



Journal Watch

1. Fasting blood sugar levels may predict hypertension risk

Tatsumi Y, Morimoto A, Asayama K, Sonoda N, Miyamatsu N, Ohno Y, et al. Fasting blood glucose predicts incidence of hypertension independent of HbA1c levels and insulin resistance in middle-aged Japanese: The Saku study. *Am J Hypertens*. 2019. doi: 10.1093/ajh/hpz123.

Diabetes parameters such as fasting blood sugar levels may predict hypertension incidence, claims a recent study published in the *American Journal of Hypertension*, and it also happens to be the first to demonstrate that. Various diabetes indices including fasting blood sugar levels, high post-loaded glucose levels, high glycated haemoglobin (HbA1c) levels, insulin resistance and impaired insulin secretion were assessed in 2210 participants without hypertension for the incidence of hypertension (that is, blood pressure

140/60 mmHg) by using multivariable-adjusted Cox proportional hazard models.

The 5-year cohort study investigated the link between diabetes indices such as fasting blood sugar levels and hypertension incidence and compared the predictive powers in middle-aged Japanese individuals aged 30–64 years. During the follow-up, 456 participants were reported to develop hypertension. Researchers found that fasting blood sugar was independently and significantly associated with hypertension. The results were similar among individuals with HbA1c < 6.5%, homeostasis model assessment of insulin resistance (HOMA-IR) < 2.5, body mass index (BMI) < 25 kg/m², age < 55 years, blood pressure < 130/80 mmHg and non- and moderate drinking. Furthermore, high 120-min blood glucose level and impaired insulin secretion did not increase the risk for hypertension.

Therefore, fasting blood sugar can be considered as a predictable index for future incidence of hypertension in the middle-aged Japanese.

2. Active sex life is linked to long-term survival following heart attack

Kepler SB, Hasin T, Benyamini Y, Goldbourt U, Gerber Y. Frequency of sexual activity and long-term survival after acute myocardial infarction. *Am J Med*. 2019. doi: 10.1016/j.amjmed.2019.06.019.

A study conducted in Israel suggests that heart attack survivors with an active sex life are less likely to die in the years after the first heart attack when compared to their celibate counterparts.

A recent report published in the *American Journal of Medicine* included 1,120 men and women aged 65 years at the time of their first heart attack. During the follow-up period of up to 22 years, 524 individuals died. The study reported that there is a 27%, 12% and 8% lower chances of dying when participants reported to have sex more than once a week, sex once a week and some sex (but not often), respectively, when compared to those who did not have sex at all during the year before their heart attack.

The association of sex with survival odds seemed to be even stronger for people with active sex lives after they had a heart attack. However, between sexually active individuals, the difference was smaller. Compared to survivors who never had sex, those who had sex less than once a week during the follow-up period were 28% less likely to die, while people who had sex weekly were 37% less likely to die and those who had sex more than once a week were 33% less likely to die.

However, Andrew Steptoe the head of the department of Behavioural Science and Health at University College London noted that ‘the people who were sexually active were more likely to be in a relationship, were younger, and generally healthier.’ Individuals who had sex more than once a week in the year before their heart attack were, on an average, aged 49 years at the start of the study, compared to the average age of 58 years for those

who had no sex at all the year before their heart attack. In addition, sexually inactive people were also more likely to have hypertension, hypercholesterolaemia, diabetes and multiple chronic health conditions in the year before the heart attack than those who had sex more than once a week.

While <50% of sexually inactive people lived with a steady partner in the year before their heart attack, this was approximately 94% among those who had sex more than once a week. In the year prior to the heart attack, 67% of the people who were sexually inactive also reportedly did not exercise at all, compared with 45% of people who had sex more than once a week. Furthermore, the association between being sexually active and survival weakened when researchers adjusted for age, lifestyle, other health conditions and socioeconomic factors.

