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Impact of season and constitution on lipid parameters

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Abstract

Ayurveda prescribes daily and seasonal regimen in maintaining good health. Measures in the preservation of health have been described considering one's own *Prakriti, Satva, Vayas, Bala, Agni, Ojus*, season, and so on. Depending on the relative predominance of *Doshas* in various constitutions and seasons, certain regimens have been prescribed. The present study was done to assess the lipid profile in 54 healthy volunteers. It was observed from the present data that winter month is one of the potential risk factors for cardiovascular diseases because more lipid profile level was observed during winter. Among the constitutions, *Kapha* and *Pitta Prakriti* are more vulnerable for cardiovascular diseases because more lipid profile level is observed in these constitutions during winter.

Key words: Ayurveda, diet, lifestyle, lipid profile, Prakriti, season

Introduction

Ayurveda is the world's oldest recorded healing system; it has been used for 5000 years by many thousands of doctors on billions of patients. Ayurveda recognizes the importance of physical balance, emotional release, mental health, environmental mindfulness, and spiritual progression. In Ayurveda prevention is emphasized over cure. Because *Ayurveda* is an all-inclusive body of knowledge, which uses a low-tech approach to healing, it is a system that can be adapted to all people and climates. Using natural forces, such as heat, cold, light, herbs, food, minerals, exercise, and working with the mind and emotions through meditation, Ayurveda may be the basis of global medicine, which is accessible and affordable to all.[1]

Health is essentially a product of interaction of an individual with his environment. This interaction of the microcosm with the macrocosm takes place on the basis of *Karmas* and genetic make-up of the individuals. A significant proportion of constitutional temperament and health is created by genetic factors and early bringing up. The subsequent health is the outcome of man's life style and environmental influence.[2]

Charaka has said Ayurveda is without beginning and is everlasting.[3] *Sushruta* says that creator has delivered it even before creation.[4] Due to revolution of earth around the sun we experience different types of seasons. The northern and southern movement of sun is mainly by earth's relationship to sun and moon. The northern movement of sun is known as *Adana Kala*, which consists of *Shishira*, *Vasanta*, and *Greeshma*. The southern phase is known as *Visarga Kala* (*Varsha*, *Sharad*, and *Hemanta*). Due to stronger energy level in northern phase the sun sucks moisture from the earth, leaving it dry. The dry wind conjugates with the sun and produces harsh nature. During this half of the year, the body tends to be weakened. In southern phase the sun's energy level begins to wane and more moisture is released into the atmosphere. During southern phase, body gains strength and vitality.[5,6] There is great need of care for rhythmic seasonal variations adhering to appropriate diet and life style.[2]

Prakriti is the inherent characteristic property of an individual; it refers to the genetically determined physical and mental makeup.[7] It is determined by sperm, ovum, season, condition of uterus, food, and regimens of the mother and nature of *Mahabhutas* comprising the fetus.[8] *Prakriti* is mainly classified into *Sharirika* and *Manashika Prakriti*. *Sharirika Prakriti* is also classified into seven types, namely, *Vataja*, *Pittaja*, *Kaphaja*, *Vataja-Pittaja*, *Vataja-Kaphaja*, *Pittaja-Kaphaja* and *Sannipataja*.[7]

The lipid profile is a group of tests that are often carried out together to determine the risk of coronary heart disease. These tests are good indicators of whether someone is likely to have a heart attack or stroke caused by blockage of blood vessels or hardening of the arteries (atherosclerosis). The results of the lipid profile are considered along with other known risk factors of heart disease to develop a plan of treatment and follow-up. Depending on lipid profile results and other risk factors, treatment options

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may involve lifestyle changes, such as diet and exercise or lipid-lowering medications, such as statins. The first step in treating high Low Density Lipoprotein-cholesterol (LDL-C) is targeted at changes in lifestyle – specifically, adopting diets low in cholesterol, saturated fat, and trans-unsaturated fats and participating in moderate exercise. If low-fat diets and exercise are not adequate to lower LDL-C to the target level, drug therapy would be the next step. There are several classes of drugs that are effective in lowering LDL. Very Low Density Lipoprotein (VLDL) is one of three major lipoprotein particles. The other two are High Density Lipoprotein (HDL) and low-density lipoprotein (LDL). Each one of these particles contains a mixture of cholesterol, protein, and triglyceride, but in varying amounts unique to each type of particle. LDL contains the highest amount of cholesterol. HDL contains the highest amount of protein. VLDL contains the highest amount of triglyceride. Since VLDL contains most of the circulating triglycerides and since the composition of different particles is relatively constant, it is possible to estimate the amount of VLDL cholesterol by dividing the triglyceride value (in mg/dL) by 5. At present, there is no simple, direct way of measuring VLDL-cholesterol, so the estimate calculated from triglyceride is used in most settings. This calculation is not valid when the triglyceride is greater than 400 mg/dL. Increased levels of VLDL-cholesterol have been found to be associated with increased risk of heart disease and stroke.[9]

