Appetite 79 (2014) 1–10

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Research report

Beverage and culture. "Zhourat", a multivariate analysis of the globalization of a herbal tea from the Middle East ☆

Concepción Obón [a,*], Diego Rivera [b], Francisco Alcaraz [b], Latiffa Attieh [a]

[a] Departamento Biología Aplicada, Escuela Politécnica Superior, Universidad Miguel Hernández, Ctra. Beniel Km 3.2, 03312 Orihuela, Alicante, Spain
[b] Departamento Biología Vegetal, Campus de Espinardo, Universidad de Murcia, 30100 Murcia, Spain

ARTICLE INFO

Article history:
Received 20 February 2014
Accepted 25 March 2014
Available online 1 April 2014

Keywords:
Ethnobotany
Herbal teas
Health claims
Functional foods
Factor analysis
Hierarchical clustering

ABSTRACT

The "Zhourat" herbal tea consists of a blend of wild flowers, herbs, leaves and fruits and is a typical beverage of Lebanon and Syria. We aim to evaluate cultural significance of "Zhourat", to determine cultural standards for its formulation including key ingredients and to determine acceptable variability levels in terms of number of ingredients and their relative proportions, in summary what is "Zhourat" and what is not "Zhourat" from an ethnobotanical perspective. For this purpose we develop a novel methodology to describe and analyse patterns of variation of traditional multi-ingredient herbal formulations, beverages and teas and to identify key ingredients, which are characteristics of a particular culture and region and to interpret health claims for the mixture. Factor analysis and hierarchical clustering techniques were used to display similarities between samples whereas salience index was used to determine the main ingredients which could help to distinguish a standard traditional blend from a global market-addressed formulation. The study revealed 77 main ingredients belonging to 71 different species of vascular plants. In spite of the "Zhourat's" highly variable content, the salience analysis resulted in a determined set of key botanical components including *Rosa* x *damascena* Herrm., *Althaea damascena* Mouterde, *Matricaria chamomilla* L., *Aloysia citrodora* Palau, *Zea mays* L. and *Elaeagnus angustifolia* L. The major health claims for "Zhourat" as digestive, sedative and for respiratory problems are culturally coherent with the analysis of the traditional medicinal properties uses of its ingredients.

Introduction

"Zhourat" (usually known as "Zahraa" in Syria) is a traditional local herbal tea and beverage consumed by Lebanese, Syrian, Assyrian and Armenian rural populations in the Middle East. This drink is also consumed very often in cafes in major cities of Syria, Lebanon and nearby countries (Carmona, Llorach, Obon, & Rivera, 2005). The diaspora of Lebanese, Syrians, Armenians and Assyrians as a result of economic, social and political factors acting strongly in the area, has spread "Zhourat" consumption, across the five continents, e.g. with a population of c. 4 million people in Lebanon, Lebanese diaspora reach 14 million (Itani, O'Conell, & Mason, 2013). Besides the Middle East, one can find grade mixtures, distributed for consumption in Europe, Africa, Australia, North and South America. This globalization of "Zhourat" involves modifications in the list of ingredients and their relative proportions. Since the ingredients and "Zhourat" itself as a whole are also used as a medicinal resource within the traditional and local medicine system these changes may disappoint the reasonable expectations of consumers who are accustomed to the traditional formulas.

"Zhourat" ("Zuhurat", "Zhurat" or "Zahraa") as an herbal tea consists of a blend of wild flowers, herbs, leaves and fruits. These are selected from over 70 species which are known for their healing properties. "Zhourat" is often taken by adding several drops of rose water to it, especially in the afternoon. "Zhourat" has soothing effects, thus, it is usually consumed at dusk. Moreover, it facilitates digestion and is safely consumed by children as it does not contain caffeine. This healthy drink is served in tea houses, restaurants, cafes or at home, where drinking it is perceived as a social activity. The consumption frequency of "Zhourat" varies from one region to another. In southern Lebanon, it is usually consumed as a relaxing tea at night before bed while it is taken as a breakfast tea in other regions. It is also common to have it as a hot drink after meals. However, "Zhourat" as a functional or nutraceutical food, due to its health benefits, merits further investigation.

