

The Silent Killer in your Pantry- How Sodium Overload Contributes to Cardiovascular Diseases

Liza Paul¹, Palash Kanti Das², Ahmed Tawhedur Rahaman³, Hussein Mohammed Nizamuddin⁴, Kausar Jahan Aushe⁵

¹Graduate Student, Department of Nutrition and Exercise Science, Southern Medical College and Hospital, Chattogram, Bangladesh

²Senior Medical Officer, Department of Medicine, Southern Medical College and Hospital, Chattogram, Bangladesh

³Senior Lecturer, Department of Anatomy, Southern Medical College and Hospital, Chattogram, Bangladesh

⁴Senior Medical Officer, Department of HDU, ICU and Critical Care Medicine, Chattogram Maa-O-Shishu Hospital Medical College, Chattogram, Bangladesh

⁵Medical Officer, Department of Emergency and Internal Medicine, Mymensingh Medical College, Mymensingh, Bangladesh

Corresponding Author: Dr. Liza Paul, Graduate Student, Department of Nutrition and Exercise Science, Southern Medical College and Hospital, Chattogram, Bangladesh

Abstract

Background: Excessive sodium consumption, primarily from processed and canned foods, has been strongly implicated in the development of cardiovascular diseases, including coronary heart disease (CHD). This study aimed to investigate the association between sodium overload from canned foods and CHD prevalence while evaluating key risk factors such as hypertension, high cholesterol, and physical inactivity.

Methods: A cohort study was conducted with 100 participants aged 30–70 years, divided into two groups: Group 1 (n = 50), consisting of individuals with CHD and regular canned food consumption, and Group 2 (n = 50), comprising healthy controls with no history of canned food consumption. Data were collected through structured interviews and medical record reviews. Sodium intake, BMI, hypertension, and other CHD risk factors were analyzed. Logistic regression and Pearson correlation analyses were performed to evaluate associations.

Results: Sodium intake above 2000 mg/day was significantly associated with CHD (OR = 4.5, 95% CI: 2.1–9.6, $p = 0.001$). Group 1 exhibited higher rates of hypertension (70% vs. 30%, $p = 0.001$), high cholesterol (60% vs. 24%, $p = 0.005$), and physical inactivity (40% vs. 70%, $p = 0.0001$). A strong positive correlation between sodium intake and CHD diagnosis ($r = 0.75$) was observed, underscoring sodium's critical role in CHD development.

Conclusion: High sodium intake from canned foods significantly contributes to CHD risk through its association with hypertension, high cholesterol, and physical inactivity. Public health efforts should prioritize sodium reduction strategies to mitigate CHD burden.

Keywords: Sodium Intake, Canned Foods, Coronary Heart Disease, Hypertension, Cholesterol, Physical Inactivity, Public Health

I. INTRODUCTION

Cardiovascular diseases (CVDs) remain the leading cause of mortality globally, claiming an estimated 17.9 million lives annually, with a significant proportion of these deaths attributable to modifiable dietary risk factors, including excessive sodium consumption (1). Sodium, primarily consumed as salt, plays an essential physiological role in maintaining fluid balance, nerve function, and muscle contraction. However, chronic overconsumption of sodium disrupts homeostasis, contributing to elevated blood pressure—widely recognized as a primary risk factor for CVDs, including heart failure, stroke, and ischemic heart disease (2,3). Current global sodium intake far exceeds the World Health Organization's (WHO) recommendation of less than 2 g/day, with many populations consuming nearly double this threshold (4). The dietary landscape in developed countries has undergone significant transformation over recent decades, marked by a shift from traditional diets to the consumption of processed and canned foods, which are key contributors to elevated sodium levels. These foods, often marketed for their convenience and long shelf-life, include common staples such as instant noodles, canned soups, frozen meals, processed meats, and snack foods, all of which contain high sodium concentrations relative to fresh, unprocessed alternatives (5,6). For example, sodium content in processed meat products alone contributes approximately 20% of dietary sodium intake in Western diets (7). This reliance on sodium-dense

