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An opinion survey of doctors who attended a postgraduate course regarding spices and their use in sports

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Abstract

Background. Spices (SPS) have proved to be useful also in sports. The objective was to evaluate medical doctors' (MD) opinion before/after a postgraduate medical course (PGC) about SPS and their use in sport (SPS-S).

Aim. It was to evaluate medical doctors' (MD) opinion before/after a postgraduate medical course (PGC) about spices (SPS) and SPS in sport (SPS-S).

Methods. A number comprising 94-MD answered a detailed questionnaire: 1) What are SPS? 2) How many SPS-PGC did you attend? 3) Which are the native SPS-countries? 4) How many SPS types do you know? 5) What are the main SPS effects/mechanisms? 6) What are the age groups to which SPS can be administered? 7) Which SPS modulate oxidative stress? 8) Which SPS influence endurance? 9) Which SPS are useful in physical fatigue? 10) Which SPS are useful in muscle soreness? 11) Which SPS are useful in exercise performance? 12) Which SPS are useful in sports? 13) On a scale of 1-10 how much dis this course help you know more about SPS/ SPS-S? For data analysis we used the percentage of the total number of participants (% of N) who responded to each subitem.

Results. Most MD responses: 1) SPS are plants; 2) None; 3) Asian countries; 4) Four; 5) Increased immunity, antioxidant; 6) All less children; 7) Ginger, Cardamom, Curcumin; 8) I don't know; 9) Ginger; 10) I don't know; 11) Ginger; 12) Ginger. 13) 9.3.

Conclusions. 1) This PGC seems to be the first one regarding SPS. 2) Initially, most MDs had little SPS knowledge regarding SPS/SPS-S. 3) At the end of PGC, MDs demonstrated good accumulation of SPS information. 4) This PGC reached the goal of providing basic information about SPS/SPS-S, but additional SPS-related training is needed.

Keywords: spices, spices course, medical doctors, spices in sport.

Introduction

The concept of returning to the "roots" of medicine has been revived at present (Salehi et al., 2019). In human history and nutrition, spices have played an important role in the development of most cultures worldwide; they are part of substances added to foods, useful to enhance their aroma and taste (García-Casal et al., 2016). In cooking, different parts of plants, commonly referred to as herbs or spices, can be used: leaves, roots, bark, fruits, buds, seeds; spices have been used in gastronomic history to enhance the taste of food, being used, for example, for meat preparations, for sauces, vegetables and desserts (Opara & Chohan, 2014) or for drinks, to enhance their aroma and color (Yashin et al., 2017).

Over time, condiments have shown many benefits in preventing and treating a wide variety of ailments, such as aging, metabolic, neurological, cardiovascular and inflammatory diseases (Gottardiet al., 2016). These benefits are due to their multiple actions, such as antioxidant, anti-inflammatory, reducing glucose and cholesterol, improving cognition and mood (Jiang, 2019). Thus, in order to prevent and control many chronic diseases associated with malnutrition, in addition to caloric control and exercise, a spicy diet could also be considered (Nilius & Appendino, 2013). Underlying the actions of spices is the composition rich in different compounds, including polyphenols, which are increasingly studied, proving that they have a number

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of important properties (Opara & Chohan, 2014).

It has been proven that herbs and spices have an excellent antioxidant activity. They are rich sources of antioxidants, thus being useful for treating oxidative stress-induced diseases (Yashin et al., 2017). Thus, spices have an effect on lipid peroxidation, by eliminating reactive oxygen species or by chelating the metal ions required to initiate lipid peroxidation (Shobana & Naidu, 2000). It has been found that synergism exists between the different phytochemical components of spices, as spices as a whole are more potent antioxidants than their purified active extracts (Patra et al., 2016).

