INTEGRATIVE REVIEW ARTICLE

INTEGRATIVE REVIEW ON MEDICAL USE AND PHARMACOLOGICAL ACTIVITIES

Bauhinia Genus Plant

RESUMEN

Objetivo: identificar la producción del conocimiento sobre plantas del género Bauhinia a respecto de su uso terapéutico popular y estudios farmacológicos en investigaciones brasileñas. Método: revisión integradora, donde fueron consultadas las bases de datos LILACS, MEDLINE y Scopus y biblioteca virtual Scielo para identificar los descriptores: Bauhinia; Medicina Popular; Plantas Medicinales; BIOENSAYOS; Antibacterianos. Algunos de los criterios de inclusión fueron: estudios realizados en Brasil, etnobotánicos y experimentales con actividades comprobadas. Resultados: el análisis de 51 artículos mostró un avance en las investigaciones etnobotánicas y farmacológicas, lo que puede estar relacionado a las importantes iniciativas gubernamentales, pero pocos son los estudios que comprueben las innumerables utilizaciones populares para las centenas de especies del referido género. Conclusión: la compilación de esas informaciones puede ofrecer subsidios en la realización de futuros estudios farmacológicos de especies aún no avaladas que puedan ser incluidas en RENISUS e listadas en RENAME, para así ser oficialmente prescritas en el Sistema Único de Salud. Descriptores: Bauhinia; Medicina Popular; Plantas Medicinales; BIOENSAYOS; Antibacterianos.

ABSTRACT

Objective: to identify knowledge production about Bauhinia genus plants on its popular therapeutic use and pharmacological studies in Brazilian research. Method: integrative review, where the databases LILACS, MEDLINE and Scopus and SciELO virtual library were consulted from descriptors: Bauhinia; Brazil; ethnobotany; folk medicine; medicinal plants; bioassay and anti-infective agents. Some of the inclusion criteria were studies conducted in Brazil, ethnobotanical studies and experimental with proven activities. Results: the analysis of 51 articles showed an improvement in the ethnobotanical and pharmacological research, which may be related to major government initiatives, but there are few studies that prove the many popular uses for hundreds of species of that genus. Conclusion: the compilation of this information can help in the realization of future pharmacological studies of not yet evaluated species that can be included in RENISUS and listed on the RENAME, to be officially prescribed in the public health system. Descriptors: Bauhinia; Popular Medicine; Medicinal Plants; Bioassays; Anti-Infective.
INTRODUCTION

The practice of medicinal plants and herbal medicine consumption around the world has validated many medicinal information accumulated over centuries. The popular knowledge on the use and effectiveness of these plants is a major contribution in the dissemination of the therapeutic benefits of vegetables, which are often prescribed for their medicinal effects, though often their chemical constitution remains unknown.¹

The ethnobotany applied to the study of medicinal plants has close relationship with ethnopharmacology, dealing with medical practices used in traditional systems of medicine.² Ethnopharmacological approach in the selection of plant species enhances the discovery of bioactive substances, compared with other approaches reported in the literature, such as random approach and chemotaxonomic.³

Traditional medicine has aroused the interest of researchers from multidisciplinary fields, which together have enriched the knowledge of the inexhaustible source from the world’s flora.³

Brazil has the largest biodiversity on the planet, having around 15-20% of the world total, with an estate can yield great benefits econômicos.⁴ In this, context, due to social, economic and cultural importance, government and private initiatives have been generated that medicinal plants have achieved their increasing demand, in order to strengthen the various activities of the production chain. Moreover, development agencies began to finance projects with the theme of medicinal plants having a great activity in the country around them.⁵

Searching for improved health care and sustainable use of Brazilian biodiversity, the Ministry of Health (MS), through Decree Number 5813 of June 22, 2006, approved the National Policy of Medicinal Plants and Herbal Medicines (PNPMF) aimed at ensuring secure access and rational use of medicinal plants and herbal medicines in the country.⁴

To comply with the PNPMF, the Ministerial Decree No. 2960 of December 09, 2008 was approved, with the intention to include medicinal plants, herbal and herbal medicine-related services in SUS, with safety, efficacy and quality, and the recognition of popular and traditional practices the use of herbal and home remedies. In addition, the program also seeks to promote and recognize popular and traditional practices of medicinal plants use.⁶

OBJECTIVE

- To identify the production of knowledge about the Bauhinia genus plants on its popular therapeutic use and pharmacological studies in Brazilian research.

