

Original article

The antioxidant status in human population based on the concept of *prakruthi* in Ayurveda

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Abstract

Objective: In the Ayurvedic system of medicine, body constitution (*prakruthi*) is said to play a vital role in the disease process as well as in its progression. Free radical toxicity is also involved in the etiopathogenesis of many disorders. Hence, in the present study an attempt has been made to correlate the body constitution type and the antioxidant status of that *prakruthi*. **Methods:** Healthy volunteers from Manipal University Campus, South Karnataka, India were classified into three main human constitutions (*prakruthi*) and their possible combinations and their serum total antioxidant activity was determined. **Results:** There was a significant negative correlation of the total antioxidant status with the *pitta prakruthi* whereas *vata* and *kapha* constitutions showed no significant correlation with the total antioxidant status. **Conclusion:** Ayurveda classifies each individual based on his/her *prakruthi* into three categories of *Doshas*: *Vata*, *Pitta* and *Kapha* (collectively known as *Tridoshas*). The three *Doshas* are fundamental regulatory principles responsible for maintaining organism functioning and manifesting those characteristics typifying each individual, that is, in equilibrium *Tridoshas* signify health and an imbalance leads to disease. Thus, in this study a significantly decreased antioxidant status in the *Pitta* group would render them more susceptible to damage by oxidative stress. Hence, we suggest that supplementation with antioxidants of herbal (Ayurvedic) origin to such a group would prove to be beneficial - opening up the arena for pharmacogenomics and customized antioxidant drug administration based on the *prakruthi* of an individual.

Keywords: Ayurveda; Antioxidant status; *Prakruthi*; *Vata*; *Pitta*; *Kapha*

INTRODUCTION

Ayurveda is rooted in India's most cherished scriptures known as the Vedas which date to about B. C. 1500. Ayurveda is not only the ancient Indian science of preventative health and healing but also a philosophy of living. Rarely treating the symptoms,

Ayurveda cures by removing the cause of disease by correcting the transgression and retaliating and re-establishing balance to our system. According to Ayurveda, we are composed of three bodies- Physical, Astral and Casual. This translates into body, mind and soul in western terms^[1].

The ancient science of Ayurveda provides guidelines to help us to identify our constitutional nature, enabling us to choose and live wisely in nature. From the three *Dosha's*- *Vata*, *Pitta* and *Kapha*, seven body types are formed. Our body type which is determined at birth by genetic and karmic memory is our constitutional nature or our *prakruthi*. *Vata*, *Pitta*, and *Kapha* are referred to as the *Dha-*

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tus of the body when they are in a balanced state. The *Doshas* are the waste products and thus considered as supporters of the organism or *Dhatus*, while performing their function as they move out of the body. The three *Doshas* are forces, not physical manifestations but when they accumulate, they cause congregation of physical imbalances which they are associated with and this leads to disequilibrium and disease^[1].

Oxidative stress is a metabolic state resulting from overproduction of reactive oxygen radicals and decreased efficiency of antioxidant defenses. Free radicals are continuously threatening living organisms and are generated by endogenic pathways during sequential reduction of molecular oxygen and vital metabolic reactions. They can also be produced by environmental factors like pollution and radiation. Many of them have useful physiological functions, but they can have toxic effects when generated in excess. The toxicity can be aggravated by the presence of transition metal ions. Lipid peroxidation induced by free radical reactions is found to be one of the major causes for cell damage. The body possesses various complex enzymatic as well as non-enzymatic protective antioxidant systems against potentially toxic substances^[2].

Several studies have been done and are still going on in the fields of Ayurveda and oxidative stress, but only few studies have been done correlating these two different fields. In this regard we have attempted a pilot study to establish a relationship between total antioxidant activity (AOA) and different constitutions (*Tridoshas*), cited in Ayurveda.

MATERIALS AND METHODS

Fifty healthy volunteers were randomly selected from a population in Manipal University Campus, located in Karnataka State, South India, during the period between April to July 2006. The study protocol was approved by the institutional ethical committee and informed written consent was obtained from the volunteers.

The study group consists of 20 males and 30 females ranging between the age group 21-55 years. The volunteers were classified into three main human constitutions (*Prakruthi*): *Vata* (*V*), *Pitta* (*P*) and *Kapha* (*K*) and other possible combinations (*VP*, *PK*, *VK*, *PV*, *KP*, *KV*) on the basis of scores obtained in self administered questionnaires consist-

ing of 50 questions which included physical (40%), physiological (30%) and psychological (30%) parameters^[3,4]. These questionnaires were analyzed along with supporting clinical judgement. Two senior Ayurvedic physicians independently determined the *prakruthi* of all the volunteers.

Several methods for serum antioxidant activity (AOA) determination have been developed. Most have been based on reduced production of malondialdehyde/thiobarbituric acid reactive substances (MDA/TBARS). Here we use a very simple and quick method for total AOA measurement in the serum^[5]. The assay measured the capacity of the biological fluids to inhibit the production of TBARS from sodium benzoate under the influence of the free radicals derived from Fenton's reaction. A solution of 1mM/L of Uric acid was used as standard. A standard solution of Fe-EDTA complex reacts with hydrogen peroxide by a Fenton type reaction, leading to the formation of hydroxyl radical. These reactive oxygen species degrade benzoate resulting in the release of TBARS^[6-8]. Antioxidant from the added sample of human fluid (serum) causes suppression of the production of TBARS. This reaction can be measured spectrophotometrically and the inhibition of color development is defined as the AOA.

Statistical analysis was carried out using SPSS package (11.0 version) and statistical significance is indicated by using the superscripts a, b and c for $P > 0.05$, $P < 0.05$ and $P < 0.01$ respectively.