Oxidative stress is correlated with muscle fatigue (Li et al., 2017). Thus, physical exercise results in an increase in the production of radicals and other forms of reactive oxygen species (ROS), which are the basis of oxidative disorders; these redox disorders induced by exercise in skeletal muscles contribute to the production of muscle fatigue and muscle injury (Powers & Lennon, 1999). Sport is an area that interferes more and more with that of plant extracts and various plant products, given their multiple health benefits. Thus, the antioxidative actions of some plants and plant-derived compounds on physical exertion are already demonstrated (Avakian et al., 1984; Abidov et al., 2003; Huang et al., 2009; Jówko et al., 2011; Jurcău & Jurcău, 2017). Also, different plant extracts have been shown to have beneficial effects in increasing endurance (Murase et al., 2006; Lee et al., 2009; Panossian, 2013; Jurcău & Jurcău, 2018) and performance (Yang et al., 2018; Jurcău et al., 2019) and reduce physical fatigue (Kimura & Sumiyoshi, 2004; Khanum et al., 2005; Yang et al., 2018; Jurcău et al., 2019).

Objectives

The aim was to evaluate medical doctors' (MD) opinion before/after a postgraduate medical course (PGC) about spices (SPS) and SPS in sport (SPS-S).

Material and methods

Research protocol

a) Period and place of the research

The study and measurements were carried out in July 2018 at the "Iuliu Haţieganu"University of Medicine and Pharmacy. Participation of all subjects in the study was voluntary. The article capitalizes the results of a postgraduate course approved by the College of Physicians and held in 2018.

b) Subjects

The subjects were MDs of different specialties: 44 men and 50 women (N = 94). The average age of the participants was: 42.4 ± 9 for men; 49.9 ± 4 for women. All MD participants attended the same postgraduate course, on the topic of spices in sports.

c) Tests applied

- *Study design*

All MD subjects answered a detailed questionnaire, developed by Jurcău RN and Jurcău IM for the evaluation of this course, which contained 13 items, with their subitems (Table I).

- *The determination program* was as follows:

The participants answered the first 12 items 15 minutes before the course, and the last item, 13, 15 minutes after the end of the course.

d) Evaluation

For data analysis we used the percentage of the total number of participants (% of N) who responded to each subitem.

Table I

Items and subitems of the applied questionnaire.

Items	Subitems									
1) What are SPS?	I do not know		Flavors		Extracts		Plants			
2) How many SPS-PGC did you attend?	1		2		3		To none			
3) Which are the native SPS-countries?	I don't know		I know - enumeration:							
4) How many SPS types do you know?	<4		4				>4			
5) What are the main SPS effects/mechanisms?	I don't know		I know - enumeration:							
6) What are the age groups to which SPS can be administered?	I don't know		0-18		19-44		45-64		65-90	>90
7) Which SPS modulate oxidative stress?	I don't know		I know - enumeration:							
8) Which SPS influence endurance?	I don't know		I know - enumeration:							
9) Which SPS are useful in physical fatigue?	I don't know		I know - enumeration:							
10) Which SPS are useful in muscle soreness?	I don't know		I know - enumeration:							
11) Which SPS are useful in exercise performance?	I don't know		I know - enumeration:							
12) Which SPS are useful in sports?	I don't know		I know - enumeration:							
13) On a scale of 1-10 how much did this course help you know more about SPS/ SPS-S?	1	2	3	4	5	6	7	8	9	10

Results

The presentation is in the order of the items in the questionnaire.

1) What are SPS? (Fig. 1) MD answers: 71.4% mentioned that SPS are plants; 3.1% answered that SPS are flavors; 20.6% mentioned that ADPs are extracts; 4.9% did not know.

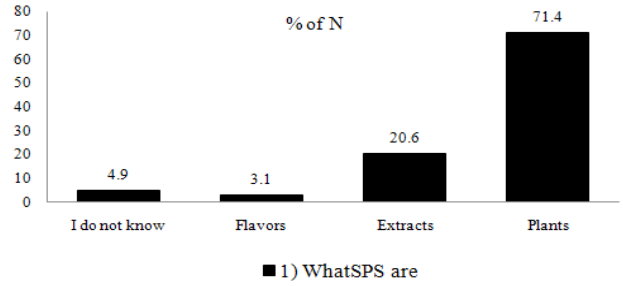

Fig. 1 – The percentage of respondents of N, for item 1.

2) How many SPS courses did you attend? (Fig. 2) All participants (100%) mentioned that they had not attended another SPS course.

