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Traditional knowledge of Western herbal medicine and complex systems science

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ABSTRACT

Traditional knowledge of Western herbal medicine (WHM) supports experiential approaches to healing that have evolved over time. This is evident in the use of polyherb formulations comprised of crude plant parts, individually tailored to treat the cause of dysfunction and imbalance by addressing the whole person holistically. The challenge for WHM is to integrate science with traditional knowledge that is a foundation of the practice of WHM. The purpose of this paper is to provide a plausible theoretical hypothesis by applying complex systems science to WHM, illustrating how medicinal plants are complex, adaptive, environmentally interactive systems exhibiting synergy and nonlinear healing causality. This paper explores the conceptual congruence between medicinal plants and humans as complex systems coherently coupled through recurrent interaction. Complex systems science provides the theoretical tenets that explain traditional knowledge of medicinal plants while supporting clinical practice and expanding research and documentation of WHM.

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1. Introduction

Western herbal medicine (WHM) is a clinical practice of healing using naturally occurring plant material or plants with little or no industrial processing. Medicines or extracts from crude plant material, such as root, bark, and flower, are used in multiple plant formulations to treat persons with disease and dysfunction and to promote health and well-being (Bone, 2003; Hoffmann, 2003, p. 71; Mills and Bone, 2000;

Tilburt and Kaptchuk, 2008). WHM is a title recently used to differentiate herbalism based on Anglo-American traditional herbal medicine (Casey et al., 2007) from other systems of herbal medicine such as Ayurveda or Traditional Chinese Medicine (TCM). Representing varied and diverse groups of practitioners, WHM is also referred to as traditional Western herbalism, herbal or botanical medicine, medical herbalism and phytotherapy. WHM is practised in Australia, Canada, New Zealand, the United Kingdom, the United States and Western Europe.

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Complex systems science (CSS) is a transdisciplinary approach to science (Morin, 2008) offering descriptions and explanations of how collective behaviors of whole systems arise from the parts and how whole systems interact with environments (Bar-Yam, 2009). CSS as an epistemology (Morin, 2008) includes the theories of complex adaptive systems and nonlinear dynamic systems. CSS has been applied to living interacting systems and the natural world. It appreciates the nonlinearity of reality and has been used to explain the unpredictability of weather, repeated patterns of shorelines and mountain ranges, the activity of ants, and the fractal or self-similar patterns of embedded plant structures (Capra, 1996). In human systems, complexity has been used to study and research the interacting network of human biology, information exchanges in social networks such as organizations (Capra, 1996; Zimmerman et al., 2001) and Ayurveda and homeopathic systems of medicine (Bellavite, 2003; Rioux, 2012). CSS may also be applicable to the study of WHM. By examining the congruence between crude medicinal plant medicines and CSS, perhaps a more comprehensive understanding of WHM may emerge. Using CSS plants as living organisms, may be considered self-organizing and environmentally adaptive. In this respect, medicinal plants are complex systems.

This paper explores the proposal that medicinal plants as complex adaptive systems have synergetic properties, are coherently coupled with humans, and give rise to nonlinear healing causality (Koithan et al., 2012; Spelman, 2011). The purpose of this paper is to provide a theoretical description, applying tenets of CSS to WHM, illustrating how medicinal plants are complex adaptive systems. Furthermore, using CSS to explain traditional knowledge of WHM provides relevant considerations related to the healing process and the practice and research of herbal medicine.

2. Current challenge for herbal medicine

The practice of WHM is based on traditional knowledge or received wisdom acquired over time through observation and real-life experience (Dods, 2004; Evans, 2008; Johnson, 1992; Mills and Bone, 2000). Traditional knowledge of WHM is evident in the use of individually tailored crude plant extracts in multiple plant formulations. Treatments directed at the cause of the problem, focusing holistically on the whole person with the intent to strengthen the overall constitution (Klein and Dunkel, 2003), shift causal and global patterns of dysfunction and imbalance (Casey et al., 2007; Mills and Bone, 2000). Holism in WHM refers to the fundamental unity of parts where the whole is greater than the sum of the parts and is not predicated by the parts (Mills and Bone, 2000). WHM practitioners apply concepts of holism to persons and plant medicines where plants and persons are multidimensional, interacting and interconnected living organisms. The assumptions of holism contrast the mechanistic view of humans and plants where causation and constituent parts are viewed as isolated or separate from the experience of the whole, resulting in a singular therapeutic focus on symptoms or disease (Hoffmann, 2003; Johnson, 1992; Whitelegg, 2003).

Tension exists between contemporary biomedical research and traditional knowledge-based WHM (Evans, 2008; Jagtenberg and Evans, 2003; Nissen and Evans, 2012). Biomedical research of herbs has concentrated on bioactivity of highly processed herb products, including singular mechanisms of action of single herb parts, isolated fractions, and purified extracted active ingredients. This is in contrast to traditional uses of entire medicinal plant portions as composites of activity on multiple levels. Furthermore, biomedical research is often conducted with delivery forms, doses and applications inconsistent with WHM. This research is incongruent with the approaches and reported experiences of WHM and is often not generalizable to polyherb formulations utilizing entire medicinal plants. This tension is illustrated with research of the herb *Hypericum perforatum* or St. Johns Wort (SJW).

Practitioners of WHM, based on experience have long used the fresh flowering tops of SJW in formulations as a nerve particular to nervousness and neuralgic pain and for its antiviral, astringent and expectorant actions (Grieve, 1931/1996; Hoffmann, 2003). Biomedical research, focusing on singular mechanisms of actions, showed antidepressant effects in SJW due to the hypericin constituent (Bladt and Wagner, 1994; Thiede and Walper, 1994). This finding resulted in multiple clinical trials and the standardization of SJW products to hypericin with the identification of SJW as the herbal antidepressant. This research-based biomedical application is contrary to the infrequent use of SJW for depression originating in traditional knowledge of WHM (Hoffmann, 2003) and presents as a new application specific to the standardized extracted or concentrated product used in the research.

A first concern is whether biomedical research on highly processed and possibly enhanced or synthesized plant parts or constituents is generalizable or applicable to the traditional uses of herbs as teas and tinctures. Teas, tinctures and liquid extracts represent a relatively intact "close-to-the-natural-state" herbal medicine. The behavior of a molecule may be a function of its environment. If the molecule is removed or the chemical is extracted from the chemical matrix of the plant, it may not be the same. This does not conclude that the products, mechanisms and outcomes researched are not valid, but instead poses the consideration that because crude intact plants used in WHM are complex the reductionist method of research may have limited applicability to the practice of WHM.

A second concern, illustrated with the SJW example, is that current research designs focusing on singular mechanisms and constituents rather than the entire plant threaten to change the definition and applications of herbal medicines. Instead of defining herbs as whole living organisms and applying herbal medicines close to their natural state according to tradition, herbal medicine will be defined as highly processed products comprised of isolated and concentrated herb constituents. These highly processed and concentrated pharmaceutical-like products, having no history of use and a body of knowledge limited to product-specific research, potentially present new and unique patient safety issues. Likewise, new and different clinical applications of herbs threaten to supplant traditional time-tested applications of herbal medicine.

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