The researchers further added that frequent sex may lead to biological changes that help people live longer as sex is linked to longer caps on telomeres, which tend to shrink with age and in response to stress. Thus, longer telomeres are associated with longer life. Additionally, regular sex is associated with higher testosterone levels in men and women, and low testosterone is linked to increased risk of cardiovascular disease (CVD) as well as low sexual desire. Thus, people who have regular sex may also have a lower risk of heart problems. Finally, being sexually active may be a sign of better health rather than the cause of it. However, whether or how sex helps heart attack survivors live longer was beyond the scope of this study.

3. Medications for atrial fibrillation may elevate fall and syncope risk in older adults

Dalgaard F, Pallisgaard JL, Numé AK, Lindhardt TB, Gislason GH, Torp-Pedersen C, et al. Rate or rhythm control in older atrial fibrillation patients: risk of fall-related injuries and syncope. *J Am Geriatr Soc.* 2019. doi: 10.1111/jgs.16062.

A recent retrospective cohort study published in the *Journal of the American Geriatrics Society* established a link between taking anti-arrhythmic drugs for atrial fibrillation (AF) and risk for falls and syncope in older adults. Data were collected from Danish nationwide administrative registries (2000–2015), and participants included 100,935 rate-lowering patients with AF aged ≥65 who were taking rate-lowering drugs and/or anti-arrhythmic drugs. To control arrhythmia, the patients were chiefly prescribed beta-blockers, calcium channel blockers (diltiazem and verapamil) and digoxin. Other medications included amiodarone, flecainide and propafenone.

During the median follow-up period of 2.1 years, emergency department visits or hospital admissions

were scanned for fainting, fall-related injuries or both. Fractures of the thigh, elbow, forearm, wrist, shoulder or upper arm, pelvis and skull and major, minor head injuries were included in ‘fall-related injuries’. The researchers found that 17% participants had a fall-related injury, 5.7% had a fainting episode and 20.9% had either a fall-related or fainting-related injury.

Anti-arrhythmic drugs were found to be associated with a higher risk of fall-related injuries and syncope than were rate lowering monotherapy. Classification based on individual drugs showed that amiodarone significantly increased the risk of fall-related injuries and syncope. A higher risk of all outcomes was seen in the first 90 days of any treatment compared with >180 days of rate-lowering monotherapy; nevertheless, the first 14 days for those treated with anti-arrhythmic drugs showed the greatest risk. Therefore, healthcare professionals should be aware of fall-related injuries and syncope risk in older patients with atrial fibrillation, especially when prescribing amiodarone.

4. Risk of peripheral artery disease persists even after smoking cessation

Ding N, Sang Y, Chen J, Ballew SH, Kalbaugh CA, Salameh MJ, et al. Cigarette smoking, smoking cessation, and long-term risk of 3 major atherosclerotic diseases. *J Am Coll Cardiol.* 2019;74(4):498–507. doi: 10.1016/j.jacc.2019.05.049.

A study published in the *Journal of the American College of Cardiology* reported that smoking and peripheral artery disease were more strongly associated than were heart disease and stroke. Cigarette smoking can elevate the risk of peripheral artery disease even up to 30 years after smoking cessation.

This is the first detailed comparison of the increase in the risks of peripheral artery disease, coronary heart disease and stroke due to smoking. The study included 13,355 Atherosclerosis Risk in Communities (ARIC) cohort participants (current smokers, 3,323; former smokers, 4,185) who were followed for a median of 20 years. Compared with never-smokers, individuals who smoked over 40 pack-years had 4 times higher risk for peripheral artery disease, 2.1 times higher risk for coronary heart disease and 1.8 times higher risk for stroke. Similarly, individuals who smoked over one pack/day had 5.4 times higher risk for peripheral artery disease, 2.4 times higher risk for coronary heart disease and 1.9 times higher risk for stroke.

