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The role of local disease perception in the selection of medicinal plants: A study of the structure of local medical systems

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ABSTRACT

Ethnopharmacological relevance: In this study, we investigated the role of local perceptions of diseases in the selection of medicinal plants. For this purpose, we consulted local experts from two communities located in the semiarid region of northeastern Brazil.
Materials and methods: After selecting the experts, we used semi-structured interviews to assess the symptoms of each disease studied, the perception of variations in each of these diseases, and the plants used for their treatment. We then conducted a participatory workshop in which the experts engaged in free grouping of the diseases mentioned in the first step.
Results: We observed that the therapeutic targets (diseases) showed a lower similarity of medicinal plants than the perceived variants of these targets. We found that plant selection was associated with the perception of symptoms: the greater the similarity between two diseases based on the perceived symptoms, the greater the similarity between these diseases based on the medicinal plants. Furthermore, we observed a greater similarity between plants used to treat diseases perceived as related to each other.
Conclusion: Local perceptions of the association between diseases and between diseases and symptoms can influence plant selection such that the similarity of the medicinal plants chosen is higher for the diseases perceived as related and as having common symptoms. These results indicate the presence of mechanisms by which local perceptions of diseases affect the structures of local medical systems.

1. Introduction

Medical anthropology and ethnopharmacology studies have emphasized the importance of individuals' perceptions of the diseases that affect them and how, based on these perceptions, they treat these diseases in a given medical system (Calvet-Mir et al., 2008; Herndon et al., 2009). Disease perception is complex and involves a variety of elements within a medical system. Briefly, it is the means by which individuals identify disease signs and symptoms for diagnosis and determine the causes for the emergence of such symptoms (Calvet-Mir et al., 2008; Reyes-García, 2010). Therefore, in this study, we assumed that local disease perception was the set of symptoms and causes attributed to different diseases within a local medical system.

Despite the importance of disease perception studies to understanding the use of medicinal plants in a local setting (Herndon et al., 2009; Reyes-García, 2010), little is known about how this perception affects the selection of medicinal plants. Many researchers have attempted to understand the role plants play in medical systems and how they are selected to create a local pharmacopoeia (Stepp and Moerman, 2001; Stepp, 2004; Saslis-Lagoudakis et al., 2012, 2014). In this study, we evaluated the following question: what is the role of local disease (or therapeutic target) perception in the selection of medicinal plants?

Several studies have offered initial insights into this question. These studies indicate that individuals perceive different types, or variations, of the same disease and select different repertoires of plants to treat each disease variant (Beiersmann et al., 2007; Ferreira Júnior et al., 2011). For example, Ferreira Júnior et al. (2011) observed that the plants used to treat inflammation in a rural community in northeastern Brazil varied depending on the type of inflammation perceived by the residents. Similarly, Beiersmann et al. (2007) observed that distinct plants were used

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for the treatment of the different types of malaria perceived by residents of Burkina Faso. These studies suggest that our understanding of the selection of medicinal plants in different medical systems needs to be refined. Although these studies suggest that the selection of medicinal plants depends on the perception of variants of the same disease, few studies have investigated this association. To fill this gap in the research, we tested the following hypothesis: (H_1) *the similarity of medicinal plants is higher between therapeutic targets (diseases) than perceived variants of such targets.* We expected that the process of selecting plants to treat disease variants would be more refined than the selection of plants to treat therapeutic targets within a medical system. We assume that disease variants reflect a hierarchical structure for the local classification of diseases in which diseases occupy the first level (e.g., “inflammation”, “cramps”, etc.) and disease variants the second level (e.g.,, “kidney inflammation”, “wound inflammation”, “cramps in children”, and “cramps in adults”).

Additional insight is available from studies showing that the perceived characteristics of diseases, such as local causes and symptoms, affect the choice of treatment (Jain and Agrawal, 2005). In Latin America, some social groups perceive diseases as belonging to two distinct groups—"hot" or "cold"—based on their characteristics. This classification system, known as hot–cold, influences plant selection because plants perceived as “hot" are used for the treatment of "cold" diseases, and plants perceived as "cold" are used for treatment of "hot" diseases (Ankli et al., 1999; Waldstein and Adams, 2006). Although these studies elucidate the association between disease perception and plant selection, to the best of our knowledge, no previous studies have investigated the association between the perceived characteristics of diseases and the selection of medicinal plants in medical systems. Therefore, we propose the following hypothesis: (H_2) *the selection of medicinal plants is associated with the perceived symptoms of the therapeutic targets (disease).*

