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Research Article

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Plant Based Diets in the Prevention and Management of Chronic Diseases: An updated Review

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ABSTRACT

Increasing prevalence of long-term health conditions such as obesity, type-2 diabetes mellitus (T2DM), cancer, hypertension highlights the critical need for effective therapeutic nutrition initiatives at global level. This narrative review assesses the role of plant-based diets in prevention and treatment of various illnesses. Moreover, the study also focuses on the effectiveness of nutrition rich bioactive components present in plants such as; polyphenols, flavonoids, carotenoids, and alkaloids with each posing various health benefits depending upon their usage and uptake in the body. This nutritive initiative holds special attention to lower and middle class countries, targeting overburden of chronic diseases with therapeutic plant based diets. Results show hat plant based diets can reduce blood pressure, lower postprandial glucose levels, control the ratio of HDL to LDL in blood serum and reduce body weight and prevent oxidative stress. Hence, consumption of plant based antioxidant, anti-inflammatory and nutrient dense phenomenon can improve overall metabolic status and lower risk of chronic diseases. The generalizability and casual inference of available evidence hindered due to observational study design, variations in dietary classifications and a lack of data from non-western culture. Despite these confounding factors, such diets not only support general health objectives but also provide affordable, effective and sustainable approach to target chronic illness. Significant health benefits can be achieved by using multidisciplinary approach to initiate natural plant based solutions via national health programs and public health interventions. Longitudinal studies and clinical trials in context to the plant based dietary approach should be the primary focus for future researches, to strengthen the pool of updated knowledge and practices.

Keywords: Plant diets, Obesity, Non-communicable diseases, Health benefits

INTRODUCTION

Chronic diseases also known as non-communicable diseases (NCDs), are long term conditions that can be managed but not cured (WHO, 2024; Budreviciute *et al*., 2020). These includes Cardiovascular Diseases (CVDs), Type 2 Diabetes Mellitus (T2DM), obesity, various types of cancer and inflammatory disorders related to hypertension (Gropper, 2023; CDC, 2024; Scully *et al*., 2021). Global statistics show that chronic diseases are responsible for more than 75% of annual deaths that constitute at least 43 million people, posing a significant threat to healthcare systems and public health worldwide (WHO, 2024; Razzaghi *et al*., 2019). Cardiac diseases are the primary reasons of death, leading to around 17.9 million fatalities every year, primarily due to ischemic heart diseases, atherosclerosis and strokes (WHO, 2021), leading to almost 33% of worldwide deaths as shown by National Institute of Health (Di Cesare *et al*., 2024). Obesity is directly responsible for 2.8 million deaths every year, affecting about 35.8 million (2.3%) of global disability-adjusted life years (DALYs) (Pugliese *et al*., 2022; Dereje *et al*., 2018). In adults aged from 20-79yrs, 11.1%, or 1 in 9 have diabetes with almost 40% going undetected according to the most recent International diabetes federation (IDF) Diabetes Atlas (Kumar *et al*., 2024). Cancer is considered as the major cause of mortality throughout the world in year 2022, Statistics found that there were almost 20 million new cases of cancer reported in year, globally, nearly 9.7 million deaths were associated with cancer (Sung *et al*., 2021). According to forecasts, new cancer cases might increase to 33 million by the year 2050 and the number of deaths could reach 18.2 million (WHO, 2024; UICC, 2024). Colorectal and breast cancers are particularly common among immunocompromised individuals (Ilham *et al*., 2023).

Hypertension remains a main risk factor to cardiovascular and kidney diseases causing 7.5 million deaths annually approximately 12.8% of all deaths worldwide (Singh *et al*., 2017). Indirectly, chronic diseases are strongly linked to systemic inflammation,

endothelial dysfunction, and metabolic disorders (Aboukhater *et al*., 2023; Pacinella *et al*., 2024a). The morbidity impact of these conditions is substantial, affecting physical health, psychological wellness, productivity, and overall life quality, thereby reducing longevity (Pacinella *et al*., 2024b). Given their growing contribution to DALYs and economic burden, prevention of these chronic diseases is a crucial public health priority globally.

Currently, several dietary interventions and therapeutic products are popular globally, claiming health benefits for preventing chronic diseases, including some plant-based diets e.g., Mediterranean, Dietary Approaches to Stop Hypertension (DASH), and ketogenic diets (Antonopoulos *et al*., 2024; Szczepańska *et al*., 2022). While these diets benefit certain populations, questions remain about their long-term feasibility, environmental sustainability and diverse health impacts (ElSayed *et al*., 2023). In contrast, unrefined plant foods including grains, pulses, and seeds while restricting animal-based products, are considered effective for long-term prevention of these diseases (Craddock, 2022; Farinon *et al*., 2020; Tucci, 2022). Research shows that plant-based diets provide higher dietary fiber, phytonutrients, polyphenols and unsaturated fats thereby offering nutritional advantages compared to high-fat animal diets (Łuszczki *et al*., 2023). Over the past five years, multiple original studies have linked plant based foods and their targeted bioactive components to improvements in dietary patterns, overall body weight, glycemic index, blood lipid profiles, blood pressure levels, and inflammatory markers (Al Othaim, 2021; Siddiqui *et al*., 2023). However, the evidence remains limited and inconclusive, highlighting the need for further clinical trials. Thorough analysis via systematic reviews have synthesized research on the significance and applications of diets rich in plant foods (Lipert *et al*., 2022; Oladimeji & Adebo, 2024; Rudrapal *et al*., 2024).

Moreover, few reviews have synthesized evidence specifically addressing the five most burdensome chronic diseases—CVD, type 2 diabetes, obesity, cancer, and hypertension—using original studies published between 2020 and 2024 (Antouri *et al*., 2024; Z. Zhang *et al*., 2022). This narrative review aims to fill those gaps by critically evaluating recent evidence related to effectiveness of plant based diets (vegan, Pescatarian etc) in the control of chronic manageable diseases. Recent clinical studies and cohort analysis also support the efficacy of nutrition rich diets in reducing risk factors and improving clinical outcomes (Gafiyatullina & Binda, 2024; Y. Xiao *et al*., 2024). Also, these diets have been proved to lower systolic and diastolic blood pressure levels, improve lipid profiles and slow progression of atherosclerosis in CVD patients (Kaur *et al*., 2024; Olabiyi & de Castro Brás, 2023; Szczepańska *et al*., 2022). In type 2 diabetes, plant-based interventions have increased insulin sensitivity, lowered HbA1c levels and improved glycemic control, controlling postprandial glucose spikes (Dinesh *et al*., 2024; Lewgood *et al*., 2021). Regarding obesity, high fiber nutrition composition and low calorie density of these diets improve satiety and support long-term weight loss better than omnivorous diets (Jarvis *et al*., 2022). Studies also indicate protective effects of these diets against certain cancers—particularly colorectal and breast cancer—likely due to anti-inflammatory, antioxidant and gut microbiome modulation benefits from dietary fiber and phytochemicals by contributing to the metabolic health and reducing the harmful microbes promoting health (Appunni *et al*., 2021; Fan *et al*., 2023; Munteanu & Schwartz, 2024). However, plant-based dietary patterns show antihypertensive effects and reductions in markers of systematic infant i.e., C-reactive protein (CRP) and interleukin-6 (IL-6) (Gibbs *et al*., 2021; Graff *et al*., 2023; Tomé-Carneiro & Visioli, 2023a; Y. B. Wang *et al*., 2023). This review article addresses United Nations Sustainable Development Goal (SDG) 3: Good Health and Well-Being, as it completely emphasizes on the preventive and therapeutic nutritions to reduce the burden of non-communicable diseases (NCDs) globally. Moreover this review alsohighlights the role of plant-based diets which impose multidimensional advantages inpreventing and managing onset of chronic diseases along with providing valuable insights for healthcare professionals, diet planners, policymakers, and individuals interested in nutrition patterns and diet trends.

Defining Plant-Based Diets: Plant based dietary approaches highlights the consumption of whole and minimally processed food choices e.g., vegetables, whole fruits and legumes rather than animal based foods (De La Motte *et al*., 2024; P. Henderson, 2024; Negowetti, 2020). These dietary patterns are not related to veganism but there is a slight spectrum that involves vegan, vegetarian and flexitarian diets (Bruns *et al*., 2024; Hargreaves *et al*., 2023). (Jovanovic, 2020; Storz, 2024). In contrast to omnivorous dietary patterns, plant-based diets are rich in vitamin C and E, dietary fiber, magnesium and phytochemicals leading to reduce saturated fats and dietary cholesterol levels (Grygorczuk *et al*., 2024; Simsek & Whitney, 2024; Szabo *et al*., 2021). Emerging global dietary trends including Mediterranean diet, DASH diet and Portfolio diet have some aspects of plant based dietary patterns, making these diets acceptable and adaptable to the general population while meeting their cultural needs (Gardner *et al*., 2023; Said *et al*., 2021). That's why, plant-based diets are reasoned as a flexible dietary model to tackle the rising burden of chronic diseases (Liang *et al*., 2024; Storz, 2024).

This narrative review focuses on synthesizing original research articles published between 2020 and 2024. Popular search engines like PubMed, Science Direct, Google Scholar, and Web of Science were utilized to conduct a systematic search of electronic databases. Keyword combinations such as "plant-based

diet," "chronic diseases," "obesity," "cardiovascular diseases," "hypertension," "type 2 diabetes," "cancer," "nutrition," and "dietary interventions" were employed (Lessem & Trapp, 2022). Only original researches such as randomized controlled trials, cohort studies and observational studies were included to ensure relevance, novelty and validity of the research evidence (Jafari *et al*., 2022; Tan *et al*., 2024). Studies involving both male and female human populations were included, while those focusing solely on pediatric and animal populations were excluded to maintain the validity and authenticity of information gathered. High-quality research was included specifically to determine the long term impact of these dietary pattern on the prevention and management of chronic diseases (Li *et al*., 2022).