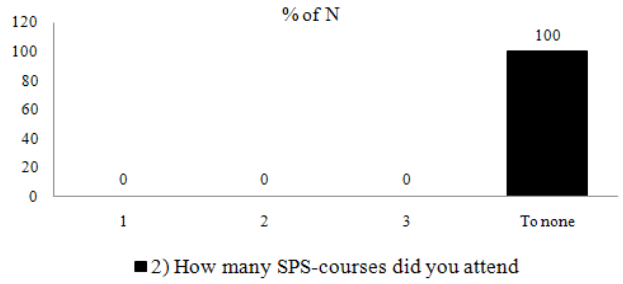

Fig. 2 – The percentage of respondents of N, for item 2.

3) What are the native SPS countries? (Fig. 3) The mentions for SPS countries were: 40% for India; 24% for countries of Arab origin; 19% for Mediterranean countries; 13% for yellow race countries (China, Japan, Korea); 4% for other countries; 0% did not know.

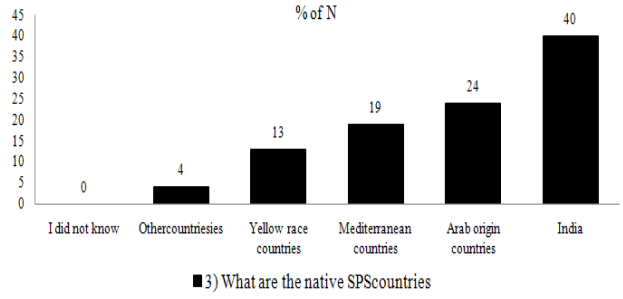

Fig. 3 – The percentage of respondents of N, for item 3.

4) How many SPS types do you know? (Fig. 4) The mentions for *SPS types* were: 49% for four types (pepper, cinnamon, cardamom, ginger); 30% more than four; 21% less than four.

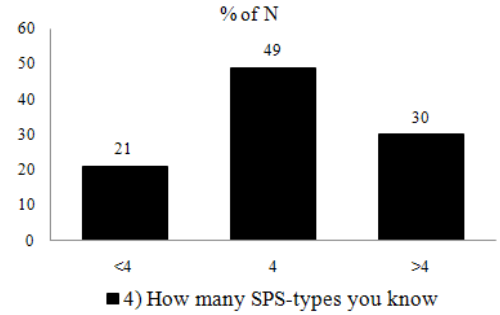

Fig. 4 – The percentage of respondents of N, for item 4.

5) What are the main SPS effects/mechanisms? (Fig. 5) The mentions for *SPS types* were: 42.2% for increase in immunity; 31.4% for antioxidant effects; 19.3% for other effects; 7.1% did not know.

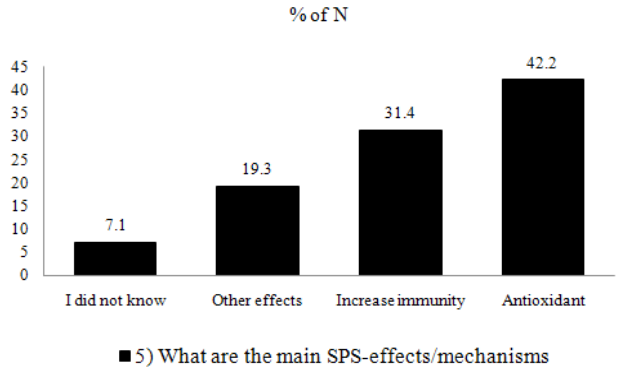

Fig. 5 – The percentage of respondents of N, for item 5.

6) What are the age groups to which SPS can be administered? (Fig. 6) The mentions for *the age groups to which SPS can be administered* were: 1.2% did not know; 3% for 0-18; 40.9% for 19-44; 31.9% for 45-64; 19% for 65-90; 4% for >90.

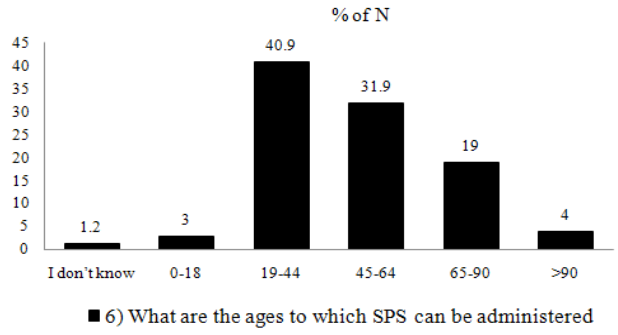

Fig. 6 – The percentage of respondents of N, for item 6.

