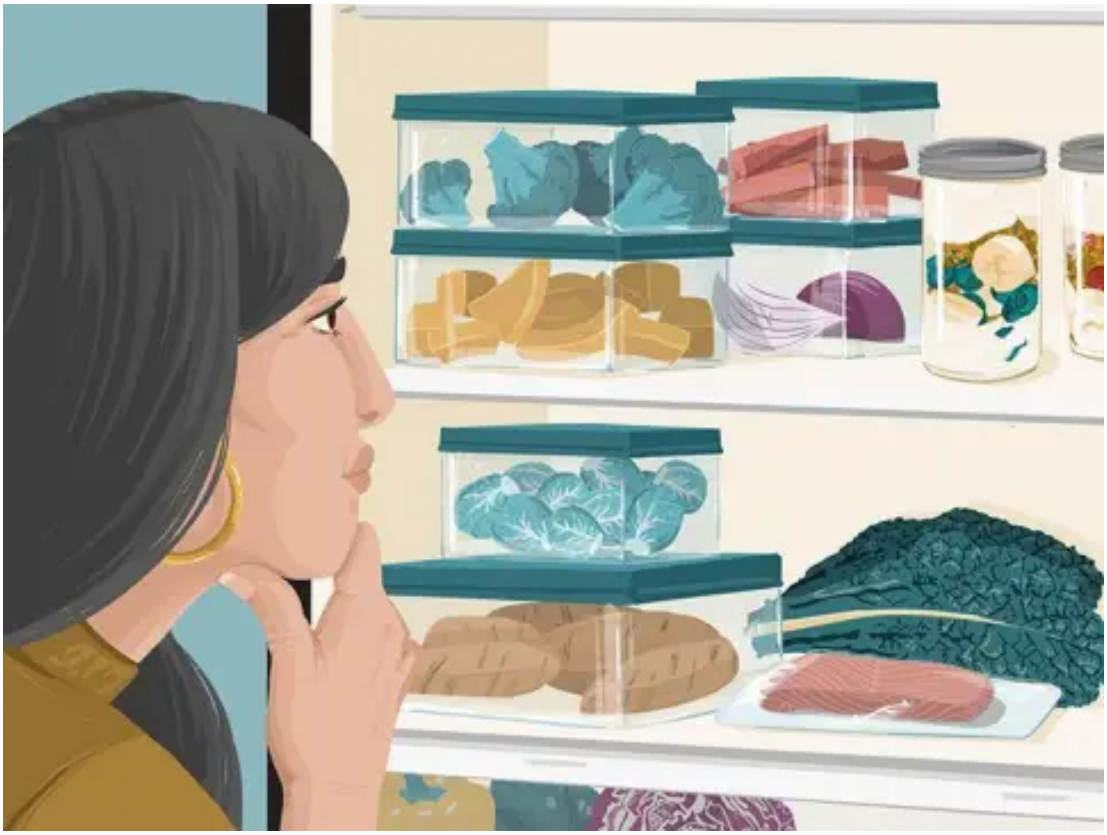
Poor Sleep Tied To Inflammation, A Risk Factor For Heart Disease, Stroke

Written by Catharine Paddock, Ph.D. on November 15, 2010

US researchers found that poor sleep quality, that is not getting a good night's sleep or not enough sleep, is linked to higher levels of inflammation, a known risk factor for heart disease and stroke.

These were the findings of a community study that Dr Alanna Morris, a cardiology fellow at Emory University School of Medicine in Atlanta, Georgia, presented on Sunday at the American Heart Association (AHA) 2010 Scientific Sessions in Chicago.

The study is part of the Emory-Morehouse Partnership to Reduce CV Disparities (META-Health), a joint initiative between Emory and Morehouse School of Medicine, also in Atlanta. An abstract of the study is published in the 23 November issue of Circulation, an AHA journal.



Morris said other studies have already shown a link between acute lack of sleep and inflammation markers and changes in blood vessels, but there is not enough research information on the physiological effects of chronic lack of sleep.

