Medicinal and Aromatic Plants - A Statistical Study on the Role of Phytotherapy in Human Health

Iris MATEESCU, Laura PAUN, Stefan POPESCU, George ROATA, Manuela SIDOROFF

Both authors are to be considered as principal authors

National Institute of Research and Development for Biological Sciences, 296 Spl. Independentei, P.O. Box 17-16, 060031 Bucharest, Romania; laura.m.paun@gmail.com

Abstract

Medicinal and aromatic plants are important factors in sustainable development, environmental protection and public health. Traditional medicine, based on the use of medicinal plants has developed and turned into the investigation of the active principles and pharmacodynamic action of medicinal plants. Thus, to achieve optimal results at cultivation, harvesting and processing levels, the collaboration between farmers and researchers became necessary. In this context, we developed and implemented "MedPlaNet" - medicinal plant network for enhancement of the comparative advantages of Calarasi–Silistra cross-border area for sustainable development" project. The aim of this article is to present the results of a statistical study performed in order to evaluate the general health condition of the population in the Romanian and Bulgarian cross-border area and to identify the best ways to improve the use of medicinal plants for phytotherapy and for obtaining natural products. The obtained results demonstrated that both physicians and patients are aware of the medicinal plants importance in preventing and treating some diseases with high level of occurrence in the studied area.

Keywords

medicinal and aromatic plants, phytotherapy, prevention, treatment, statistical analysis, social and economic development

INTRODUCTION

Nowadays, the world is quickly developing and the population demographics are continuously growing. As a consequence, the use of natural available resources is a new challenge and it has become a typical approach, where the environment permits it. It is of high priority to do so in areas that have a favorable climate (Bogers, 2006), and the Romanian-Bulgarian cross-border area is one favorable place where the medicinal plants are an important natural resource (Sârbu, 2001; Evstatieva et al., 2007). Such natural resources are found and extensively utilized in many other places in the world (China, India, Bangladesh) (Mohammad et al., 2006; Mohammed et al., 2012).

Medicinal plants are an important part of our natural wealth. They serve as important therapeutic agents, as well as valuable raw materials for manufacturing numerous traditional and modern remedies. These plants have a high content of active components, which can be used for pharmaceutical and cosmetic products, in food industry, as well as many other fields (Ciulei et al., 1995; Yadav et al., 2010). In the field of public health, phytotherapy is a branch of alternative therapy and it is the science of prevention and the treatment of human, animal or plant diseases with the help of medicinal plants. The medicinal and aromatic plant production and processing are economical activities, which contribute to the social and economic development (Onisei et al., 2006; Blessing, 2009).
Due to the importance of medicinal plants in human health and for economic development (Boers, 2006), a major cross-border project (MedPlaNet - medicinal plant network for enhancement of the comparative advantages of Calarasi-Silistra cross-border area for sustainable development) was developed by our research team.

This project was a support for cross-border business cooperation in the field of medicinal plants and contributed to the creation of a new regional image and identity.

One of the project's objectives was to provide complete information regarding the medicinal plants (cultivated or from spontaneous flora), the cultivators and the processors of these plants, the latest technologies used in this field, the natural obtained products and their benefits on human health. All this information was organized in an Oracle database on the Internet portal (http://medplanet.dbioro.eu).

The project's Internet portal was created to provide information for all those interested to start a business or to use medicinal plants for personal health.

Information was structured as follows:
- The results of the statistical study, concerning the use of medicinal and aromatic plants and natural products, the knowledge of their therapeutic indications and the interest in phytotherapy, that was performed in the hospitals from Calarasi-Silistra cross-border area.
- An educational video program, courses and guidelines concerning the cultivation, harvesting and processing of medicinal plants.
- The local farmers and all those interested in getting more information about the benefits of the usage of medicinal plants or developing a local business can access the information organized in the database through the project's internet portal.

The performed statistical study had the purpose to reveal the interest of the population from the target area regarding the usage of medicinal plants.

**MATERIALS AND METHODS**

Several methods were employed to find out more information about the herbs from Calarasi-Silistra cross-border. 81 species of medicinal and aromatic plants were available in this area (such as Thyme-Tymus vulgaris, Hyssop-Hyssopus officinalis, Lavender-Lavandula angustifolia, Mint-Mentha piperata, Lemon Balm-Mellisa officinalis, Sage-Salvia officinalis, Oregano-Origanum vulgare, Valerian-Valeriana officinalis, Plantain-Plantago lanceolata, White mustard-Sinapis alba) and were inventoried. The study also included: the mainly used technologies of cultivating (ecological zoning, crop rotation, fertilization, soil works, seeds and planting material, care works), harvesting techniques (mechanized, manual) and processing techniques. The methods used for the phytochemical screening were: specific identification reaction, thin layer chromatography-TLC and high performance thin layer chromatography-HPTLC. At the end, a statistical analysis was performed.