Obesity: Obesity is a global public health challenge and a main challenging factor for metabolic disorders, including cancer and diabetes (Kułak *et al*., 2024). According to the World Health Organization (WHO), obesity is defined as excessive accumulation of fats in body tissues that poses a risk to overall human health, more than 30 body mass index (BMI) is classified as Obese. (Naji *et al*., 2024). Approximately 2.5 billion adults were overweight as per statistics in the year 2022, and among them 890 million lived their lives with obesity (Islam *et al*., 2024). Recently, plant-based diets came up as a significant dietary contributor in preventing obesity and ultimately managing chronic complications due to their high fiber, complex carbohydrates and phytochemicals rich nutritional composition and comparable lower density than general omnivorous diets (Ivanova *et al*., 2021). All these core characteristics of plant based foods including high dietary fiber content , vitamins, minerals, and bioactive compounds such as antioxidants and phytochemicals. helps to reduce overall calorie intake, indirectly improve metabolic profile (Johannesen *et al*., 2020).

Clinical investigations and observational research studies have demonstrated that those individuals who consume plant diets have significant reduction in their BMI and overall body fat percentages rather than those having animal based diets (Larcher, 2023; Slater, 2022). A randomized controlled trial was done to determine the effect of 5 diverse plant based dietary approaches (mention names of approaches here) in reducing weight over a period of 6 months. Research statistics showed that subjects that followed a vegan diet lost significantly more weight (-7.5%) than those having omnivorous, semi-vegetarian and pesco-vegetarian diets (-3.1-3.2%) effectiveness. Surprisingly, non- adherent vegan diet lost more weight (-6.0%) than non-adherent omnivorous diets (G. M. Turner-McGrievy *et al*., 2015). Likewise, various systematic reviews and meta-analysis also reported that vegetarian diets have led to more weight loss, varies as per subject specific body weight and composition (2-4.5kgs) (G. Turner-McGrievy *et al*., 2017).

All these mechanisms of action that involve significant weight loss via plant based dietary consumption are phenomenal. Also intake of these diets enhance satiety value and in return delays gastric emptying leading to feeling of fullness and reduce hunger for more time (Alshammari, 2023; van Aken, 2024). Hence, reduces overall food consumption, indirectly preventing fat accumulation at cellular level (Al-Ibraheem *et al*., 2024; Y.-L. Xiao *et al*., 2024). Moreover, plant-based diets often exclude consumption of high-fat, energy-dense foods, leading to reduced total caloric intake (Alsayed, 2021). Improved insulin sensitivity and reduced systemic inflammation, frequently observed in plant-based diet adherents, further support weight regulation Furthermore, plant-based diets may induce positive effects on the microbial activity of gut, which is highly recognized as a key factor in obesity onset. Diets rich in plant foods promote the growth of beneficial microbial species that contribute to improved metabolism and reduced adiposity leading to a healthy BMI (Al Othaim, 2021; Szabo *et al*., 2021)

Despite these various benefits, significant and prolonged weight management using plant-based diets depends on overall diet quality. *Hypertension* beneficial effects of whole plant foods, leads to weight gain. Therefore, emphasis should be placed on consumption of processed plant foods for optimal benefits (Hall, 2023; Temple, 2024).

Cardiovascular Diseases (CVDs): Cardiovascular diseases (CVDs) are the cardinal cause of death worldwide, taken almost 43 million lives in year 2021, mainly due to plaque formation in arteries (Shahjehan *et al*., 2024), which is the major reason behind heart attack and stroke that covers 75% of all deaths (WHO, 2024). CVDs are disorders of the heart and blood vessels including coronary heart disease, stroke, myocardial infarction and other conditions like; cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, etc(Olvera Lopez *et al*., 2023; Di Cesare *et al*., 2024). Statistics showed that every 4 out 5 CVD deaths occurred due to heart attacks and strokes, and one third of these are reported among people under 70 years (Kundu J. *et al*., 2022). Various risk factors such as hypertension, dyslipidemia, obesity, high blood glucose levels, smoking and unhealthy dietary practices significantly contribute towards the progression of CVDs (NDITHIA, 2024; Saadatu & Dil, n.d.; TANTOH, 2024). Diet is considered as a major role player in prevention of cardiovascular diseases. Extensive studies have demonstrated that plant-based diets considerably reduce morbidity and mortality rates associated with cardiovascular diseases (Dominguez *et al*., 2021; Rippe, 2022). Referring to the findings of a prospective cohort study conducted in 2021, role of plant based dietary patterns was found productive in reducing the incidence of coronary artery diseases and stroke (Mehta *et al*., 2023). Though the cardio-protective effects of these diets are beneficial due to

their fiber rich content, anti-oxidant activity, low saturated fats levels and rich phytonutrients content and its bioactivity, which directly regulate blood pressure, improve serum lipid profile and reduce systematic inflammation (X. J. Wang *et al*., 2024). Moreover, diets high in fruits, vegetables and whole grains have been shown to lower low-density lipoprotein cholesterol (LDL-C) serum levels, that is a contributor for atherosclerosis and ischemic heart disease (Upadhyay, 2023; Velissaridou *et al*., 2024). Among individuals with elevated cardiovascular risk, plant-derived foods were linked with reducing non-HDL cholesterol −0.18 mmol/L (~−7mg/dL), systolic blood pressure (−2.66 mmHg), and diastolic blood pressure (−1.69 mmHg), as well as an increase in HDL cholesterol (0.21 mg/dL), results of meta-analysis (Li *et al*., 2017; Tomé-Carneiro & Visioli, 2023). All these outcomes suggest that plant-based interventions can yield clinically significant improvements in heart health (Alasmre & Alotaibi, 2020).

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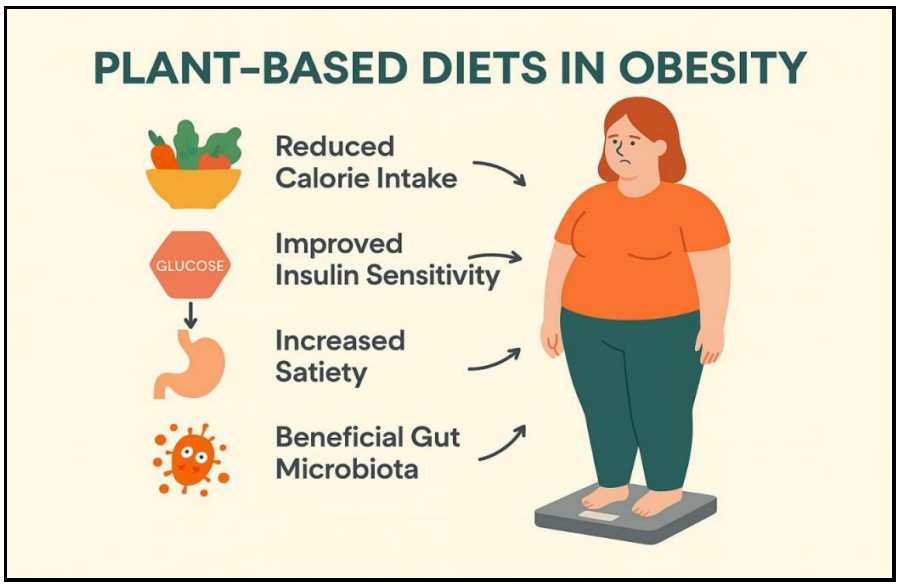

Figure 1. How plant diet reduces risk of obesity

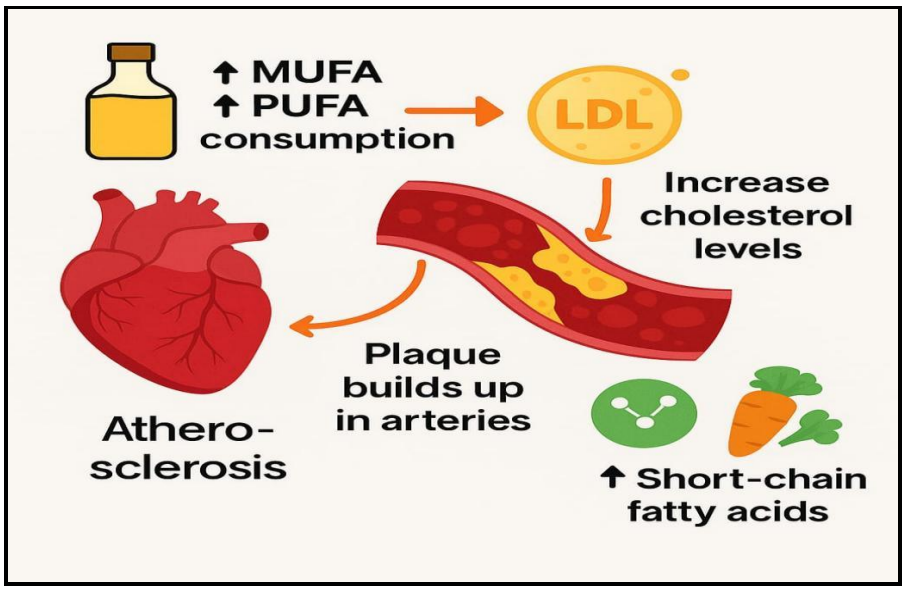

Figure 2. A brief representation of atherosclerosis process in body (MUFA-monounsaturated fatty acids; PUFA-polyunsaturated fatty acids, LDL- low-density lipoprotein)same issue as other picture mentioned earlier

Also, plant-based diets reduce oxidative stress and inflammation causing biomarkers such as C-reactive protein (CRP), which are commonly elevated in individuals at risk for CVDs. Additionally, all these diets stimulate endothelial function, which is vital for maintaining vascular health and preventing plaque buildup in coronary arteries (Butcher, 2020; Mehta *et al*., 2023). In contrary to this, diets rich in animal sources including red meat and processed foods, are correlated with increased risk of cardiovascular

diseases due to their high content of saturated fat, heme iron, and sodium content. These components lead to oxidative stress, hypertension, and endothelial dysfunction (Chen *et al*., 2023; Jiménez-Cortegana *et al*., 2021; Tu *et al*., 2024). Hence, adopting a whole-food, plant-based dietary pattern can serve as an effective intervention for primary and secondary level prevention of cardiovascular diseases, while also improving overall life quality (Baden *et al*., 2020; McGrath & Fernandez, 2022)

Hypertension: According to World Health Organization, estimated 7.5 million deaths worldwide are caused by hypertension which constitutes roughly 12.8% of all total deaths (WHO, 2023). An estimate of 1.28 billion adults from 30–79 years of age globally diagnosed with high blood pressure and two-thirds are living in lower and middle income countries. Despite being asymptomatic in nature, uncontrolled hypertension can lead to serious health consequences leading to more comorbidities (Farhadi *et al*., 2023; Mondal *et al*., 2023).