Thus, along with smoking prevention for nonsmokers, there should be focus on early smoking cessation for smokers. Campaigns on smoking-related health risks should highlight the elevated risk of peripheral artery disease as well.

This was a branch of the ARIC study, which began in the late 1980s and enrolled 15,792 participants aged 45–64 years from four communities in the United States. The study includes follow-ups over 30 years to record health and potential health risk factors. The researchers found that smoking strongly affected the risk of peripheral artery disease over a long period of time. The peripheral artery disease risk returned to the baseline level only after 30 years of smoking cessation, while the period was 20 years for coronary heart disease risk.

Smoking cessation seems to bring about a quick and meaningful drop in peripheral artery disease risk. Smoking cessation for 5–9 years was associated with a much greater decrease in peripheral artery disease risk (57%) than that for coronary heart disease and stroke (30%–40%). There was a lower risk for peripheral artery disease, coronary heart disease and stroke within 5 years of smoking cessation.

It has been observed that adolescents and young adults start smoking; therefore, young individuals should be made aware of the elevated health risks that are associated with smoking even after cessation. Thus, public health campaigns against smoking should also focus on elevated peripheral artery disease risk and highlight how long it takes to eliminate that risk.

5. Both systolic and diastolic blood pressure contribute to cardiovascular risk

Flint AC, Conell C, Ren X, Banki NM, Chan SL, Rao VA, et al. Effect of Systolic and Diastolic Blood Pressure on Cardiovascular Outcomes. *N Engl J Med.* 2019;381(3):243–51. doi: 10.1056/NEJMoa1803180.

A recent study published in the *New England Journal of Medicine*, including over 1.3 million people, reported that both systolic and diastolic hypertension significantly contribute to CV risk, regardless of the threshold used for hypertension. There has been a controversy regarding whether systolic blood pressure, diastolic blood pressure or both contribute to CV risk. This study demonstrated that both are important and it is better to have lower blood pressure. These findings are consistent with the NIH-sponsored Systolic Blood Pressure Intervention Trial (SPRINT) trial results and supportive of the latest recommendations from the American College of Cardiology / American Heart Association CACC/AHA).

Researchers analysed data on more than 36 million blood pressure measurements in 1.3 million outpatients from Kaiser Permanente Northern California, a large integrated health care delivery system. CV outcomes including a composite of myocardial infarction, ischemic stroke or hemorrhagic stroke were recorded over a period of 8 years, during which 44,286 outcome events occurred.

Researchers calculated hypertension prevalence using two thresholds (140/90 mmHg and 130/80 mmHg) from the 2017 ACC/AHA guidelines. For the former threshold, 18.9% of the measurements showed hypertension and for the latter threshold, 43.5% of the measurements showed hypertension. Systolic blood pressure measurements indicating hypertension were reported to increase as a function of age, whereas diastolic blood pressure measurements indicating hypertension peaked in individuals in their 50s. After adjusting for demographic characteristics and coexisting conditions, the burdens of systolic and diastolic hypertension each independently predicted adverse outcomes. Systolic hypertension (140 mmHg) was associated with a greater risk than diastolic hypertension (90 mmHg), and there were similar observations with the lower threshold of hypertension (130/80 mmHg).

There was a ‘J-curve’ relationship between diastolic blood pressure and outcomes, which may be partly explained by the relationship to age and other covariates. Notably, systolic hypertension showed a greater effect in individuals with lower diastolic blood pressures.

However, the study’s outpatient cohort showed a low prevalence of coronary artery disease, and thus, a direct J-curve relationship may be of greater importance in individuals with active coronary artery disease or conditions involving end-organ microcirculatory abnormalities. Regarding ‘J curve’ for diastolic blood pressure, the authors advice on being cautious about excessively aggressive blood pressure lowering in patients who are of advanced age, frail or with critical cerebrovascular or coronary artery disease.

This study included relatively healthy participants, and other studies in patients with CAD suggest that a diastolic blood pressure of <70 mmHg may be associated with favourable CV outcomes.