Materials and Methods

For the purpose of the present study 54 volunteers (23 female and 31 male) aged between 18 and 30 years were randomly selected. Prakriti was determined by assessment criteria designed on the basis of *Charaka*,[8] *Sushruta*,[10] and *Vagbhata*.[11] *Prakriti* was categorized as *Vataja (Vata-Pittaja* and *Vata-Kaphaja)*, *Pittaja (Pitta-Vataja* and *Pitta-Kaphaja)*, and *Kaphaja (Kapha-Vataja* and *Kapha-Pittaja)*. Subjects were not using any medication and were nonsmokers and not addicted to any bad habits, which interfere in physiological functions. The volunteers were provided with detailed information concerning purpose and methods used in the study. Written consent was obtained before initiating the study. Institutional Ethics Committee approved the study. Most subjects were students spending average time on study, sports, or daily living activities; none of them were extreme athletes or extremely active in outdoor activities.

Study design

Experiment took place in the month of January–February (*Shishira Ritu*, season I), and all measurements were repeated in the same subjects in the month of May–June (*Greeshma Ritu*, season II) and September–October (*Sharad Ritu*, season III) to assess the seasonal influence on various *Prakriti* individuals with special reference to serum cholesterol (s. cholesterol), serum triglycerides (s. triglycerides), HDL, LDL, and VLDL. These were measured in Clinical Laboratory (Indian medicine) and Centre of Clinical Investigations (CCI), Sir Sunderlal Hospital, Banaras Hindu University, Varanasi. Subjects visited the laboratory in the morning after 10- to 12-h fasting to undergo lipid profile tests.

Statistical analysis

Statistical analysis was carried out by using SPSS (Statistical Package for Social Sciences), Version 16.0. Data was presented as Mean ± SD. All parameters were analyzed by paired *t* test. A *P* value of less than 0.05 was considered statistically significant.

Observations and Results

Effect of season on lipid profile

The present study showed that serum cholesterol, serum triglycerides, HDL, and VLDL are higher in winter (season I) and lower in summer (season III). LDL tends to be higher in autumn and lower in summer season. Study showed serum changes in cholesterol and HDL level statistically significant. Changes were found among all three seasons. Serum triglycerides, LDL, and VLDL showed statistically significant changes between winter versus summer and summer versus autumn [Table 1].

Effect of *Prakriti* (constitution) on lipid profile

In *Vata Prakriti* group, HDL parameters showed statistically significant changes in-between winter and summer. HDL level tends to be higher in winter and lower in summer [Table 2].

In *Pitta Prakriti* group, lipid profile level showed statistically significant changes in all lipid profile parameters between winter and summer. Serum triglycerides, HDL, and LDL showed statistically significant changes between summer and autumn. Serum cholesterol, serum triglycerides, HDL, and VLDL were found to be higher in winter and lower in summer. LDL tends to be higher in autumn and lower in summer season [Table 3].

Kapha Prakriti group also showed statistically significant changes in HDL and VLDL levels between winter and summer. Serum cholesterol level showed significant changes between winter versus summer and summer versus autumn. Serum cholesterol, serum triglycerides, HDL, and VLDL were found to be higher in winter and lower in summer [Table 4].

Discussion

Human being is the conglomeration of five great elements, body tissues, and three humors. Two people are not identical depending on predominance of five great elements and three humors resulting into formation of various physical constitutions, namely, *Vataja*, *Pittaja*, *Kaphaja*, *Dwandwaja*, and *Sama Pakriti* and mental constitutions, namely, *Satva Kaya*, *Rajasa Kaya*, and *Tamasa Kaya*. That's why different individuals respond differently to seasonal changes. Hence Ayurveda prescribes seasonal regimen, daily regimen, regimen according to constitution, and so on, to lead a normal healthy life. Serum cholesterol level tends to be higher in winter than autumn and summer. It may be due to excess intake of food and lack of physical exercises. S. cholesterol, s. triglycerides, and VLDL levels were observed more in winter than autumn and summer and it may be hypothesized that winter is the risk factor for cardiovascular disease and stroke. The significant change of lipid profile indicates the accumulation of *Kapha*. It may be hypothesized that it may be due to drastic temperature variation, life style activities, and changes in metabolic rates. By observing various concentrations of lipid profile we may hypothesize that certain seasons are good for certain *Prakriti* and others are not. Due to heat attribute of *Pitta* the person having predominant *Pitta Prakriti* are intolerant to