The main objective of this statistical study was to evaluate the general health condition of the population in this area, the awareness towards the importance and benefits of medicinal plants and the identification of the best ways to improve the usage of natural products. We believe that the results of this study could be useful because of the information provided about the use of herbal treatments.

The study had two target groups: the physicians and the patients from the Romanian-Bulgarian cross-border area hospitals, in order to observe the interest groups in medicinal plants. We studied these target groups because we thought there is a strong relation between advice and practice, as the performed correlation tests have shown.

There were two types of questionnaires, one of them was addressed to physicians and the other type to patients. The statistical analysis was performed using the R software and the methods employed varied from t-tests to ANOVA, multiple comparisons and correlation coefficients.

We were interested in finding if patients know the benefits of medicinal plants in preventing and treating diseases and also if they receive information and advice in using medicinal plants from physicians. We tried to find out what are the percentages of those who use medicinal plants to prevent or treat diseases and if they noticed any beneficial effects after using them. We surveyed physicians to investigate their attitude regarding the use of phytotherapeutic treatment, along with the allopathic one.

The statistical analysis was performed both for the questionnaires completed by the patients,
as well as the questionnaires completed by the physicians.

The patients’ answers were analyzed according to age, gender, environment and level of studies. Regarding the use of medicinal plants, also there were performed comparative analyses between Romanian and Bulgarian patients’ opinions.

The first type of questionnaires (addressed to the physicians) was completed by 39 respondents (24 women and 15 men, aged over 14 years) and the second type of questionnaires (addressed to patients) was completed by 27 respondents, from 6 hospitals in Calarasi and Silistra.

RESULTS AND DISCUSSION
The statistical analysis reveals a positive attitude both from physicians and patients for natural treatments. The results of the questionnaires analysis are presented in Table 1 and Table 2.

Table 1. Table of percentages for patients’ answers, regarding the use of medicinal plants in the target area

<table>
<thead>
<tr>
<th>Question</th>
<th>% answers “yes”</th>
<th>% answers “no”</th>
<th>% answers “don’t know”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 Do you know the benefits of using medicinal plants in preventing and treating diseases?</td>
<td>69</td>
<td>31</td>
<td>-</td>
</tr>
<tr>
<td>Q2 Have you used medicinal plants to prevent diseases?</td>
<td>64</td>
<td>36</td>
<td>-</td>
</tr>
<tr>
<td>Q3 Have you used medicinal plants for treating diseases?</td>
<td>77</td>
<td>23</td>
<td>-</td>
</tr>
<tr>
<td>Q4 Have you used medicinal plants at doctor’s recommendation?</td>
<td>51</td>
<td>49</td>
<td>-</td>
</tr>
<tr>
<td>Q5 Have you noticed beneficial effects from the use of medicinal plants?</td>
<td>67</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>Q6 If you have not already used, would you like to know the therapeutic indications and use of medicinal plants?</td>
<td>97</td>
<td>3</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2. Table of percentages for doctors’ answers regarding the recommendation of medicinal plants, in the target area

<table>
<thead>
<tr>
<th>Question</th>
<th>% answers “yes”</th>
<th>% answers “no”</th>
<th>% answers “don’t know”</th>
</tr>
</thead>
<tbody>
<tr>
<td>q1 Are you documenting about the indications and usage of medicinal plants?</td>
<td>78</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>q2 Do you agree with herbal treatments?</td>
<td>85</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>q3 In addition to allopathic treatment, do you recommend, to your patients, treatments based on medicinal plants?</td>
<td>63</td>
<td>37</td>
<td>-</td>
</tr>
<tr>
<td>q4 Do patients require or are interested in herbal treatments?</td>
<td>67</td>
<td>33</td>
<td>-</td>
</tr>
<tr>
<td>q5 In case you recommended a phytotherapeutic treatment, did you observe a positive development?</td>
<td>44</td>
<td>7</td>
<td>48</td>
</tr>
</tbody>
</table>
Sample t-Test and the null hypothesis was rejected ($p$-value=0.01302). Same conclusions about the use of medicinal plants are presented in a recent study in Switzerland (Dal Cero et al., 2014).

In our study, we were testing the existence of significant relationship between the education, location, gender and age variables. Significant results were obtained when testing for a significant relationship between the education and location ($p$-value=0.003428). The tested hypothesis was that the two variables -education and location- are not correlated. Based on the obtained $p$-value, the hypothesis was rejected, therefore the proportion of patients with different education levels are not independent on location.

The level of education is an important factor in understanding the benefits of herbs. It has been observed in eastern Serbia that due to the migration of young people with a higher education level from the mountain villages to bigger urban cities, the knowledge of the benefits of medicinal plants in the area has decreased (Bojan et al., 2014). In conclusion, as it was expected, there is a correlation between the education and the location of the respondents.