Deepak L. Bhatt, a co-author, explained that the elderly with stiff atherosclerotic arteries with elevated systolic blood pressure and low diastolic blood pressures are at increased risk because of the stiff arteries, wide pulse pressure or elevated systolic blood pressure, which are difficult to treat without creating side effects. This issue is more complex than merely lowering diastolic blood pressure. Briefly, this study suggests that in generally healthy people, lower blood pressure is better.

The findings of this study are in line with the recent ACC/AHA hypertension guidelines, which establish 130/80 mmHg as well as 140/90 mmHg as thresholds above which there are clear increases in myocardial infarction and stroke event rates. In general, low diastolic blood pressure seem to predict risk mainly when they are associated with high systolic blood pressure, that is, in patients with wide

pulse pressures (difference between systolic and diastolic measurements).

The findings from this study prompt doctors to adopt the ACC/AHA guidelines for the diagnosis of hypertension at blood pressure levels $\geq 130/80$ mmHg and treat patients to levels below $130/80$ mmHg.

This study was supported by a grant from the Kaiser Permanente Northern California Community Benefit Program. Bhatt has disclosed no relevant financial relationships.

6. High-intensity lipid-lowering therapy works in the very elderly

Bach RG, Cannon CP, Giugliano RP, White JA, Lokhnygina Y, Bohula EA, et al. Effect of simvastatin-ezetimibe compared with simvastatin monotherapy after acute coronary syndrome among patients 75 years or older: a secondary analysis of a randomised clinical trial. *JAMA Cardiol.* 2019. doi: 10.1001/jamacardio.2019.2306.

Individuals over the age of 75 years reportedly benefit from high-intensity lipid-lowering therapy after hospitalisation for acute coronary syndrome (ACS) at least as much as individuals aged 65–74 years. A pre-specified analysis of the IMPROVED Reduction of Outcomes: Vytorin Efficacy International Trial (IMPROVE-IT trial) showed an 8.7% absolute reduction in the risk of a broad CV endpoint in very elderly patients taking ezetimibe on top of simvastatin in the trial when compared to similarly aged patients on simvastatin monotherapy. However, the absolute risk reduction in patients aged 65–74 and 50–64 years was only 0.8% and 0.9%, respectively. The age interaction was significant at $p = 0.02$ in the study including over 18,000 randomised patients.

Low-density-lipoprotein cholesterol (LDL-C) levels were reported to be significantly improved in all three age groups. During the mean follow-up period of 6 years, the number needed to treat to prevent one primary endpoint was 125 for the patients aged < 75 years but only 11 for those aged ≥ 75 years. The primary endpoint was CV death, myocardial infarction, stroke, unstable angina hospitalisation or revascularisation more than 30 days after the ACS hospitalisation.

Thus, continuing to treat elderly patients after an ACS with moderate rather than higher-intensity lipid-lowering therapy may represent a missed opportunity to incrementally improve long-term outcomes in them.

IMPROVE-IT trial compared the effect of the higher-intensity lipid-lowering therapy with simvastatin monotherapy in recently stabilised ACS patients aged 50 years or older and demonstrated a significant 6.4% relative reduction in the risk of the primary endpoint with

the combination therapy over 7 years. The participants had no upper age limit, which gave the researchers of the present study the opportunity to examine the effect of age on outcome of the benefit of intensive lipid-lowering with ezetimibe combined with simvastatin versus simvastatin monotherapy.

Researchers were surprised to find a trend toward more reduction in relative risk in older patients, which was not seen in any other randomised lipid-lowering trial with clinical endpoints. The combination of statin and ezetimibe is considered safer than high-dose statin and more affordable than alirocumab and evolocumab.

Patient–physician discussions should include shared decision model highlighting risks and benefits of statin therapy, and the present study plays a key role in this aspect. The findings of this study provide valuable information for both the patient and the healthcare provider. They strongly support the benefit of intensive therapy to reduce LDL-C levels in older patients with atherosclerotic CVD.