Table 1: Showing variations of lipid profile parameters among different seasons

Parameters	Season I Mean±SD	Season II Mean±SD	Season III Mean±SD	Season I vs Season II (paired *t* test)	Season I vs Season III (paired *t* test)	Season II vs Season III (paired *t* test)
Serum cholesterol (mg/dL)	187.94±44.96	150.08±33.14	174.75±32.13	*t*=6.881 *P*=<0.001 (S)	*t*=3.043 *P*=<0.01 (S)	*t*=4.855 *P*=<0.001 (S)
Serum triglycerides (mg/dL)	116.31±35.85	90.79±49.66	106.52±45.99	*t*=3.322 *P*=<0.01 (S)	*t*=1.389 *P*=>0.05	*t*=2.439 *P*=<0.05 (S)
HDL (mg/dL)	40.19±7.73	34.45±6.48	37.45±6.48	*t*=5.321 *P*=<0.001 (S)	*t*=2.163 *P*=<0.05 (S)	*t*=3.793 *P*=<0.001 (S)
LDL (mg/dL)	81.58±22.47	73.77±19.33	83.28±24.50	*t*=2.996 *P*=<0.01 (S)	*t*=0.181 *P*=>0.05	*t*=2.493 *P*=<0.05 (S)
VLDL (mg/dL)	23.23±6.98	17.51±9.00	21.26±9.59	t=4.357 *P*=<0.001 (S)	t=1.451 *P*=>0.05	t=2.719 *P*=<0.05 (S)

HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein; VLDL: Very Low Density Lipoprotein; (S): Significant

Table 2: Showing variations of lipid profile parameters among three different seasons in *Vata Prakriti* group

Parameters	*Vata Prakriti* Group (n=10) (Mean±SD)			Between Group Comparison (Paired *t* test)		
	Season I Jan–Feb	Season II May–June	Season III Sep–Oct	Season I vs II	Season I vs III	Season II vs III
S. cholesterol (mg/dL)	170.57±38.89	139.48±19.67	160.93±31.75	*t*=2.077 *P*=>0.05	*t*=0.976 *P*=>0.05	*t*=2.995 *P*=>0.05
S. triglycerides (mg/dL)	127.70±41.65	98.33±49.29	113.85±57.23	*t*=0.724 *P*=>0.05	*t*=0.40 *P*=>0.05	*t*=0.34 *P*=>0.05
HDL (mg/dL)	35.14±5.19	31.87±5.53	38.60±8.45	*t*=1.792 *P*=>0.05	*t*=0.747 *P*=>0.05	*t*=2.58 *P*=>0.05
LDL (mg/dL)	77.33±19.23	64.87±17.10	77.10±8.13	*t*=3.45 *P*=<0.05 (S)	*t*=0.632 *P*=>0.05	*t*=0.778 *P*=>0.05
VLDL (mg/dL)	21.82±7.30	18.00 ±9.95	2108±12.27	*t*=1.678 *P*=>0.05	*t*=1.028 *P*=>0.05	*t*=0.761 *P*=>0.05

HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein; VLDL: Very Low Density Lipoprotein; (S): Significant

Table 3: Showing variations of lipid profile parameters in three different seasons in *Pitta Prakriti* group

Parameters	*Pitta Prakriti* group (n=24) (Mean±SD)			Between group comparison (Paired *t* test)		
	Season I Jan–Feb	Season II May–June	Season III Sep–Oct	Season I vs II	Season I vs III	Season II vs III
S. cholesterol (mg/dL)	194.38±41.82	144.26±34.42	177.98±34.99	*t*=6.348 *P*=<0.001 (S)	*t*=1.919 *P*=>0.05	*t*=4.23 *P*=<0.001 (S)
S. trigycerides (mg/dL)	116.81±39.90	87.34±50.06	104.66±43.02	*t*=2.445 *P*=<0.05 (S)	*t*=0.813 *P*=>0.05	*t*=1.72 *P*=>0.05
HDL (mg/dL)	41.78±8.60	34.71±5.84	38.06±5.99	*t*=3.87 *P*=<0.001 (S)	*t*=1.88 *P*=>0.05	*t*=2.81 *P*=<0.05 (S)
LDL (mg/dL)	81.60±23.91	71.55±16.03	84.21±30.27	*t*=2.35 *P*=<0.05 (S)	*t*=0.247 *P*=>0.05	*t*=2.44 *P*=<0.05 (S)
VLDL (mg/dL)	23.60±7.94	17.94±9.68	21.15±9.53	*t*=2.558 *P*=<0.05 (S)	*t*=0.759 *P*=>0.05	*t*=1.610 *P*=>0.05

HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein;VLDL:Very Low Density Lipoprotein; (S): Significant.

