RHODIOLA ROSEA, UN ADAPTOGEN UTIL ÎN OBOSEALĂ – DE LA CERCETARE LA PRACTICĂ

RHODIOLA ROSEA, AN ADAPTOGEN USEFUL IN FATIGUE – FROM RESEARCH TO PRACTICE

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Abstract. Rhodiola Rosea (RR) belongs to those herbs that reported having adaptive properties. Studies have shown that RR can reduce mental fatigue in stressful conditions in life. Due to its adaptogenic properties, RR has been studied for its performance-enhancing capabilities in healthy populations and for its therapeutic properties in a number of clinical researches. RR determines the regulation of homeostasis through several mechanisms of action associated with the hypothalamic-pituitary-adrenal axis and the control of key mediators of the stress response, including cortisol. Thus, RR reduces mental fatigue and improves mental performance, stimulates physical work capacity, improves and increases resistance to fatigue.

Keywords: Rhodiola Rosea, adaptogen, stress, oxidative stress, fatigue, physical effort.

Introduction

During the 1950s and 1960s, Lazarev and Brekhman suggested that certain adaptogenic herbs could decrease the magnitude of the alarm phase and prolong the duration of nonspecific resistance to stress [14]. The main adaptogens are represented by: R. rosea, S. chinensis and E. senticosus. They are the most studied and effective. Their safety is also the most analyzed [11, 15]. Adaptogenic effects on mediators of the adaptive stress response and longevity signaling pathways have been reported [10, 13]. Rhodiola rosea L. (RR), also known as Rhodiola, Rosenroot, Roseroot, Golden Root, Rose Stonecrop, Arctic Root and Reddish Rhodiola, belonging to the Crassulaceae family, is a genus of herbaceous perennial plants [9, 12]. For a long time in traditional medical systems in Asia and Europe, R. rosea root has been used as an adaptogen to increase an organism's resistance to physical stress [16]. R. rosea may have beneficial effects on mental performance and endurance capacity, and attenuate stress responses [17].

Hypothesis

We can see that so far, studies show interest in R. rosea and stress in general. On the other hand, the relationship between these two fields remains relatively little analyzed, given the numbers of publications found on the PubMed site.

Objective

The objective of the thesis is to evaluate the interest in the relationship between R. rosea and stress, from the perspective of some parameters which relate to the field of stress, as well as to the adaptogenic role of *R. rosea* in stress, by analyzing the numbers of PubMed publications corresponding to this interest.

Material and methods

The source of information necessary for this study was the PubMed.

Keywords

The key words chosen were: "RR and fatigue". We chose the time periods from the year of the first publication announced by the site, until the end of 2018. The time periods analyzed: 2000-2009, 2010-2018; calculating the average number of publications per year.

PubMed filters and sub-filters analyzed were: "Species" filter, sub-filters: animals (Animals - An) and humans (Humans - H). "Sex" filter, the sub-filters: men (male - HM), women (female - HF) and men + women (male + female - HM+HF). "Ages" filter, the sub-filters: Child: birth-18 years – 0-18; Adult: 19-44 years (Adult: 19-44 years – 19-44); Average age: 45 to 64 years (Middle Aged: 45-64 years – 45-64); 65 years and over (Aged: 65+ years – >65); and 80 years and over (80 and over: 80+ years – >80). To better follow the PubMed information, we will look at the words of the filters and sub-filters in English, and the initials mentioned at the top.

Organization was carried out on the following criteria

Analysis of the chosen keywords, in relation to the filters and the total number (N) of publication. Analysis of the chosen keywords, in relation to the sub-filters and the average number (NM) of publication per year. For each keyword mentioned above, the total number of publications and the average per year were calculated. The publication numbers that we will present in the results are those displayed by the PubMed site, according to the publication information.

Statistical evaluation

The data were entered into Excel software. The statistical evaluation was carried out by the "Student T-test". For statistical evaluation, we calculated the mean, standard deviation and p-value. In the second part, the corresponding statistical data will be mentioned in the tables. Differences are considered significant if $p<0.05$, and are considered non-significant if $p>0.05$.

Results

Analysis for the keywords "RR and fatigue"

NM had an increasing evolution between 2000-2012 and 2013-2016.

a) Analysis of the keyword RR and fatigue, for the Species filter (table 1, figure 1).

We can see the following: a) H was more numerous than An, for all periods except 2015 and 2017; b) An and H had the same number of studies in 2015 and 2017; c) An was the most numerous in 2015 and 2017; d) H was the most numerous in 2012 and 2016; e) the site did not announce any studies for An in 2011, 2013 and 2018. The differences were significant between NM-An and NM-H. The difference between An-H was not significant.

