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RESEARCH ARTICLE

Association of ABO blood group with different constitutional types

Kumari Vandana[1], Brij Mohan Singh[2]

[1]Department of Paediatrics, All India Institute of Medical Sciences, New Delhi, India, [2]Department of Kaumarbhritya/Balroga, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Correspondence to: Kumari Vandana, E-mail: kri.vandana@gmail.com

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ABSTRACT

Background: *Tridosha* and *Prakriti* are the fundamental principles of Ayurveda which forms the basis of individualized approach of Ayurveda for health and diseases. All individuals have the same blood group system, but differences in ABO and Rh gene phenotype are seen across the globe. **Aims and Objectives:** The aim of the study is to find the distribution and the possible association between blood group and prakriti, the Ayurvedic constitutional types**. Material and Methods:** For this study to be carried out, a total of 70 infants were selected. Assessment of *Prakriti* was done using prototype research software relevant to infants' *Prakriti* assessment software. ABO blood group of the infants was obtained, and its incidence was studied in relation with the body constitution. **Results:** The present study we found that blood group B^+ (40.0%) was most prevalent, followed by A^+ (25.7%), closely followed by O^+ (22.9), and then AB^+ (8.6%). It has been found that the incidence of blood group A is more in *Kaphaja prakriti* (41.2%) followed by *Vata-kaphaja prakriti*, blood group B in more prevalent in *Pittaja prakriti* than in *Vata-pittaja prakriti,* and Oblood group was found to be maximum (66.70%) in *Vataja prakriti* infants followed by *Pittaja kaphaja prakriti.* **Conclusion:** The study showed blood group B was found most prevalent blood group. It may be concluded that there exists a relation between ABO blood group and different constitutional types of infants.

KEY WORDS: Blood Group; *Prakriti; Pitta; Vata; Kapha*

INTRODUCTION

In the recent decade, the emphasis on genomic approach has been increased for identification of groups having variations in susceptibility, prognosis, and therapeutic requirement which has led to the development of predictive, personalized, and participatory (P_4) medicine.[1-5]

The Prakriti or the Ayurvedic constitutional type is described to be consequence of the relative predominance of *Doshas,* namely, *Vata*, *Pitta*, *and Kapha* and is influenced by environment during development, ethnicity (Jatiprasakta), familial characteristics (Kulanupatini), and place of origin (Dehaupatini) are also said to influence the body constitution through their effect on *Tridosha* and *Prakriti*.[6,7] One or more than one *Dosha* predominates at the time of conception resulting in seven types of *Doshika prakriti*, namely, *Vataja* (V), *Pittaja* (P), *Kaphaja* (K), *Vata-pittaja*, *Vata-kaphaja* (VK), *Kapha-pittaja*, and *Sama prakriti* (S). The first three *Prakriti* out of seven are considered as extremes exhibiting readily recognizable phenotypes and are more predisposed to certain diseases.[6,8,9]

In the recent decades, with the advent of limitation faced by western medicine such as the need for individualized treatment, potential side effects, and lack of desired therapeutic effectiveness, the traditional system of medicine is being looked on as potential source for

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obtaining possible solutions.[10] Keeping this in mind, there has been shift in paradigm of Ayurveda and significant changes in the outlook of researchers, and studies are being done to understand the application of the basic principles of Ayurveda in modern context. Ayurgenomics is the new branch in the field of research connecting genomics and Ayurveda which helps in understanding the differences between individuals in response to the treatment of various diseases.[11] In this regard, various studies have demonstrated links between Ayurveda *Tridosha* theory and various metabolic systems, and biochemical markers and even some genomic linkage have been found. Evidences are being generated regarding the association between prakriti and various genes which explain their working mechanism.[12,13] In a study involving genome wide (single nucleotide polymorphism), it was found that PGM1 gene was associated with energy production which was more homogenous in Pitta individual than in *Kapha* and *Vata* constitution.[14] Another study by Bhushan *et al*. has suggested link between HLA allele and *Tridosha*-based constitutional types.[15] Blood group antigens such as A, B, and H antigen are present on the surface of red blood cells and numerous other tissues throughout the body, which are formed by certain enzymes synthesized by ABO gene.[16] The blood group antigens remain stable throughout life even though variations in ABO and Rh genes phenotype are widely seen across races and geographical areas.[17-19]

The ABO blood group system was the first polymorphism in genetics discovered in human being.[20] Due to the importance of ABO blood group system in transfusion medicine and organ transplantation,[21] it has been immensely studied in relation to various diseases. Recent studies have suggested association between ABO blood group inflammatory markers and risk of various diseases such as cardiovascular diseases.[22-25] Some studies have shown that specific *Prakriti* individual shows specific grouping according to anthropometric measurements and biochemical parameters or blood groups.[26,27] Therefore, this study was conducted to evaluate the correlation between blood group and *Prakriti* of infants.