RESULTS

According to questionnaire analysis the distribution of various *prakruthi* was as follows; *Vata* 7%, *Pitta* 82% and *Kapha* 11% (Figure 1). The AOA of different *Prakruthi* is given in Table 1. The AOA was least in the *Pitta Prakruthi* followed by *Vata* and *Kapha Prakruthi*. The AOA was correlated with scores of *V*, *P* and *K*. In the study population it was observed that AOA negatively correlated with *Pitta* score significantly^b ($r = -0.300$). Whereas no significant correlation was found with the scores of other two groups (Table 2). The percentage distribution of population among combination of various three *Doshas* was as follows *VP-5*, *PK-64*, *VK-0*, *PV-20*, *KP-11*, *KV-0* (Figure 2). However, no significant correlation between AOA and scores of possible combinations of various doshas was observed (Table 3).

Table 1 AOA in various *Prakruthi* (Mean ± SD)

<i>Prakruthi</i>	Total Antioxidant activity(mmoles/L)
<i>Vata</i> (n = 4)	1.06 ± 0.26 (0.76 - 1.22)
<i>Pitta</i> (n = 36)	0.97 ± 0.38 (0.26 - 2.10)
<i>Kapha</i> (n = 5)	1.25 ± 0.45 (0.88 - 2.01)

n = sample size, Range in parentheses

Table 2 Correlation of AOA with % scores of all three *Prakruthis*

<i>Prakruthi</i>	Pearson correlation "P" values
<i>Vata</i>	r = 0.205, P = 0.181
<i>Pitta</i>	r = - 0.300 *, P < 0.05
<i>Kapha</i>	r = - 0.078, P = 0.615

* Correlation is significant at the 0.05 level (2-tailed)

Table 3 AOA in various combinations of *Prakruthi* (Mean ± SD)

<i>Prakruti</i>	Total antioxidant activity(mmoles/L)
<i>Vata Pitta</i> (n = 5)	0.99 ± 0.33 (0.76 - 1.22)
<i>Pitta Kapha</i> (n = 28)	0.99 ± 0.42 (0.26 - 2.10)
<i>Vata Kapha</i> (n = 0)	-
<i>Pitta Vata</i> (n = 12)	0.95 ± 0.17 (0.71 - 1.27)
<i>Kapha Pitta</i> (n = 5)	1.25 ± 0.45 (0.88 - 2.02)
<i>Kapha Vata</i> (n = 0)	-

n = sample size, Range in parentheses

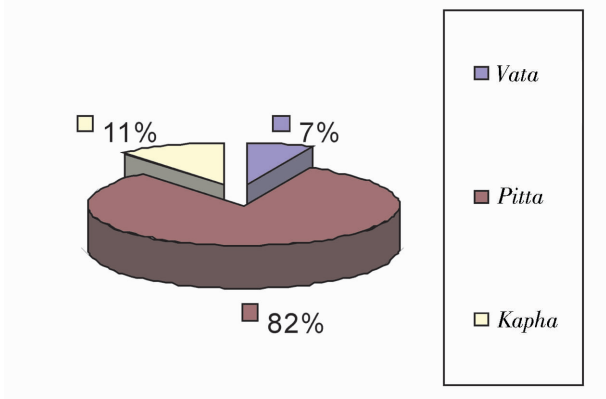


Figure 1 Percentage distribution of various *prakruthi*'s among subjects

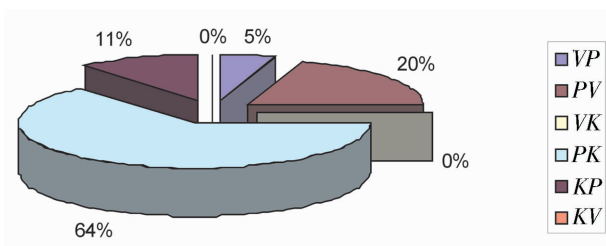


Figure 2 Percentage distribution of different combination of *prakruthi*'s among subjects

DISCUSSION

Prakruthi (constitution) is specific for each individual. It is said to be determined at the time of conception and remains unaltered over the individuals' life time. *Prakruthi* specific treatment, including prescription of medications, diet and life style is a distinctive feature of Ayurveda^[9]. For every individual there is dominance of one *Prakruthi* with the presence of one or both of the other two types^[9]. Antioxidants inactivate reactive free radicals which are spontaneously being produced in the normal physiological process, in our body^[10]. An imbalance in the prooxidant / antioxidant milieu leads to oxidative stress which in turn leads to a number of disorders.

In the present study, the anti oxidant status is low in *Pitta* dominant group. *Pitta* is associated with metabolism, conversion, vision and emotions^[11]. The low levels of AOA in *Pitta* group could therefore be attributed to increased production of free radicals



during metabolism and conversion reaction in our system. Further, *Pitta* dominance followed by *Kapha* has been reported in a constitutional study of cancer patients [12]. It is increasingly proposed that reactive oxygen species (ROS) and reactive nitrogen species (RNS) play a key role in human cancer development [13-17]. Therefore AOA status could be treated as one of the objective parameters for the assessment of *Prakruthi* and would have far reaching implications if validated for human health and administration of antioxidants of Ayurvedic origin. Moreover, Ayurvedic physicians have developed therapeutic measures for revitalization and rejuvenation, traditionally known as “*Rasayana chikitsa*” (rejuvenation therapy). *Rasayana* plants possess potent antioxidant activity [18]. Further, based on the nature/type of *Prakruthi* of an individual customized antioxidant therapy could be designed leading to a fruitful/purposeful lifestyle.

However this preliminary study needs to be carried out in a larger population to give concrete evidence to the concept of antioxidant status in the assessment of *Prakruthi*.

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