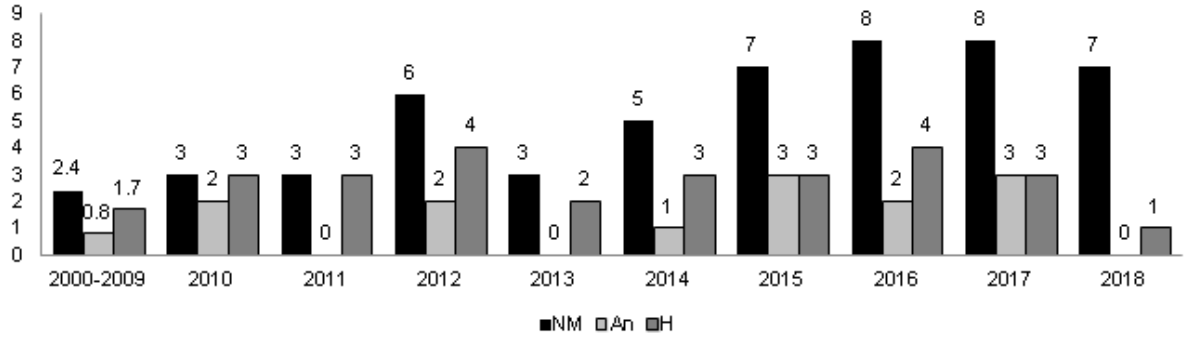

Figure 1. Number of publications for each period of time analyzed, for the keyword "RR and fatigue" and the *Species* filter

Table 1. The mean, standard deviation and p-value for the period analyzed, for the keyword "RR and fatigue" and the *Species* filter

Period 2000-2018	**NM**	**An**	**H**
Average	5,24	1,38	2,77
Standard Deviation	2,1256	1,1223	0,9034
p for comparison with NM		**0,0019**	**0,0129**
p for comparison with An			0,0929

5. *Analysis of the keyword RR and fatigue, for the Sex filter* (table 2, figure 2)

We can see the following: a) HM was more numerous than HF between 2000-2009, in 2011, in 2017 and 2018; b) HF was more numerous than HM in 2016; c) HM and HF had the same number of studies between 2012-2015; d) HM was the most numerous in 2011, 2012, 2014 and 2017; e) HF was the most numerous in 2012 and 2014; f) HM+HF was the most numerous in 2011, 2012, 2014, 2015 and 2017; g) the site has not announced any studies for: HM in 2016; HF in 2018; HM, HF and HM+HF in 2010. The differences were significant between: NM-HM; NM-HF and NM-(HM+HF). The differences were not significant between: (HM+HF)-HM and (HM+HF)-HF.

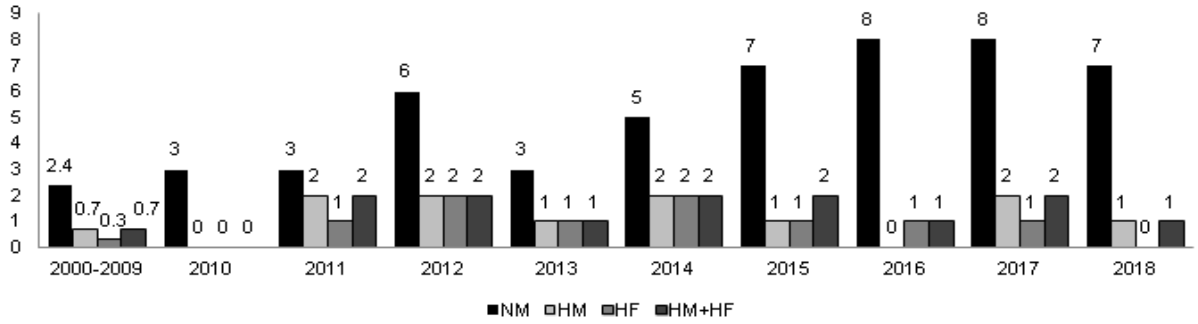

Figure 2. Number of publications for each time period analyzed, for the keyword "RR and fatigue" and the *Sex* filter

Table 2. The mean, standard deviation and p-value for the period analyzed, for the keyword "RR and fatigue" and the *Sex* filter

Period 2000-2018	**NM**	**HM**	**HF**	**HM+HF**
Moyenne	5,24	1,17	0,93	1,37
Déviation Standard	2,1256	0,7616	0,6664	0,6871
p pour la comparaison avec NM		**0,0005**	**0,00001**	**0,0007**
p pour la comparaison avec HM+HF		0,4135	0,1333	

6. *Analysis of the keyword RR and fatigue, for the Ages filter* (table 3, figure 3)