METHOD

Study using integrative review as methodological resource through a literature review of articles on therapeutic use and the pharmacological evaluation of the Bauhinia genus plants.

The preparation of this type of review begins with the formulation of a hypothesis, considered by scholars as the guiding step to conduct a well elaborated integrative review.¹⁴ The question guiding this research is: What are the therapeutic activities and pharmacological effects proven of the Bauhinia genus plants in Brazil?

The following databases were consulted: LILACS (Latin American and Caribbean Health Sciences), MEDLINE, Scopus and virtual library SciELO (Scientific Electronic Library Online) during the period of August and September 2012 and used the following descriptors indexed on the list of systems DeCS (Descriptors trilingual Health Sciences) and MeSH (Medical Subject of Health): Bauhinia;
Caffaro KM, Araújo Júnior JX, Santos JM et al.

Brazil; ethnobotany; people medicine; medicinal plants; bioassay and anti-infective agents, adopting the strategy of grouping the Bauhinia descriptor and/or Brazil with others.

The searches were conducted at all levels and fields except in Scopus, which was restricted to the abstract and article title, abstract and keywords.

The inclusion criteria of articles and/or abstracts were publications in English, Portuguese and Spanish languages at any time in such databases; research conducted in Brazil; ethnobotanical studies with a quotation of Bauhinia genus and their respective medicinal use and experimental research articles with biological or pharmacological activities proven of extracts and/or chemical constituents of the Bauhinia genus.

Macro and microscopic botanical and phytochemicals studies, as research from isolation, purification and characterization of active phytochemicals principles without pharmacological activity tests were excluded, as well as literature reviews and ethnobotanical studies with the genus quotation but without specifying their use in people medicine.

To collect relevant information from the selected studies, data previously set were used seeking to answer the guiding question of the review. Figure 1 shows data characterizing instrument designed for that purpose.

There were 91 articles found in SciELO, 63 in LILACS, 341 in MEDLINE and 992 in Scopus, totaling 1,487 published studies using only the descriptor Bauhinia.

When accessing these databases, 513 publications were found by the intersection of the descriptors, and 95 were selected after critical reading of abstracts before the previously established criteria. Considering the duplication of publications between the databases, the final sample included 51 articles for the review of this composition. The different therapeutic uses as well as the pharmacological activities are proven in Figures 3 and 4.

**RESULTS**

<table>
<thead>
<tr>
<th>Descriptors (MeSh/Decs)</th>
<th>Database/Virtual library and total of articles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SciELO</td>
</tr>
<tr>
<td>Bauhinia AND Brazil or Brasil</td>
<td>68</td>
</tr>
<tr>
<td>Brazil or Brasil AND ethnobotany</td>
<td>81</td>
</tr>
<tr>
<td>Bauhinia AND Brazil AND ethnobotany</td>
<td>0</td>
</tr>
<tr>
<td>Bauhinia AND Brazil AND folk medicine</td>
<td>0</td>
</tr>
<tr>
<td>Bauhinia AND Brazil AND medicinal plants</td>
<td>5*</td>
</tr>
<tr>
<td>TOTAL</td>
<td>154</td>
</tr>
</tbody>
</table>

*In that results found, “AND Brazil” was not found, increasing the possibility of search; E: number of articles found; S: number of articles selected.
It is seen the predominance of the articles found in MEDLINE and Scopus database, with respectively 36.8% and 31.6% of the total. Of the 51 publications, 38 were acquired in full (74.5%) and only 13 abstracts (25.5%), and 26 articles were about the medicinal use of Bauhinia genus or ethnobotanical studies (51%) and 25 on pharmacological studies proven in some type(s) of this kind (49%).

In the analysis on the publication period, 21 articles were published from 2010 to 2012. From 2007 to 2009, 11 publications were found, between 2004 to 2006 were found, between 2001-2003 were four and only one before 2000. It is noteworthy that no ethnobotanical research in the following databases in the period prior to 2003 (last 11 years), five publications between 2004 and 2006, six between 2007 and 2009 and 15 between 2010 and 2012. This considerable growth in ethnobotanical research shows the importance of the popular knowledge acquired and consequent investment in this type of survey in recent years.

