Plant Proteins for a Healthier Heart: A Meta-Analysis Approach

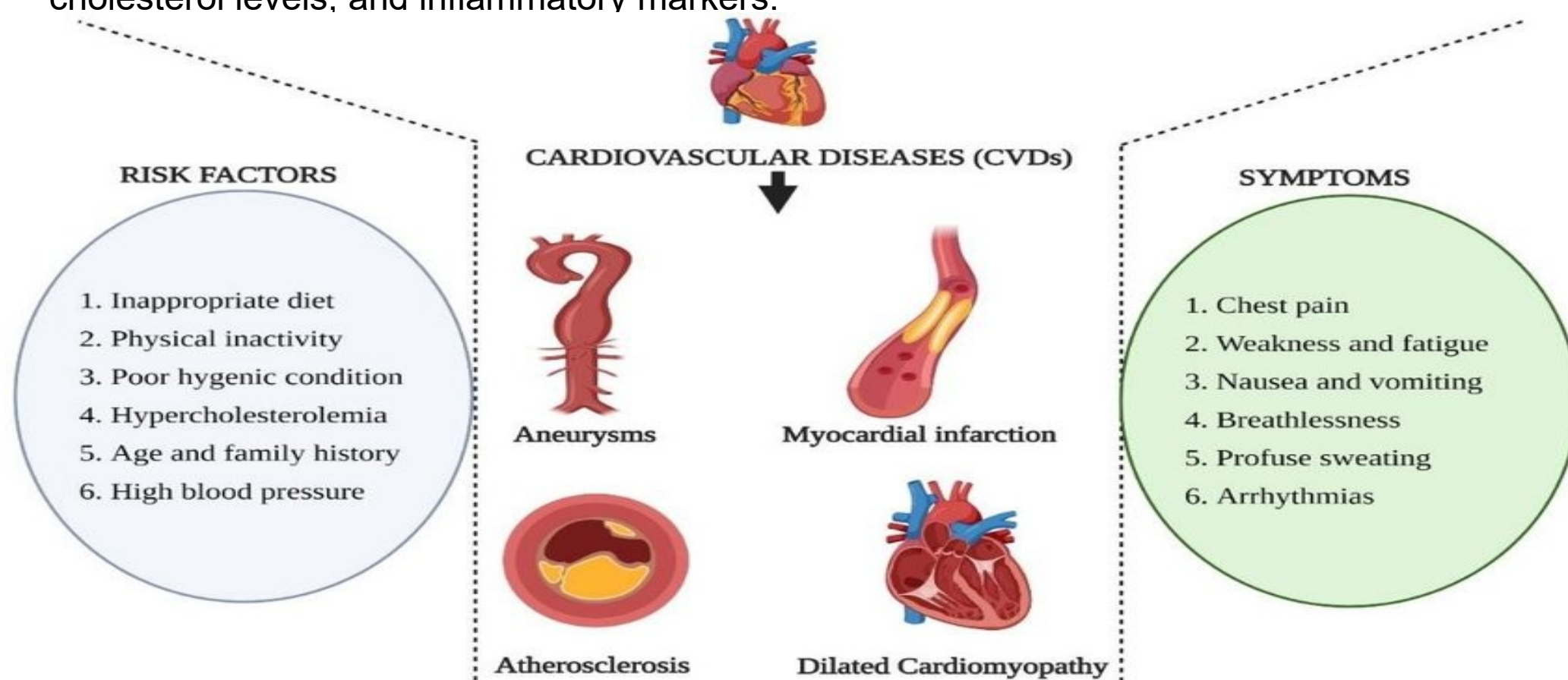**ZABOUB Nada Malak *, BOUSSENA Sabrina, DIB Amira Leila**

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INTRODUCTION & AIM

Cardiovascular diseases (CVDs) encompass a range of disorders affecting the heart and blood vessels, including conditions such as coronary artery disease, heart failure, hypertension, and stroke. These diseases are a leading cause of morbidity and mortality worldwide, often linked to lifestyle factors such as poor diet, physical inactivity, and smoking. Recently, there has been growing interest in the potential benefits of plant-based proteins for heart health, given their rich nutritional profiles and health-promoting properties. Plant proteins, found in foods like legumes, nuts, seeds, and certain algae, are not only low in saturated fat but also rich in fiber, antioxidants, and essential nutrients. Research suggests that incorporating these proteins into the diet may help manage and prevent CVDs.

