Effect of Melatonin (Magic Hormone) on the Suppression of Metastases in Cancer: A Systematic Review Study

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ABSTRACT

Introduction: Melatonin, a naturally occurring hormone, exhibits anti-cancer properties, including suppressing metastasis. This effect is attributed to its immunogenic mechanisms, antioxidant activities, tumor cell proliferation inhibition, and apoptosis induction. This systematic review investigated the effect of melatonin on suppressing metastatic processes in cancer cells.

Methods and Materials: A comprehensive search was conducted until May 2024 in Scopus, Medline, Web of Science, and Google Scholar databases. English keywords included "neoplasm", "metastasis", "melatonin", and "cancer" with appropriate logical operators (and). Inclusion criteria were full-text, English-language randomized controlled trial articles exploring the impact of melatonin on cancer metastasis. Journal notes (editorials and opinion pieces), conference abstracts, and thesis were excluded. Articles meeting the criteria underwent quality assessment, data extraction, and classification.

Results: Based on the inclusion criteria, 50 studies entered the data extraction stage. These studies involved both in vitro and in vivo experiments on human and animal cancer cells. The findings demonstrated the ability of melatonin to inhibit metastasis and cancer cell progression across various cancers. Melatonin treatment suppressed invasive properties, migration, and epithelial-to-mesenchymal transition in breast, lung, mouth, liver, ovarian, esophageal, and stomach cancers. It modulated key signaling pathways like angiogenic factors and hypoxia-inducible factor-1α while inhibiting osteoclast function and SOX9-mediated signaling. The anti-cancer effects were observed through anti-invasive, anti-migratory, and anti-proliferative properties of melatonin on cancer cells.

Conclusion and Discussion: Laboratory studies suggest melatonin's potential to suppress metastasis in human and animal cancer cells. It holds promise as a therapeutic agent for inhibiting metastasis and tumor progression across a range of cancers. Further research is necessary to elucidate the underlying mechanisms and ensure successful clinical applications in cancer treatment.

Keywords: Hormones, Melatonin, Neoplasm metastasis

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