Several research papers (Batal & Hunter, 2007; Hwalla & Tannous, 2008; Jeambey, Johns, Talhouk, & Batal, 2009) and books (Yazbeck, 2009; Zurayk, 2008) describe the traditional diets and cuisines of

☆ *Acknowledgements:* Ministerio de Ciencia y Tecnología Project CGL2008-04635. We appreciate the kindness and availability provided by all our informants.
* Corresponding author.
E-mail address: cobon@umh.es (C. Obón).

http://dx.doi.org/10.1016/j.appet.2014.03.024
0195-6663/

the region. Ethnopharmacological studies on traditional medicine tend to avoid conducting scientific investigation on "Zhourat" because of its manifold ingredients and its classification as a fairly common drink (El Beyrouthy, Arnold, Delelis-Dusollier, & Dupont, 2008). The use of medicinal plants is still common in Syria, Lebanon, Palestine, Jordan, and Israel where several publications cite single-species herbal teas. However, the mixtures of herbs are rarely included in those publications excluding the study of "Zahraa", the Syrian variant of "Zhourat" by Carmona et al. (2005).

The lack of information on ingredients, proportions, uses for this herbal mixture known as "Zhourat" made the present investigation indispensable. It is of high importance that such herbal mixes be documented in order to preserve the traditional knowledge of flora which is on the verge of being lost for young people and modern herbalists (Azaizeh, Saad, Khalil, & Said, 2006) and to furnish criteria to the industry to produce a blend coherent with local cultural traditions.

Therefore we aim to evaluate cultural significance of this beverage, to determine cultural standards for its formulation including core ingredients and to determine acceptable variability levels in terms of number of ingredients and their relative proportions, in summary what is "Zhourat" and what is not "Zhourat" from an ethnobotanical perspective. With this purpose on mind we develop a novel methodology to describe and analyse the patterns of variation of the traditional multi-ingredient formulations, beverages and herbal teas and to qualitatively and quantitatively identify key or most important ingredients of the blend. We apply this methodology to "Zhourat" samples consumed in Syria, Lebanon and abroad and determine their degree of similarity and patterns of variation in order to determine cultural standards.

Materials and methods

Plant material

A total of 12 samples were quantitatively analysed. Interviews were conducted with a total of 25 farmers, housewives, shepherds and herbalists from Lebanon. The study's informants were asked to prepare a sample of the "Zhourat" tea. Three herbal blends numbered 1, 2, 3, (Leb S1, Leb S2, Leb S3) were prepared by three independent informants in Kfarhamam (South Lebanon). Sample number 4 (Tripoli) was bought in a "Dabbous" specialist shop of herbs and spices, in Tripoli (North Lebanon). On the other hand, samples number 5, and 6 which are usually sold in Beirut were acquired in a Lebanese food store in Paris (Paris1, Paris2). Samples (A to F) from Syria were acquired from different herbalists of Souk El-Hamidiyyeh in Damascus (Carmona et al., 2005). Lists of ingredients were qualitatively studied in samples commercialized in Germany, Great Britain and the USA (see below).

Botanical study of plant material

The "Zhourat" mixtures consist of plant parts (leaves, flowers and stems), whether whole or cut, but not reduced to a powder. The different ingredients were classified in the rank of botanical species or subspecies. All samples were studied in the laboratories of the University of Murcia where the various ingredients were screened through seven sieves with 0.1 to 2 mm mesh and were separated using a binocular microscope Olympus SZ 11(10 to 110×). Various references (Mouterde, 1966, 1970, 1983, 1970, 1983; Nehmé, 1980; Post & Dinsmore, 1932; Tohme & Tohme, 2007; Université Saint-Joseph de Beyrouth, 2009; Zurayk & Talhouk, 2009) were consulted including the Encyclopaedia of Medicinal Plants (in Arabic) (Hayek, 1996, 1997, 1998a, 1998b). Plant names and authors abbreviations were standardized consulting TPL (2014). Afterwards, the different components were quantified with a Sartorius GE812 digital scale. Voucher specimens and the samples of "Zhourat" were deposited at the University Miguel Hernandez herbarium in Orihuela (UMH) (Spain).