In the IMPROVE-IT, of the 18,144 patients aged ≥ 50 years, 56% were younger than age 65, 29% were aged 65–74 years and 15% were older than 75 when they were randomly assigned to receive once-daily 40 mg simvastatin plus either 10 mg/d ezetimibe or placebo. The mean age of the oldest group was 79 years at the beginning of the trial and 85 by its end. The reduction in rate of primary endpoint at 7 years was 0.9, 0.8 and 8.7 in individuals aged < 65 , 65–74 and ≥ 75 years, respectively. Previous reports studying higher-intensity lipid-lowering agents in the elderly have revealed higher rate of abnormal liver function tests with high-dose statins, thus raising concern of myalgias and myopathy. In the IMPROVE-IT, the rates of myopathy, rhabdomyolysis and liver-enzyme elevation were found to be very low and did not increase with age in case of combined simvastatin–ezetimibe when compared with simvastatin monotherapy. In other words, the combination was well-tolerated across all age groups and did not increase the incidences of liver-related and muscle-related adverse events. Although the rates of newly diagnosed cancers, cataracts and neurocognitive events increased with age, they were not significant in any group. Furthermore, hemorrhagic stroke rates were not significantly different between the two arms in patients aged ≥ 75 years.

Of note, the ongoing Statin Therapy for Reducing Events in the Elderly (STAREE) trial aims to report additional information regarding the use of statin therapy in healthy individuals aged more than 70 years by evaluating the effects of statin therapy on overall survival and disability-free survival in 18,000 Australian participants.

IMPROVE-IT was supported by Merck & Co. Bach reported grants from Merck & Co during the conduct of the study; grants from CSL Behring and MyoKardia outside the submitted work; and personal fees from Armaron Bio, Novo Nordisk, and Pharmacosmos outside the submitted work. Gotto disclosed personal fees for serving on the Board of Directors of Esperion Therapeutics, consulting for Kowa Pharmaceuticals, and serving on the Data Safety Monitoring Board of Akcea Pharmaceuticals. Streja has disclosed no relevant financial relationships.

7. More plant-based diet may lower diabetes risk

Qian F, Liu G, Hu FB, Bhupathiraju SN, Sun Q. Association between plant-based dietary patterns and risk of type 2 diabetes: A systematic review and meta-analysis. *JAMA Int Med.* 2019.

doi: 10.1001/jamainternmed.2019.2195.

Middle-aged individuals having plant-based foods are reportedly less likely to develop type 2 diabetes (T2DM) compared to individuals on a diet of more meat, fish, eggs and dairy. After a 2- to 28-year follow-up, individuals with the highest versus lowest intake of any plant-based foods were found to have a 23% lower risk of developing T2DM, and this was independent of body mass index (BMI). Similarly, in case of the highest versus lowest intake of healthy plant-based foods (such as whole grains, fruits, vegetables, nuts and legumes), there was a 30% lower risk of incident diabetes.

A recent meta-analysis of nine observational studies in high-income countries, which was published in *JAMA Internal Medicine*, provides the comprehensive evidence on the association between plant-based dietary patterns and incidence of T2DM. However, this study cannot show cause and effect, and the data were based on (mainly one-time) self-reported questionnaire. It is important to consider the overall low feasibility of randomised clinical trials that directly test plant-based dietary patterns for the prevention of T2DM and that this study supports a possible protective role of these dietary patterns against the development of T2DM.

Participants in the category of greatest adherence to a plant-based diet reportedly consumed approximately 1.7–3.9 servings per day of dairy, eggs, fish or meat, and thus, additional studies are warranted to evaluate whether further reduction would increase health benefits.