7) Which SPS modulate oxidative stress? (Fig. 7) The mentions for *SPS* that modulate oxidative stress were: 43.1% for curcumin; 20.4% for ginger; 10% for cardamom; 9.4% for other SPS; 17.2% did not know.

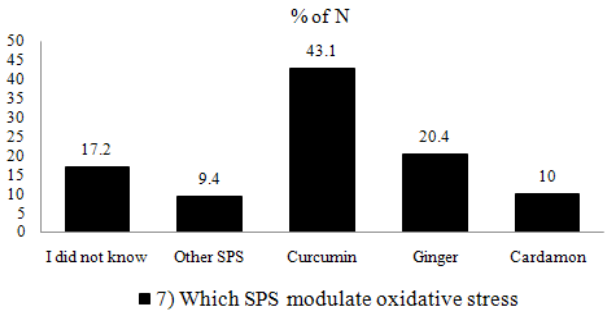

Fig. 7 – The percentage of respondents of N, for item 7.

8) Which SPS influence endurance? (Fig. 8) The mentions for *SPS* that influence endurance were: 72% did not know; 17% for other SPS; 4.9% for curcumin; 4.2% for ginger; 1.9% for cardamom.

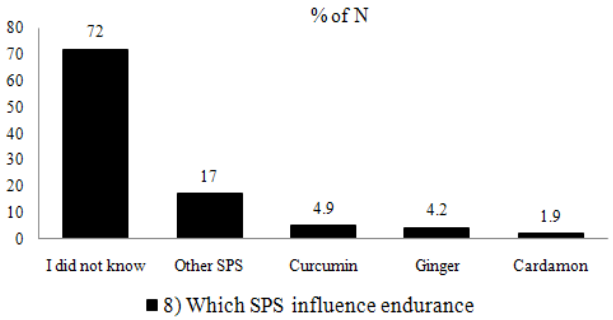

Fig. 8 – The percentage of respondents of N, for item 8.

9) Which SPS are useful in physical fatigue? (Fig. 9) The mentions for SPS useful in physical fatigue were: 49% for ginger; 34% did not know; 17% for different SPS.

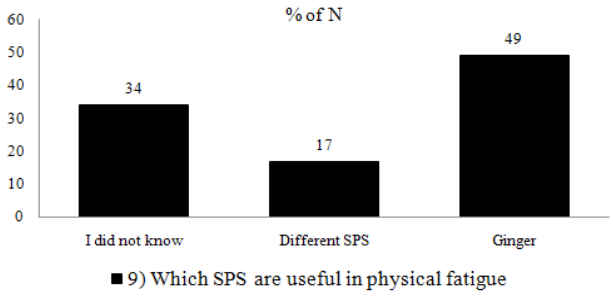

Fig. 9 – The percentage of respondents of N, for item 9.

10) Which SPS are useful in muscle soreness? (Fig. 10) The mentions for SPS useful in muscle soreness were: 90.1% did not know; 9.9% for different SPS.

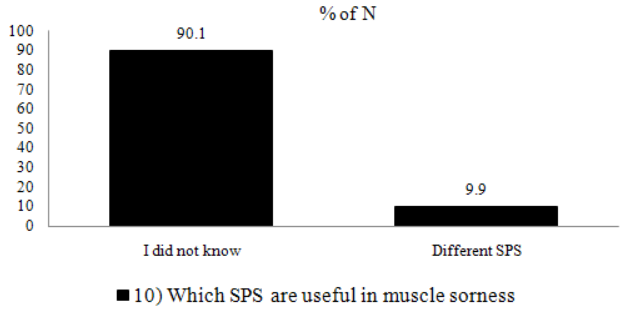

Fig. 10 – The percentage of respondents of N, for item 10.

