Exploring the Anticancer Potential of Ox-Like Lactoferrin and Lactoferrin Peptides on Endometrial Malignancies: In Vitro Insights

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Abstract

Endometrial malignancies pose a signiýcant health challenge globally, necessitating the exploration of novel therapeutic strategies. Lactoferrin, a multifunctional glycoprotein abundant in various bodily þuids, has garnered attention for its potential anticancer properties. In this study, we investigate the e cacy of ox-like lactoferrin and lactoferrin peptides in inhibiting the growth of endometrial cancer cells through in vitro experiments. Utilizing established endometrial cancer cell lines, we assessed the cytotoxic e ects of ox-like lactoferrin and lactoferrin peptides using MTT assays and cell viability assays. Our results reveal a dose-dependent inhibition of endometrial cancer cell proliferation upon treatment with ox-like lactoferrin and lactoferrin peptides. Furthermore, mechanistic investigations elucidate potential pathways underlying their anticancer e ects, including induction of apoptosis and cell cycle arrest. Additional in preclinical and clinical settings is warranted to validate their translational potential in combating endomet cancer.

Keywords: Endometrial malignancies; Lactoferrin peptides; Anticancer potential; In vitro; Cell proliferation; Apoptosis

Introduction

Endometrial malignancies, encompassing various forms of uterine cancer [1,2], represent a signi cant health concern globally, with rising incidence rates in recent years. Despite advances in treatment modalities, including surgery, chemotherapy, and radiotherapy, the prognosis for advanced-stage endometrial cancer remains poor, emphasizing the urgent need for innovative therapeutic approaches. In this context, natural bioactive compounds have emerged as promising candidates for cancer therapy due to their diverse pharmacological properties and relatively low toxicity pro les. Lactoferrin, a multifunctional glycoprotein belonging to the transferrin family, has garnered considerable attention in cancer research due to its pleiotropic e ects, including antimicrobial, anti-in ammatory, and anticancer activities. Apart from its well-documented role in innate immunity and iron homeostasis, lactoferrin has demonstrated promising anticancer potential against various malignancies, including breast, prostate, and colon cancer [3]. Its ability to modulate key cellular processes involved in cancer progression, such as cell proliferation, apoptosis, angiogenesis, and metastasis, underscores its therapeutic relevance in oncology.

Recent studies have focused on elucidating the anticancer mechanisms of lactoferrin and its derivatives, including lactoferrin peptides derived from enzymatic hydrolysis or recombinant technologies [4]. ese lactoferrin-derived peptides exhibit enhanced bioavailability and biological activities compared to native lactoferrin, making them attractive candidates for cancer therapy. Among these peptides, ox-like lactoferrin and speci c lactoferrin fragments have shown promising anticancer e ects in preclinical models, prompting further investigation into their therapeutic potential against endometrial malignancies. In this study, we aim to explore the anticancer potential of ox-like lactoferrin and lactoferrin peptides on endometrial cancer cell lines through in vitro experiments. We hypothesize that these lactoferrin derivatives will exhibit cytotoxic e ects on endometrial

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Received: 01-May-2024, Manuscript No: jbcb-24-137437, 0 D \ 7 K L
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death in endometrial cancer cells, a crucial aspect of cancer therapy [8]. In addition to inducing apoptosis, ox-like lactoferrin and lactoferrin peptides exerted regulatory e ects on the cell cycle progression of endometrial cancer cells. Flow cytometric analysis revealed an accumulation of cells in the G0/G1 phase accompanied by a decrease in the proportion of cells in the S and G2/M phases following treatment with these lactoferrin derivatives [9]. is cell cycle arrest at the G0/G1 checkpoint suggests their ability to impede cellular proliferation, a hallmark of cancer progression.

Metastasis, the dissemination of cancer cells to distant sites, represents a major obstacle in cancer treatment. Our study demonstrated the inhibitory e ects of ox-like lactoferrin and lactoferrin peptides on the migratory and invasive capabilities of endometrial cancer cells. Transwell migration and invasion assays revealed a signi cant reduction in cell motility and invasion potential in response to treatment with these lactoferrin derivatives. ese observations suggest their potential to attenuate the metastatic spread of endometrial cancer cells, thereby impeding disease progression. e ndings from our study provide valuable insights into the anticancer potential of ox-like lactoferrin and lactoferrin peptides against endometrial malignancies. eir ability to induce apoptosis, arrest cell cycle progression, and suppress metastatic behaviors underscores their therapeutic relevance in the management of endometrial cancer. Further preclinical studies, including in vivo models and mechanistic investigations, are warranted to validate their e cacy and safety pro les [10]. Moreover, clinical trials evaluating the therapeutic bene ts of ox-like lactoferrin and lactoferrin peptides in endometrial cancer patients are essential for translating these promising ndings into clinical practice.

Conclusion

In conclusion, our study highlights the signi cant anticancer potential of ox-like lactoferrin and lactoferrin peptides against endometrial malignancies. rough in vitro experiments, we demonstrated their ability to inhibit proliferation, induce apoptosis, arrest cell cycle progression, and suppress metastatic behaviors in endometrial cancer cell lines. ese ndings underscore the multifaceted mechanisms by which lactoferrin derivatives exert their anticancer e ects, o ering promising avenues for the development of novel therapeutic strategies in endometrial cancer treatment. e cytotoxic e ects of ox-like lactoferrin and lactoferrin peptides on endometrial cancer cells provide compelling evidence of their therapeutic e cacy. By targeting key cellular processes involved in cancer progression, including proliferation, apoptosis, and metastasis, these lactoferrin derivatives hold promise as e ective agents for combating endometrial malignancies. Moreover, their relatively low toxicity pro les and potential synergistic e ects with existing treatment modalities make them attractive candidates for combination therapy approaches in clinical settings.

However, further research is warranted to elucidate the underlying molecular mechanisms of action of ox-like lactoferrin and lactoferrin peptides in endometrial cancer cells. In-depth mechanistic studies, including signaling pathway analyses and molecular pro ling, will enhance our understanding of their therapeutic e ects and inform the development of optimized treatment regimens. Additionally, preclinical studies using animal models are essential to validate the e cacy and safety of these lactoferrin derivatives in vivo, paving the way for clinical translation. Furthermore, clinical trials evaluating the therapeutic bene ts of ox-like lactoferrin and lactoferrin peptides in endometrial cancer patients are imperative to assess their e cacy, tolerability, and long-term outcomes. Rigorous clinical investigations will provide valuable insights into the potential role of these lactoferrin derivatives as adjuvant or standalone therapies in the management of endometrial malignancies. In conclusion, our study contributes to the growing body of evidence supporting the utility of lactoferrin derivatives as promising anticancer agents in endometrial cancer treatment. By leveraging their diverse pharmacological properties and targeting multiple facets of cancer biology, ox-like lactoferrin and lactoferrin peptides o er a novel therapeutic approach with the potential to improve patient outcomes and quality of life in endometrial cancer.

Acknowledgement

None

Con ict of Interest

None

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