Analysis of variance was performed for testing if the mean responses on the benefits of herbs in preventing and treating diseases (Question 1) are the same for each age group. The hypothesis was rejected ($p$-value=0.03448), stating that the mean response on the benefits of herbs in preventing and treating diseases is different for the age groups. Multiple comparisons between the answers regarding the knowledge on the benefits of herbs in preventing and treating diseases revealed that all four variables (education, location, gender and age) had different levels of knowledge regarding the benefits of herbs. Similar results were obtained when testing the mean responses on the benefits of herbs in preventing and treating diseases for each education level. Multiple comparisons also revealed that patients with different levels of education had different knowledge levels regarding the benefits of herbs. As it was expected, higher correlation was observed between questions Q1 and Q2 ($r=0.66$), Q3 and Q4 ($r=0.58$) (See the questions in Tab. 1).

Correlation was tested for all the pairs of variables in the doctor’s questionnaires. The results are summarized in the Table 3.

We observed that there is strong correlation between questions 1 and 2, supporting the fact that a doctor who agrees to herbal treatments is documented about the indication and usage of medicinal plants ($r=0.78$). Weaker correlation than the above mentioned one, although still a high correlation, is between questions 2 and 4 ($r=0.5897$), suggesting that if a doctor agrees to herbal treatment he will treat more patients interested in phytotherapy. Similar correlation between questions 3 and 5 ($r=0.6085$) shows that doctors who observe a positive health improvement of their patients indicate them future medicinal plants based treatment.

An ethnobotanical study of medicinal plants that had been made in the Nandi Forest in Kenya revealed that local doctors encourage the local population to use herbs as healing remedies (Jeruto et al., 2008).

Performing the statistical analysis described in the article, one can conclude that different social categories have different knowledge regarding the usage of phytotherapy in preventing and treating diseases. There is higher awareness in the urban population as compared to rural population. This was surprising showing that rural patients are loosing long time traditional remedies, and, nowadays, through education/age individuals are acquiring such traditional awareness. Doctors also seem to be more in favor of herbal treatments,

<table>
<thead>
<tr>
<th></th>
<th>q1</th>
<th>q2</th>
<th>q3</th>
<th>q4</th>
<th>q5</th>
</tr>
</thead>
<tbody>
<tr>
<td>q1</td>
<td>1.00000000</td>
<td>0.7801895</td>
<td>0.51245004</td>
<td>0.5669467</td>
<td>0.25736296</td>
</tr>
<tr>
<td>q2</td>
<td>0.78018950</td>
<td>1.00000000</td>
<td>0.54373907</td>
<td>0.5897678</td>
<td>0.30921949</td>
</tr>
<tr>
<td>q3</td>
<td>0.51245004</td>
<td>0.5437391</td>
<td>1.00000000</td>
<td>0.4338609</td>
<td>0.60857318</td>
</tr>
<tr>
<td>q4</td>
<td>0.56694671</td>
<td>0.5897678</td>
<td>0.43386092</td>
<td>1.00000000</td>
<td>0.29960409</td>
</tr>
<tr>
<td>q5</td>
<td>0.25736296</td>
<td>0.3092195</td>
<td>0.60857318</td>
<td>0.2996041</td>
<td>1.00000000</td>
</tr>
</tbody>
</table>
proportional to their knowledge and personal documentation on medicinal plants and in support of use of herbal treatment in direct correlation with patients’ awareness of the herbal benefits. However in southwestern Serbia, citizens use herbs as quick forms of treatment, more in external than internal use. There is a lower awareness of their benefits, and they are being used as an immediately remedy for minor symptoms of some illnesses such as gastrointestinal and respiratory diseases (Savikin et al., 2013).

A variety of studies provide information regarding the tendency for using natural health products (Damodar, 2001; Trease et al., 2002). According to World Health Organization estimations, a percentage of 80% of the population depends on traditional medicine for primary health care in many developing countries. Also, in the developed countries, people tend to be more informed about the health benefits of food, the basic nutritional ingredients and the existing natural products for disease prevention. Beyond the use of various medicinal and aromatic plants in their natural state, studies also provide information on medical beneficial contribution of some plant compounds (Ullah and Khan, 2008).

In the context of the sustainable development, it is also important to have local information on this situation. This article wants to present the tendency to use medicinal and aromatic plants in the Romanian - Bulgarian cross border area.

CONCLUSION

Surveying the opinion through questionnaires and disseminate the results increase the awareness towards the existence and the diversity of the medicinal and aromatic plants. In this way, both patients and physicians will have more information and will be able to take informed decisions, when deciding on the usage of treatments based on medicinal plants.

Beyond observing a positive attitude both from doctors and patients for natural treatments, we also find out that rural patients are loosing long time traditional remedies, and, nowadays, through education/age individuals are acquiring such traditional awareness.

The results of this study present the economical local approach of cultivation and high capitalization of medicinal plants.

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REFERENCES