We can see the following: a) 19-44 was more numerous than other ages between 2000-2009, in 2011, 2017 and 2018; b) 0-18 was the most numerous between 2000-2009; c) 19-44 was the most numerous in 2014 and 2017; d) 45-64 was the most numerous in 2014; e) >65 was the most numerous in 2015 and 2016; f) >80 was the most numerous between 2000-2009; g) the site has not announced any studies for: 0-18 between 2010-2013 and 2015-2018; 19-44 in 2010; 45-64 in 2010, 2011 and 2018; >65 between 2010-2014, in 2017 and 2018; >80 between 2010-2018. The differences were significant between: NM-(0-18); NM-(19-44); NM-(45-64); NM-(>65); NM-(>80); (19-44)-(>65) and (19-44)-(>80). The differences were not significant between: (19-44)-(0-18) and (19-44)-(45-64).

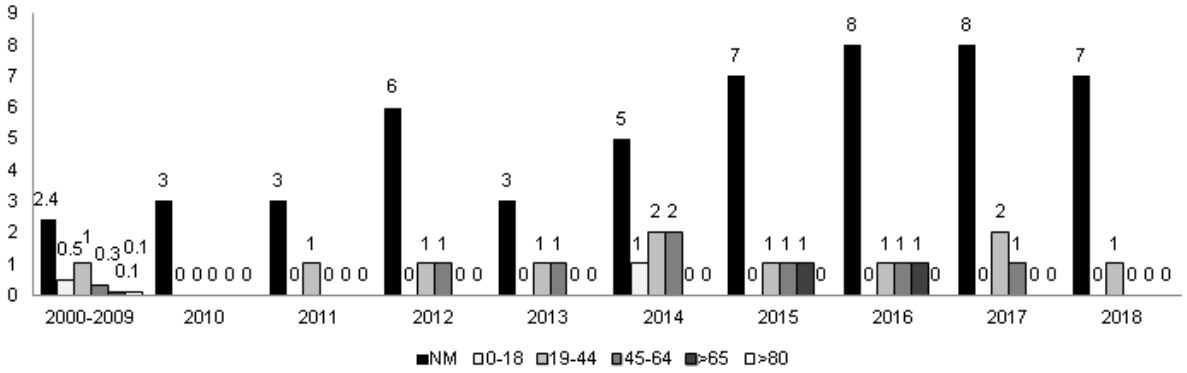

Figure 3. Number of publications for each period of time analyzed, for the keyword "RR and fatigue" and the *Ages* filter

Table 3. The mean, standard deviation and p-value for the period analyzed, for the keyword "RR and fatigue" and the filter *Ages*

Period 2000-2018	**NM**	**0-18**	**19-44**	**45-64**	**>65**	**>80**
Moyenne	5,24	0,15	1,1	0,73	0,21	0,01
Déviation Standard	2,1256	0,3202	0,5385	0,6133	0,3961	0,03
p pour la comparaison avec NM		**< 0,00001**	**0,00001**	**< 0,00001**	**< 0,00001**	**< 0,00001**
p pour la comparaison avec 19-44		0,1441		0,2929	**0,0008**	**0,00003**

Discussion

Fatigue is mental or physical, resulting from difficult work and intense stress [2].

Eleutherococcus senticosus, Schisandra chinensis, RR and Panax ginseng are described as adaptogens, having important effects in stress modulation and in reducing oxidative stress and fatigue, including mental fatigue [6]. Of these, RR is a well-known adaptogen, and among its actions are those of antistress [5] and anti-fatigue protection [4].

A study on swimming-induced fatigue in rats showed that R. rosea supplementation significantly improved swimming-induced exhaustive fatigue through protective defense mechanisms [7]. A study of eleven physically active women showed that supplementation with R. rosea. May have ergogenic and anaerobic performance enhancing benefits [1]. An open, uncontrolled multicenter clinical trial, in 100 subjects with symptoms of prolonged or chronic fatigue, showed that Rodiola extract could constitute an effective treatment for fatigue [8]. RR supplements improve attention, mood, cognitive performance, modulate depression. RR in sport: relieve fatigue; increase time to exhaustion, pulmonary ventilation and endurance exercise performance; decreases heart rate and perception of effort [3].

Conclusion

1. Interest in R. rosea as an adaptogen has been highlighted by publications that contain the keywords RRF, which although small compared to the number of publications for RR, support the adaptogenic role of R. rosea.

2. Overall, interest in publications concerning R. rosea and its relationship with fatigue has generally increased over the time periods analyzed.

3. The number of publications with animals and humans were quite close, and the largest number of publications was for both genders (male and female, for humans) and for ages 19-44.

4. Taking into consideration the results obtained after the studies we have carried out, we can affirm that the interest of the study for R. rosea from the point of view of its adaptogenic role, as well as for the relationship of R .rosea with fatigue is important and is in an almost continuous increase over time.

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