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Medicinal plants used for neurological and mental disorders in Navarra and their validation from official sources

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ABSTRACT

Ethnopharmacological relevance: This paper provides important ethnopharmacological information on plants used in neurological and mental disorders in Navarra.
Material and methods: Information was collected using semi-structured ethnobotanical interviews with 667 informants in 265 locations. In order to confirm the pharmacological validation of the uses claimed by the informants, monographs from Official International Agencies (ESCOP, Commission E, WHO and EMA) were reviewed. A literature review was conducted focusing on the plants that were widely used but had no published monograph.
Results: A total of 172 pharmaceutical uses were reported, for 46 plants and 26 families, mainly represented by *Lamiaceae* (15%), *Asteraceae* (13%), *Rosaceae* and *Rutaceae* (7%, each one), and *Clusiaceae*, *Malvaceae*, *Papaveraceae* and *Urticaceae* (4%, each one). The most frequently used parts were inflorescence (39%), flowered aerial parts (16%), and aerial parts (13%), followed by inflorescence bract (8%) and leaves (7%). Nine out of 46 plants (20%) and 81 of 172 uses (47%), have already been pharmacologically validated. The remaining 37 plants (of total 46, 80%) have been reported for neurological and mental disorders and need to be screened through standard pharmacological and clinical procedures for their activities. The most used species are *Chamaemelum nobile* (L.) All., *Jasonia glutinosa* (L.) DC., and *Santolina chamaecyparissus* L. ssp. *squarrosa* (DC.) Nyman, in all cases the administration as infusion.
Conclusions: Data indicate a high degree of plants knowledge in Navarra regarding neurological and mental disorders. The present study constitutes a good basis for further phytochemical and pharmacological research of *C. nobile*, *J. glutinosa* and *S. chamaecyparissus*, which could be of interest in the design of new inexpensive, effective and safe drugs.

1. Introduction

Traditional medicine is used worldwide and it is of great economic importance in the 21st century (Bussmann, 2013). Among the positive aspects of traditional medicine, researchers have mentioned diversity, flexibility, accessibility, relevance in developing countries, increasing popularity in developed countries, relative low cost, few side effects of medicinal plants (Payyappallimana, 2010).

The World Health Organization (WHO) estimates that over one billion people worldwide suffer from illnesses of the central nervous system. Besides injuries of the brain and the spinal cord, these include a large number of neurological or mental illnesses. Neurological disorders are diseases of the central and peripheral nervous system. These disorders include epilepsy, Alzheimer disease and other dementias, migraine and other headache disorders, multiple sclerosis, Parkinson's disease, neuroinfections, brain tumors and traumatic disorders of the nervous system. Mental disorders, on the other hand, are psychiatric illnesses or diseases, (i.e. anxiety, depressive and schizophrenia), which appear primarily as abnormalities of thought, feeling or behavior, producing either distress or impairment of function. These illnesses not only cause great human suffering, but are also linked with enormous costs – stays in hospital, loss of working hours, early retirement and, in many cases, life-long care. These social, ethical and economic reasons call for the urgent improvement of medical research in this field (WHO, 2001).

The investigation carried out by our research group in Navarra began in 2003 and continues to the present. The high number of plants collected to date has allowed the publication of several manuscripts for various affections: digestive (Calvo et al., 2013), dermatological (Cavero et al., 2013), cardiovascular (Calvo and Cavero, 2014), respiratory (Cavero and Calvo, 2014) and musculoskeletal diseases (Cavero and Calvo, 2015). Following on from this, the aims of the present paper are: i) to collect information

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about plant species used for problems associated with the nervous system; ii) to analyze these ethnopharmacological data; iii) to look for coincidences of the reported uses in the literature in order to validate them from a pharmacological viewpoint; and, iv) to propose highly plants reported without bibliographic validation.

2. Material and methods

2.1. Study area

Navarra is a territory of 10,421 km^2 placed to the North of the Iberian Peninsula, where three zones can be differed: the Mountain on the North, the Riverside on the South, and both separated by a zone of transition, the Middle Navarra. There are two macrobioclimates, Temperate and Mediterranean. These factors provide a great diversity of plant communities and a rich flora (2,650 vascular plants) (Cavero et al., 2013).

2.2. Methodology

Information was collected using semi-structured ethnobotanical interviews as a technique for data collection from informants. Interviews were practiced from 2003 to 2014. Native people, 667 informants (mean age > 70 years) of 265 locations, were interviewed in Basque and Castilian language, both official languages of Navarra.