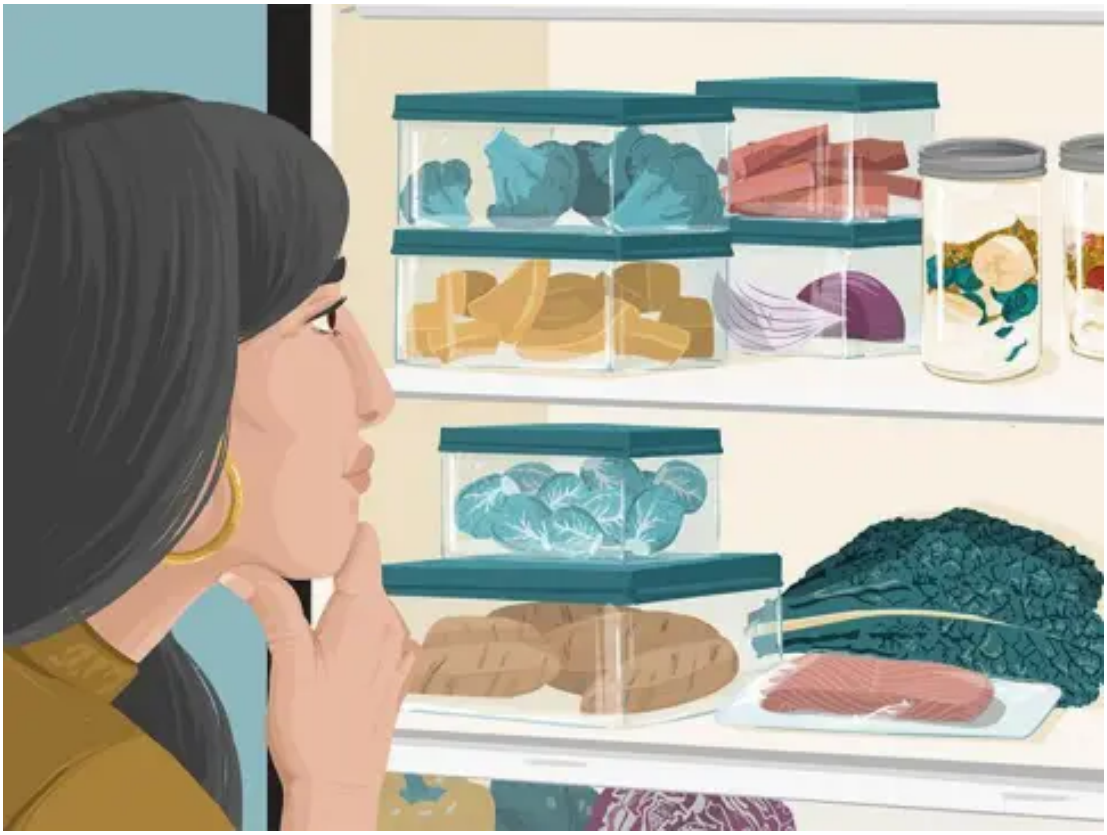
“Most of the studies looking at the body’s response to lack of sleep have looked at subjects who have been acutely sleep deprived for more than 24 hours in experimental sleep laboratories,” said Morris.

Morris and colleagues examined data on 525 middle-aged participants of the META-Health study who had filled in the Pittsburgh Sleep Quality Index (PSQI) questionnaire. 47 per cent of the participants were African American, and 61 per cent were female.

The PSQI asked the participants detailed questions about sleep duration and sleep quality.

The researchers defined poor sleep as a total PSQI score of six or more, based on the median score. They also analyzed data according to hours of sleep, in three groups: less than 6 hours per night, between 6 and 8.9, and 9 hours or more.

The participants' levels of three inflammatory markers: fibrinogen, IL-6 and C-reactive protein (CRP), were also examined as continuous values.



C-reactive protein (CRP) is often used as a marker of inflammation and heart disease risk.

According to the AHA and the US Centers for Disease Control and Prevention (CDC), people whose CRP is above 3 mg per litre, that is the upper third of the US population, have around twice the risk of a heart attack compared to those with lower levels.