Dietary practices played a pivotal role in the prevention, development and management of hypertension. Plant-based diets have significant amount of potassium, magnesium, fiber, and antioxidants that are related with reduced blood pressure levels (Charoenwoodhipong, 2023; Dominguez *et al*., 2021; Łuszczki *et al*., 2023). A study was administered in 2023, found that those individuals who followed purely vegan diet had − 5.4 mmHg drop in systolic blood pressure and a –2.49 mmHg reduction in diastolic blood pressure (Tomé-Carneiro & Visioli, 2023) similar work was done in another study back in 2023 , which reportedly concluded that risk of stroks are reduced by consumption of plant based diets (Mehta *et al*., 2023).qoute more studies

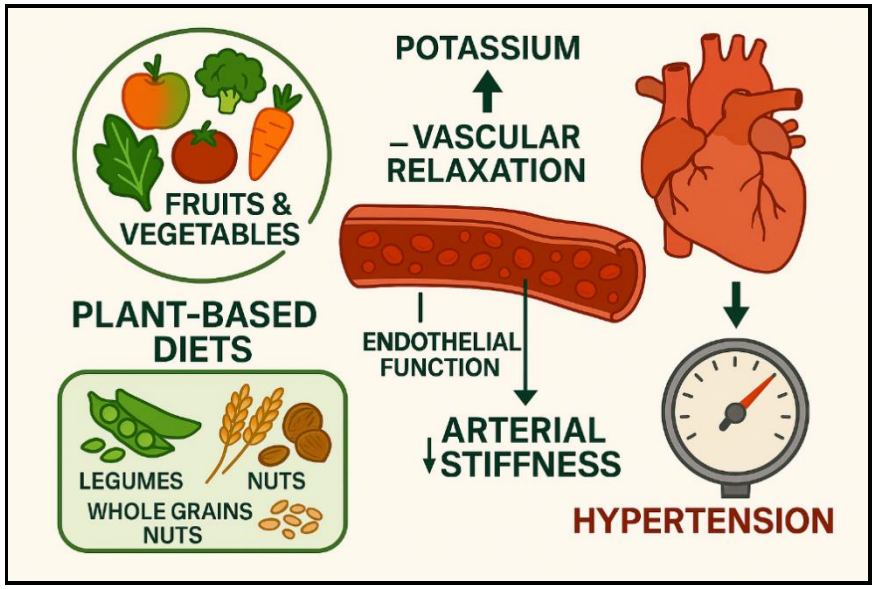

Figure 3. Hypertension and the Role of Plant- Diets in Blood Pressure Regulation same issue with pictures

Fruits and vegetables which are central component of plant-based diets, provide basic nutrients like potassium that help to hinder the effects of sodium and aid in vascular relaxation. While, whole grains, nuts and seeds also contribute to improved endothelial function in body and hence, reduced arterial stiffness, both of these mechanisms are crucial in maintaining healthy blood pressure (Bardhi *et al*., 2023; Charles *et al*., 2024). The Dietary Approaches to Stop Hypertension (DASH) diet, also addressed that plant based diet rich in fruits, vegetables, low-fat dairy products with reduced total and saturated fat and cholesterol has been proven as an effective step in lowering blood pressure among subjects (Tyson *et al*., 2012). lthough it's not considered as a fully vegan diet, its success rate undermines the scope of the plant-rich meals into daily life (Filippou *et al*., 2020; Guo *et al*., 2021).

Moreover, plant-based dietary foods are lower in saturated fats content and cholesterol levels, which can further support in blood pressure regulations and vascular health and reduce risk of future comorbidities (Narayan, 2021). Statistically, plant-based diets reduce oxidative stress and systemic inflammation, both involved in the pathogenesis of hypertension (Griendling *et al*., 2021; Krzemińska *et al*., 2022). In addition to this, plant based diets are indispensable in weight management and insulin sensitivity among targeted subjects and both are considered as major key factors in raising arterial blood pressure (Kolanu *et al*., 2024). Briefly, adapting a plant based diet gives a therapeutic, nutritious and evidence based functional approach in management of stage-1 hypertension. It also stands as an applied and productive strategy especially for those living in regions having less access to healthcare systems (Joshi *et al*., 2020).

Type 2 Diabetes Mellitus (T2DM): Diabetes is defined as a chronic metabolic disease along with basal insulin resistance leading to hyperglycemia (WHO, 2024; CDC, 2024; NIH, 2023; Pirdhankar *et al*., 2023). As per International Diabetes Federation (IDF) statistics, 1 in every 8 adults having diabetes that

constitute approximately 853 million people and among them almost 90% are those linked to lifestyle modification. Beta cell dysfunction impairs insulin production and utilization that causes sudden glucose spikes after ingesting carbohydrates based diets, resulting in a huge risk of various chronic complications like stroke, CVD, hypertension and some types of cancers (Carrero *et al*., 2020; Jebraeili *et al*., 2023). To lower the risk of developing diabetic macro and micro complications, therapeutic approaches should be administered effectively (Carrero *et al*., 2020; Jebraeili *et al*., 2023). Moreover it can also be controled by the stimulation of GLP-1hormone that improves insulin sensitivity, satiety and weight control (Collins and Costello, 2024).

Also, there is a dramatic increase in diabetes cases globally; hence, there is a need to address its therapeutic management through nutritional aspects for effective prevention and management. Poor dietary habits, sedentary lifestyle, obesity, and genetic predisposition are the main contributors to the global burden of diabetes (Maadjhou, 2022).

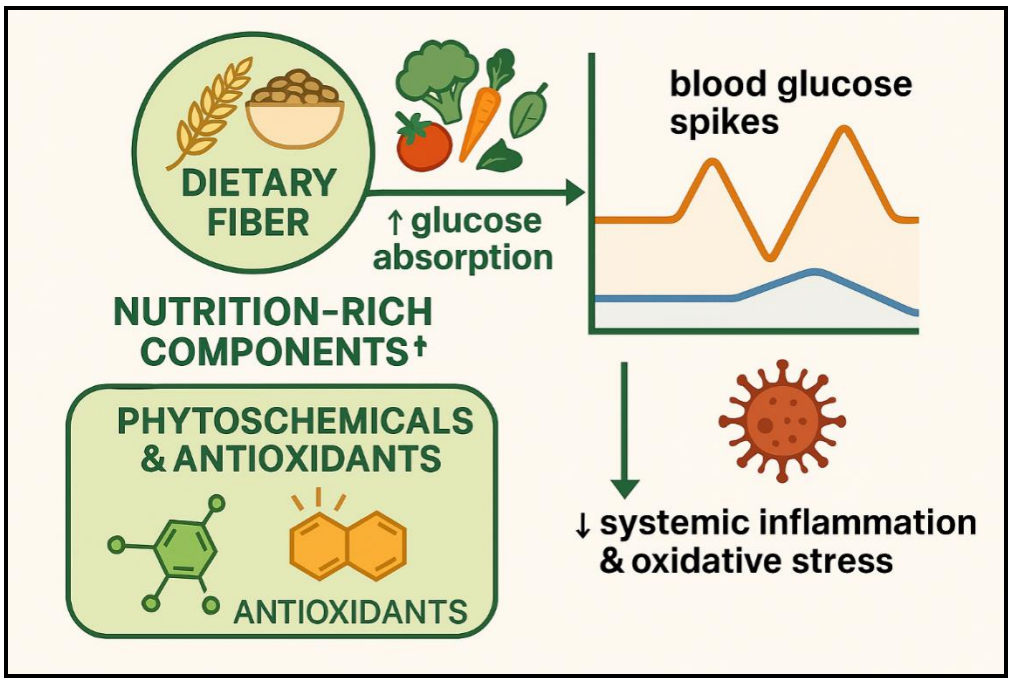

Figure. 4. The Role of Plant-Based Diets in Managing and Reducing Diabetes Risk

PBDs have emerged as a promising strategy for both prevention and management of type-2 diabetes. These diets are rich in whole grains, fruits and vegetables, legumes, nuts and seeds are connected with improved insulin sensitivity, better glycemic control, and a lower risk of diabetes onset (Kusmy *et al*., 2024; Mykhailovska *et al*., 2023). A study conducted back in 2016, concluded that the plant-based diets correspond to a lower risk of diabetes onset, and these are alsoinvolved in improving insulin sensitivity through multiple pathways mention any 2-3 pathways (Satija *et al*., 2016). The high dietary fiber content, particularly from whole grains and legumes, slows glucose absorption, reduces postprandial glucose spikes, and supports gut microbiota balance, which influences glucose metabolism, hence lowering blood glucose spikes (Berg, 2024; Alahmari, 2024). Phytochemicals and Antioxidants mention some names are the main nutrition rich bioactive components found in plant foods reduce inflammation and oxidative cellular stress, both involved in pathogenesis phase of insulin resistance (Akpoveso *et al*., 2023; Makhaik *et al*., 2021).

Clinical trials also support the efficacy of plant diet in diabetes control. Findings from a randomized controlled trial showed that a low-fat and vegan diet led to more reductions in HbA1c, body weight, and LDL serum cholesterol compared to a conventional diabetic recommended diet (del Carmen Fernández-Fígares Jiménez, 2024; Hanick, 2024). Also, another research highlights the significance of plant based interventions in improving blood glucose levels among type-2 diabetic individuals, hence, reducing the need and overuse of anti-diabetic medications (Yadav *et al*., 2024; Balasubramaniam *et al*., 2024).

As evident, plant based diets promote weight loss that is a key marker in blood glucose cellular control, even minimal weight loss results in significant improvement in cellular insulin uptake and pancreatic beta-cell functioning. Thereby, potential effect of plant based dietary approaches not only helps to prevent the initiation of diabetes but also useful in managing type-2 diabetic individuals. The compelling evidence from current studies mention studies also supported the therapeutic role of plant-based diets in the prevention and management of type 2 diabetes. These diets provide a nutrition dense and sustainable health approach by modifying key mechanisms involving glucose regulation and insulin activity at cellular level

(Oberhauser & Maechler, 2021; Cerf, 2020; Jain *et al*., 2022).

