Are the Newer Phytochemicals Effective in the Treatment of Cancer?

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Dear Editor,

Phytochemicals are generally regarded as the secondary metabolites of the higher plants including dietary and medicinal/ aromatic plants. These are well reviewed to possess medicinal value with several health promoting effects and pivot of contemporary medicines for the treatment of diseases including cancer, a foremost cause of mortality worldwide. In the context of phytochemical-based anticancer therapeutics, the use of phytochemicals in cancer chemoptherapy and chemoprevention are very important. Classically, a good number of the extant cancer chemotherapeutic agents are phytochemicals or their analogues. On the other hand, the use of chemical agents to suppress, reverse or prevent the progression of cancer is known as chemoprevention. Advancements in recent research reveals that, phytochemicals are effective in both the treatment and the prevention of cancer, the outcomes seem extremely encouraging for further anticancer drug discovery efforts (Bhattacharya, 2023, 2024).

The majority of the relevant scientific literature concentrates on the intricate and multifaceted physiological and molecular processes involving cytotoxicity, oxidative stress, apoptosis, bioenergetics, inflammation and genotoxicity through which the newly isolated phytochemicals affect cancer cells in vitro and in vivo in experimental animals/cell lines i.e., pre-clinical studies. Various clinical trials using the newer phytochemicals in treatment of cancers are presently underway. Most of the pre-clinically effective regimen of phytochemicals are found ineffective in clinical setup principally owing to their abysmal pharmacokinetics leading to poor human bioavailability of the phytochemicals. Therefore, the clinically active dose in cancer patients could result in higher exposure of the phytocompound and precipitate serious adverse effects. Curcumin, urosolic acid and cucurbitacins B and D are the most pertinent examples of such striving newer natural products. Hence, the pharmacokinetic and

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toxicity/safety issues preclude the great cancer chemotheraputic potential of newer phytochemicals demonstrated in the variety of pre-clinical studies from being explored further in humans (Choudhari *et al.*, 2020; Rudzińska *et al.*, 2023).

The potent cancer chemopreventive effect of recent phytochemicals is also well-established and ratified by several epidemiological research on the different cancers, primarily based on a plant-rich diet. Nevertheless, such effects could also not be reproduced in the majority of available clinical trials, despite the fact that, most epidemiological works report a remarkable benefit of increased phytochemical consumption and elevated blood levels of these compounds, connecting increased consumption with lower cancer risk in the most types of cancers. Practically, most of such clinical trials on newer phytocompounds were terminated early for the lack of corroboration or safety concerns (Rudzińska *et al.*, 2023).

Because of the above, even though the newer natural products or phytochemicals pre-clinically hold potent chemotherapeutic and epidemiologically have chemopreventive effects against malignancies, definitive pharmacokinetic and clinical studies are still desperately needed to validate their potential druggability; with careful attention to safety precautions. Exploitation of novel drug delivery and targeting strategies especially nanotechnology can improve therapeutic compliance thereof, warranting further research in this multi-disciplinary field in pursuit of new phytochemical-based therapeutic candidate against cancer with least negative effects.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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