After adjusting the results to take into account potential demographic (age, gender, race) and health (smoking, diabetes, blood pressure, glucose, waist size, blood fat levels) confounders, the researchers found that:

- Participants with poor sleep quality had significantly higher levels of fibrinogen, IL-6, and CRP than participants with good sleep quality.
- Levels of the three inflammatory markers also differed across the three categories of sleep duration.
- Sleep duration of 6 to 8.9 hours was linked to significantly lower levels of mean fibrinogen, median IL-6 and CRP compared to sleep duration of under 6 hours.
- Comparisons between 6 to 8.9 and nine hours or more of sleep duration did not show any statistically significant effects.

The researchers concluded that:

“Poor sleep quality, and short sleep durations are associated with higher levels of inflammation.”

They suggested that improving sleep quality and duration may be an appropriate therapeutic target for reducing cardiovascular disease risks.

Morris said that although the increased levels of C-reactive protein seen in those participants who got little sleep were within the range that health authorities would describe as low to intermediate cardiovascular disease risk, this study looked at community-based participants, as opposed to

lower risk and lower C-reactive protein levels than many of the high risk populations in other studies".

Inflammation could be a route through which poor sleep quality increases the risk of heart disease and stroke, said Morris.

But she pointed out that it is still not clear whether short sleep duration contributes directly to cardiovascular mortality or whether it is a mediating factor.

Other studies have shown that having between 7 and 8 hours sleep a night is linked to living longer, and sleeping a lot less or a lot more than that is linked to shorter lifespan. Short and long sleep durations have also been associated with high blood pressure, obesity, diabetes and stress, all of which are known risk factors for heart disease and stroke, although in this study there was no significant result for longer sleep duration.

Morris and colleagues are also reporting to the conference the results of a separate study that looked at the difference between men and women in terms of links between sleep quality and artery hardening or stiffness, where lack of flexibility in the vessel wall causes high blood pressure and makes the heart work harder.

Those results showed that while poor sleep was linked to higher blood pressure in both men and women, the link between poor sleep quality and arterial stiffness was only significant for men.

"Sleep Quality and Duration are Associated with Higher Levels of Inflammatory Biomarkers: the META-Health Study."
Alanna Morris, Dorothy Coverson, Lucy Fike, Yusuf Ahmed, Neli Stoyanova, W. Craig Hooper, Gary Gibbons, Donald Bliwise, Viola Vaccarino, Rebecca Din-Dzietham, and Arshed Quyyumi.
Circulation, 23 November 2010; 122: Abstract: A17806.

Additional source: Emory University.

Written by: Catharine Paddock, PhD

Heart Disease Stroke Cardiovascular / Cardiology
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FEEDBACK:

New research finds that two servings of avocado a week may reduce cardiovascular risk. Darren Muir/Stocksy

- **Researchers examined the relationship between avocado consumption and cardiovascular events.**
- **They found that eating 2 or more servings of avocado per week is linked to 16% fewer cardiovascular events over a 30-year period. One serving is half an avocado, or 80 grams (g).**
- **The researchers conclude that replacing certain fat-containing foods with avocado could lower cardiovascular disease risk.**
- **The note however that replacing plant oils with avocado is linked to a 45% higher stroke risk.**

Cardiovascular disease (CVD) is the leading cause of death worldwide. However, it can be prevented through lifestyle factors like diet.

The American Heart Association (AHA) recommends limiting 5- 6% of calories intake from saturated fatty acid (SFA), and replacing SFA and trans-fats with monounsaturated fats (MUFA) and polyunsaturated fats for better heart health.

Avocados are rich in MUFAs and polyunsaturated fats. Studies have found that their regular consumption reduces triglycerides, low-density lipoprotein (LDL) cholesterol, and total cholesterol level.

consumption and cardiovascular events could improve understanding of the fruit's health benefits.

Recently, researchers have investigated the link between avocado consumption and cardiovascular events.

They found that higher consumption of avocados was linked to a lower risk of CVD and coronary heart disease (CHD).

