

Effect of coffee and derivatives consumption on obesity and oxidative stress-related disorders: an updated review.

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INTRODUCTION & AIM

In the **Dominican Republic**, coffee production generates a total of 18,405 tons of annual waste, composed of **husk and pulp**. These **byproducts** are rich in polyphenols, which give them potentially preventive and therapeutic properties. These properties have the ability to mitigate disorders associated with obesity, insulin resistance, type 2 diabetes, glucose intolerance, in addition to contributing to the reduction of body weight, hypertension, and liver damage (Bashir et al., 2024; Moon et al., 2021; Fibrianto et al., 2023).

Objective: To conduct a comprehensive review of the scientific literature published between 2021 and 2025, focusing on the impact of coffee and its derivatives such as food supplements, extracts, and byproducts on the modulation of oxidative stress and obesity.

METHOD

Searches were carried out in Scopus using the key terms “**coffee therapy**” with a result of 1830 documents, and the strategy detailed by Álvarez-Martínez et al. (2023) was followed, which takes advantage of artificial intelligence applied to natural language processing.

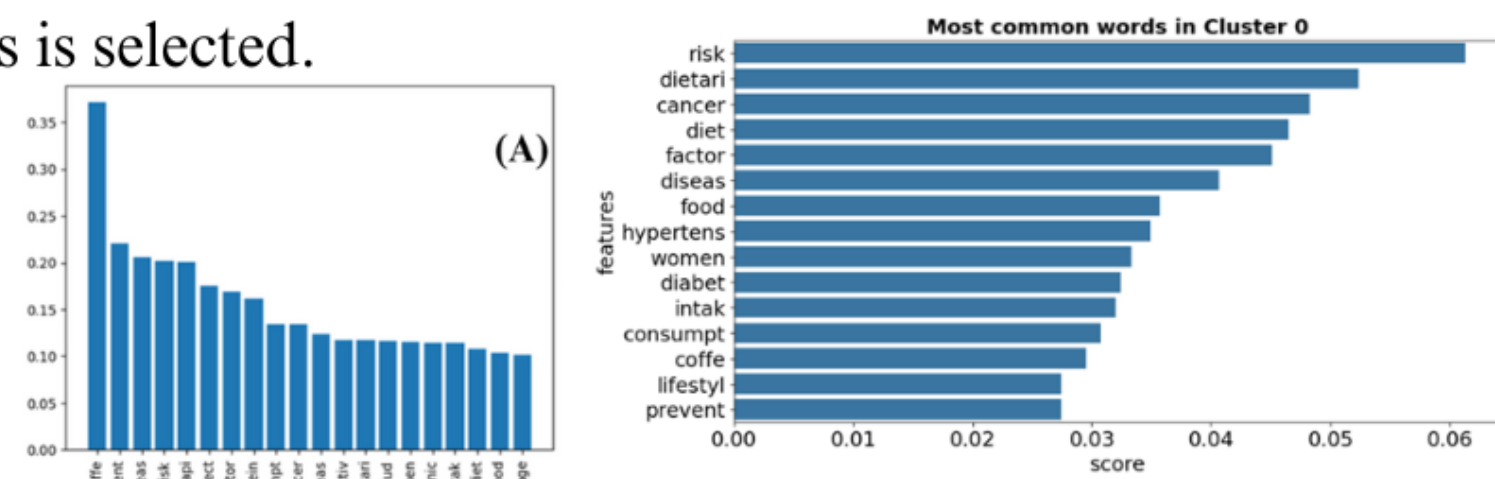
RESULTS

Finally, 58 articles were selected, using the most representative clusters (0 and 2) and the most recent articles most closely related to the described objective (Figure 1).

(1) Search: “Coffee Therapy” → Scopus → Result of 1830 articles

(2) Clusters are generated with Python

(3) The cluster with the grouping that best matches the search objectives is selected.



(4) Articles are filtered

From 2021 to 2025

Cluster 0

Result:
58 articles to review

Figure 1. Selection scheme for the reviewed articles.

FUTURE WORK & REFERENCES

Use of Bioactive Extracts from Coffee By-Products (*Coffea arabica*) for the Prevention of Infectious Diseases in Poultry (*Gallus gallus domesticus*).