Cancer: Cancer is defined as a group of multiple diseases having abnormal and uncontrolled cell growth and its ability of metastasis (NCI, 2021; Brown *et al*., 2023). Globally, it is considered as a major leading cause of death that accounts for almost 20 million new cases and 9.7 million deaths in year 2022 by statistics (WHO, 2024; Bray *et al*., 2024). Estimated that almost 53.5 million people stayed alive for 5 years after cancer diagnosis occurs. Every 1 in 5 people develop cancer in their lifetime; approximately 1 in 9 men and 1 in 12 women die from the disease (WHO, 2024; Bray *et al*., 2024). Diet plays an important role in preventing cancers, accounting for an estimated 30–40% of cancer-related mortality, making nutrition a critical area of focus for both prevention and supportive cancer care (FUKUMURA *et al*., 2016).

Among trending diets, plant-based diets have more potency in reducing the risk of multiple cancers, particularly colorectal and breast cancer. Plant foods rich in polyphenols, flavonoids, dietary fiber, antioxidants, phytochemicals are effective in reducing inflammation and hinders activity of carcinogenic agents (DeClercq *et al*., 2022; Rose & Strombom, 2019; Shah, 2023).

Colorectal cancer is included in diet-related cancers and strongly associated with red meat and processed foods intake, low fiber and high-fat diets (Kumar *et al*., 2023; Zheng *et al*., 2022; Zhou & Rifkin, 2021). In contrast, plant-based diets offer protective effects by enhancing gut microbiota production, reducing inflammation of the intestine, and stimulating the production of butyrate, a short-chain fatty acids, which exhibit anti-proliferative effects on cancer-causing cells (Jovandaric *et al*., 2024; Mann *et al*., 2024; Thiruvengadam *et al*., 2023). A prospective study revealed that intake of vegetarian diet is linked with overall 55.4% reduction in all types of cancer than non-vegetarian diets (Bai *et al*., 2023).

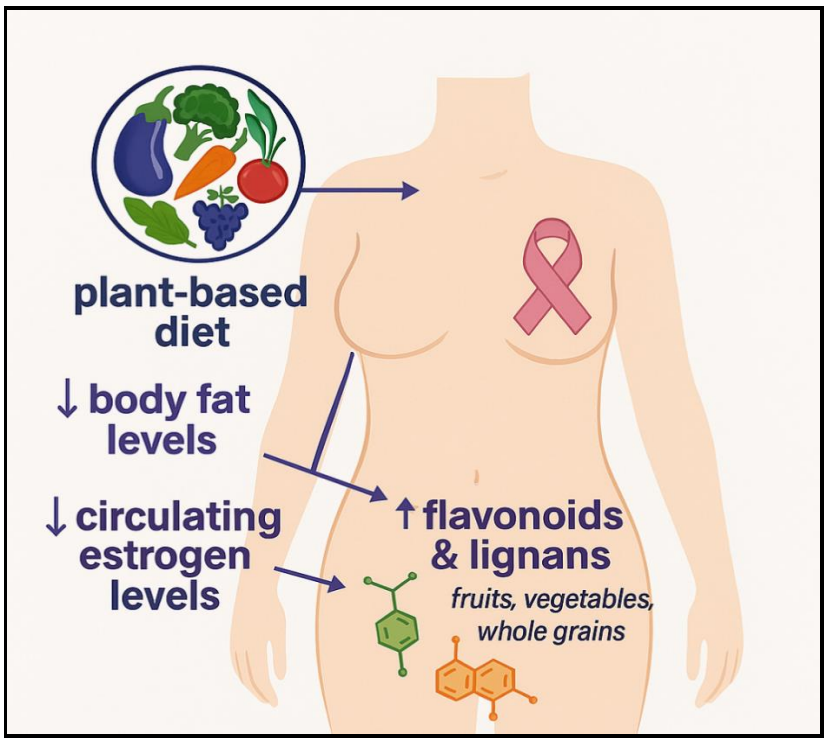

Figure 5. Effect of plant diets in reducing risk of breast cancer.

Most common type of cancer among females is breast cancer, triggered by hormonal, environmental, and dietary factors. Scientific evidence suggests that these diet acts as a key component in reducing breast cancer risk via lowering body fat levels, reducing circulating estrogen levels, and increasing intake of flavonoids and lignin's from fruits, green leafy vegetables and whole grains cereals (Raihan, 2023; Singh, 2024). High dietary fiber intake has been allied with less breast cancer incidence, particularly in premenopausal women (Farvid *et al*., 2020). Additionally, antioxidants and phytochemicals such as carotenoids, polyphenols, and isothiocyanates found in plant foods neutralize reactive oxygen species (ROS) and support DNA repair mechanisms, further reducing cancer risk (Ejike & Liman, 2022). Plant-based diets may also improve complications associated with cancer treatment by mitigating inflammation, preserving immune function, and improving their life quality. In short, plant-based dietary patterns, when nutritionally adequate, serve as an effective initiative for cancer prevention. The consistent intake of plant-derived nutrients offers protective mechanisms that can reduce carcinogenesis and enhance overall metabolic and immune health (Khalifa *et al*., 2024).

Public Health Significance: Spectrum of long term metabolic disorders, including cancer and diabetes pose a major global health challenge, constituting approximately 75% of all deaths worldwide and imposing immense burdens on healthcare systems (WHO, 2024; Razzaghi *et al*., 2019). The rising incidence and prevalence of these chronic conditions are largely attributed to modifiable lifestyle factors, including unhealthy dietary habits, reduced physical activity, and use of tobacco (Ng *et al*., 2020; Niebuur *et al*., 2023). In relatively low and middle income countries like Pakistan, triple burden of infectious diseases alongside rising chronic disease rates presents significant challenges like inadequate public health infrastructure and insufficient human and financial resources, for public health infrastructure and resource allocation (Ogugua *et al*., 2024).

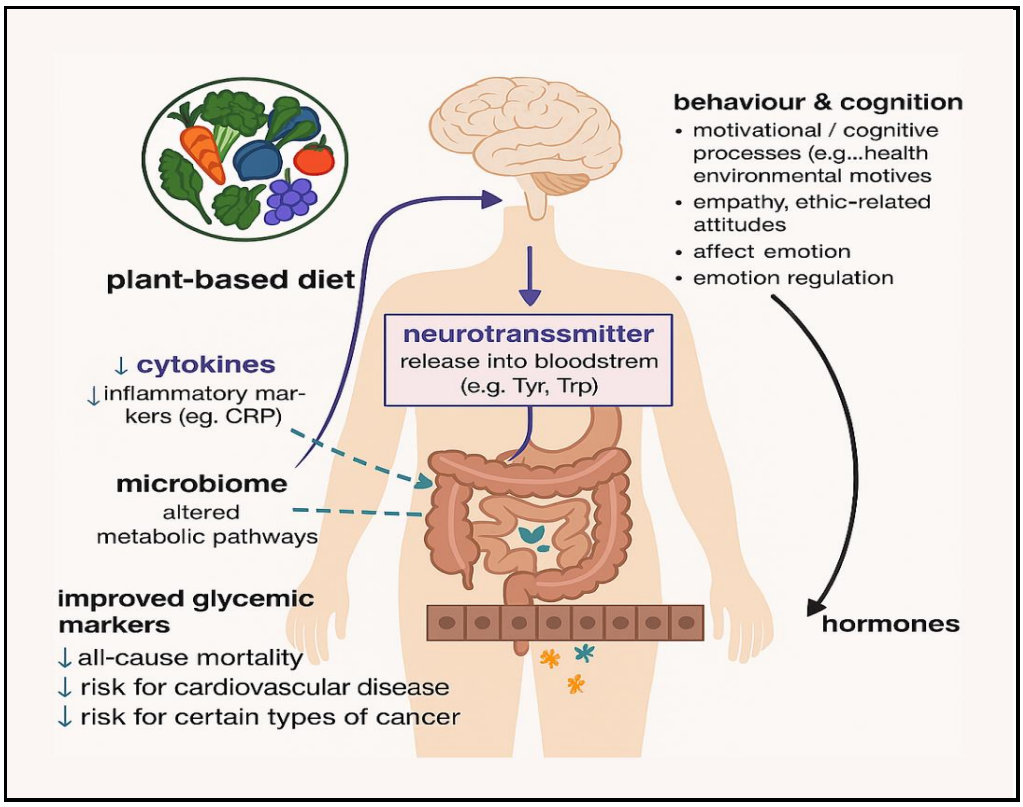

Figure 6. Plant-based diets improving glucose control, lower inflammatory markers and changes in neurotransmitter metabolic pathways via dietary intake mention source.

Adopting plant-based dietary patterns has the capability to substantially suppress the incidence and progression of these chronic diseases, leading to improved life quality and decreased cost for health care system (N. Henderson & Sampson, 2023; Landry & Ward, 2024). Furthermore, plant-based diets align with sustainable food system goals by minimizing greenhouse gas emissions, land degradation, and usage of water, thereby offering dual benefits to human and planetary health. Hence, integrating plant-based nutrition strategies into national health policies, dietary guidelines, and community education programs is crucial to address the escalating burden of chronic diseases worldwide and in countries like Pakistan where dietary transitions are ongoing (Järvinen, 2024).

Limitations: Irrespective of comprehensive nature of this narrative review, several constraints should be addressed. The focus on literature published between 2020 and 2024 may have excluded earlier landmark studies that offer foundational insights into the effects of diets based on plant origin in disease prevention (Cuzick, 2023). Many included studies are observational or cross-sectional, limiting causal inference due to potential biases and confounding factors (Hammerton & Munafò, 2021). Few long-term clinical trials countered that rigorously evaluate the sustained impact of plant-based diets on metabolic or cardiovascular outcomes, particularly in ethnically diverse or high-risk populations (Hernando Redondo, 2024; Lopez-Pentecost, 2022). Heterogeneity in defining "plant-based" diets and inconsistencies in dietary assessment tools complicate comparisons and synthesis (Beyer *et al*., 2023). Additionally, geographical representation is skewed toward high-income countries, limiting generalizability to populations in lower-middle countries such as Pakistan, where dietary practices and healthcare infrastructure differ substantially (Kowal *et al*., 2022). Important lifestyle confounders such as physical activity and socioeconomic factors were inconsistently adjusted across studies, possibly biasing associations. Lastly, the minimal use of a meta-analysis limits

quantitative assessment of associations, though this narrative synthesis provides a focused appraisal of primary evidence (Campbell *et al*., 2019).

