

NATURAL PRODUCT AS AN ANTI-CANCER AGENT

Research Proposal

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CHAPTER ONE: INTRODUCTION

1. Contextual Background

Humans have always relied on nature throughout the ages for their basic needs related to medicines. A sophisticated traditional medicine system has been formed by plants, in the past decades, aiding different scholars, from various time periods, to obtain medicinal cure. Different cultures have been documented extensively for using plants in traditional medicine systems (Cragg, et. al, 2011). The plant-based systems are continuously playing a significant role in healthcare; the WHO (World Health Organisation) estimated that nearly 80% of the world's population is dependent on traditional medicines in order to fulfil their needs of primary health care.

Products extracted from plants also play an essential role, within the medicinal framework, for the remaining 20% population, largely living in developed countries (Sultana, 2011, p. 620). Data analyses performed on prescriptions dispensed from pharmacies of different communities in UK showed that 25% of the ingredients used for medicines are extracted from plants or through the dynamic principle, resulting from higher plants, thus, implying that plants hold a rich history for treating cancer.

A study by Lee (2010, p. 502) states that there are more than 3000 species of plants which are reported to have been used in cancer treatment. In addition, there are many cases in which cancer is undefined or sometimes referred to as calluses, hard swellings, corns, polyps, warts, abscesses, tumours and many more. All these symptoms usually apply to skin infections or conditions that are visible, and sometimes match to cancerous condition.

1.2 Aim and Objectives

The main aim of this research is to assess the role of natural products as anti-cancer agents in pharmaceutical industry. Following are the objectives of this research study;

- To determine the significance of Natural Products as an anti-cancer agents.
- To explain the effectiveness of Natural Products in curing the symptoms of cancer in pharmaceutical.
- To identify the Plants from Annonaceae family that are important for extracting anti-cancer agents for curing cancer.
- To recommend pharmaceutical industry in UK about the use of natural products as anti-cancer agents and also to emphasise on the importance of Annonaceae plant family.

1.3 Research Questions

The main question for this research is 'what role do natural products play in manufacturing anti-cancer agents?' These questions are further divided into following questions;

- What is the significance of Natural Products as an Anti-cancer agent?
- How effective are these natural products in curing the symptoms of cancer in pharmaceutical industry?
- Which plants from Annonaceae family are important for extracting anti-cancer agents for curing cancer?

1.4 Problem Statement

There exist numerous difficulties that are associated with natural products, specifically related to products that are derived from plants, which adds towards the declining attention of their growth in the pharmaceutical industry (Jantan, et. al, 2015). There are major problems related to obtaining and extracting authentic material from plants which creates difficulties in accessing the traditional knowledge and genetic resources by pharmaceuticals and multinational firms.

The absence of a legal framework also creates problems in equitable and fair sharing of benefits which arise due to commercial utilisation and other uses of the genetic resources from different countries, resulting in withdrawal of several drug companies from making investments in natural products that came from plants in tropical rainforest as a basis of drug leads.

1.5 Rationale of Research

The use of natural products for curing the symptoms of cancer and for manufacturing the anti-cancer agents has been extensively discussed in academic resources. There are many natural plants from which essential ingredients and components are extracted in order to cure many of the diseases that are found today (Newman and Cragg, 2014, p. 258). The reason behind executing this research is to identify that how important these plants are for curing and providing important elements for the development of new medicines.

In particular, the plant family of Annonaceae has been the main focus of the study since the plants belonging to this family are used for manufacturing anti-cancer agents. By learning the

significance of these plants new discoveries are made and also new genes of plants are identified which have the potential to provide benefits to several other cures.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Natural products have been playing a significant role as a source for remedies, a key notion, and one which has been acknowledged for a significant duration of time. Regardless of major technological and scientific advancement in the combinatorial chemistry, the drugs that are derived from natural resources still make huge contribution in the discovery of new medicinal ingenuities (Danishefsky, 2010).