Lists of ingredients

A total of nine lists of ingredients were analysed. These included commercial labels (Abido Mills Herbal Tea, Abido Libanesischer Krautertee, Alattar Zhourat Lebnania (Syria), Zhourat Samia (Syria), Al Rayan Zhourat, Syrian Natural Products Zhourat tea, London Tea (Lebanon), blends of Assyrian Tur-Abdin (Turkey) (Abdalla, 2004), and cookbook recipes from the USA (Arab Women Union, 1976), which are consumed by Lebanese and Syrian diaspora in Europe and the USA and Assyrian in Turkey. With the purpose of calculating salience value for each ingredient we observed the order in which ingredients were organized in each list.

Data analysis

"Zhourat" samples and lists were systematized in a crude matrix with 21 units which are samples and lists of ingredients, and 77 variables (presence–absence descriptors) which are individual ingredients (Table 1). The crude matrix was used to compute a dissimilarity matrix with the Sokal–Sneath index of dissimilarity (un2) ($d_{ij} = 2(b + c)/a+2(b + c)$), where d_{ij} is the dissimilarity between units i and j, a: number of variables where x_i = presence and x_j = presence, b: number of variables where x_i = presence and x_j = absence and c: number of variables where x_i = absence and x_j = absence. These dissimilarities are even and are Euclidean distances. The dissimilarity is =0 for two units (samples or lists) sharing the 77 descriptors (ingredients) and =1 for two species which present 0 descriptors shared (with ingredients completely different). This and subsequent analyses and graphics were carried out with DARwin 5.0.158. (Perrier, Flori, & Bonnot, 2003; Perrier & Jacquemoud-Collet, 2006).

Principal coordinates analysis (PCoA), a member of the factor analysis family, was used to represent the distances between samples and to give an overall representation of the samples' diversity. A hierarchical tree was constructed to realistically represent individual relations and to describe the relationships between units based on the common agglomerative heuristic that proceeds by successive ascending agglomerations. For updating dissimilarity during the tree construction, the Ward criterion which searches at each step for a local optimum to minimize the within-group or equivalently to maximize the between-group inertia was adopted. A weighted neighbour-joining tree was used to verify close similarities between samples. The neighbour-joining method proposed by Saitou and Nei (1987) uses the criterion of relative neighbourhood, weighted average for dissimilarity updating, and adjustment to an additive tree distance. A bootstrap value is given to each edge indicating the occurrence frequency of this edge in the bootstrapped trees. Bootstrap values range between 0 and 100. Radial cladogram was drawn using Dendroscope (Huson & Scornavacca, 2012).

In order to determine culturally key ingredients within the large repertory of Table 1, the salience index value was calculated for each ingredient. This value typically reflects contrasts between items. At a community level, the conventional levels of salience are slowly embedded in the sign systems and culture, and they cannot be changed arbitrarily (Murphy, Math, & Finkel, 2003; Wikipedia, 2006a, 2006b). Salience is here calculated for each single ingredient in terms of frequency and weight. Frequency is the percentage of samples in which the ingredient is present, no matter of its proportion. Weight is the contribution of each one of the ingredients to the total weight of each sample. For each sample ingredients are listed in order of decreasing contribution to the total weight of the sample.

The salience of each ingredient (S) was calculated according to Sutrop (2001) and Vainik (2004), using the formula $S = F/(N^*mP)$,