CONCLUSION

Due to increased consumption of unhealthy dietary choices and sedentary lifestyles, risk of chronic disease i.e., obesity, cardiovascular diseases, hypertension, type 2 diabetes and cancer have become prevalent over time. Plant origin diets including whole grains, fruits, vegetables, legumes, nuts and seeds gives substantial protection against these chronic metabolic conditions due to their anti-inflammatory, antioxidant and several metabolic pathways. A growing body of evidence shows that plant-based diets beneficially modulate the gut microbiota, enhancing microbial diversity and promoting the production of short-chain fatty acids (SCFAs). These microbial metabolites play a pivotal role in regulating inflammation, maintaining metabolic homeostasis, and strengthening immune function, thereby linking gut health to systemic disease prevention. Contemporary research highlights the role of plant based dietary patterns in improving disease outcomes and hence, upgrading overall health. Implementing plant based effective therapeutic strategies not only support individual wellbeing but also boost environmental sustainability and in return, reduce overall healthcare cost. Globally, it presents as a cost effective and impactful strategy for managing and preventing chronic diseases among at risk and diseased individuals.

RECOMMENDATIONS

Based on current evidence, several recommendations emerge. Healthcare providers should integrate plant-based dietary counseling into chronic disease prevention and management protocols, as structured education improves adherence and health outcomes (Lawson, 2023; Mbata *et al*., 2024). Public health policies should prioritize accessible and affordable plant-based foods, especially in underprivileged nations through food labeling, nutrition programs and school meal planning promoting plant foods. Future research should focus on culturally appropriate, long-term and sustainable plant-based interventions across diverse populations with more randomized controlled trials (Reyes *et al*., 2021). Collaboration between nutritionists, policymakers and environmental advocates is vital to align dietary shifts with sustainability goals. Digital health platforms and media campaigns should raise awareness, debunk myths and foster behavioral change (Coman *et al*., 2024; Odongo, 2024).

AUTHORS' CONTRIBUTION

MA. conceptualized the manuscript, provided the original idea, and proofread the final version. QA wrote the initial draft of the manuscript under the guidance of MA, JA. SF, QA. KF and JS contributed to editing, formatting, and rephrasing the manuscript to improve clarity and coherence.

CONFLICT OF INTEREST

It is declared that the research was conducted without any commercial or financial relationship that could be understandable as a potential conflict of interest. So, the authors declare no conflict of interest.

REFERENCES

Aboukhater, D., Morad, B., Nasrallah, N., Nasser, S. A., Sahebkar, A., Kobeissy, F., Boudaka, A., & Eid, A. H. (2023). Inflammation and hypertension: Underlying mechanisms and emerging understandings. *Journal of Cellular Physiology*, *238*(6), 1148–1159.

Akpoveso, O. O. P., Ubah, E. E., & Obasanmi, G. (2023). Antioxidant phytochemicals as potential therapy for diabetic complications. *Antioxidants, 12*(1), 123.

Alahmari, L. A. (2024). Dietary fiber influence on overall health, with an emphasis on CVD, diabetes, obesity, colon cancer, and inflammation. *Frontiers in Nutrition, 11,* 1510564.

Al Othaim, A. (2021). *Impact of Different Plant-Based Foods Consumption on the Composition and Diversity of Gut Microbiota*. https://scholarworks.uark.edu/etd/3992/

Alasmre, F. A., & Alotaibi, H. A. (2020). Plant-based diet: A potential intervention for heart failure. *Cureus, 12*(5), e8042.

Al-Ibraheem, A. M. T., Hameed, A. T. A. Z., Marsool, M. D. M., Jain, H., Prajjwal, P., Khazmi, I., … & Amir, O. (2024). Exercise-induced cytokines, diet, and inflammation and their role in adipose tissue metabolism. *Health Science Reports, 7*(9), e70034.

Alsayed, E. A. A. K. (2021). The proportion of plant-based foods in the diets of adolescent females in New Zealand.https://hdl.handle.net/10523/12488

Alshammari, N. (2023). *Enhancing clinical nutrition, glycaemic, appetite and gastrointestinal responses of white rice* https://eprints.nottingham.ac.uk/id/eprint/76952

Antonopoulos, S. N., Bakhshi, B., Barker, K., Bell, C., Cartwright, M., Drescher, A. A., … Wilson, H. (2024). Popular diets and health. In *Culinary Medicine*. University of Arizona. https://opentextbooks.library.arizona.edu/culinarymedicine/chapter/chapter-8-popular-diets/

Antouri, Z., Mezouaghi, A., Djilali, S., Zeb, A., Khan, I., & Omer, A. S. (2024). The impact of obesity on chronic diseases: Type 2 diabetes, heart disease, and high blood pressure. *Applied Mathematics in Science and Engineering, 32*(1), 2422061.

Appunni, S., Rubens, M., Ramamoorthy, V., Tonse, R., Saxena, A., McGranaghan, P., & Kotecha, R. (2021). Emerging evidence on the effects of dietary factors on the gut microbiome in colorectal cancer. *Frontiers in Nutrition, 8,* 718389.

Baden, M. Y., Kino, S., Liu, X., Li, Y., Kim, Y., Kubzansky, L. D., … & Kawachi, I. (2020). Changes in plant-based diet quality and health-related quality of life in women. *British Journal of Nutrition, 124*(9), 960–970.

Bai, T., Peng, J., Zhu, X., & Wu, C. (2023). Vegetarian diets and the risk of gastrointestinal cancers: A meta-analysis of observational studies. *European Journal of Gastroenterology & Hepatology*, *35*(11), 1244–1252.

Bardhi, O., Clegg, D. J., & Palmer, B. F. (2023). The role of dietary potassium in the cardiovascular protective

effects of plant-based diets. *Seminars in Nephrology, 43*(2), 151406.

Balasubramaniam, A. K., Elangovan, A., Rahman, M. A., Nayak, S., Richards, A., Swain, D., & Rahman, M. A. (2024). Purple tea (*Camellia sinensis* var. *assamica*) leaves and obesity management: A review of 1,2-di-galloyl-4,6-hexahydroxydiphenoyl-β-D-glucose's (GHG) potential health benefits and future prospects. *Cureus, 16*(12), e75314.

Berg, A. T. (2024). *Impact of dietary fiber on inflammation related to type 2 diabetes* (Doctoral dissertation, The University of Memphis). The University of Memphis Digital Commons. https://digitalcommons.memphis.edu/etd/3857.

Budreviciute, A., Damiati, S., Sabir, D. K., Onder, K., Schuller-Goetzburg, P., Plakys, G., … & Kodzius, R. (2020). Management and prevention strategies for non-communicable diseases (NCDs) and their risk factors. *Frontiers in Public Health, 8,* 574111.

Bray, F., Laversanne, M., Sung, H., Ferlay, J., Siegel, R. L., Soerjomataram, I., & Jemal, A. (2024a). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, *74*(3), 229–263.

Brown, J. S., Amend, S. R., Austin, R. H., Gatenby, R. A., Hammarlund, E. U., & Pienta, K. J. (2023). Updating the Definition of Cancer. *Molecular Cancer Research*, *21*(11), 1142–1147.

Bruns, A., Greupner, T., Nebl, J., & Hahn, A. (2024). Plant-based diets and cardiovascular risk factors: A comparison of flexitarians, vegans and omnivores in a cross-sectional study. *BMC Nutrition*, *10*(1).

Butcher, R. L. (2020). The effects of a plant-based diet on inflammation of patients with cardiac disease (Honors undergraduate thesis, University of Central Florida). University of Central Florida STARS. https://stars.library.ucf.edu/honorstheses/680

Campbell, M., Katikireddi, S. V., Sowden, A., & Thomson, H. (2019). Lack of transparency in reporting narrative synthesis of quantitative data: A methodological assessment of systematic reviews. *Journal of Clinical Epidemiology*, *105*, 1–9.

Carrero, J. J., González-Ortiz, A., Avesani, C. M., Bakker, S. J., Bellizzi, V., Chauveau, P., … & Fouque, D. (2020). Plant-based diets to manage the risks and complications of chronic kidney disease. *Nature Reviews Nephrology, 16*(9), 525–542.

Cerf, M. E. (2020). Beta cell physiological dynamics and dysfunctional transitions in response to islet inflammation in obesity and diabetes. *Metabolites, 10*(11), 452.

Coman, C., Bucs, A., Gherheș, V., Rad, D., & Alexandrescu, M. B. (2024). The Influence of Social Media Platforms on Promoting Sustainable Consumption in the Food Industry: A Bibliometric Review. *Sustainability*,

Charles, J. A., Habibullah, N. K., Bautista, S., Davis, B., Joshi, S., & Hull, S. C. (2024). Planting the Seed for Blood Pressure Control: The Role of Plant-Based Nutrition in the Management of Hypertension. *Current Cardiology Reports*, *26*(3), 121–134.

Charoenwoodhipong, P. (2023). *Better health through plant-based functional foods* (Doctoral dissertation, University of California, Davis). ProQuest Dissertations Publishing.

Chen, W., Zhang, S., Hu, X., Chen, F., & Li, D. (2023). A review of healthy dietary choices for cardiovascular disease: From individual nutrients and foods to dietary patterns. *Nutrients, 15*(23), 4898.

Craddock, J. C. (2022). Nutritional intake, diet quality and exercise training: An exploration of adults following vegetarian-based dietary patterns (Doctoral dissertation, University of Wollongong). University of Wollongong Research Online. https://ro.uow.edu.au/theses1/1547

Cuzick, J. (2023). The importance of long-term follow up of participants in clinical trials. *British Journal of Cancer*, *128*(3), 432–438.

DeClercq, V., Nearing, J. T., & Sweeney, E. (2022). Plant-Based Diets and Cancer Risk: What is the Evidence? *Current Nutrition Reports*, *11*(2), 354–369.

De La Motte, K. L., Campbell, J. L., & Zinn, C. (2024). Exploring Consumption of Ultra-Processed Foods and Diet Quality in the Context of Popular Low Carbohydrate and Plant-Based Dietary Approaches. *Food Science & Nutrition*, *12*(11), 9651–9663.