products is particularly pronounced in high-income countries, where food industry practices and consumer demand have exacerbated sodium overconsumption (8). As a result, the prevalence of hypertension—a key precursor to CVD—has surged in these regions, underscoring the urgent need for population-wide sodium reduction strategies (9). Despite public health efforts to address sodium overconsumption, significant gaps in consumer awareness and knowledge persist. Many individuals remain unaware of the sodium content in everyday foods, including “healthy” or “low-fat” options that often contain hidden sodium for flavor enhancement or preservation (10). Furthermore, studies indicate that consumers frequently misinterpret nutritional information on food labels or fail to use them effectively, hindering their ability to make informed dietary choices (11). In Beijing, for instance, only 12.6% of participants in a cross-sectional survey reported regularly reading sodium information on food labels, while a majority struggled to understand sodium-to-salt conversion, which is essential for dietary management (12). These findings highlight the critical need for clearer and more accessible sodium labeling formats, such as front-of-pack labels that utilize visual cues like traffic light systems to improve consumer understanding (13,14). The economic and healthcare burden associated with sodium-related CVDs further underscores the public health relevance of this issue. In the United States alone, it is estimated that achieving national sodium reduction targets could prevent nearly 895,000 cardiovascular events over a decade, resulting in healthcare cost savings of \$37 billion (15). Globally, sodium overconsumption is responsible for 1.72 million deaths and 40.54 million disability-adjusted life years (DALYs) annually, with developed nations bearing a significant portion of this burden due to their aging populations and high rates of processed food consumption (16). In addition to the direct healthcare costs associated with hospitalizations and long-term treatments, the societal impact of reduced workforce productivity and diminished quality of life cannot be overstated. While public health campaigns and regulatory frameworks, such as mandatory sodium labeling and reformulation initiatives, have shown promise in reducing population-wide sodium intake, substantial barriers remain. For instance, the effectiveness of such interventions is often undermined by inconsistencies in labeling regulations and the food industry’s resistance to reformulation efforts (17). Moreover, vulnerable populations, including individuals with lower health literacy or educational attainment, are disproportionately affected, as they face greater challenges in understanding and utilizing nutritional information (18,19). Addressing these disparities will require targeted education programs and innovative labeling solutions that empower consumers to make healthier food choices. This study aims to address these critical issues by evaluating the association between sodium overconsumption and CVD prevalence, with a particular focus on the role of processed and canned foods as key contributors in developed countries. By identifying knowledge gaps and assessing the efficacy of existing regulatory measures, this research seeks to inform more effective public health strategies and policy interventions to mitigate the burden of sodium-related CVDs.

II. METHODS

This cohort study was conducted at Southern Medical College and Hospital from January, 2023 to December, 2023 to investigate the role of sodium overload from pantry items, particularly canned foods, in the development of coronary heart disease (CHD). A total of 100 participants, aged 30 to 70 years, were purposively selected and classified into two groups based on their history of canned food consumption and CHD diagnosis. Group 1 included 50 individuals with a history of consuming canned foods regularly (at least three times per week for the past five years) and a confirmed CHD diagnosis. Group 2 consisted of 50 healthy individuals with no history of CHD and no regular consumption of canned foods. This classification was based on self-reported frequency of canned food consumption and clinical confirmation of CHD through medical records. Data collection involved structured interviews and a review of medical records. The questionnaire collected information on sociodemographic characteristics, lifestyle behaviors (e.g., smoking, alcohol consumption, physical activity), and dietary habits, focusing on canned food consumption over the past five years. Medical records were reviewed to confirm CHD diagnoses and to gather relevant health data, including blood pressure, cholesterol levels, and serum sodium levels. Confounding factors such as age, gender, BMI, hypertension, and smoking status were also recorded. The primary outcome of interest was the presence of CHD, while the independent variable was the frequency of canned food consumption, serving as a proxy for sodium intake. Descriptive statistics were computed for sociodemographic and clinical variables. Chi-square tests were applied to compare categorical variables (e.g., gender, smoking status), and independent t-tests were used for continuous variables (e.g., age, BMI). Pearson’s correlation analysis was conducted to evaluate the relationship between sodium intake from canned food consumption and CHD diagnosis. Logistic regression analysis was performed to assess the association between sodium intake and the likelihood of developing CHD, adjusting for potential confounders such as hypertension, smoking, and physical inactivity. All statistical analyses were performed using SPSS version 26.0. Statistical significance was set at $p < 0.05$.