It is known that meat, particularly processed meat, is linked to higher risks of diabetes, heart failure, cancer, hypertension, stroke, hyperlipidaemia, heart attacks and death. The findings of this study contribute to a growing body of research that a diet rich in plants and low in animal intake may help in reducing the risk of developing many chronic Western diseases, including T2DM.

Notably, people can take simple steps to improve their diet and shift toward healthy plant-based sources. This study may even encourage doctors to recommend a more plant-based diet to their patients.

It is unclear whether eating a more vegetarian-type diet might ward off T2DM. Therefore, the researchers conducted a meta-analysis of nine studies in five US cohorts (Nurses' Health Study I and II, Adventists Health Study I and II, and Health Professionals Follow-up Study) and four other cohorts from around the world in Greece (ATTICA), Singapore (Singapore Chinese Health Study), the Netherlands (Rotterdam Study) and Taiwan (Tzu Chi Health Study) to investigate this. The analysis included 307,099 participants (mean age, 36–65 years; mean BMI, 23–36.7 kg/m²), and during follow-up, 23,544 participants were diagnosed with diabetes.

After adjusting for risk factors such as BMI, age, smoking and family history of diabetes, participants with a higher versus lower adherence to a plant-based diet were found to have a reduced risk of incident T2DM [relative risk (RR), 0.77]. Using data from cohorts with more detailed information, the researchers found that participants with a higher versus lower adherence to a 'healthy plant-based diet' had an even greater reduced risk of the outcome (RR, 0.70).

Michelle L. O'Donoghue, MD, MPH, associate professor of medicine, Harvard Medical School, and a cardiologist at Brigham and Women's Hospital, Boston, Massachusetts suggests that carbohydrates alone should not be held responsible for risk of T2DM. Processed/refined carbohydrates and sugars may contribute to inflammation and disease development; however, a plant-based diet that reduces or eliminates animal intake while increasing intake of healthy whole grain carbohydrates may actually have very favorable effects. It is important to note that the food nutrient quality is crucial, which is consistent with the findings of this study that was nutrient-rich plant-based foods provided greater benefit than nutrient-poor plant-based foods. In addition, it is important to provide healthier food choices in schools.

Diets such as the Mediterranean diet highlight the importance of fruits and vegetables, which may offer clinical benefit for patients unwilling to fully commit to a plant-based diet. Although ketogenic diet may lead to weight loss, the data regarding its effects on inflammation, lipid parameters and disease progression are mixed. Unfortunately, people living in low-income communities still have limited access to fresh, wholesome fruits and vegetables ('food deserts'). Nevertheless, even in the absence of fresh produce patients can make healthier choices at local grocery stores for healthy and inexpensive plant-based foods, such as dried or canned legumes (e.g., beans, chickpeas

and lentils), whole grains (e.g., brown rice, oats and barley), frozen vegetables and fresh seasonal produce. Furthermore, affordable or free grocery delivery is gaining popularity.

The researchers explain that plant-based foods contain fiber, vitamins, minerals, antioxidants, phenolic compounds and unsaturated fatty acids that help in improving insulin sensitivity, blood pressure, systemic inflammation and long-term weight gain, which are all known to be involved in T2DM. Furthermore, plant-based diet leads to avoiding red and processed meats, which adversely affect risk of T2DM. Further research is warranted to provide understanding of the beneficial association of plant-based dietary patterns with T2DM.

The study was supported by grants from the National Institutes of Health. Qian and Williams have reported no relevant financial disclosures. Disclosures for the other authors are listed in the article. O'Donoghue has reported receiving research grants from Merck, GlaxoSmithKline, Eisai, AstraZeneca and Janssen. McMacken currently serves on the advisory board for Nutrinic and as faculty for Sustainable Diet.

8. Relaxing salt targets linked to extra cases of CVD and cancer

Laverty AA, Kypridemos C, Seferidi P, Vamos EP, Pearson-Stuttard J, Collins B, et al. Quantifying the impact of the Public Health Responsibility Deal on salt intake, cardiovascular disease and gastric cancer burdens: interrupted time series and microsimulation study. *J Epidemiol Community Health*. 2019;73(9):881–7.

doi: 10.1136/jech-2018-211749.