Dereje, D., Yirgu, R., & Chichiabellu, T. (2018). Magnitude of overweight/obesity and associated factors among high school adolescents in Addis Ababa, Ethiopia. *Journal of Nutritional Disorders & Therapy, 8*(2),

Di Cesare, M., Perel, P., Taylor, S., Kabudula, C., Bixby, H., Gaziano, T. A., McGhie, D. V., Mwangi, J., Pervan, B., Narula, J., Pineiro, D., & Pinto, F. J. (2024). The Heart of the World. Global heart, 19(1), 11.

Dinesh, S., Sharma, S., & Chourasiya, R. (2024). Therapeutic applications of plant and nutraceutical-based compounds for the management of type 2 diabetes mellitus: A narrative review. *Current Diabetes Reviews, 20*(2).

Dominguez, L. J., Di Bella, G., Veronese, N., & Barbagallo, M. (2021). Impact of Mediterranean diet on chronic non-communicable diseases and longevity. *Nutrients, 13*(6), 2028.

ElSayed, N. A., Aleppo, G., Aroda, V. R., Bannuru, R. R., Brown, F. M., Bruemmer, D., … & Gabbay, R. A. (2023). Facilitating positive health behaviors and well-being to improve health outcomes: Standards of care in diabetes—2023. *Diabetes Care, 46*(Suppl. 1), S68–S96.

Ejike, U. D. I., & Liman, M. L. (2022). Role of dietary antioxidants in chemoprevention of nitrosamines-induced carcinogenesis. In V. S. Rajendram, V. R. Preedy, & V. B. Patel (Eds.), *Handbook of oxidative stress in cancer: Therapeutic aspects* (pp. 253–275). Springer Nature Singapore.

Fan, N., Fusco, J. L., & Rosenberg, D. W. (2023). Antioxidant and anti-inflammatory properties of walnut constituents: Focus on personalized cancer prevention and the microbiome. *Antioxidants, 12*(5), 982.

Farhadi, F., Aliyari, R., Ebrahimi, H., Hashemi, H., Emamian, M. H., & Fotouhi, A. (2023). Prevalence of uncontrolled hypertension and its associated factors in 50–74 years old Iranian adults: A population-based study. *BMC Cardiovascular Disorders*, *23*(1), 318.

Farinon, B., Molinari, R., Costantini, L., & Merendino, N. (2020). The seed of industrial hemp (*Cannabis sativa* L.): Nutritional quality and potential functionality for human health and nutrition. *Nutrients, 12*(7), 1935.

Farvid, M. S., Spence, N. D., Holmes, M. D., & Barnett, J. B. (2020). Fiber consumption and breast cancer incidence: A systematic review and meta-analysis of prospective studies. *Cancer*, *126*(13), 3061–3075.

Filippou, C. D., Tsioufis, C. P., Thomopoulos, C. G., Mihas, C. C., Dimitriadis, K. S., Sotiropoulou, L. I., … & Tousoulis, D. M. (2020). Dietary Approaches to Stop Hypertension (DASH) diet and blood pressure reduction

in adults with and without hypertension: A systematic review and meta-analysis of randomized controlled trials. *Advances in Nutrition, 11*(5), 1150–1160.

Fukumura, D., Incio, J., Shankaraiah, R. C., & JAIN, R. K. (2016). Obesity and Cancer: An Angiogenic and Inflammatory Link. *Microcirculation (New York, N.Y. : 1994)*, *23*(3), 191–206.

Gafiyatullina, R., & Binda, J. (2024). Nutritional Interventions in Chronic Disease Management: Evidence-Based Approaches for Improved Patient Outcomes. *Scientific Journal of Bielsko-Biala School of Finance and Law*, *28*(4). https://www.asej.eu/index.php/asej/article/view/861

Gardner, C. D., Vadiveloo, M. K., Petersen, K. S., Anderson, C. A. M., Springfield, S., Van Horn, L., Khera, A., Lamendola, C., Mayo, S. M., Joseph, J. J., & on behalf of the American Heart Association Council on Lifestyle and Cardiometabolic Health. (2023). Popular Dietary Patterns: Alignment With American Heart Association 2021 Dietary Guidance: A Scientific Statement From the American Heart Association. *Circulation*, *147*(22), 1715–1730.

Gibbs, J., Gaskin, E., Ji, C., Miller, M. A., & Cappuccio, F. P. (2021). The effect of plant-based dietary patterns on blood pressure: A systematic review and meta-analysis of controlled intervention trials. *Journal of Hypertension, 39*(1), 23–37.

Graff, E., Vedantam, S., Parianos, M., Khakoo, N., Beiling, M., & Pearlman, M. (2023). Dietary Intake and Systemic Inflammation: Can We Use Food as Medicine? *Current Nutrition Reports*, *12*(2), 247–254.

Griendling, K. K., Camargo, L. L., Rios, F. J., Alves-Lopes, R., Montezano, A. C., & Touyz, R. M. (2021). Oxidative Stress and Hypertension. *Circulation Research*, *128*(7), 993–1020.

Grygorczuk, O., Mrozik, M., Lipert, A., Kamińska, S., Białas, A., Drygas, W., … & Kwaśniewska, M. (2024). Cardiovascular health and diet quality among vegetarians, vegans and omnivores: Insights from a large urban population in Poland. *Nutrients, 16*(20), 3438.

Guo, R., Li, N., Yang, R., Liao, X. Y., Zhang, Y., Zhu, B. F., … & Lei, Y. (2021). Effects of the modified DASH diet on adults with elevated blood pressure or hypertension: A systematic review and meta-analysis. *Frontiers in Nutrition, 8,* 725020.

Gropper S. S. (2023). The Role of Nutrition in Chronic Disease. Nutrients, 15(3), 664.

Hammerton, G., & Munafò, M. R. (2021). Causal inference with observational data: The need for triangulation of evidence. *Psychological Medicine, 51*(4), 563–578.

Hall, K. D. (2023). From dearth to excess: The rise of obesity in an ultra-processed food system. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *378*(1885).

Hargreaves, S. M., Rosenfeld, D. L., Moreira, A. V. B., & Zandonadi, R. P. (2023). Plant-based and vegetarian diets: An overview and definition of these dietary patterns. *European Journal of Nutrition*, *62*(3), 1109–1121.

Henderson, N., & Sampson, C. (2023). The impact of higher uptake of plant-based diets in England: Model-based estimates of health care resource use and health-related quality of life. *medRxiv.*

Henderson, P. (2024). Exploring dietary patterns of a vegan population living in Auckland, New Zealand: A thesis presented in partial fulfilment of the requirements for the degree of Master of Science in Nutrition and Dietetics at Massey University, Auckland, New Zealand [PhD Thesis, Massey University]. https://mro.massey.ac.nz/handle/10179/72798

Hernando Redondo, J. (2024). *Effects of Mediterranean Diet on Cardiometabolic Biomarkers in Randomized Clinical Trials: Molecular Mechanisms*. https://diposit.ub.edu/dspace/handle/2445/220464

Ivanova, S., Delattre, C., Karcheva-Bahchevanska, D., Benbasat, N., Nalbantova, V., & Ivanov, K. (2021). Plant-based diet as a strategy for weight control. *Foods, 10*(12), 3052.

Islam, A. N. M. S., Sultana, H., Nazmul Hassan Refat, M., Farhana, Z., Abdulbasah Kamil, A., & Meshbahur Rahman, M. (2024). The global burden of overweight-obesity and its association with economic status, benefiting from STEPs survey of WHO member states: A meta-analysis. *Preventive Medicine Reports, 46*, 102882.

Jain, C., Ansarullah, N., Bilekova, S., & Lickert, H. (2022). Targeting pancreatic β cells for diabetes treatment. *Nature Metabolism, 4*(9), 1097–1108.

Jafari, S., Hezaveh, E., Jalilpiran, Y., Jayedi, A., Wong, A., Safaiyan, A., & Barzegar, A. (2022). Plant-based diets and risk of disease mortality: A systematic review and meta-analysis of cohort studies. *Critical Reviews in Food Science and Nutrition*, *62*(28), 7760–7772.

Järvinen, S. (2024). *Plant-Based Dairy and the Food Transformation: Leveraging Sociocultural Acceptability and Personal Benefit to Shift Consumer Behavior Toward Sustainability*.

Jarvis, S. E., Nguyen, M., & Malik, V. S. (2022). Association between adherence to plant-based dietary patterns and obesity risk: A systematic review of prospective cohort studies. *Applied Physiology, Nutrition, and Metabolism, 47*(12), 1115–1133.

Jebraeili, H., Mirzababaei, A., Abaj, F., Mohsenian, S., & Mirzaei, K. (2023). *The Association between Plant-Based Dietary Index and Odds of Diabetic Nephropathy in Women: A Case-Control Study*. https://www.researchsquare.com/article/rs-2756405/latest

Jiménez-Cortegana, C., Iglesias, P., Ribalta, J., Vilariño-García, T., Montañez, L., Arrieta, F., … & Cardiovascular Disease Working Group of the Spanish Society of Diabetes (SED). (2021). Nutrients and dietary approaches in patients with type 2 diabetes mellitus and cardiovascular disease: A narrative review. *Nutrients, 13*(11), 4150.

Johannesen, C. O., Dale, H. F., Jensen, C., & Lied, G. A. (2020). Effects of Plant-Based Diets on Outcomes Related to Glucose Metabolism: A Systematic Review . *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, *Volume 13*, 2811–2822.

Joshi, S., Ettinger, L., & Liebman, S. E. (2020). Plant-based diets and hypertension. *American Journal of Lifestyle Medicine, 14*(4), 397–405.

Jovandaric, M. Z., Jovanović, K., Raus, M., Babic, S., Igic, T., Kotlica, B., & Milicevic, S. (2024). The significance of plant nutrition in the creation of the intestinal microbiota—Prevention of chronic diseases: A narrative review. *Medicina, 60*(12), 1969.