III. RESULTS

Table 1: Demographic Characteristics of Participants (N=100)

Characteristic	Group 1 (Exposed to Canned Foods and CHD)	Group 2 (Unexposed, No CHD)	p-value
Age (Mean $\pm$ SD)	59.6 $\pm$ 8.2	57.3 $\pm$ 6.9	0.18
Gender			
Male	30,60.0%	28,56.0%	0.82
Female	20,40.0%	22,44.0%	
BMI (Mean $\pm$ SD)	28.6 $\pm$ 4.3	25.4 $\pm$ 3.1	0.004
Smoking Status	18,36.0%	10,50.0%	0.07
Hypertension	35,70.0%	15,30.0%	0.001

The demographic characteristics of the participants in Group 1 (exposed to canned foods and CHD) and Group 2 (unexposed, no CHD) are presented in Table 1. The mean age of participants in Group 1 was slightly higher than that of Group 2 (59.6 $\pm$ 8.2 vs. 57.3 $\pm$ 6.9 years), though the difference was not statistically significant ($p = 0.18$). The gender distribution was comparable between the two groups, with males comprising 60.0% of Group 1 and 56.0% of Group 2 ($p = 0.82$). However, Group 1 had a significantly higher mean BMI compared to Group 2 (28.6 $\pm$ 4.3 vs. 25.4 $\pm$ 3.1, $p = 0.004$). Additionally, a greater proportion of participants in Group 1 had hypertension (70.0% vs. 30.0%, $p = 0.001$). Although smoking status was more prevalent in Group 2 (50.0%) than in Group 1 (36.0%), this difference did not reach statistical significance ($p = 0.07$).

Table 2: Canned Food Consumption and CHD Diagnosis (N=100)

Canned Food Consumption (per week)	Group 1 (Exposed to Canned Foods and CHD)	Group 2 (Unexposed, No CHD)	p-value
0-1 times	5 (10%)	45 (90%)	0.0001
2-3 times	15 (30%)	5 (10%)	
4+ times	30 (60%)	0 (0%)	

Table 2 summarizes the patterns of canned food consumption among the participants in relation to CHD diagnosis. A significantly higher proportion of individuals in Group 1 (exposed to canned foods and CHD) reported consuming canned foods four or more times per week compared to Group 2 (unexposed, no CHD) (60% vs. 0%, $p = 0.0001$). Additionally, while 30% of participants in Group 1 consumed canned foods 2–3 times per week, only 10% of Group 2 reported the same frequency. Conversely, the majority of individuals in Group 2 (90%) consumed canned foods infrequently (0–1 times per week), compared to only 10% in Group 1.

Table 3: Sodium Intake (mg/day) and CHD Diagnosis (N=100)

Sodium Intake (mg/day)	Group 1 (Exposed to Canned Foods and CHD)	Group 2 (Unexposed, No CHD)	p-value
<1500 mg	5 (10%)	40 (80%)	0.0001
1500-2000 mg	10 (20%)	7 (14%)	
>2000 mg	35 (70%)	3 (6%)	

Table 3 highlights the relationship between daily sodium intake and CHD diagnosis. A significantly higher proportion of participants in Group 1 (exposed to canned foods and CHD) consumed more than 2000 mg of sodium per day compared to Group 2 (unexposed, no CHD) (70% vs. 6%, $p = 0.0001$). Conversely, the majority of individuals in Group 2 (80%) reported a sodium intake of less than 1500 mg per day, while only 10% of Group 1 fell within this range. Sodium intake between 1500–2000 mg/day was slightly more prevalent in Group 1 (20%) compared to Group 2 (14%).

