

## CXCR4 Inhibitory Activity Analysis of Linoleic Acid Isolated from Ethanolic Extract of *Cayratia trifolia* (L.): An Molecular Docking Simulation

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### ABSTRACT

Chemokine Receptor type 4 (CXCR4) is the increasing interest as a drug target, which is involved in many disease states including more than 23 types of cancer and several immunodeficiency disorders. On the other hand, the chemical constituents of medicinal plant are helpful in the discovery of therapeutic agents. Therefore the main aim of the study was to analyze the inhibitory activity of linoleic acid against CXCR4. Previous studies the natural compound of linoleic acid was isolated and identified from ethanolic extract of *Cayratia trifolia*. The molecular docking analysis was carried out to find the CXCR4 inhibitory activity of the isolated compound. Results, the isolated compound of linoleic acid possess comparable good Glide score and Glide energy when compared with FDA approved drug. Based on the results, it can be concluded that, the isolated compound of linoleic acid may act as novel inhibitor against CXCR4 and further it can be lead to development of therapeutic agent for variety of cancers and other disorders.

**Keywords:** *Cayratia trifolia* (L.); Linoleic acid; CXCR4; Molecular docking analysis.

### INTRODUCTION

The chemokine gradients are playing significant role movement of cells in a variety of normal and pathologic processes. Cancers have a complex chemokine network that may influence the leucocyte infiltrate and angiogenesis<sup>1</sup>. Malignant cells can also state the chemokine receptors and respond to chemokine gradients and this may be associated with the development and spread of cancer. Different cancers express different CC and CXC chemokine receptors and the corresponding ligands are sometimes expressed at sites of tumour spread<sup>2,3</sup>. There is one chemokine receptor, however, Chemokine Receptor type 4 (CXCR4) is a G-protein-coupled membrane receptor which is present in various cell types. It is increasing interest as a drug target and it can be involved in many disease states including more than 23 types of cancer and several immunodeficiency disorders<sup>4</sup>. CXCR4 has been shown to play a critical role in (breast) cancer progression and metastatic spread. It has been reported that 69% of ductal carcinoma in situ (DCIS) lesions are CXCR4-positive. Over-expression of CXCR4 has also been suggested to be of value for imaging applications<sup>5</sup>. As a number of reviews have recently been published highlighting CXCR4 as a target in HIV and its role in cancer metastasis<sup>6</sup>.

Consideration of the bioactive compounds from the medicinal plant is helpful to discovery of therapeutic agents as well as new sources of economic materials like oil and gums<sup>7</sup>. Secondary metabolites from medicinal plants have demonstrated to be an excellent reservoir of new medical compounds<sup>8</sup>. Numbers of bioactive compounds are present in medicinal plants which are widely used against variety of diseases<sup>9</sup>. *Cayratia trifolia* (L.) is the medicinal plant belongs to the family of Vitaceae, commonly known as Fox grape in English is native to India, Asia and Australia. It is a perennial climber having trifoliated leaves with (2-3 cm), long petioles and ovate to oblong-ovate leaflets. Flowers are small greenish white brown in color. Fruits are fleshy, juicy, dark purple or black, nearly spherical, about 1 cm in diameter<sup>10</sup>. The whole plant is used as anti diuretic, in tumors, neuralgia and splenopathy. It has been reported to contain huge amount of bioactive compounds such as yellow waxy oil, steroids, terpenoids, flavonoids and tannins<sup>11</sup>. The bark extract has been reported to have antiviral, antibacterial, antiprotozoal, hypoglycemic, anticancer and diuretic activities in animal models<sup>12</sup>. Therefore, the aim of the present research work is to analyze the inhibitory activity of linoleic acid (Isolated

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