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SECTION 10

MEDICAL AND PHARMACEUTICAL SCIENCES

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DEVELOPMENT OF A METHOD FOR DETERMINING ERGOCALCIFEROL IN DIETARY SUPPLEMENTS

Introduction. Vitamin D plays an essential role in calcium and phosphorus metabolism, bone mineralization, and the maintenance of normal immune system function. Among its biologically active forms, ergocalciferol (vitamin D_2) is widely used in fortified foods and dietary supplements, particularly in plant-derived products. In recent years, the global consumption of dietary supplements containing vitamin D has increased significantly due to the widespread prevalence of vitamin D deficiency. However, the complex composition of dietary supplements and variability in manufacturing processes may affect the accuracy of labeled vitamin content. Therefore, reliable and validated analytical methods are required to ensure the quality, safety, and regulatory compliance of these products.

Aim. The aim of this study was to develop and optimize a reliable analytical method for the quantitative determination of ergocalciferol in dietary supplements [1–3].

Materials and Methods. The determination of ergocalciferol was performed using high-performance liquid chromatography (HPLC), which is widely recognized as an effective technique for the analysis of fat-soluble vitamins. Particular attention was given to the development of a suitable sample preparation procedure to ensure efficient extraction of ergocalciferol from complex supplement matrices and minimize potential

interferences. The extraction process involved dissolution of the sample in an appropriate organic solvent followed by purification steps to remove matrix components. Chromatographic separation was carried out using a reversed-phase column. Key analytical parameters, including the composition of the mobile phase, flow rate, column temperature, and detection wavelength, were optimized to achieve efficient separation and reliable detection of ergocalciferol. Quantification was performed using an external standard method.

Results. The optimized chromatographic conditions provided effective separation of ergocalciferol from other components of the dietary supplement matrix. The developed method demonstrated satisfactory analytical performance characteristics. A linear relationship between peak area and ergocalciferol concentration was observed within the studied concentration range. The method showed acceptable precision and reproducibility, as well as good recovery values during sample preparation. These results indicate that the proposed analytical procedure is suitable for accurate quantification of ergocalciferol in dietary supplements.

Conclusion. A reliable HPLC-based method for the determination of ergocalciferol in dietary supplements was developed and optimized. The method provides sufficient selectivity, accuracy, and reproducibility for routine analytical applications. Implementation of this method can improve the quality control of dietary supplements containing vitamin D_2 and help ensure compliance with regulatory standards for labeling and product safety.

Keywords: ergocalciferol, vitamin D_2, dietary supplements, high-performance liquid chromatography, analytical method development, quality control.

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