❖ **This work aims** to evaluate the impact of plant protein consumption on cardiovascular health by synthesizing findings from recent studies. We focused on how these proteins affect blood pressure, cholesterol levels, and inflammatory markers.


METHOD

➢ **We conducted a meta-analysis** of 20 scientific papers.
➢ These papers are recent (2015-2023) sourced from: **ScienceDirect, Google Scholar and PubMed**
➢ **Study Selection**: We included studies that examined the effects of plant protein intake on cardiovascular risk factors, such as blood pressure, cholesterol levels, and inflammatory markers, focusing on those involving animal and human participants.
➢ **Data Extraction**: detailed data, including the type of plant protein, dosage, duration of intervention, and their effects on cardiovascular risk factors were extracted.
➢ **We used the key words**:

Plant-based Diet | Cardiovascular Health | Plant Protein and Cardiovascular Diseases | Cardiovascular Risk Factors
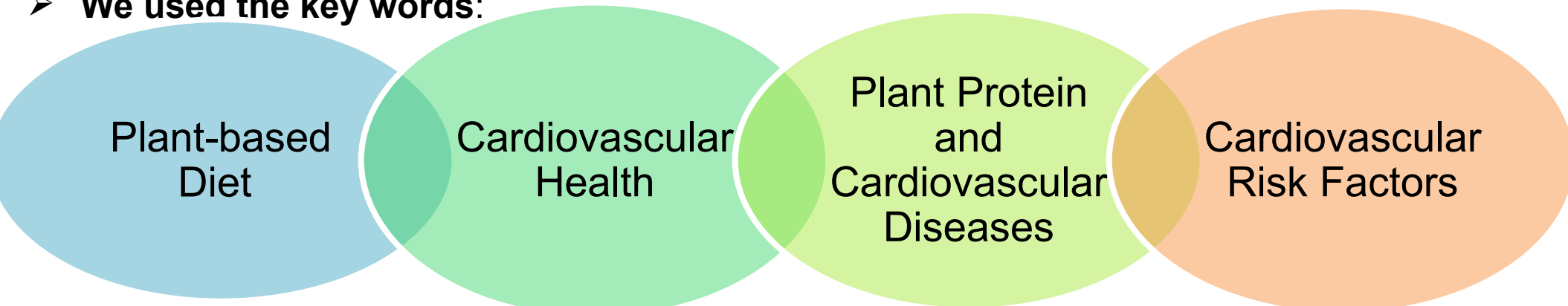
RESULTS

Table 1: Effect of Nuts and Microalgae on Blood pressure, Cholesterol levels and Inflammatory markers.

