

# The Journal of Phytopharmacology

(Pharmacognosy and phytomedicine Research)

## Review Article

ISSN 2230-480X  
JPHYTO 2015; 4(1): 58-60  
January- February  
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### Haroon Khan

Associate Professor & Chairman,  
Department of Pharmacy, Abdul  
Wali Khan University, Mardan,  
Pakistan

### Correspondence:

#### Dr. Haroon Khan

Associate Professor & Chairman,  
Department of Pharmacy, Abdul  
Wali Khan University, Mardan,  
Pakistan

## Brilliant future of phytomedicines in the light of latest technological developments

Haroon Khan\*

### Abstract

The phytomedicine have been used throughout the world as an integral part of our health care system since long time ago. The knowledge of traditional therapies, inherited from ancestors, is highly deep-rooted and time tested. The recent incredible development of synthetic drugs has not imprecise the outstanding potential of phytomedicines; rather paradigm shift in the natural way of treatment has been observed, singling the outstanding future of phytomedicines. To get more significant results, phytopharmacological screening coupled with phytochemical studies in the light of modern technologies is much needed.

**Keywords:** Phytomedicines, Advancement in Phytopharmacology, Phytochemistry.

### Introduction

The medicinal plants have been used as therapeutic agents since time immemorial. The phytomedicines are now an integral part of our health care system; crossing all boundaries of time and race limitations.<sup>1-2</sup> The traditional knowledge of phytomedicines developed from one generation to another is based on extensive of traditional healers over time.<sup>3-4</sup> Most of the civilized nations have developed their own *Materia Medica*, compiling details about various plants used for therapeutic purposes.

The combination of phytomedicine with various other fields of medical sciences, indeed provides the foundation for a much needed revolution in the existing healthcare system that include phytomedicines as a major stakeholder. Reports from different parts of the world have suggested that only 35, 000 species are used in the form of herbal therapies/recipes. However, it is estimated that approximately 20% of medicinal plants have been subjected to phytochemical analysis and 10% to biological screening.<sup>5-8</sup> The rest of plants, are therefore required exploration in the light of modern technologies; thus, this therapeutic modality has tremendous scope in the discovery of new effective therapeutic agents. The natural way of treatment is now once again revived by day-to-day practice for its outstanding curative potential, easy availability and safety concern of synthetic drugs.<sup>9</sup> Regardless of increasing popularity, communication about the use of phytomedicine between physicians and patients is limited. In fact, the majority of physician knows little about phytomedicine and patients avoid discussing them.

Historically, drug discovery from medicinal plants led to the isolation of some important such as morphine, cocaine, codeine, digitoxin and quinine; some of them either directly or in the form derivatives are in use. Isolation and characterization of pharmacologically active compounds from medicinal plants continue today. As a recently developed, new effective techniques have been discovered and implementing to the standardization of botanicals, to elucidate analytical marker compounds and accelerate the overall process of drug discovery.

### Future scenario

#### Collection of plant materials

Over the years, phytomedicines have contributed a miraculous role in the devolvement of new effective therapeutic agents. Nevertheless, significant development has been made in the fields of chemistry such as synthetic, combinatorial, analytical and biotechnological sciences; phytomedicines can still be exploited as an initial point for the synthesis of new compounds with different structural parameters. These modern, sophisticated technologies further streamlined the plant-derived drugs. The proper utilization of these techniques has already led to the discovery of some interesting, clinically useful molecules.<sup>10-13</sup> It has been reports that 25% of modern drugs are basically originated/ isolated from medicinal plants. The recent reports showed outstanding development in the discovery of anticancer agents followed

by antibacterial.<sup>14</sup> It has been recently estimated that the natural product offer 100 times higher hit rate when compared with synthetic drugs.<sup>15</sup>

Phytotherapies are based on the treatment of plant extracts (mono plant extract or combination of plant, extracts); primarily containing multiple pharmacologically active constituents or the selected drug combinations are based on the known mode of actions of each single drug.<sup>16</sup> Principally, they activate the human defense system, rather to eradicate directly the cascading agents. The most important development that has been recognized in the clinical practice is the introduction of multiple drug therapy.<sup>17-19</sup> The typical examples in this regards are acquired immune deficiency syndrome (AIDS), cancer, malaria and hypertension. Following this, another outstanding paradigm shift in the treatment of clinical disorders is the focusing on activation of defense, protective and repair mechanisms of the body, unlike the direct destruction of the damaging agents as normally done in the treatment of various cancers.<sup>1,20</sup> The philosophy behind these approaches are long-standing therapeutic experiences and the believe that a complex pathophysiological process can be treated more effective with the combination of low dose extracts due to synergetic/additive effects and obviously with fewer or less side-effects than by a single highly dosage isolated compound.<sup>21</sup>

The introduction of new technologies like high-throughput enormously expedites screening of extracts; 100,000 plant extracts can be screened in a period of 1 week while using a 384-well format.<sup>22</sup> The commendable development in spectroscopy and chromatography in addition to the use of cell culture techniques for considerable increase in percentage yield of desirable components of plants can revolutionize the plant base new drugs.<sup>23-25</sup> The identification of the active component in a well mixture is an essential step for subsequent resynthesis or isolation of the active component(s) or for removal of intractable wells from further consideration. It is believed the technique described also applicable to any mixture library, provided the expected component (or components) of each well is (are) known.<sup>24</sup> High-throughput screening (HTS) has advanced into an industrial scale and HTS of small molecules is one of the most important approaches to spot novel entry points for drug discovery mission.<sup>26-27</sup>

Recently, HTS and ultra-high throughput screening (uHTS) have been primarily in the kingdom of the pharmaceutical industry where large amounts of data have been generated using these technologies.<sup>28-29</sup> In 2003, NIH started to make HTS and uHTS capabilities accessible to public sector research via the Molecular Libraries Initiative to advance translational research and specifically the Molecular Libraries Program (MLP).<sup>30-31</sup> MLP projects lever age innovative assay technologies to develop compounds effective at modulating biological processes or disease states via novel targets.

An ideal coordination of numerous fields is crucial in the discovery of phytomedicine. The identification and collection of plant material from specific locality is the job of ethnobotanist.<sup>32-33</sup> Phytochemist urges to design rapid but efficient method of extraction from plant source. Keeping in view the fork uses, the ethnopharmacologist proposes and screens out the extract in some relevant assay. Based on the fallout of test, the phytochemist subjects the extract to the isolation of pure chemical entities that could be responsible for the activity. Afterward, different clinical trials are carried for the particular molecule. It is bitter truth that only one molecule out of 5000 successfully completes all stages of development and obtain registration for clinical applications.<sup>10</sup>

## Conclusion

To sum up, plant base drugs have unparalleled chemical diversity and an incredible potential of new drug development. Around the globe, numerous research laboratories are involved in phytomedicines research with some outstanding success over the years. Consequently, several promising new chemical entities of plant origin are in clinical

trial phase. In this regard, the modern medical system recognizing and stirring to a system based on the combination of orthodox and natural therapies as a leading science to deal with the wisdom that lies in botanicals. However, many folds are still most wanted to explore unseen secrets of their curative potentials and to relieve humanity from dreaded diseases.

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