"The [...] results are significant and strengthen previous findings of avocados' association with a lower risk of cardiovascular disease [as well as] reducing heart outcomes such as fatal and nonfatal myocardial infarction," Bhanu Gupta, MD, cardiologist at The University of Kansas Health System, not involved in the study, told *Medical News Today.*

> "Point to be noted: avocado consumption does not lower the risk of stroke in the study. Another point to be noted: avocado is not a replacement for healthy dietary fats such as olive oils, nuts, and other plant oils."
>
> – Dr. Gupta

The study was published in the *Journal of the American Heart Association (JAHA)*.

Data analysis

For the study, the researchers used data from the Health Professionals Follow-Up Study (HPFS) and the Nurses' Health Studies (NHS). Both studies are ongoing and began in 1986 and 1976 to examine the effects of health and lifestyle on the incidence of serious illness in male and female healthcare professionals.

For the present study, the researchers included 62,225 females and 41,701 males who did not have a history of heart disease, stroke, or cancer.

The researchers examined their medical records for incidence of myocardial infarction and stroke, dietary surveys taken once every 4 years, and risk factors such as hypertension and type 2 diabetes from self-reports and physician diagnoses. Participants were tracked for 30 years.

By the end of the study period, the researchers noted 14,274 incident cases of CVD including 9,185 CHD events and 5,290 strokes.

The researchers noted that males and females with higher avocado intake tended to have higher total energy intake and a healthier diet with more fruits, vegetables, whole grains, nuts, and dairy products such as yogurt and cheese.

After adjusting for major dietary and lifestyle factors, the researchers found that having two or more servings of avocado per week was linked to a 16% lower CVD risk and 21% lower CHD risk compared to those who did not eat avocados.

They further found that replacing half a serving per day of mayonnaise, margarine, butter, egg, yogurt, cheese, or processed meats with the same amount of avocado was linked to a 19–31% lower risk of coronary heart disease.

They reported no significant association between stroke risk and avocado

plant oils with an equivalent amount of avocado was linked to a 45% higher stroke risk.

Nutrient-rich food

When asked to explain what might account for the positive effects of avocado on CVD risk, study first author Lorena Pacheco, Ph.D., MPH, RDN, postdoctoral research fellow at Harvard T.H. Chan School of Public Health, told *MNT*:

"Avocados are a nutrient-rich food item with favorable food compounds including monounsaturated and polyunsaturated fats (healthy fats), vitamins, minerals, soluble fiber, vegetable proteins, phytosterols, and polyphenols. There are potential biological mechanisms by which avocados offer cardioprotective benefits."

"The primary monounsaturated fatty acid present in avocados is oleic acid – healthy fat – and it is suggested that it helps in reducing hypertension, inflammation, and insulin sensitivity."

"Additionally, they contain plant sterols that could have favorable effects on lipid profiles. [Also], the soluble fiber intake in avocados can also lead to a better lipid profile, meaning lower 'bad cholesterol' levels," she explained.

"They also are a source of vegetable protein," added Penny M. Kris-Etherton Ph.D., professor of nutritional science at Penn State College of Health and Human Development, not involved in the study. "Collectively, it is very likely that this 'package' of heart-health compounds accounts for the findings," said Dr. Kris-Etherton.

The researchers concluded that replacing certain fat-containing foods with avocado could lower CVD risk.

Study limitations

The authors noted some limitations to their findings. As their study was observational, they could not establish causation.

Shannon Hoos-Thompson, MD, a cardiologist at The University of Kansas Health System, not involved in the study, explained for *MNT*:

> "To put the findings in perspective, eating less cardiovascular unhealthy food may be the explanation [rather] than the result being specific to avocado consumption."

The authors also noted that their study population was primarily non-Hispanic white nurses and health professionals, so their results may not be generalized to wider demographics.

"The dietary data were self-reported and have some measurement error," added Dr. Kris-Etherton. "However, the authors used a repeated measurements dietary assessment method and collected intake data over time, which reduces random measurement error."

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