Furthermore, individuals perceive that some diseases are more related to each other than to other sets of diseases, leading to the selection of the same medicinal plants to treat diseases known to be related to each other. This reasoning is based on the idea of mental models, which are cognitive structures created by individuals to represent their environment and serve as a basis for reasoning, decision-making, and behavior (Jones et al., 2011; Lynam et al., 2012). In this sense, the way people perceive relationships between diseases from their mental models can be linked with the selection of medicinal plants. Therefore, we tested the following hypothesis: (H_3) *the similarity of medicinal plants is higher between therapeutic targets (diseases) perceived as related to each other.*

2. Materials and methods

2.1. Study area

For this study, two communities were selected: the Sítio Bréa [“Bréa Ranch”] (S 07°04′29.7″ W 039°28′44.1‴) and the Assentamento 10 de Abril [“April 10 Settlement”] (S 07°05′53.4″ W 039°31′23.0‴). These communities are located in a region formed by a semideciduous tropical rain forest (dry forest) and a deciduous forest (arboreal savanna) (FUNCEME, 2009) adjacent to the Environmental Protection Area (Área de Proteção Ambiental–APA) of Chapada do Araripe in the municipality of Crato, Ceará state in northeast Brazil. The region has a tropical semiarid climate (Type Aw, according to the Köppen classification), with rainfall concentrated between January and May (FUNCEME, 2009). Initially, informal talks were held with the leaders of each community to obtain general information, including the number of households and the locals’ primary economic activities. Through visits to some houses and informal conversations with local residents, we found that some medicinal plants were planted in homegardens and, furthermore, residents have visited nearby vegetation areas to collect native species from caatinga vegetation, such as "aroeira" (*Myracrodruon urundeuva* Allemão) and "angico" (*Anadenanthera colubrina* (Vell.) Brenam), among others. From this, the two communities were chosen for this study.

Assentamento 10 de Abril is located in the district of Monte Alverne. It is further from urban centers and is linked to Sítio Bréa by a dirt road that is impassable during the rainy season. The settlement was established in 1991 and comprises 47 families belonging to the Landless Workers' Movement (Movimento dos Sem-Terra–MST). These families formerly lived in the surrounding districts. Residents are primarily engaged in agriculture activities and raising cattle. Food and medicinal plants are cultivated in community gardens near the residents’ homes. The impact of urbanization is lower on the settlement than on the ranch because fewer residents work outside the community and there are no local markets or bars. No health center is available in the settlement and there is no health worker to assist the local population. Until recently, a single health worker lived in the settlement. This health worker had lived in the settlement since its formation and had organized a project known as “Farmácia Viva” (Living Pharmacy) to encourage the cultivation of medicinal herbs among residents. After this agent moved away, the project was abandoned. However, residents still remember the names of the medicinal plants that the health worker taught them during the project.

Sítio Bréa is located 9 km from Assentamento in the Dom Quintino district in Crato. This community is close to urban centers and is geographically bounded by highway CE-55, which connects the community to the center of Crato 24 km away. The ranch supports approximately 100 families, whose main activities include agriculture and cattle ranching. The residents are Catholic and attend a local church, where Masses and residents' association meetings are held. Many residents grow medicinal and food plants in their backyards. No health center is available in the community, but one health worker from the municipality of Crato visits the ranch regularly. Unlike the Assentamento, we have no information regarding exchanges of knowledge about medicinal plants between the health worker and residents in Sítio Brea. Some residents, especially the younger generation, work in downtown Crato or in nearby districts. The community has three small markets, one construction shop, and five bars that sell alcoholic beverages. On weekends, residents from other districts visit these bars.

2.2. Ethical and legal issues

According to the National Health Council’s (Conselho Nacional de Saúde) resolution No. 466 of December 12, 2012, the participants and researchers who agreed to participate in the study signed an informed consent form. This form and the study objectives were explained to the participants. This study was approved by the Research Ethics Committee of Pernambuco University (Universidade de Pernambuco–UPE) under protocol No. 351.068 and under Certificate for Ethics Assessment (Certificado de Apresentação para Apreciação Ética–CAAE) No. 01578012.5.0000.5207.

2.3. Data collection

This study focused on local experts who are recognized by community residents as having extensive knowledge of the use of medicinal plants (Gazzaneo et al., 2005). The experts were chosen because they represented a group with vast experience in medicinal plant experimentation. They therefore played an important