A recent move giving greater freedom to the food industry to set and monitor targets for salt intakes in UK was reportedly linked to an estimated 9900 additional cases of CVD and 1500 of gastric cancer.

For 7 years leading up to 2010, the Food Standards Agency of UK had taken up the initiative to reduce salt intake and accordingly reformulated processed foods, increased public awareness and introduced food labeling. It monitored and regulated salt content in the food industry. However, in 2010, this responsibility was transferred to the Department of Health and Social Care (DHSC), and the salt targets were replaced in England by the Public Health Responsibility Deal during 2011–2017. The food industry was then authorised to specify its own targets and report progress to the DHSC.

A recent study published in the *Journal of Epidemiology & Community Health* estimated the impact of this reform on salt intake and associated changes in CVD, gastric cancer, mortality and economic costs in England from 2011 to 2025 and found that the national decline in salt intake had stalled. The study used data from the National

Diet and Nutrition Survey (2000 and 2001) and national sodium intake surveys taken from the Health Survey for England for the years 2006, 2008, 2011 and 2014. Briefly, the mean salt intake was 10.5 g and 8.0 g in men and women, respectively, during 2000–2001. It was plummeting annually by 0.2 g and 0.12 g a day for men and women, respectively, between 2003 and 2010. However, this decline slowed to 0.11 g and 0.07 g per day for men and women, respectively, between 2011 and 2014.

The Responsibility Deal lacked robust and independent target setting, monitoring and enforcement, and mandatory approaches are more effective than self-regulation by industry in reducing salt and sugar intake. Considering additional healthcare costs, deaths and workplace absences, the authors estimated that this move cost the economy around £160 million during 2011–2018. Furthermore, using computer modeling, they predicted future cases of CVD and stomach cancer if the average reduction in salt intake persisted at the current rate. They estimated additional 26,000 cases of CVD and 3800 cases of stomach cancer between 2019 and 2025. The health impacts were estimated to be higher in deprived areas, thereby expanding health inequalities, and the cost to the economy during this period could be an additional £970 million. Thus, a robust mandatory programme with clear targets and penalties is needed to accelerate salt intake reduction and ensure adherence from the food industry.

Graham MacGregor, professor of CV medicine at Queen Mary University of London, emphasised that along with the food industry pushing consumers to eat less salt, a monitored programme is required to ensure that the set targets are maintained and, where there is a lack of progress, addressed in real time. Tracy Parker, senior dietitian at the British Heart Foundation, highlighted that high salt consumption has been linked to raised blood pressure, which is a risk factor for coronary heart disease and stroke and added that the findings of this study does not accurately reflect why there has been a recent slower decline in salt intake. Tom Sanders, professor emeritus of nutrition and dietetics at King's College London, remarked that since consumers find unsalted food unpalatable and salt is used in food preservation, encouraging the partial replacement with potassium chloride for salt rather than heavy-handed legislation may help.

Commenting on this study, a spokesperson for the DHSC reminded that the body is committed to people living longer, healthier lives and that they are making progress in salt reduction. Public Health England acknowledged that more work is needed to reduce dietary salt.

Tim Rycroft, chief operating officer for the Food and Drink Federation (FDF), remarked that FDF

members have led the way in voluntarily reducing salt in food. Compared with 4 years ago, FDF member products contribute 14% less salt to the average shopping basket, continuing to build on two decades of steady reformulation work following successive voluntary targets.

However, he added that more should be done and manufacturers should remain committed to the government's various reformulation programmes.

9. Higher office and ambulatory blood pressure are linked to mortality and CV outcomes

Yang WY, Melgarejo JD, Thijs L, Zhang ZY, Boggia J, Wei FF, et al. Association of office and ambulatory blood pressure with mortality and cardiovascular outcomes. *JAMA*. 2019;322(5):409–20. doi: 10.1001/jama.2019.9811.

