

## Chapter 9

# Role of Herbal Medicine/ Phyto–Therapy in Cancer Prevention by Inhibiting Epithelial–Mesenchymal Transition (EMT) Pathways

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### **ABSTRACT**

*Human life is surrounded and dependent on its environment. Human civilization is nurtured by nature as it provides raw materials that are used in the manufacturing of various essential products like medicine, food items, etc. Not only developing countries but developed countries also depend on herbal-based medications. Cancer is a global health burden. Epithelial-mesenchymal-transition (EMT) plays a key role in cancer progression and is also stimulated by different extracellular signals and could be regulated at different levels. Conventional therapies exhibit a cytotoxic effect, which encourages the development of a new approach that could be used with synthetic drugs. Phytotherapy emerged as an effective weapon against cancer. Herbal drugs directly target different signaling pathways that promote EMT and eventually lead to cancer.*

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## **INTRODUCTION**

The human population have been in close contact with the environment since the beginning of human civilization and also dependent on nature for their food and medicinal need. Nature could be referred to as the best friend of the human since development of human civilization, as human population totally dependent on nature for their basic daily requirements. Various products required in daily life are manufactured by raw materials collected from different parts of plants. Plants provide different products which are the basis for treating different chronic diseases (Firenzuoli *et al.*, 2007). Use and adequacy of plants with medicinal values increasing day by day. The interest of researchers and pharmaceutical industries in medicinal plants also increased. Without plants and plant-derived compounds human survival could be quite difficult. Plants are not only important for the ecosystem but also important for the survival of humans. Plants produce a number of secondary metabolites that exhibited a wide spectrum of bio-activities which also support its acceptability. Different ancient civilizations have a history of usage of medicinal plants such as China, Egypt, Greece, and India. Hamilton, (2004) documented different role and application of plants such as drugs, disinfectant and aromatic agents in ancient Persia. Additionally, medicinal plants have a long history of using as a disease control agent against different diseases for mankind (Halberstein, 2005). Only the tenth part of explored medicinal plants are used by pharmaceutical industries and only collected from the wildlife population. Indeed, the demand for wildlife sources has increased by 8-15% per year in Europe, North America and Asia in recent decades (Verma and Singh, 2008). Plant species that possess medicinal properties are called medicinal plants and these plants have the ability to produce compounds, from which drugs can be synthesized (Rasool, 2012). Sometimes the whole plant is considered as medicinal plant whereas sometimes some part of plants *viz.* seeds, root, leaf, fruit, skin and the flower used for medication purposes. These plants have different substances and stored compounds which showed physiological effect on the living organisms (Phillipson, 2001). Raw materials obtained from medicinal plants used by humans to maintain health and for treatment or cure of diseases (Shakya, 2016). Synergistic properties of medicinal plants make it an appropriate candidate for treating diseases. Plant-derived compounds have the potential to improve chronic diseases such as cancer. The cytotoxic and adverse effect of conventional drugs could prevent by the use of plant-based drugs and this property is behind its high demand in the medical industry (Rasool, 2012).

A phenomenon in which uncontrolled growth of cells occurs called cancer. In a report, the World Health Organization (WHO) estimated that approximately 14 million people are suffering from different type of cancers worldwide and 8 million people died from cancer in 2012. Cancer exhibited high mortality and morbidity rate which makes it a global health and economic burden which requires immediate prevention measures. Currently, radiotherapy, chemotherapy and immunotherapy are available treatments against cancer progression. But these treatments have their limitations and showed adverse effects on healthy cells which encouraged an urgent need for new and safe alternative approaches against cancer prevention. Interestingly, herbal therapy or use of herbs in the treatment of cancer could be an alternative, better and safe approach (Saini *et al.*, 2012).

## **EPITHELIAL TO MESENCHYMAL TRANSITION (EMT)**

A cellular process where epithelial cell represses their cellular characteristics *i.e.* cellular morphology, controlled cell growth, cell-cell adhesion and developed invasive and migratory properties during wound

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