Table 4: Risk Factors for CHD by Group (N=100)

Risk Factor	Group 1 (Exposed to Canned Foods and CHD)	Group 2 (Unexposed, No CHD)	p-value
Hypertension	35,70.0%	15, 30.0%	0.001
High Cholesterol	30,60.0%	12, 24.0%	0.005
Physical Activity	20,40.0%	35,70.0%	0.0001

Table 4 outlines the prevalence of key risk factors for CHD between the two groups. Hypertension was significantly more common in Group 1 (70.0%) compared to Group 2 (30.0%), with a p-value of 0.001. Similarly, a higher proportion of participants in Group 1 had high cholesterol levels (60.0%) compared to Group 2 (24.0%), and this difference was statistically significant ($p = 0.005$). On the other hand, participants in Group 2 reported significantly higher levels of physical activity (70.0%) compared to Group 1 (40.0%), with a p-value of 0.0001. These findings highlight the elevated prevalence of hypertension and high cholesterol, along with lower physical activity levels, as significant contributors to CHD among individuals in Group 1.

Table 5: Pearson Correlation between Sodium Intake and CHD Diagnosis (N=100)

Variable	Group 1 (Exposed to Canned Foods and CHD)	Group 2 (Unexposed, No CHD)	Correlation Coefficient (r)
Sodium Intake (mg/day)	2218.2 $\pm$ 309.7	1721.8 $\pm$ 2074	0.75
Age	59.6 $\pm$ 8.2	57.3 $\pm$ 6.9	0.23
BMI	28.6 $\pm$ 4.3	25.4 $\pm$ 3.1	0.48

Table 5 presents the Pearson correlation analysis between sodium intake and CHD diagnosis. A strong positive correlation was observed between sodium intake and CHD diagnosis ($r = 0.75$), indicating that higher sodium intake is significantly associated with an increased risk of CHD. Moderate correlations were observed for BMI ($r = 0.48$), suggesting that higher BMI also contributes to CHD risk. In contrast, the correlation between age and CHD diagnosis was weaker ($r = 0.23$), indicating a less pronounced relationship. These findings highlight sodium intake and BMI as key factors linked to the development of CHD.

Table 6: Logistic Regression Analysis for CHD Risk Factors (N=100)

Variable	Odds Ratio (OR)	95% Confidence Interval	p-value
Sodium Intake >2000 mg/day	4.5	2.1-9.6	0.001
Hypertension	3.2	1.5-6.9	0.005
High Cholesterol	2.8	1.3-5.8	0.01
Physical Inactivity	2.2	1.0-4.7	0.04

Table 6 presents the logistic regression analysis for CHD risk factors. Sodium intake exceeding 2000 mg/day was the strongest predictor of CHD, with an odds ratio (OR) of 4.5 (95% CI: 2.1–9.6, $p = 0.001$), indicating individuals with high sodium intake were 4.5 times more likely to develop CHD compared to those with lower sodium intake. Hypertension also significantly increased the likelihood of CHD, with an OR of 3.2 (95% CI: 1.5–6.9, $p = 0.005$). High cholesterol was another significant risk factor, with an OR of 2.8 (95% CI: 1.3–5.8, $p = 0.01$). Physical inactivity was associated with an increased CHD risk as well, with an OR of 2.2 (95% CI: 1.0–4.7, $p = 0.04$). These findings emphasize the critical role of high sodium intake, hypertension, high cholesterol, and physical inactivity in contributing to CHD risk.

IV. DISCUSSION

The current study investigates the association between sodium intake, dietary patterns involving canned foods, and the prevalence of coronary heart disease (CHD), alongside evaluating key risk factors such as hypertension, high cholesterol levels, and physical inactivity. Our findings reveal a significant association between high sodium intake (>2000 mg/day) and CHD diagnosis, with an odds ratio (OR) of 4.5. This aligns with previous studies that identified high sodium consumption as a critical risk factor for cardiovascular diseases, emphasizing its direct role in raising blood pressure and contributing to the development of CHD (20,21). The strong positive correlation between sodium intake and CHD observed in our study ($r = 0.75$) further supports the causal relationship documented in earlier works, which highlighted sodium-induced endothelial dysfunction and vascular remodeling as key mechanisms underlying this association (22).

