Chapter 1

Introduction

1.1 Background

Non-small cell lung cancer (NSCLC) accounts for about 80-85% of all reported occurrences of lung cancer, making it one of the leading causes of cancer-related deaths globally (Zhou et al., 2024). Currently, cisplatin is a platinum-based chemotherapeutic drug that remains as the first-line therapy compared to other medications. Cisplatin utilizes multiple mechanisms of action to induce DNA damage that eventually leads to cell death (Brown et al., 2019). However, the therapeutic success of cisplatin as treatment for NSCLC is impaired due to the rapid development of resistance. Furthermore, this resistance emerges through a diverse range and overlapping cellular mechanisms, causing significant issues in lung cancer management (Zhu et al., 2016). This highlights the importance for novel alternative therapeutic approaches that improve cisplatin sensitivity and target multiple resistance pathways.

Recently, herbal remedies have become a potential adjunctive treatment option for cancer. Plant extract contains multiple bioactive compounds that have synergistic effect and high possibility of disrupting the signalling pathways that contribute to cisplatin resistance. Coriander (*Coriandrum sativum)*, a popular culinary herb, can serve as a potent adjuvant therapy to overcome cisplatin resistance in NSCLC because it contains high phenolic and flavonoid compounds such as β-sitosterol and quercetin that can suppress tumor growth and enhance cisplatin sensitivity through both synergistic cytotoxicity towards cisplatin resistance NSCLC cell lines and anti-inflammatory mechanisms (Mahleyuddin et al., 2021; Bhadra et al., 2021; Costea et al., 2020).

However, direct administration is not feasible due to the instability and limited bioavailability of coriander key compounds, including quercetin and rutin (Rashidinejad et al., 2022). Therefore, the coriander extract is first formulated into emulsion, a colloidal dispersion consisting of two immiscible

liquids (oil and water) that is stabilized using an emulsifying agent (surfactant) (Preeti et al., 2023). The emulsion acts as the carrier to stabilize the coriander extract and protect its various bioactive compounds from degradation due to exposure to environmental factors (Preeti et al., 2023).

The selection of surfactant is crucial, particularly for formulation that is intended for administration into animal cells. The surfactant must be non-cytotoxic and can effectively integrate into the cells without disrupting cell membrane integrity. Soy lecithin will be used as surfactant for the formulation of coriander emulsion. Soy lecithin is a naturally-derived phospholipid mixture that is non-toxic and highly biocompatible with the human body, allowing it to protect the bioactive compounds from degradation without inducing toxic effects to the body (Mangrulkar et al., 2024). This study is focused on investigating the effect of soy lecithin as surfactant on the formulation optimization, characterization, and stability of coriander-based emulsion.

1.2 Objective

1. To formulate and optimize the coriander emulsion formulation utilizing soy lecithin as the surfactant.
2. To evaluate the influence of soy lecithin as surfactant at different concentrations toward the stability and characterization of coriander emulsion.

1.3 Hypothesis

1. Coriander emulsion using soy lecithin as surfactant can be formulated and evaluated and the optimal formula can be identified with a desired characteristics and stability profile.
2. Coriander emulsion formulated with different concentrations of soy lecithin as surfactant will have different characteristics and stability profile.