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# Evaluating the Pioneering Cardiovascular Effects of Trigonelline: A Natural Alkaloid with Emerging Therapeutic Potential

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Globally, cardiovascular diseases continue to be the leading cause of mortality, significantly driven, and primarily caused by atherosclerosis, oxidative stress, and chronic inflammation. The global statistics of victims are progressively on the rise, displaying the urgency needed for adjunctive therapies and preventive measures. A natural polar hydrophilic quaternary alkaloid, Trigonelline (TRG), is contained abundantly within coffee beans and fenugreek seeds. Having drawn attention for its cardiovascular benefits, TRG has emerged as a promising solution. Preclinical studies advocate that TRG can reduce lipid peroxidation and oxidative stress markers (e.g., malondialdehyde), reinforce intracellular enzymatic antioxidants (e.g., superoxide dismutase, catalase, glutathione peroxidase), suppress pro-inflammatory cytokines (Tumour Necrosis Factor-α, Interleukin-6), etc. via various mechanisms. In animal models of cardiac injury, TRG positively impacted cardiac biomarkers and maintained tissue integrity. TRG intake also aids in enhancing endothelial function (increased flow-mediated dilation) as proven by research. This evaluation integrates findings as recent as the past 5 years to point out mechanisms, preclinical results, and potential translational implications, in addition to noting limited data from human subjects and bioavailability issues of TRG.

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