Additionally, the current study found a higher prevalence of hypertension (70%) and high cholesterol (60%) among individuals regularly consuming canned foods, compared to controls without CHD. These findings align with studies such as those by Panwar et al., where hypertension (OR = 8.95) and high LDL cholesterol (OR = 2.49) were identified as significant contributors to CHD (23). The elevated prevalence of these risk factors in the exposed group in our study suggests that high sodium consumption through canned foods exacerbates these conditions, as previously noted by Zodepy et al (24). Moreover, physical inactivity, observed in 40% of CHD patients in our study, was found to significantly increase CHD risk, with an OR of 2.2. This corroborates findings from the EPIC-CVD study, which reported that while moderate physical activity mitigates CHD risk, it does not fully counteract the adverse effects of other risk factors such as hypertension and high cholesterol (25). The role of dietary sodium as a predictor of cardiovascular outcomes has been extensively documented, with studies highlighting its independent association with CHD risk, especially in hypertensive populations (Äijälä et al., 2015). Our logistic regression analysis supports these findings, demonstrating that individuals with sodium intake above 2000 mg/day were significantly more likely to develop CHD. The population-attributable risk of sodium-related CHD underscores the need for dietary sodium reduction, as recommended by studies advocating for population-level interventions to address hidden sodium in processed foods (22,26). Furthermore, our study's findings of higher BMI among CHD patients (28.6 ± 4.3 vs. 25.4 ± 3.1 , $p = 0.004$) are consistent with earlier studies, which identified obesity as a significant contributor to hypertension and lipid abnormalities, both of which are key mediators of CHD (23). The association between canned food consumption and CHD observed in our study echoes findings from large-scale analyses, such as those by Srour et al. and Montero-Salazar et al., which reported a dose-response relationship between ultra-processed food intake and increased cardiovascular risk (27,28). In our study, 60% of individuals with CHD consumed canned foods four or more times per week, compared to none in the control group, highlighting the significant dietary shift towards sodium-laden processed foods in modern diets. The high prevalence of sodium intake exceeding recommended limits among these individuals further reinforces the public health relevance of dietary monitoring and sodium reduction strategies (1). Interestingly, our findings also demonstrate a weaker correlation between age and CHD ($r = 0.23$) compared to stronger predictors like sodium intake and BMI. This observation is supported by studies that highlight age as a less modifiable but still relevant risk factor, particularly when compounded by lifestyle and dietary habits (24,29). The significant role of lifestyle factors, including physical inactivity, was evident in our study and aligns with prior evidence demonstrating the cumulative effects of poor physical activity and dietary habits on cardiovascular health (25,30). Overall, this study reinforces the substantial role of sodium overload, primarily from processed and canned foods, in exacerbating CHD risk through its influence on hypertension, cholesterol levels, and BMI. Our findings align with and extend the existing literature, emphasizing the urgent need for regulatory frameworks to improve sodium labeling and increase public awareness regarding hidden sodium in foods. Additionally, targeted interventions promoting physical activity and dietary modifications are critical to mitigating the burden of CHD, particularly in populations with high processed food consumption.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

V. CONCLUSION

This study demonstrated a strong association between high sodium intake from canned foods and the development of coronary heart disease (CHD). Participants who consumed canned food regularly had significantly higher sodium intake and a higher prevalence of CHD risk factors such as hypertension and high cholesterol. The findings suggest that sodium overload from pantry items, particularly canned foods, plays a significant role in the development of cardiovascular diseases, supporting the need for public health interventions focused on reducing sodium intake in the general population.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- [1]. Mozaffarian D, Fahimi S, Singh GM, Micha R, Khatibzadeh S, Engell RE, et al. *Global sodium consumption and death from cardiovascular causes*. N Engl J Med. 2014 Aug 14;371(7):624–34.
- [2]. Strazzullo P, D'Elia L, Kandala NB, Cappuccio FP. *Salt intake, stroke, and cardiovascular disease: meta-analysis of prospective studies*. BMJ [Internet]. 2009 Nov 25 [cited 2025 Jan 27];339:b4567. Available from: <https://www.bmj.com/content/339/bmj.b4567>
- [3]. Aburto NJ, Ziolkovska A, Hooper L, Elliott P, Cappuccio FP, Meerpohl JJ. *Effect of lower sodium intake on health: systematic review and meta-analyses*. BMJ [Internet]. 2013 Apr 4 [cited 2025 Jan 27];346:f1326. Available from: <https://www.bmj.com/content/346/bmj.f1326>