MATERIALS AND METHODS

A total of 70 indoor infants were randomly selected in the study from Sir Sunderlal Hospital, Varanasi, Uttar Pradesh after getting the Ethical Committee Clearance from Institute of Medical Sciences, Banaras Hindu University having ECC No. 2014-15/EC/1338.

Written informed consent was obtained from the parents after considering inclusion and exclusion criteria.

Inclusion Criteria

Healthy indoor baby irrespective to sex was registered after birth.

Exclusion Criteria

Infants having abnormal perinatal history such as abnormal gestational maturity, low birth weight (LBW), and very LBW or suffering with any congenital birth defects or any systemic disorders were excluded from the study.

Prakriti of all the registered infants was assessed at registration and on subsequent follow-ups up to 6 months using "prototype research software relevant to infants' *Prakriti* assessment" software,[28] and infants were divided into groups according to their body type.

Blood Grouping

Harvey and David, 2005.[29] The blood samples were obtained from the healthy infants of mean age 3 days after their birth by heel prick method**.** The blood group was determined by antigen agglutination test using commercially available standard antisera, i.e., anti-A, anti-B, and anti-D (manufactured by BioTec Laboratories, UK).

Statistical Analysis

The data collected were tabulated using Microsoft Excel 2010 and were analyzed using statistical software SPSS 16.0 version.

RESULTS

In this study, of total 70 infants, 51.4% were male while 48.5% were female. Among them, 80% infants were delivered by cesarean section) while 20% were delivered by spontaneous vaginal delivery [Table 1].

We found that in ABO blood groups, the blood group B^+ (40.0%) was most prevalent, followed by A^+ (25.7%), closely followed by O^+ (22.9), and then AB^+ (8.6%). The incidence of each blood group was computed and is shown in Table 2.

The present study has suggested that incidence of blood group A^+ is more in *Kaphaja prakriti* (41.2%) followed by VK *prakriti* (33.33%) and *Pitta-kaphaja prakriti*. The scenario with B^+ was different with the highest prevalence in *Pittaja prakriti* followed by *Vataja pittaja* and *Pitta-kaphaja prakriti*. None of the infant was of blood group AB^- and O^-. These findings showed no statistical significance variations among the various tested *prakriti.*

DISCUSSION

The prevalence of different blood group as found in our study is in the order of B^+, A^+, O^+, and AB^+, respectively. On analyzing the blood group with respect to *prakriti* types, association was noticed between blood group type A with *Kapha* individual and VK *prakriti* while the blood group B was found more prevalent in, especially *Pittaja prakriti.*

Table 1: Percentage distribution of infants according to sex and mode of delivery in various *Prakriti*

Prakriti (*n*=70)	Sex		Mode of delivery	
	Male (*n*=36)	Female (*n*=34)	CS (*n*=56)	SVD (*n*=14)
V (*n*=3)	0.0	100.0	33.3	66.7
P (*n*=6)	33.3	66.8	100.0	0.0
K (*n*=16)	64.7	35.3	87.5	12.6
VP (*n*=7)	57.1	42.8	100.0	0.0
VK (*n*=12)	50.0	50.0	58.3	41.7
KP (*n*=26)	52.0	48.0	80.0	20.0
Total (*n*=70)	51.4	48.5	80.0	20.0

CS: Cesarean section, SVD: Spontaneous vaginal delivery, VP: *Vata-Pittaja,* VK: *Vata-Kaphaja,* KP: *Kapha-Pittaja*

Table 2: Distribution of blood groups (in percentage) in different *Prakriti* infants