Nature is one the most attractive source for new healing candidate mixtures as a remarkable chemical variety which is found in many animals, plants, micro and marine organisms. The chemical diversity present in these organisms mirrors the impact of evolution in conservation and selection of mechanism of self-defence that signifies different strategies that are adopted to destroy or repel predators.

2.1.1 Plant-Derived Agents

Different species of plants have the ability and capacity to defend themselves from predators that have the potential to harm them. For survival purposes different plants have developed mechanisms of sophistication which includes a rich arsenal of toxic chemical substances, such as alkaloids and terpenes which deter other plant's growth, making them unattractive and protected from predators (Pohlit, 2011, p. 620).

For example the production tannin by some of the species of trees, it does it when the predators start harming trees in a grove; it then releases ethylene into air (Savoia, 2012, p. 982). This indicates several other trees to increase the production level of tannin which makes them unpalatable and poisonous to predators. These properties of allows them to eliminate different diseases and unwanted cells in humans also which benefits in making medicines from them.

2.1.2 Plant-Derived Anticancer Agents

Very few drugs, among the currently available option, are being utilised for cancer treatment and were discovered on the foundation of the design of rational structure. Most medicinal agents for anticancer vaccines have been discovered from plants which were resulted from serendipity, empiricism and large scale programs of evaluation and screening (Cretu et al., 2012). However, this must not be regarded as a criticism of diligence, dedication, intuition and intellect of various authors who have delivered the agents that are being currently used.

The path from discovery to the conceptual phase and towards clinical utilisation is usually vague. Initiating with the nitrogen's availability from the early 90's for systematic chemotherapy, currently there are almost 50 anticancer drugs that are available (Schneider-Stock, 2011, p. 135). Majority of these clinically valuable and beneficial entities are either derived from natural products or are natural products.

Several compounds that are currently derived from plants are successfully used for treatment of cancer. The most popular example can be taken of vinca alkaloid family which is isolated form periwinkle *Catharanthus roseus*, generally found in Madagascar's rainforest. According to Kaur et al., (2011, p. 120) when vinca alkaloid vincristine was introduced it was responsible for the escalation in the rate of cures for specific diseases related Hodgkin's and

some other forms of leukaemia. Vincristine deters microtubule assembly, inducing tubulin self-association into coiled spiral aggregates.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

Ideally, the designs upon which a research can be formulated are of three types, qualitative, quantitative and mixed method. This particular study has used qualitative research design to collect relevant data. The design is selected in order to facilitate the researcher for accurately addressing the concerns that have been raised under the heading of research problem.

Furthermore, the qualitative research design will allow the researcher to gather data from literature regarding the elements that have been selected for the study. The data will enable comprehensive insight into the knowledge of natural products and their uses for curing different diseases.

3.2 Types of Investigation

There are three types of investigations that can be used for research purposes including explanatory, exploratory and descriptive investigation. The research being undertaken is explanatory in nature, since, it will be explaining the role and importance of natural products as anti-cancer agents.

The research will be focused on the significance of natural products towards the manufacturing of anti-cancer agents and how plants in Annonaceae family are facilitating the pharmaceuticals in discovering new ways to combat the symptoms of cancer.

3.3 Data Collection Method

There are two methods for collecting data for research which are primary and secondary data collection method. For this research the researcher has adopted secondary data collection method because area of study under discussion requires extensive research to understand how natural products help in treating cancer as an anti-cancer agent.

The data will be collected from secondary sources which include previously established research papers, research articles, magazines and academic literature. The data collected will consist of all the knowledge, information related to natural products that are derived from plants and are used for making anti-cancer agents.

3.4 Data Analysis Plan

The data collected after reviewing literature will be analysed by adopting the method of content analysis. This approach will help in identifying the role of natural products which are used for making anti-cancer agents. Further the analysis will also extract the main purpose and its findings on how a specific family of Annonaceae plants are able to provide such benefits related to healthcare.

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