Protein source	Dose	Duration	Blood Pressure	Cholesteol Levels	Inflammatory Markers	References
Mixed nuts (walnuts, hazelnuts, and almonds)	30 g/day of mixed nuts (15 g walnuts, 7.5 g hazelnuts, 7.5 g almonds).	median follow-up period of 4.8 years.	NM	*TC: Reduction of 10.9 mg/dL (5.1%). *LDL-C : Reduction of 10.2 mg/dL (7.4%). *LDL-C/HDL-C ratio: Decreased by 8.3%. *TC/HDL-C ratio: Decreased by 5.6%.	NM	Bitok and Sabaté.,2018
Almonds, cashews, pistachios, peanuts, and walnuts	intake of ≥60 g per day.	various durations to analyze lipid effects.	NM	*LDL-C lowered by 4.8 mg/dL . *ApoB lowered by 3.7 mg/dL.	Significant reductions in CRP, though results were influenced by participant health status, nut type, and dose.	Bitok and Sabaté.,2018
Brazil nuts	5g	12 weeks	NM	Decreased LDL-c Increased HDL-c-	IL-6, TNFα, MDA, CRP, Nf-kB-Decrease	Silva et al.2019
Microalgae (Arthrospira platensis – Spirulina)	*5.7g/day * 6 g/day. * 500 mg/day.	*7 weeks *21 days *4 weeks	Regulate blood pressure due to its high nutrient content.	*Lower LDL cholesterol levels. *Improve lipid profiles.	spirulina supplementation was linked to increased nesfatin-1 levels, a peptide associated with reduced inflammation.	Turnagöl et al.2023
Microalgae (Chlorella vulgaris – Chlorella)	*300 mg/day .	*8 weeks	Regulate blood pressure due to its vasodilatory and antioxidant properties.	*Chlorella intake may reduce LDL cholesterol. *Improve lipid profiles over longer durations.	Chlorella, when combined with exercise, enhances mitochondrial biogenesis, which is associated with reduced inflammation and improved energy metabolism.	Turnagöl et al.2023

Table 2: Effect of Plant-based products on Blood pressure, Cholesterol levels and Inflammatory markers.

Plant-based protein source	Dose	Duration	Blood pressure	Cholesterol levels	Inflammatory markers	references
legumes, nuts, grains, and soy products without isoflavones	NM	4 weeks	NM	Improve cholesterol profiles (TC and LDL)	NM	Wayne W Campbell. 2019
DASH = plant protein sources from fruits, vegetables, whole grains, nuts, legumes, and seeds + of low-fat dairy, fish, chicken, lean meats	NM	8 weeks	Reduced both SBP and DBP.	NM	NM	Richter et al.2015
Soy protein (low-isoflavone) Lupin protein Barley protein Cowpea protein	From 25 to 30 mg/day.	4 to 24 weeks.	Modest reduction in blood pressure	*Reductions in total cholesterol *Lower LDL-cholesterol levels *The reduction in TG levels was moderate.	NM	Christel Lamberg-Allardt et al.2023
Lacto-ovo-vegetarian diets	NM	12 weeks	NM	NM	Modest reductions in inflammatory biomarkers such as CRP and White Blood Cells counts	Phillips et al.2022
Lupin Protein Isolate	25 g/day	4 weeks	Reduce blood pressure. It can help in managing hypertension.	Reduction in LDL-C levels (p ≤ 0.036). This reduction in "bad" cholesterol is a key factor in lowering cardiovascular risk.	Reduce inflammation-associated CRP.	Angeles et al.2021
Cowpea Vigna unguiculata L. Walp.	18-21 g/day	28 days	Significant reduction in SBP. (due to he inhibition of ACE1)	Significant reductions in TC, LDL-C, non-HDL-C, and TAGs.	Potentially lowering levels of CRP.	Angeles et al.2021
Pea protein isolates	20 g/day	16 to 30 days	Pea proteins inhibit ACE1, reducing blood pressure in hypertensive individuals.	Significant reductions in TC, LDL-C, TAGs, and an increase in HDL-C through upregulation of LDL receptors.	Pea proteins reduce vascular inflammation by modulating the NF-κB pathway and the ACE2 axis.	Angeles et al.2021
Soy, pea, lentils	30-50g/day, depending on individual study protocols.	6 to 24 weeks	Moderate reduction in blood pressure, with an emphasis on soy-based interventions.	Consistent decrease in LDL cholesterol (5-10%), moderate decrease in total cholesterol.	Reduction in CRP and IL-6, but effects are more noticeable in participants with elevated baseline inflammation.	Becerra-Tomás et al.2019
Legumes, soy, nuts	NM	Several years , ranging from 4 to 12 years.	Reductions of around 2-4 mm Hg in systolic blood pressure.	Decreases in LDL cholesterol, slight improvements in HDL cholesterol.	Noticeable reduction in CRP and TNF-α.	Becerra-Tomás et al.2019

