



Muhammad Israr Ul Haq

Thesis Title

Development of Spray-Dried Inhalable Combination Formulations for the Management of COPD and Other Chronic Pulmonary Diseases

About the Author

Muhammad Israr Ul Haq is a master's student in Pharmaceutical Sciences at the University of Iceland. He holds a PharmD degree and has professional experience as a hospital pharmacist, as well as in pharmaceutical production and community pharmacy settings. His academic interests focus on pulmonary drug delivery, pharmaceutical manufacturing, and analytical method development. During his studies, he has worked on spray-dried inhalable formulations and HPLC method validation. In addition to his academic work, he has experience in healthcare support roles and volunteer work with the Red Cross in Iceland.

Abstract

This thesis focuses on the development of spray-dried inhalable combination formulations containing azithromycin, salmeterol, and fluticasone for the treatment of COPD and other chronic pulmonary diseases. The study investigates the influence of spray-drying parameters on particle size, morphology, and powder yield. Particles within the respirable size range ($<5\ \mu\text{m}$) were successfully produced, with optimal yield achieved at a spray gas flow rate of 700 L/h. The formulations were found to be predominantly amorphous and demonstrated good thermal stability. Salmeterol showed sensitivity to photodegradation, while other drugs remained stable. A robust HPLC method was developed and validated for the simultaneous analysis of the active compounds and their degradation products.