- [4]. Powles J, Fahimi S, Micha R, Khatibzadeh S, Shi P, Ezzati M, et al. *Global, regional and national sodium intakes in 1990 and 2010: a systematic analysis of 24 h urinary sodium excretion and dietary surveys worldwide*. *BMJ Open*. 2013 Dec 23;3(12):e003733.
- [5]. Baker P, Machado P, Santos T, Sievert K, Backholer K, Hadjikakou M, et al. *Ultra-processed foods and the nutrition transition: Global, regional and national trends, food systems transformations and political economy drivers*. *Obes Rev*. 2020 Dec;21(12):e13126.
- [6]. Taormina PJ. *Implications of salt and sodium reduction on microbial food safety*. *Crit Rev Food Sci Nutr*. 2010 Mar;50(3):209–27.
- [7]. Inguglia ES, Zhang Z, Tiwari BK, Kerry JP, Burgess CM. *Salt reduction strategies in processed meat products – A review*. *Trends in Food Science & Technology* [Internet]. 2017 Jan 1 [cited 2025 Jan 27];59:70–8. Available from: <https://www.sciencedirect.com/science/article/pii/S0924224416302539>
- [8]. Anderson CAM, Appel LJ, Okuda N, Brown IJ, Chan Q, Zhao L, et al. *Dietary sources of sodium in China, Japan, the United Kingdom, and the United States, women and men aged 40 to 59 years: the INTERMAP study*. *J Am Diet Assoc*. 2010 May;110(5):736–45.
- [9]. Gardener H, Rundek T, Wright CB, Elkind MSV, Sacco RL. *Dietary sodium and risk of stroke in the Northern Manhattan study*. *Stroke*. 2012 May;43(5):1200–5.
- [10]. Chan CMJ, Dickens BSL, Chong MFF. *Understanding knowledge, attitudes and behaviours related to dietary sodium intake in a multi-ethnic population in Singapore*. *Public Health Nutr*. 2023 Dec;26(12):2802–14.
- [11]. He Y, Huang L, Yan S, Li Y, Lu L, Wang H, et al. *Awareness, understanding and use of sodium information labelled on pre-packaged food in Beijing: a cross-sectional study*. *BMC Public Health*. 2018 Apr 17;18(1):509.
- [12]. Okuda N, Nishi N, Ishikawa-Takata K, Yoshimura E, Horie S, Nakanishi T, et al. *Understanding of sodium content labeled on food packages by Japanese people*. *Hypertens Res*. 2014 May;37(5):467–71.
- [13]. McLean R, Hoek J, Hedderley D. *Effects of alternative label formats on choice of high- and low-sodium products in a New Zealand population sample*. *Public Health Nutr*. 2012 May;15(5):783–91.
- [14]. Shanguan S, Afshin A, Shulkin M, Ma W, Marsden D, Smith J, et al. *A Meta-Analysis of Food Labeling Effects on Consumer Diet Behaviors and Industry Practices*. *Am J Prev Med*. 2019 Feb;56(2):300–14.
- [15]. Dehmer SP, Cogswell ME, Ritchey MD, Hong Y, Maciosek MV, LaFrance AB, et al. *Health and Budgetary Impact of Achieving 10-Year U.S. Sodium Reduction Targets*. *Am J Prev Med* [Internet]. 2020 Aug [cited 2025 Jan 27];59(2):211–8. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7768612/>
- [16]. Wang K, Jin Y, Wang M, Liu J, Bu X, Mu J, et al. *Global cardiovascular diseases burden attributable to high sodium intake from 1990 to 2019*. *J Clin Hypertens (Greenwich)*. 2023 Sep;25(9):868–79.
- [17]. Pietinen P, Valsta LM, Hirvonen T, Sinkko H. *Labelling the salt content in foods: a useful tool in reducing sodium intake in Finland*. *Public Health Nutr*. 2008 Apr;11(4):335–40.