NM: Not Mentioned, **TC**: Total cholesterol, **LDL-C**: Low-Density Lipoprotein Cholesterol, **HDL-C**: High-Density Lipoprotein Cholesterol, **MDA**: Malondialdéhyde, **ApoB**: Apolipoprotéine B, **DASH**: dietary approaches to stop hypertension, **SBP**: Systolic Blood Pressure , **DBP**: Diastolic Blood Pressure, **TG** or **TAGs**: Triacylglycerols, **CRP**: C-Reactive Protein, **ACE1**: Angiotensin-Converting Enzyme, **NF-кB**: Nuclear Factor kappa-light-chain-enhancer of activated B cells, **IL-6**: Interleukin 6, **TNF-α** :Tumor Necrosis Factor-alpha.

CONCLUSION

❑ These findings highlight the potential of plant proteins to improve cardiovascular health by lowering key risk factors such as high blood pressure, unhealthy cholesterol levels, and inflammation.
❑ Including more plant-based proteins in the diet could be an effective strategy for preventing and managing cardiovascular diseases.
❑ For better understanding the long-term benefits and mechanisms behind these effects further research is recommended .
❑ This study supports the inclusion of plant proteins in dietary guidelines for better heart health.
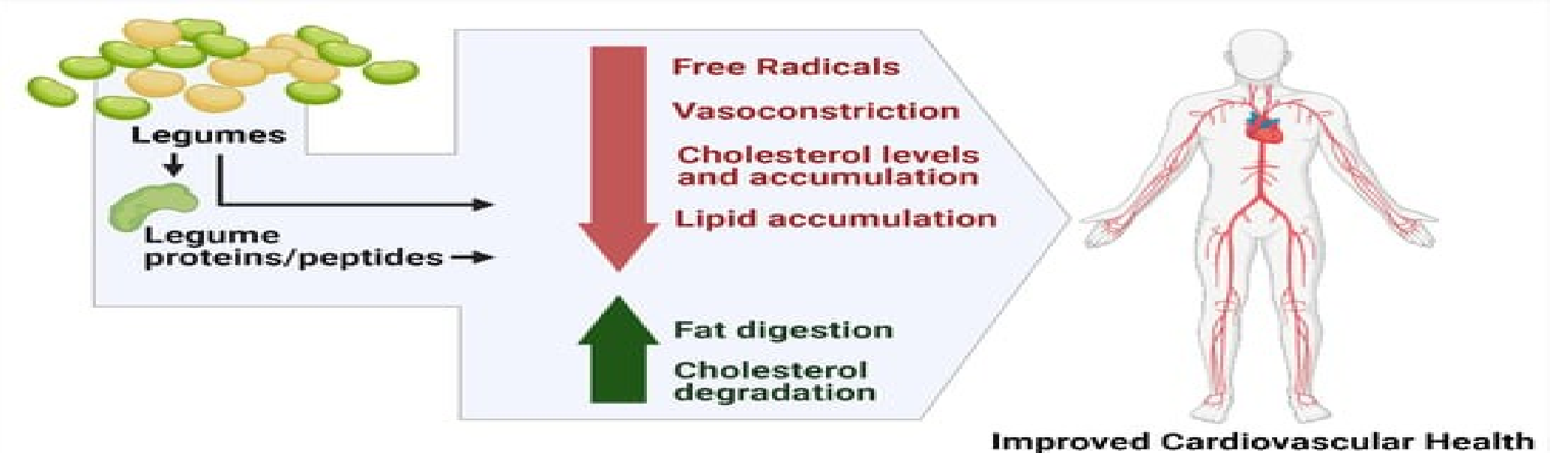
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