In the field work we noted for each species the local name, place and collection method, drying and preservation system, parts or organs used and method of preparation, dosage and administration. Voucher samples are kept in the PAMP Herbarium at the Faculty of Science (University of Navarra). In the present study, medicinal plants used for neurological and mental disorders were analyzed.

To confirm the reported uses by participants in the study, the literature was reviewed in order to carry out a pharmacological validation in reported plants, using monographs (sometimes linked to databases) from official sources: the European Scientific Cooperative on Phytotherapy (ESCOP, 2003–2009), German Commission E (Blumenthal et al., 2000), World Health Organization (WHO, 1999–2010), European Medicines Agency (www.ema.europa.eu/ema/index), European Pharmacopoeia (2013) and Real Farmacopea Española (Real Farmacopea Española, 2015) monographs. These monographs are responsible for evaluating the quality, safety and efficacy of herbs.

A literature review was carried out for the plants that were reported to be in widespread use, for which no monograph exists.

3. Results and discussion

3.1. Botanical information

A total of 172 pharmaceutical uses were reported, belonging to 46 plants (78% native and 22% introduced species from other continents, or other European regions). The complete catalog of the ethnoflora of the surveyed territory is given in Akerreta (2009).

The 46 medicinal plants belong to 26 families, mainly represented by *Lamiaceae* (15%), *Asteraceae* (13%), *Rosaceae* and *Rutaceae* (7%, each one), and *Clusiaceae*, *Malvaceae*, *Papaveraceae* and *Urticaceae* (4%, each one).

Table 1
Plants with validation from official sources.

Plant (Family, voucher specimen)	Popular name	Part used	Ph	Administration	Preparation	Popular use (number of use reports)	FU	Monograph
Crataegus monogyna Jacq. (*Rosaceae*, 18723)	Ellori zuria, espino, espino blanco	Flower	A, B	Internal (I)	Infusion	Anxiety, for nerves, tranquilizer and relaxing (5), for sadness (1)	6	1,3,4
Humulus lupulus L. (*Cannabaceae*, 21144)	Lupibelarra, lúpulo	Female inflorescence	A	External (D)	To put inside the pillow.	To sleep better (3)	3	2,4
				Internal (D)	Infusion			
Hypericum perforatum L. (*Clusiaceae*, 21559)	San Juan belarra, hipérico, hierba de San Juan	Flowered aerial part, flower	A, B	Internal (D)	Infusion	To lift the spirits, depression (6)	6	1,2,3,4
Lavandula angustifolia Mill ssp.*angustifolia* (*Lamiaceae*, 21575)	Espliego, lavanda	Flowed aerial part	A, B	Internal (D)	Infusion	Tranquilizer (2)	2	1,2,3,4
Melissa officinalis L. (*Lamiaceae*, 18688)	Melisa	Leaf, aerial part Flower	A, B	Internal (I)	Infusion	Tranquilizer and relaxing (5), depression (1)	6	1,4
Rosmarinus officinalis L. (*Lamiaceae*, 21655)	Romero	Aerial part, flowered aerial part	A, B	External (I)	To rub with the macerated in wine or alcohol, or with wine decoction, vapors.	Analgesic (3)	5	3
				Internal (I)	Infusion or maceration in wine	Stimulant (2)		3
Sambucus nigra L. ssp. *nigra* (*Adoxaceae*, 18661)	Astunpa, intsusa, sabuko, saúco	Internal bark, leaf	A, B	External (I)	Ointment with lard and wax, roasted in poultice Poultice or ointment with lard and wax.	Analgesic (2)	4	3[a]
		Inflorescence		Internal (I)	Smoke inhalation	Analgesic (2)		3
Tilia cordata Mill. (*Tiliaceae*, 22028)	Tilo	Inflorescence	A	Internal (D)	Infusion	For nerves and to relax (4)	4	4
Tilia platyphyllos Scop. ssp. *platyphyllos* (*Tiliaceae*, 18752)	Tilo	Inflorescence bract, inflorescence	A	Internal (D)	Infusion	For nerves, tranquilizer and relaxing, to sleep better (45)	45	4

Ph: Pharmacopeia; A: European Pharmacopoeia; B: Real Farmacopea Española; F: fresh; D: dry; I: without distinction; 1: ESCOP monograph; 2: German Commission E monograph; 3. WHO monograph; 4: EMA monograph.

[a] Different part used; FU: frequency of uses.