Andrade N, Rodrigues I, Carmo F, Campanher G, Bracchi I, Lopes J, Patrício E, Guimarães JT, Barreto-Peixoto JA, Costa ASG, et al. Utilización sostenible de la pulpa de café, un subproducto de la producción de café: efectos sobre el síndrome metabólico en ratas alimentadas con fructosa. *Antioxidantes*. 2025; 14(3):266. <https://doi.org/10.3390/antiox14030266>

Bashir, K. M. I., Kim, J. W., Park, H. R., Lee, J. K., Choi, B. R., Choi, J. S., & Ku, S. K. (2024). Validating the Health Benefits of Coffee Berry Pulp Extracts in Mice with High-Fat Diet-Induced Obesity and Diabetes. *Antioxidants*, 13(1). <https://doi.org/10.3390/antiox13010010>

RESULTS & DISCUSSION

Obesity is a multifactorial syndrome characterized by excess body fat, which leads to the incidence of diseases such as type 2 diabetes, insulin resistance, hypertension, atherosclerosis, hypercholesterolemia, and hyperlipidemia. This pathology is accompanied, among other factors, by a state of chronic low-grade inflammation and a high level of oxidative stress (Figure 2) in adipose tissue, which leads, among other effects, to the production of proinflammatory cytokines, such as TNF- α , IL-1, and IL-6 (Figure 3), which impairs metabolic regulation of multiple organs (Bonetti et al., 2022).

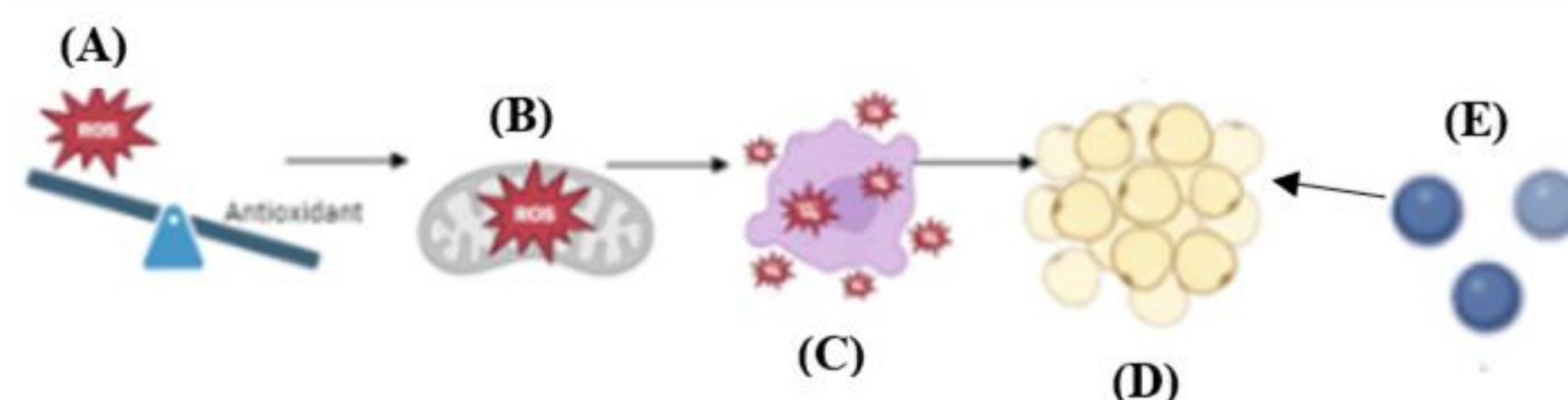


Figure 2. Response to the imbalance between ROS and antioxidants (A), in mitochondria (B) causing oxidative stress (C) inducing inflammation and cytokine production (E) in adipose tissue (D).

Green **coffee** extract supplementation has been shown to be effective in reducing body weight, BMI, and waist circumference in obese individuals (Yang et al., 2023). This extract has also been shown to be effective in reducing inflammation and improving metabolic health in obese individuals (Elbastv et al., 2022).