11) Which SPS are useful in exercise performance? (Fig. 11) The mentions for SPS useful in exercise performance were: 43.4% for ginger; 37.3% did not know; 19.3% for different SPS.

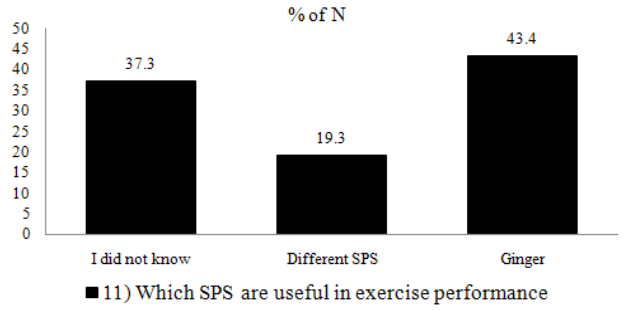

Fig. 11 – The percentage of respondents of N, for item 11

12) Which SPS are useful in sports? (Fig. 12) The mentions for SPS useful in sports were: 40.3% for ginger; 39.3% did not know; 20.4% for different SPS.

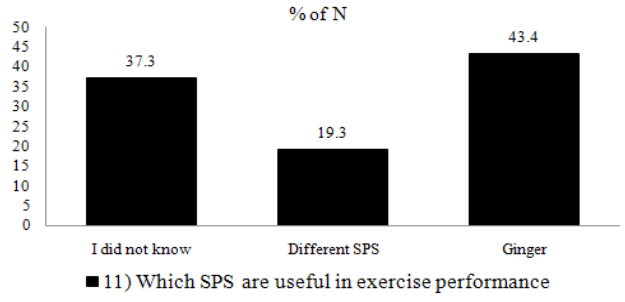

Fig. 12 – The percentage of respondents of N, for item 12

13) On a scale of 1-10 how much did this course help you know more about SPS? (Fig. 13) The mentions for how much this course helped know more about SPS were: 0% for 1-6; 1.7% for 7; 3.9% for 8; 4% for 9; 72.4% for 10.

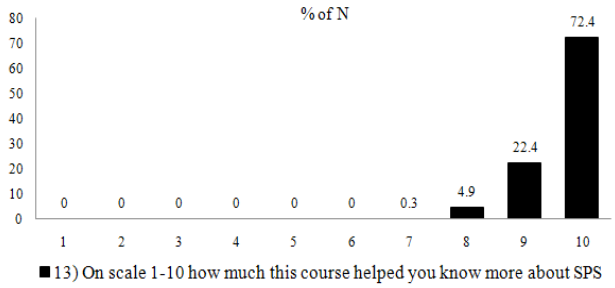

Fig. 13 – The percentage of respondents of N, for item 13.

Overall, most of the answers were in favor of using SPS. Differences between genders and ages were not important, for all items in the applied questionnaire. Most of the knowledge about SPS had female MDs and MDs aged 42-49 years.

Discussion

1) Analysis of the answers to the questionnaire

In this study, a large number of medical doctors (94) of different specialties and of both genders, in a relatively equal proportion, participated. For most of them, this was the first course about SPS in which they participated.

After applying the questionnaire, we found that most participants had, before the course, some generic information, but they did not know details, about: SPS native countries, effects and mechanisms for SPS, optimal age for SPS use, which SPS modulate oxidative stress.

MD participants had little or no information about SPS: what SPS are, SPS types, SPS effects/mechanisms. It was also found that doctors had very little information about SPS in sport: SPS for endurance, SPS in physical fatigue, SPS in muscle soreness, SPS in exercise performance. The comparable responses given by male MDs and female MDs, regardless of their age, do not allow us to make a particular comment about the differences in responses depending on the gender or the age of the participants.

What is encouraging with regard to the position of MD participants in the study towards SPS is the answer to the last item, which represented the end-of-course question. This answer shows that the information provided at the course helped most participants to understand SPS and SPS use in sport and thus, to create the possibility to better know, use and indicate SPS in the future.