Although blood pressure (BP) is a known risk factor for overall mortality and CV-specific outcomes, it remains unclear whether office or ambulatory blood pressure is more strongly associated. A recent longitudinal population-based cohort study published in *JAMA* assessed the association of blood pressure indices with death and a composite CV event. Baseline observations were collected from 11,135 adults from Asia, Europe and South America during May 1988–May 2010, with the last follow-ups during August 2006–October 2016. Blood pressure was measured by an observer or an automated office machine for 24 hours and the dipping ratio, which is nighttime divided by daytime readings, was calculated.

The risk of death or CV event (such as CV mortality combined with nonfatal coronary events, heart failure and stroke) associated with 20/10-mmHg blood pressure increment were estimated using multivariable-adjusted hazard ratios (HRs). During the median follow-up of 13.8 years, 2836 participants died (18.5 per 1000 person-years) and 2049 (13.4 per 1000 person-years) experienced a CV event. Both end points were significantly associated with all single systolic blood pressure indices. For nighttime systolic blood pressure level, the HR for total mortality was 1.23 and that for CV events was 1.36. For the 24-hour systolic blood pressure level, the HR for total mortality was 1.22 and that for CV events was 1.45. Even after adjusting for any of the other systolic blood pressure indices, the associations of nighttime and 24-hour systolic blood pressure with the primary outcomes remained statistically significant. Base models that included single systolic blood pressure indices yielded an AUC of 0.83 for mortality and 0.84 for the CV outcomes. Adding 24-hour or nighttime systolic blood pressure to base models that included other blood

pressure indices resulted in incremental improvements in the AUC of 0.0013 to 0.0027 for mortality and 0.0031 to 0.0075 for the composite CV outcome. Adding any systolic blood pressure index to models already including nighttime or 24-hour systolic blood pressure did not significantly improve model performance. Similar findings were obtained for diastolic blood pressure.

Higher 24-hour and nighttime blood pressure measurements showed significantly greater risks of death and a composite CV outcome. Therefore, 24-hour and nighttime blood pressure may be optimal methods for estimating CV risk, although model improvement compared with other blood pressure indices was found to be statistically small.

10. High serum uric acid level may predict subclinical coronary atherosclerosis in asymptomatic individuals

Lim DH, Lee Y, Park GM, Choi SW, Kim YG, Lee SW, et al. Serum uric acid level and subclinical coronary atherosclerosis in asymptomatic individuals: An observational cohort study. *Atherosclerosis*. 2019;288:112–7. doi: 10.1016/j.atherosclerosis.2019.07.017.

A recent study published in *Atherosclerosis* investigated whether serum uric acid (SUA) level is linked to subclinical coronary atherosclerosis using coronary computed tomography angiography (CCTA) in asymptomatic individuals. Participants were 6431 asymptomatic individuals (mean age, 53 years, 72.9% men) without coronary artery disease history. They underwent laboratory tests and CCTA and were classified into quartiles on the basis of their SUA levels. Coronary atherosclerotic plaques (calcified, mixed and non-calcified plaques) were assessed using CCTA and the association between SUA levels and subclinical coronary atherosclerosis was determined using logistic regression analysis.

The results of the study indicated that the prevalence of any atherosclerotic, calcified, mixed and non-calcified plaques increased with SUA quartiles. Following CV risk factor adjustment, there were no statistically significant differences in the adjusted odds ratios for calcified plaque and mixed plaque in the fourth SUA quartile compared to the first quartile. However, the adjusted odds ratios for any atherosclerotic plaque and non-calcified plaque were found to be significantly higher in the fourth SUA quartile. This study indicates that high SUA level is an independent predictor of non-calcified plaques in asymptomatic individuals, suggesting an increased CV risk.