Table 4: Showing variations of lipid profile parameters in three different seasons in *Kapha Prakriti* group

Parameters	*Kapha Prakriti* Group (n=20) (Mean±SD)			Between-group comparison (Paired *t* test)		
	Season I Jan–Feb	Season II May–June	Season III Sep–Oct	Season I vs II	Season I vs III	Season II vs III
S. cholesterol (mg/dL)	188.88±50.93	160.41±33.76	174.18±29.45	*t*=3.139 *P*=<0.01 (S)	*t*=2.116 *P*=>0.05	*t*=2.20 *P*=<0.05 (S)
S. triglycerides (mg/dL)	117.52±28.76	92.30±51.79	107.01± 49.80	*t*=2.093 *P*=>0.05	*t*=1.16 *P*=>0.05	*t*=1.75 *P*=>0.05
HDL (mg/dL)	40.80±6.88	35.01±7.53	37.28±6.97	*t*=3.35 *P*=<0.01 (S)	*t*=1.43 *P*=>0.05	*t*=1.57 *P*=>0.05
LDL (mg/dL)	83.67±22.97	79.19±22.51	83.67±19.38	*t*=0.892 *P*=>0.05	*t*=0.02 *P*=>0.05	*t*=0.865 *P*=>0.05
VLDL (mg/dL)	23.48±5.75	16.48±8.35	21.45±9.69	*t*=3.253 *P*=<0.01 (S)	*t*=1.141 *P*=>0.05	*t*=2.132 *P*=>0.05

HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein; VLDL: Very Low Density Lipoprotein; (S): Significant.

heat, having hot face, delicate *(Sukumara)*, and fair organs. *Kapha* predominant individuals are having pleasing, delicate *(Sukumara)* and soft organs due to softness (*Mridu*).[8] Seasons influence the aggravation, accumulation, and pacification of humors, which might affect the functions in various constitutions. The level of cholesterol was higher in *Pitta* and *Kapha Prakriti* group as compared with *Vata Prakriti* group in winter. So it may be due to accumulation of *Kapha* in winter. Unctuous nature of *Pitta* may be supporting the aggravation of cholesterol. The serum cholesterol and VLDL levels found more in *Pittta* and *Kapha Prakriti* individuals, respectively. So *Pitta* and *Kapha prakriti* individuals are more prone to heart disease and stroke in winter season.

Conclusion

Season has influence on different physiological parameters. *Pitta* and *Kapha Prakriti* individuals are more sensitive than *Vata Prakriti* individuals. So diet and life style should be modified according to season, especially in *Pitta* and *Kapha Prakriti* individuals. Lipid profile measurement showed statistically significant results in *Pitta* and *Kapha Prakriti* individuals in various seasons. So it may be concluded that seasons influence the aggravation, accumulation, and pacification of humors, which might affect the functions in various constitutions.

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हिन्दी सारांश

रक्तगतमेद के मापदण्डों पर ऋतु एवं प्रकृति के प्रभाव का अध्ययन

प्रमोद कुमार सिंह, परमेश्वरप्पा एस. ब्याडगी, गिरीश सिंह, नरेंद्र शंकर त्रिपाठी

आयुर्वेद में स्वास्थ्य को बनाये रखने के लिए दिनचर्या एवं ऋतुचर्या का विधान बताया गया है । स्वास्थ्य के रक्षण के लिए प्रत्येक की प्रकृति, सत्व, वय, बल, अग्नि, ओज एवं ऋतु इत्यादि साधन बताए हैं । विभिन्न प्रकृति/संगठन और ऋतुओं में दोषों की प्रधानता के आधार पर निश्चित चर्या बताई गयी है । यह शोध ५४ स्वस्थ व्यक्तियों में लिपिड प्रोफाइल को मापने हेतु किया गया । इस शोध में यह पाया गया कि शीतऋतु में रक्तसंवहनगत विकारों के होने का अधिक खतरा या संभावना रहती है क्योंकि शीत ऋतु में लिपिड प्रोफाइल बढ़ा हुआ पाया गया । देह प्रकृति में कफ एवं पित्त प्रकृतिवालों को रक्त संवहनगत विकार होने की अधिक संभावना है क्योंकि इन प्रकृतियों में शीतऋतु में लिपिड प्रोफाइल बढ़ा हुआ पाया गया ।