- [18]. Kollipara UK, Jaffer O, Amin A, Toto KH, Nelson LL, Schneider R, et al. *Relation of lack of knowledge about dietary sodium to hospital readmission in patients with heart failure*. *Am J Cardiol*. 2008 Nov 1;102(9):1212–5.
- [19]. Bhawra J, Kirkpatrick SI, Hall MG, Vanderlee L, Thrasher JF, Hammond D. *Correlates of Self-Reported and Functional Understanding of Nutrition Labels across 5 Countries in the 2018 International Food Policy Study*. *J Nutr*. 2022 Jun 13;152(Suppl 1):13S-24S.
- [20]. Äijälä M, Malo E, Santaniemi M, Bloigu R, Silaste ML, Kesäniemi YA, et al. *Dietary sodium intake and prediction of cardiovascular events*. *Eur J Clin Nutr*. 2015 Sep;69(9):1042–7.
- [21]. Joosten MM, Gansevoort RT, Mukamal KJ, Lambers Heerspink HJ, Geleijnse JM, Feskens EJM, et al. *Sodium excretion and risk of developing coronary heart disease*. *Circulation*. 2014 Mar 11;129(10):1121–8.
- [22]. Polonia J, Monteiro J, Almeida J, Silva JA, Bertoquini S. *High salt intake is associated with a higher risk of cardiovascular events: a 7.2-year evaluation of a cohort of hypertensive patients*. *Blood pressure monitoring*. 2016;21(5):301–6.
- [23]. Panwar RB, Gupta R, Gupta BK, Raja S, Vaishnav J, Khatri M, et al. *Atherothrombotic risk factors & premature coronary heart disease in India: A case-control study*. *Indian J Med Res* [Internet]. 2011 Jul [cited 2025 Jan 28];134(1):26–32. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3171913/>
- [24]. Zodepy SP, Kulkarni HR, Vasudeo ND, Chaubey BS. *A risk scoring system for prediction of coronary heart disease based on multivariate analysis: development and validation*. *Indian Heart J*. 1994;46(2):77–83.
- [25]. Fortuin-de Smidt MC, Sewe MO, Lassale C, Weiderpass E, Andersson J, Huerta JM, et al. *Physical activity attenuates but does not eliminate coronary heart disease risk amongst adults with risk factors: EPIC-CVD case-cohort study*. *Eur J Prev Cardiol*. 2022 Sep 7;29(12):1618–29.
- [26]. Chen X, Chu J, Hu W, Sun N, He Q, Liu S, et al. *Associations of ultra-processed food consumption with cardiovascular disease and all-cause mortality: UK Biobank*. *Eur J Public Health*. 2022 Oct 3;32(5):779–85.
- [27]. Srouf B, Fezeu LK, Kesse-Guyot E, Allès B, Méjean C, Andrianasolo RM, et al. *Ultra-processed food intake and risk of cardiovascular disease: prospective cohort study (NutriNet-Santé)*. *BMJ*. 2019 May 29;365:11451.
- [28]. Montero-Salazar H, Donat-Vargas C, Moreno-Franco B, Sandoval-Insausti H, Civeira F, Laclaustra M, et al. *High consumption of ultra-processed food may double the risk of subclinical coronary atherosclerosis: the Aragon Workers' Health Study (AWHS)*. *BMC Med*. 2020 Aug 13;18(1):235.
- [29]. Kalandidi A, Tzonou A, Toupadaki N, Lan SJ, Koutis C, Drogari P, et al. *A case-control study of coronary heart disease in Athens, Greece*. *Int J Epidemiol*. 1992 Dec;21(6):1074–80.
- [30]. Mushtaq M, Anjum A, Butt MM. *NUTRITIONAL, LIFESTYLE AND PSYCHOLOGICAL FACTORS AS PREDICTORS OF CORONARY HEART DISEASE*. *Pakistan Heart Journal* [Internet]. 2020 [cited 2025 Jan 28];53(3). Available from: <https://www.pkheartjournal.com/index.php/journal/article/view/574>