Jovanovic, C. E. (2020). *The intersection of diet, health and the environment: Plant-based diets and public health* (Doctoral dissertation, The University of Texas Health Science Center at Houston). Digital Commons.

https://digitalcommons.library.tmc.edu/uthsph_dissertsopen/133/

Kaur, P., Dahiya, R., Kaur, G., Buttar, H. S., Wilson, D. W., & Telessy, I. G. (2024). Pathogenesis of atherosclerosis and coronary heart disease: Epidemiology, diagnostic biomarkers and prevention by nutraceuticals, functional foods, and plant-derived therapies. In H. S. Buttar, D. W. Wilson, & I. G. Telessy (Eds.), *Botanicals and natural bioactives: Prevention and treatment of diseases* (pp. 146–204). Bentham Science Publishers.
https://www.benthamdirect.com/content/books/9789815238273.chapter-7

Krzemińska, J., Wronka, M., Młynarska, E., Franczyk, B., & Rysz, J. (2022). Arterial hypertension—Oxidative stress and inflammation. *Antioxidants, 11*(1), 172.

Kułak, K., Sztybór, I., & Kamińska, K. (2024). Obesity—An epidemic of the 21st century: Literature review. *Journal of Education, Health and Sport, 70,* 49557.

Kumar, A., Chinnathambi, S., Kumar, M., & Pandian, G. N. (2023). Food intake and colorectal cancer. *Nutrition and Cancer, 75*(9), 1710–1742.

Kundu, J., & Kundu, S. (2022). Cardiovascular disease (CVD) and its associated risk factors among older adults in India: Evidence from LASI Wave 1. *Clinical Epidemiology and Global Health*, *13*, 100937.

Kusmy, P., Saxena Pal, R., Chaitanya, M. V. N. L., & Pal, Y. (2024). A Comprehensive Investigation into the Relationship between Dietary Therapy Strategies for Metabolic Illnesses and the Underlying Myriad Factors. *Current Nutrition & Food Science*, *20*(5), 586–601.

Kowal, M., Sorokowski, P., Kulczycki, E., & Żelaźniewicz, A. (2022). *The impact of geographical bias when judging scientific studies*. *Scientometrics, 127*(1), 265–273.

Kumar, A., Gangwar, R., Zargar, A. A., Kumar, R., & Sharma, A. (2024). Prevalence of Diabetes in India: A Review of IDF Diabetes Atlas 10th Edition. Current diabetes reviews, 20(1), e130423215752.

Li, S. S., Blanco Mejia, S., Lytvyn, L., Stewart, S. E., Viguiliouk, E., Ha, V., de Souza, R. J., Leiter, L. A., Kendall, C. W. C., Jenkins, D. J. A., & Sievenpiper, J. L. (2017). Effect of plant protein on blood lipids: A systematic review and meta-analysis of randomized controlled trials. *Journal of the American Heart Association, 6*(12), e006659.

Landry, M. J., & Ward, C. P. (2024). Health Benefits of a Plant-Based Dietary Pattern and Implementation in Healthcare and Clinical Practice. *American Journal of Lifestyle Medicine*, *18*(5), 657–665.

Larcher, N. (2023). *Effects of a 12-week plant-based diet program on obese and overweight adults in rural Michigan* (Doctoral dissertation, Andrews University). Andrews University Digital Commons. https://digitalcommons.andrews.edu/dissertations/1234

Lawson, S. (2023). *Addressing hypertension in overweight and obese African Americans using a plant-based diet* (Doctoral dissertation, University of Massachusetts Global). University of Massachusetts Global ScholarWorks. https://scholarworks.umassglobal.edu/dissertations/567

Lessem, A., & Trapp, C. (2022). Preventing, treating, and reversing chronic disease with nutritional interventions. In K. L. Munroe & S. Smith (Eds.), *Lifestyle nursing* (pp. 193–208). CRC Press.

Lewgood, J., Oliveira, B., Korzepa, M., Forbes, S. C., Little, J. P., Breen, L., & Candow, D. G. (2021). Efficacy of dietary and supplementation interventions for individuals with type 2 diabetes. *Nutrients, 13*(7), 2378.

Li, T., Guan, L., Wang, X., Li, X., Zhou, C., Wang, X., … & Xi, Y. (2022). Relationship between dietary patterns and chronic diseases in rural population: Management plays an important role in the link. *Frontiers in Nutrition, 9,* 866400.

Liang, J., Wen, Y., Yin, J., Zhu, G., & Wang, T. (2024). Utilization of plant-based foods for effective prevention of chronic diseases: A longitudinal cohort study. *npj Science of Food, 8*(1), 113.

Lipert, A., Szadkowska, I., Matusiak-Wieczorek, E., & Kochan, E. (2022). The effect of herbal supplements on blood pressure: Systematic review and meta-analysis. *Antioxidants, 11*(8), 1419.

Lopez-Pentecost, M. (2022). *Informing dietary interventions for obesity-related cancer prevention in Mexican-origin Hispanic adults* [Doctoral dissertation, The University of Arizona]. ProQuest. https://search.proquest.com/openview/873f1e62693a396ec12b5d00e4cdf6bf/1?pq-origsite=gscholar&cbl=18750&diss=y

Mann, E. R., Lam, Y. K., & Uhlig, H. H. (2024). Short-chain fatty acids: Linking diet, the microbiome and immunity. *Nature Reviews Immunology, 24*(8), 577–595.

Mbata, A. O., Soyege, O. S., Nwokedi, C. N., Tomoh, B. O., Mustapha, A. Y., Balogun, O. D., Forkuo, A. Y., & Iguma, D. R. (2024). Preventative medicine and chronic disease management: Reducing healthcare costs and improving long-term public health. *International Journal of Multidisciplinary Research and Growth Evaluation, 5*(6), 1584–1600.

McGrath, L., & Fernandez, M.-L. (2022). Plant-based diets and metabolic syndrome: Evaluating the influence of diet quality. *Journal of Agriculture and Food Research, 9,* 100322.

Mondal, M. K., Nessa, A., & Khatun, N. (2023). Study of body mass index, blood pressure, serum sodium in newly diagnosed hypertensive patients. *Mymensingh Medical Journal: MMJ, 32*(2), 355–360.

Munteanu, C., & Schwartz, B. (2024). Interactions between dietary antioxidants, dietary fiber and the gut microbiome: Their putative role in inflammation and cancer. *International Journal of Molecular Sciences, 25*(15), 8250.

Mykhailovska, N. S., Grytsay, A. V., Shershnyova, O. V., & Mykhailovskyi, Y. M. (2023). *The risk factors and screening of main chronic noncommunicable diseases: Study guide for the practical classes and individual work for 6th-years students of international faculty*. http://dspace.zsmu.edu.ua/handle/123456789/19546

Makhaik, M. S., Shakya, A. K., & Kale, R. (2021). Dietary phytochemicals. In *Antioxidants: Benefits, sources, mechanisms of action* (p. 421). Springer.

Naji, H. A., Al-Ani, W. A. T., & Ali, B. M. (2024). *Overweight/obesity and its association with physical activity among intermediate school students in Baghdad-Al-Karkh*. http://www.iraqinmj.com/upload/2971417802.pdf

Narayan, K. V. (2021). *Pandemic of diabetes and prediabetes: Prevention and control* (Vol. 50). Elsevier Health Sciences. https://www.elsevier.com/books/pandemic-of-diabetes-and-prediabetes-prevention-and-control/narayan/978-0-323-90503-3

Ndithia, J. M. (2024). *Behavioural and social-demographic risk factors associated with hypertension among low*

income adultsin Kiambu County, Kenya [PhD Thesis, Maseno University]. https://repository.maseno.ac.ke/handle/123456789/6308

Negowetti, N. E. (2020). A planetary health approach to the labeling of plant-based meat. *Food & Drug Law Journal, 75,* 142–165. https://www.fdljournal.com

Ng, R., Sutradhar, R., Yao, Z., Wodchis, W. P., & Rosella, L. C. (2020). Smoking, drinking, diet and physical activity—Modifiable lifestyle risk factors and their associations with age to first chronic disease. *International Journal of Epidemiology, 49*(1), 113–130.

Niebuur, J., Vonk, J. M., Du, Y., de Bock, G. H., Lunter, G., Krabbe, P. F., Alizadeh, B. Z., Snieder, H., Smidt, N., & Boezen, M. (2023). Lifestyle factors related to prevalent chronic disease multimorbidity: A population-based cross-sectional study. *PLoS One, 18*(7), e0287263.

Olabiyi, A. A., & de Castro Brás, L. E. (2023). Cardiovascular remodeling post-ischemia: Herbs, diet, and drug interventions. *Biomedicines, 11*(6), 1697.

Oladimeji, B. M., & Adebo, O. A. (2024). Antiobesity effect of healthy food crops and functional foods: A systematic review of their mechanisms. *Food Science & Nutrition*, *12*(3), 1380–1398.

Oberhauser, L., & Maechler, P. (2021). Lipid-induced adaptations of the pancreatic beta-cell to glucotoxic conditions sustain insulin secretion. *International Journal of Molecular Sciences, 23*(1), 324.

Odongo, M. (2024). Health communication campaigns and their impact on public health behaviors. *Journal of Communication*, *5*(2), 55–69.

Olvera Lopez, E., Ballard, B. D., & Jan, A. (2023, August 22). Cardiovascular disease. In *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK535419/

Pugliese, G., Liccardi, A., Graziadio, C., Barrea, L., Muscogiuri, G., & Colao, A. (2022). Obesity and infectious diseases: Pathophysiology and epidemiology of a double pandemic condition. International Journal of Obesity, 46(3), 449–465.

Pacinella, G., Ciaccio, A. M., & Tuttolomondo, A. (2024b). Molecular Links and Clinical Effects of Inflammation and Metabolic Background on Ischemic Stroke: An Update Review. *Journal of Clinical Medicine*, *13*(24), Article 24.

Pirdhankar, M. S., Rasal, K. S., & Tasgaonkar, R. (2023). Brief review on diabetes mellitus. International Journal for Research in Applied Science & Engineering Technology *(IJRASET),* ISSN 2321–9653. https://www.ijraset.com

Raihan, D. (2023). A review of Breast Cancer risk factor assessment on women in developing countries, cancer drug resistance, and Breast Cancer treatment in Bangladesh [PhD Thesis, Brac University]. https://dspace.bracu.ac.bd/xmlui/handle/10361/22942

Reyes, L. I., Constantinides, S. V., Bhandari, S., Frongillo, E. A., Schreinemachers, P., Wertheim-Heck, S., Walls, H., Holdsworth, M., Laar, A., Nguyen, T., Turner, C., Wellard, K., & Blake, C. E. (2021). Actions in global nutrition initiatives to promote sustainable healthy diets. *Global Food Security*, *31*, 100585.