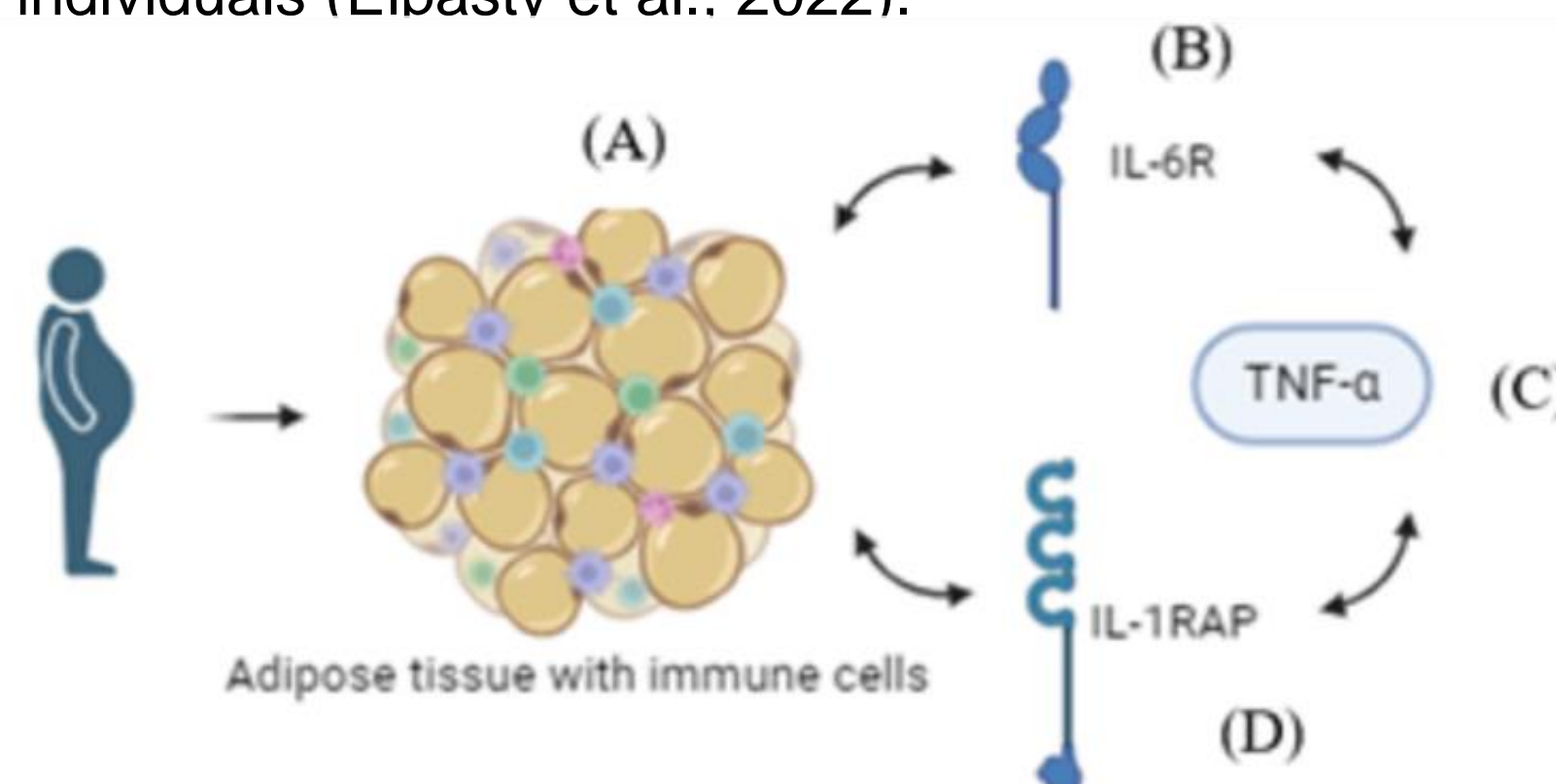


Figure 3. Metabolic dysregulation by cytokine production: Adipose tissue with immune cells (A), tumor necrosis factor alpha (TNF- α) (C), interleukin-6 (IL-6) (B) and interleukin-1 (IL-1) (D).

Chlorogenic acid, one of the main polyphenols present in coffee, exhibits the ability to scavenge **free radicals and reduce oxidative stress** in several cell lines (Seow et al., 2021). The antioxidant effect of chlorogenic acid, among other factors, appears to be responsible of the ability of **coffee pulp** consumption to reduce weight gain, blood pressure, blood sugar levels and insulin resistance in rats (Andrade et al., 2025).

CONCLUSIONS

The consumption of coffee and its bioactive components holds significant therapeutic potential, particularly in the prevention and management of obesity, diabetes, and other metabolic disorders. Research indicates that an intake of 400 mg of coffee polyphenols, particularly chlorogenic acid, can reduce glucose levels, stimulate insulin secretion, and improve anthropometric parameters and lipid profiles in humans. Additionally, a 10-week diet supplemented with 250 mg/kg/day of coffee pulp has been shown to enhance metabolic syndrome management. For optimal health benefits, a moderate coffee intake of 2 to 3 cups per day (approximately 400 mL) is recommended.