In pharmacological research, there were only one study published before 2000, four in 2001 and 2003, 14 between 2004 and 2006, 11 between 2007 and 2009 and 21 between 2010 and 2012, also demonstrating a breakthrough in research on plant species in the pharmacology area. This can be directly related to the MS encouraging with the approval of PNPMF and the preparation of RENISUS in 2009, pushing pharmacological research on herbal medicines since an increase in publications and consequent medical evidence.4,10

Regarding the language of the articles, 17 (33.3%) were published in Portuguese, 34 (66.6%) in English and no one in Spanish. Among the pharmacological research, 92% of articles were published in English, which

**DISCUSSION**

Figure 3. Medicinal uses of Bauhinia genus plants.

<table>
<thead>
<tr>
<th>Species</th>
<th>Nº articles</th>
<th>Medicinal use</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. forficata</td>
<td>8</td>
<td>diabetes, kidney disease and bladder, cystitis, diuretic, cholesterol, cancer, heart, endocrine, nutritional, metabolic and genitourinary diseases, column, anhemorrhagic, swelling body</td>
</tr>
<tr>
<td>B. cheilantha</td>
<td>7</td>
<td>flu, cough, pain in general, diabetes, back pain, hemostatic, intestinal problems, stomach problems, anti-inflammatory, toning, purifying, anti-diabetic, antilipidêmico, kidney disease, headache, cough, phlegm</td>
</tr>
<tr>
<td>B. spp.</td>
<td>4</td>
<td>hypoglycemic, anti-diabetic, anti-lipemic, kidney, hypertensive</td>
</tr>
<tr>
<td>B. rufa</td>
<td>3</td>
<td>anti-hyperlipidemia, anorectic, anti-diabetic, diuretic, anti-obesity, astringent, hypoglycemic</td>
</tr>
<tr>
<td>B. acuruana</td>
<td>1</td>
<td>Diabetes</td>
</tr>
<tr>
<td>B. candicans</td>
<td>1</td>
<td>kidney disease, kidney stones, cystitis, diabetes</td>
</tr>
<tr>
<td>B. dùbia</td>
<td>1</td>
<td>diabetes, high cholesterol</td>
</tr>
<tr>
<td>B. glabra</td>
<td>1</td>
<td>Hypoglycemic</td>
</tr>
<tr>
<td>B. holophyla</td>
<td>1</td>
<td>antidiabetic, diuretic, anti-obesity, astringent</td>
</tr>
<tr>
<td>B. nitida</td>
<td>1</td>
<td>kidney, Diabetes</td>
</tr>
<tr>
<td>B. pentandra</td>
<td>1</td>
<td>inflammation, wound healing</td>
</tr>
<tr>
<td>B. purpurea</td>
<td>1</td>
<td>diabetes, diuretic</td>
</tr>
<tr>
<td>B. radiata</td>
<td>1</td>
<td>diseases of the endocrine glands, nutrition, metabolism</td>
</tr>
<tr>
<td>B. ungulata</td>
<td>1</td>
<td>diabetes, stroke, constipation</td>
</tr>
</tbody>
</table>

**Figure 4.** Pharmaceutical activities of Bauhinia genus plant.

<table>
<thead>
<tr>
<th>Species</th>
<th>Nº articles</th>
<th>Pharmacological activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. forficata</td>
<td>10</td>
<td>Hypoglycemic / antioxidant / hypolipidemic / antitumor / anticoagulant properties</td>
</tr>
<tr>
<td>B. microstachya</td>
<td>5</td>
<td>Analgesic / anti-oxidant / anti-nociceptive / immunomodulatory human mononuclear cells</td>
</tr>
<tr>
<td>B. monandra</td>
<td>3</td>
<td>Hypoglycemic / antioxidant / Insecticide</td>
</tr>
<tr>
<td>B. variegata</td>
<td>1</td>
<td>Potential healing</td>
</tr>
<tr>
<td>B. cheilantha</td>
<td>2</td>
<td>Pypoglycemic / larvicide / cytotoxic</td>
</tr>
<tr>
<td>B. splendens</td>
<td>1</td>
<td>Antinociceptive</td>
</tr>
<tr>
<td>B. acuruana</td>
<td>1</td>
<td>antibacterial</td>
</tr>
<tr>
<td>B. bauhinioides</td>
<td>1</td>
<td>Antinflamatory properties</td>
</tr>
<tr>
<td>B. outrimouta</td>
<td>1</td>
<td>anticonvulsant properties</td>
</tr>
<tr>
<td>B. platypetala</td>
<td>1</td>
<td>anxiolytic</td>
</tr>
</tbody>
</table>
integrative review on medical use and pharmacological...