2) Publications related to SPS. Pubmed evidence

Spices - Concept

Spices have been used since ancient times, mainly as flavoring and coloring agents, but also for food preservation (Gottardi et al., 2016). In addition, spicy food not only provides an important hedonic contribution, but also has beneficial effects on our health, such as modulation of gastrointestinal and cardiovascular activities, skeletal muscle performance, reduction of chronic inflammation and prevention of metabolic syndrome and diabetes (Nilius & Appendino, 2013). There is a wide variety of forms in which condiments can be used: fresh, dried whole, or dried before grinding (Balasubramanian et al., 2016).

Spices - Effects / Mechanisms

It has been proven that spices have various beneficial effects on human health, including the following actions: anti-sclerotic, anti-inflammatory, anti-thrombotic, anti-rheumatic, anti-arrhythmic, gastroprotective, lipid lowering, lipoprotein oxidation inhibition with low density and protein glycerol, anti-allergic, anti-malarial, anti-viral (Yashin et al., 2017) and anti-microbial (Liu et al., 2017).

Spices - Oxidative stress. Some examples of spices are used in oxidative stress.

Among the spices proven to have antioxidant potential are the following, for which their active components are mentioned: turmeric/ curcumin, cloves/ eugenol, red pepper/ capsaicin, black pepper/ piperine, ginger/ gingerol, garlic, onion (Srinivasan, 2013). Types of spices with antioxidant effects: ginger - Zingiber officinale Rosc. (Zingiberaceae), by gingerol (Dugasani et al., 2010); rosemary, via carnosic acid, caffeic acid and its derivatives, such as rosmarinic acid (Moreno et al., 2014); other spices - cinnamon (Jayaprakasha et al., 2003), black pepper (Kapoor et al., 2009), curcumin (Abrahams et al., 2019).

Spices - sports, endurance, physical fatigue, muscular sensation, exercise performance.

A study in healthy male rats shows that regular training and supplementation with cinnamon bark extract increases overall antioxidant capacity and protects against oxidative damage induced by exhaustive exercises (Dehghan et al., 2014). Another experimental study in rats with diabetes, undergoing a resistance exercise, showed that the administration of rosemary extract can alleviate oxidative stress, by improving the activities of antioxidant enzymes and lowering the level of lipid peroxidation (Nazem et al., 2015). Curcumin can improve physical performance and prevent fatigue; thus, supplementation with curcumin results in increased endurance and physical performance and significantly reduces post-exercise lactate levels (Huang et al., 2015). Ginger can reduce pain through endurance and prolonged running; it can accelerate the recovery of maximal power after resistance exercise and reduce the inflammatory response to cardiorespiratory exercises (Wilson, 2015). Supplementation with capsaicin, a bioactive phytochemical substance in peppers, CAP, can lead to improved physical performance and alleviation of physical fatigue (Hsu et al., 2016). In the case of exercise-induced muscle injury, daily consumption of raw and heat-treated ginger leads to moderate to large reductions in muscle pain (Black et al., 2010). Coriander oil, used for massage as such or incorporated into creams or lotions, can help reduce mental tension and fatigue, as well as muscle spasms (Balasubramanian et al., 2016). Piperine, an active compound in black pepper, is a source for improving exercise capacity, as it balances carbohydrate and fat metabolism, as well as redox reactions during exercise (Kim et al., 2017).

Conclusions

1. This PGC seems to be the first one regarding SPS.
2. Initially, most medical doctors had little knowledge regarding spices/ spices in sport.
3. At the end of the postgraduate medical course,

medical doctors demonstrated a good accumulation of information about spices.

4. This postgraduate medical course reached the goal of providing basic information about spices/ spices in sport, but additional SPS-related training is needed.

Conflicts of interest

Nothing to declare.

Acknowledgement

The data regarding the course evaluated in this paper are the following: name "The modulatory role and the effects of spices in the mechanisms of stress"; code 112; period, 13.07.2018-17.07.2018. In order to have more participants, doctors enrolled in courses with the codes 113 and 114, courses which were conducted during the period 03.07.2018-07.07.2018 and 08.07.2018-2.07.2018, respectively, were also allowed to attend the course, to listen and to complete the questionnaire. All the three courses were organized within the Pathophysiology Department and were coordinated by Ramona-Niculina Jurcau and Carmen Sfrangeu. The courses can be found in the 2017-2018 brochure of the "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca.

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