Rippe, J. M. (2022). *Integrating lifestyle medicine in cardiovascular health and disease prevention*. CRC Press.

Razzaghi, H., Martin, D. N., Quesnel-Crooks, S., Hong, Y., Gregg, E., Andall-Brereton, G., Gawryszweski, V., & Saraiya, M. (2019). 10-year trends in noncommunicable disease mortality in the Caribbean region. Revista Panamericana de Salud Pública = Pan American Journal of Public Health, 43, e37.

Scully, T., Ettela, A., LeRoith, D., & Gallagher, E. J. (2021). Obesity, Type 2 Diabetes, and Cancer Risk. Frontiers in oncology, 10, 615375.

Singh, S., Shankar, R., & Singh, G. P. (2017). Prevalence and associated risk factors of hypertension: A cross-sectional study in urban Varanasi. *International Journal of Hypertension, 2017,* 5491838.

Said, M. S., El Sayed, I. T., Ibrahim, E. E., & Khafagy, G. M. (2021). Effect of DASH Diet Versus Healthy Dietary Advice on the Estimated Atherosclerotic Cardiovascular Disease Risk. *Journal of Primary Care & Community Health*, *12*.

Satija, A., Bhupathiraju, S. N., Rimm, E. B., Spiegelman, D., Chiuve, S. E., Borgi, L., Willett, W. C., Manson, J. E., Sun, Q., & Hu, F. B. (2016). Plant-Based Dietary Patterns and Incidence of Type 2 Diabetes in US Men and Women: Results from Three Prospective Cohort Studies. *PLoS Medicine*, *13*(6), e1002039.

Shah, S. (2023). *Plant-based dietary patterns and the risk of breast cancer in the E3N Cohort* [PhD Thesis, Université Paris-Saclay]. https://theses.hal.science/tel-05042294/

Siddiqui, S. A., Azmy Harahap, I., Suthar, P., Wu, Y. S., Ghosh, N., & Castro-Muñoz, R. (2023). A comprehensive review of phytonutrients as a dietary therapy for obesity. *Foods, 12*(19), 3610.

Simsek, M., & Whitney, K. (2024). Examination of primary and secondary metabolites associated with a plant-based diet and their impact on human health. *Foods, 13*(7), 1020.

Singh, D. D. (2024). Epigenetic mechanisms of endocrine-disrupting chemicals in breast cancer and their impact on dietary intake. *Journal of Xenobiotics, 15*(1), 1.

Slater, R. (2022). *Effects of the vegetarian diet on adult body composition and obesity in the United States*. https://openresearch.okstate.edu/bitstreams/1afaa29e-734a-45a5-81f5-940c860b9d33/download

Storz, M. A. (2024). Will the plant-based movement redefine physicians' understanding of chronic disease? In *Environmental Bioethics* (pp. 69–85). Routledge. https://www.taylorfrancis.com/chapters/edit/10.4324/9781003465652-7/plant-based-movement-redefine-physicians-understanding-chronic-disease-maximilian-andreas-storz

Szabo, Z., Koczka, V., Marosvolgyi, T., Szabo, E., Frank, E., Polyak, E., Fekete, K., Erdelyi, A., Verzar, Z., & Figler, M. (2021). Possible biochemical processes underlying the positive health effects of plant-based diets: A narrative review. *Nutrients, 13*(8), 2593.

Szczepańska, E., Białek-Dratwa, A., Janota, B., & Kowalski, O. (2022). Dietary therapy in prevention of cardiovascular disease (CVD)—Tradition or modernity? A review of the latest approaches to nutrition in CVD. *Nutrients, 14*(13), 2649.

Tan, J., Zhang, S., Jiang, Y., Li, J., & Yang, C. (2024). Plant-based diet and risk of all-cause mortality: A systematic review and meta-analysis. *Frontiers in Nutrition, 11,* 1481363.

Tantoh, N. T. (2024). Knowledge, attitude and practices of the modifiable risk factors of cardiovascular diseases amongst the adult population of the Bokova community (Unpublished master's thesis). Academia. https://www.academia.edu/download/117695622/Final_Thesis_Dissertation_2024_Nsame_Tantoh_.pdf

Temple, N. J. (2024). Making sense of the relationship between ultra-processed foods, obesity, and other chronic diseases. *Nutrients, 16*(23), 4039.

Thiruvengadam, M., Subramanian, U., Venkidasamy, B., Thirupathi, P., Samynathan, R., Shariati, M. A., Rebezov, M., Chung, I.-M., & Rengasamy, K. R. R. (2023). Emerging role of nutritional short-chain fatty acids (SCFAs) against cancer via modulation of hematopoiesis. *Critical Reviews in Food Science and Nutrition*, *63*(6), 827–844.

Tomé-Carneiro, J., & Visioli, F. (2023). Plant-Based Diets Reduce Blood Pressure: A Systematic Review of Recent Evidence. *Current Hypertension Reports*, *25*(7), 127–150.

Tu, Z., Yang, J., & Fan, C. (2024). The role of different nutrients in the prevention and treatment of cardiovascular diseases. *Frontiers in Immunology, 15,* 1393378.

Tucci, M. (2022). Definition and critical evaluation of nutritional strategies to achieve the development of optimized healthy and sustainable dietary patterns: from theory to practice. https://air.unimi.it/handle/2434/940334

Turner-McGrievy, G. M., Davidson, C. R., Wingard, E. E., Wilcox, S., & Frongillo, E. A. (2015). Comparative effectiveness of plant-based diets for weight loss: A randomized controlled trial of five different diets. *Nutrition*, *31*(2), 350–358.

Turner-McGrievy, G., Mandes, T., & Crimarco, A. (2017). A plant-based diet for overweight and obesity prevention and treatment. *Journal of Geriatric Cardiology : JGC*, *14*(5), 369–374.

Upadhyay, R. K. (2023). High cholesterol disorders, myocardial infarction and its therapeutics. *World Journal of Cardiovascular Diseases, 13*(8), 433–469.

van Aken, G. A. (2024). Computer modeling of digestive processes in the alimentary tract and their physiological regulation mechanisms: Closing the gap between digestion models and in vivo behavior. *Frontiers in Nutrition, 11,* 1339711.

Velissaridou, A., Panoutsopoulou, E., Prokopiou, V., & Tsoupras, A. (2024). Cardio-protective-promoting properties of functional foods inducing HDL-cholesterol levels and functionality. *Nutraceuticals, 4*(4), 469–502.

Wang, X. J., Voortman, T., de Crom, T. O. E., Tilly, M., Kavousi, M., Ikram, M. K., & Steur, M. (2024). Healthy and unhealthy plant-based diets and the risk of cardiovascular diseases: The Rotterdam study and updated meta-analysis. *Progress in Cardiovascular Diseases*, *87*, 8–15.

Wang, Y. B., Page, A. J., Gill, T. K., & Melaku, Y. A. (2023). The association between diet quality, plant-based diets, systemic inflammation, and mortality risk: Findings from NHANES. *European Journal of Nutrition*, *62*(7), 2723–2737

World Health Organization. (2024). *Noncommunicable diseases*. World Health Organization. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

Xiao, Y., Xiao, X., Zhang, X., Yi, D., Li, T., Hao, Q., Zhang, F., Li, X., & Wang, N. (2024). Mediterranean diet in the targeted prevention and personalized treatment of chronic diseases: Evidence, potential mechanisms, and prospects. *EPMA Journal*, *15*(2), 207–220.

Yadav, J. P., Singh, A. K., Grishina, M., Pathak, P., Verma, A., Kumar, V., … & Patel, D. K. (2024). Insights into the mechanisms of diabetic wounds: Pathophysiology, molecular targets, and treatment strategies through conventional and alternative therapies. *Inflammopharmacology, 32*(1), 149–228.

Zhang, Z., Chen, B., Zeng, J., Fan, M., Xu, W., Li, X., Xing, Y., & Xu, S. (2022). Associations between consumption of dietary fibers and the risk of type 2 diabetes, hypertension, obesity, cardiovascular diseases, and mortality in Chinese adults: Longitudinal analyses from the China Health and Nutrition Survey. *Nutrients, 14*(13), 2650.

Zheng, Y., Meng, L., Liu, H., Sun, L., Nie, Y., Wu, Q., Fan, D., & Li, M. (2022). Let food be thy medicine: The role of diet in colorectal cancer: A narrative review. *Journal of Gastrointestinal Oncology, 13*(4), 2020–2032.

Zhou, E., & Rifkin, S. (2021). Colorectal cancer and diet: Risk versus prevention, is diet an intervention? *Gastroenterology Clinics, 50*(1), 101–111.

Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). *Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries*. CA: A Cancer Journal for Clinicians, 71(3), 209–249.

Shahjehan, R. D., Sharma, S., & Bhutta, B. S. (2024). Coronary artery disease. In *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK574519/

Mehta, P., Tawfeeq, S., Padte, S., Sunasra, R., Desai, H., Surani, S., & Kashyap, R. (2023). Plant-based diet and its effect on coronary artery disease: A narrative review. *World Journal of Clinical Cases, 11*(20), 4752–4764.

Tyson, C. C., Nwankwo, C., Lin, P. H., & Svetkey, L. P. (2012). The Dietary Approaches to Stop Hypertension (DASH) eating pattern in special populations. *Current Hypertension Reports, 14*(5), 388–396.

Collins, L., & Costello, R. A. (2024). Glucagon-like peptide-1 receptor agonists. In *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK557823

Łuszczki, E., Boakye, F., Zielińska, M., Dereń, K., Bartosiewicz, A., Oleksy, Ł., & Stolarczyk, A. (2023). Vegan diet: Nutritional components, implementation, and effects on adults' health. *Frontiers in Nutrition, 10,* 1294497.

Ogugua, J. O., Olorunsogo, T. O., Muonde, M., Maduka, C. P., & Omotayo, O. (2024). Developing countries' health policy: A critical review and pathway to effective healthcare systems. *International Journal of Science and Research Archive, 11*(1), 371–382.