_Cheilanthes Bauhinia_ is a native species of the savanna which has wide popular use for numerous therapeutic purposes.16-20 B. cheilanthes was the most mentioned species in the ethnobotanical studies after B. forficata, but with scarce pharmacological studies to prove many of their mentioned properties, as in a survey in which the species has been mentioned for the treatment of various symptoms such as influenza, cough, general pain, diabetes, back pain, hemostatic, intestinal problems and stomach problems.21

_Bauhinia rufa_ was also cited, but did not appear in any pharmacological study, which deserve also consider it for future experiments in discovering their potential pharmacological properties. However, microstachya _Bauhinia_ and _B. monandra_, despite not having been cited in ethnobotanical studies in this review showed some therapeutic effects in experimental studies, as the evidence of analgesic effect of _B. microstachya_ extract, indicating the potential use of this plant for the treatment of painful procedures.22

**CONCLUSION**

The number of research on the several species of the _Bauhinia_ genus has grown in recent years. This shows that the use in popular medicine plants of the _Bauhinia_ genus has found support in some scientific studies, both ethnobotanical as pharmacological, being proven the effectiveness of their effects in experimental investigations.

Although three of the species of this genus are in the _RENIUS_, it can be concluded that there are still many researches about the therapeutic properties that may exist in the isolated extracts of these compounds and many other species _Bauhinia_ genus, such as _B. cheilanthes_ which was one of the species most cited in ethnobotanical studies. However, there is still no scientific support for their use in primary health care due to lack of research proving their biological activities.

_Levantamentos adicionais a fim de identificar pesquisas farmacológicas com plantas do gênero Bauhinia_ publicadas fora do Brasil, também poderão auxiliar no investimento e seleção de espécies para futuras pesquisas com plantas desse gênero.

Additional surveys to identify pharmacological research on plants of the genus _Bauhinia_ published outside Brazil, will also assist in the investment and selection of species for future research with plants of this kind.

Caffaro KM, Araújo Júnior JX, Santos JM et al.

enables greater universal accessibility in Brazilian pharmaceutical research than the ethnobotanical studies.

As for the area of training of researchers or main researcher, most of the articles in ethnobotanical studies were from the area of biology (15 articles), followed by pharmacy (5) and agronomy (3). In pharmacological studies, there were chemistry (8 articles) and pharmacy and biology (7 articles each) with a higher prevalence. It can be seen the great influence of researchers with backgrounds in biology in ethnobotanical surveys, and in pharmacological studies there is a greater interdisciplinary in publications between the chemical, pharmacy and biology.

It was observed health care researchers and biomedical, nurses and doctors in some of the raised publications, and nursing has a publication in each of the types of studies, enriching the knowledge on the subject in areas that complement each other.

Among the national states, in which were carried out ethnobotanical research, Rio Grande do Sul has 4 articles, Mato Grosso, Pernambuco and Santa Catarina contributed with three articles each, which reveals that these states are leading publications in the _Bauhinia_ genus in parents. In pharmaceutical research, most were held in Santa Catarina (7 articles), São Paulo (6) and Pernambuco (5). The states of Pernambuco and Santa Catarina have published research in both areas.

Among the species cited for use in people medicine (Figure 2), only _Bauhinia forficata_ is in _RENIUS_, which is the species with the highest number of citations in both ethnobotanical studies, as in pharmacological, according to this survey. Its widespread popular use for the treatment of diabetes has been evidenced in experimental research, which proved hypoglycemic effect, suggesting validation _B. forficata_ clinical use for the treatment of diabetes mellitus type II.16

Among the pharmacological studies with _Bauhinia_ genus, for the three species found on _RENIUS_, only two were object of study in the country. _B. forficata_ with ten articles, and _B. variegata_, with only one article on its biological activity, in which the lectin was used to assist in this species the healing process of acute wounds, with healing properties observed. _B. affinis_, which also makes up the list of _RENIUS_, was not mentioned and found in any of the publications of two search modes performed in this study, revealing the need for further studies for this species.
The compilation of information and evidence can help on the realization of future biological, pharmacological and phytochemical with that genus, not evaluated yet and that can become promising possibilities in discovering new herbal medicines being included in RENISUS and listed in the National List of Essential Drugs (RENAME) in order to be officially prescribed in public health system.

REFERENCES


Submission: 2014/05/26
Accepted: 2015/08/23
Publishing: 2015/09/15

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