Prakriti (*n*=70)	A^+	A^-	B^+	B^-	AB^+	O^+
V (*n*=3)	33.3	0.0	0.0	0.0	0.0	66.7
P (*n*=6)	0.0	0.0	66.6	0.0	16.7	16.7
K (*n*=16)	41.2	5.8	29.4	0.0	11.8	11.8
VP (*n*=7)	14.3	0.0	57.1	0.0	14.3	14.3
VK (*n*=12)	33.3	0.0	25.0	8.3	16.7	16.7
KP (*n*=26)	20.00	0.0	48.0	0.0	0.0	32.0
VPK (*n*=0)	0.0	0.0	0.0	0.0	0.0	0.0
Total (*n*=70)	25.7	1.40	40.0	1.4	8.6	22.9

VP: *Vata-Pittaja,* VK: *Vata-Kaphaja,* KP: *Kapha-Pittaja*

Blood type is determined by the presence of certain protein such as glycolipid and glycoprotein on the surface of red blood cells and numerous other tissues throughout the body.[16] ABO blood group is the most important system in blood transfusion being the only one among the blood group systems in which the antibodies are consistently and predictably present in the serum of normal person whose red cell lacks the antigen.[21,30]

The frequencies of blood groups vary with geographical areas, and even small variations may be seen in different areas of a small country reflecting the ethnic and genetic diversity occurring within population.[17-19,31] For example, the most common blood groups as reported in Australians are O and A while in Africans B group.[32] On the other hand, the blood group O and A are most prevalent group in people of Egypt and Russian Federation, respectively.[33,34] Similar studies from South India showed that blood group O was most common (38.75%) blood group, followed by group B (32.69%), group A (18.85%), and AB (5.27%).[35] Similarly, Karnataka and Jammu and Kashmir showed blood group O as the most common type.[36,37]

We found in our study that blood group B^+ was most common, which is similar to the study done by Chandra *et al*., and both the study has represented Uttar Pradesh population.[38]

Ayurveda is based on the fundamental concept of *Tridosha*, and living organism, disease, diet, drug, as well as environment have been described in terms of doshic component. Each *dosha* has distinct properties and functions. For example, *Vata* is responsible for cell shape, cell division, signaling, movement, etc., and *Pitta* is primarily responsible for metabolism, thermoregulation, energy homeostasis, pigmentation, vision, etc. On the other hand, *Kapha* is responsible for growth and maintenance of all structures, storage, and stability.[6] These three *doshas* combine in different proportion at the time of fertilization, leading to formation of seven types of *Prakriti,* the Ayurvedic constitutional types which are also influenced by environment during development including maternal lifestyle and diet.[7-9]

A study carried out by Rotti *et al.* (2014) has shown the similar distribution of A^+ and B^+ blood group in *Kaphaja* and *Pittaja prakriti* individuals, respectively.[39]

The finding of our study showed that blood group A is found in more in *Kapha* individual. In other study, it was found that ABO blood group has been associated with plasma lipid levels, and particularly, the A blood group has been noted to have higher levels of serum total cholesterol and low-density lipoprotein cholesterol.[40,41]

In the present study, it was found that blood groups AB and A were more evident in *Kaphaja* and VK individual. Interestingly, individuals with VK and *Kaphaja prakriti* are at increased risk of cardiovascular disease such as coronary artery disease as it was found that VK body type and *Kapha* body type had higher levels of inflammatory markers such as IL6, TNF alpha, hsCRP, and HOMA IR which were associated with risk of cardiovascular disorders.[27] Hence, it can be seen that associations between ABO blood group and coronary heart disease (CHD) risk can be correlated with the *Prakriti* (body constitution). A recent study reported that non-O blood group has increased risk of cardiovascular disease compared with O blood group with significantly elevated risk of the incidence of CHD in individuals with blood group A or B or AB, compared with those with blood group O with blood group AB having the highest risk, followed by blood groups B and A. However, significant associations were not found on restricting the analysis to the prospective cohorts.[22,42]

In our study, we found blood group B was prevalent in *Pittaja prakriti*. It is well known fact of Ayurveda that similar *prakriti* individual is more prone to similar doshika disorders such as Pitta individuals which are more prone to develop *Pittaja* diseases such as fever and jaundice.[8] While a study has reported the role of ABO blood group in malaria with blood group B having 4 times more risk of developing the severe infection.[13] The limitation of the study is that it has been carried out in smaller population involving only infants, and relation of Rh blood group was not compared.

CONCLUSION

Blood group B is the most prevalent blood group among the infants. It may be concluded that there exists a relation between ABO blood group and constitutional types of infants.

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