

A Pilot Study of Correlation between Intelligence Quotient, Social Quotient, and Ayurveda Parameters in Children

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ABSTRACT

Background: Intelligence quotient (IQ) and social quotient (SQ) are comparable in predicting intelligence status. The latter is assessed whenever IQ testing is not possible. According to Ayurveda, Buddhi (intelligence) is affected by Prakriti (body constitution) which depends on the predominance of Tridosha and Triguna. There is a paucity of studies to examine their association. The study was designed to examine correlation among IQ, SQ, performance quotient (PQ) and maladaptive behaviour; and to find out their relationship with primary (Anubandhya) and secondary (Anubandha) doshas with intelligence in children with mild to moderate intellectual disability. **Methodology:** Children ($n = 120$) were recruited from outpatient department of a tertiary care hospital as part of a clinical trial of a novel Ayurveda formulation. Stanford Binet Scale, Vineland Social Maturity Scale, Seguin Form Board Test, and Maladaptive Behavior Schedule-II were administered. Ayurvedic parameters were assessed clinically by Ayurveda practitioner. Separate regression analyses were carried out to look for associations. **Results:** IQ and SQ were positively correlated ($P = 0.01$). Maladaptive behavior and SQ were negatively correlated (0.05). SQ was associated with secondary dosha ($P = 0.002$) and stage of disease (Roga Kriyakala) ($P = 0.015$). IQ was also associated with secondary dosha ($P = 0.008$). **Conclusion:** SQ and IQ are positively correlated. The correlation of Anubandha (secondary) dosha was high on IQ and SQ.

Key words: *Dosha, intelligence quotient, maladaptive behavior, performance quotient, Prakriti, social quotient*

INTRODUCTION


Intelligence is the key to the survival of all living creatures to deal with day-to-day challenges.

A widely accepted definition of mental retardation (MR) is “significantly subaverage general intellectual

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functioning existing concurrently with difficulty in adaptive behavior and manifested during the developmental period.^[1] It is a disorder which may be present from birth or begin during developmental period before age of 18 years. Thus, only those children who demonstrate deficits in both intelligence (measured by specified intelligence quotient [IQ] tests) and adaptive behavior are classified as being mentally retarded.^[2] Children with mild degree of MR are diagnosed at school age whereas other severe degrees of retardation may be diagnosed much earlier.^[3] The impact of this disorder on society is enormous in terms of financial cost, stress, and other personal and social complications.

It is important to assess IQ to offer the best help to children who cannot cope with regular school. While assessing IQ, it is desirable to assess social functioning and adaptive behavior by means of the social quotient (SQ) as an index of social maturity. Social intelligence involves one's ability to understand and interpret social situations as well as interact appropriately.^[4] Significant correlation is reported between measures of social maturity and IQ.^[5] Comparing IQ and SQ may suggest whether they can be used interchangeably and save effort and time for children who cannot cooperate for specific IQ tests.

Wardlaw in his doctoral thesis, compared social maturity and intelligence of nursery school children.^[6] Intelligence was measured by Revised Terman Binet Intelligence Form L and social maturity by Vineland Social Maturity Scale (VSMS). There was no significant correlation between the two. However, it was suggested that social maturity fluctuated depending on the intelligence level. In a study in India, reporting effect of diarrhea on children, it was suggested that there was a trend to correlation between lower SQ ($P = 0.09$) and significantly lower IQ ($P = 0.04$) in children.^[7]

Ayurveda has described bodily constitution (physical Prakriti), psychological constitution (psychological Prakriti), and predominance of dosha to understand and describe individual health status and intelligence-like characteristics. According to Ayurveda, MR is termed as "Manasa Mandata" and is considered as mental deficiency.^[8] In Manasa Mandata, the normal development of mental abilities is affected and the condition is present in the child by birth.^[9] Thus, this condition can be equated with MR.

Ayurveda defines health as a state of total biological equilibrium, where the biological humors (Dosha-Vata, Pitta, Kapha), metabolism (Agni), bodily tissues (Dhatu), functions of excretion, sensory, mental, emotional, and spiritual elements are harmoniously balanced.^[10] Predominance of any specific Prakriti (body constitution)

depends on the predominance of Tridosha, namely, Vāta, Pitta and Kapha (at physical level) and Triguna, namely, Sattva, Raja, and Tama (at psychological level).^[8] Assessment of constitution is necessary to understand the physical and psychological nature of the individual since these humors govern biological, psychological, physiological as well as pathological changes within the individual.^[11]

In Manasa Mandata, these elements, which indicate organic function of mind, are said to be affected. Intelligence is one of the important functions of mind along with eight essential psychological factors (Manovaha Srotas) which are negatively affected in various ways in all psychiatric disorders.^[12] They are mind (Manas), cognition (Buddhi), memory (Smriti) orientation and responsiveness (Samjna jnana), devotion (Bhakti), habits (Sheela), psychomotor activity (Chesta), and conduct (Achara).^[12] Primary dosha Anubandhya is the dosha which gets vitiated first, which is independent and has symptoms manifested with described etiology and explained remedy. Secondary dosha (Anubandha) is the dosha which demonstrates characteristics contrary to Anubandhya dosha.^[13]

Manasa mandata is said to be due to vitiated doshas affecting the mind, especially if the MR is manifested because of organic causes. Extreme constitutional types (Prakriti) in normal individuals show differential disease predisposition.^[14] Cardiovascular risk factors, inflammatory markers, and insulin resistance in patients with coronary artery disease were observed to be strongly related to Prakriti.^[15] A study on patients with rheumatoid arthritis using the "ayurgenomics" approach validated the concept of Prakriti.^[16] However, the authors have not come across any studies comparing Ayurvedic parameters with different measures of intelligence.

According to Ayurveda, manifestation of disease occurs in six stages (Roga Kriyakala) beginning with exposure to etiological factors to complete manifestation with full blown symptoms. They are accumulation of dosha (Sanchaya), vitiation of dosha (Prakopa), spread of dosha (Prasara), localization of dosha (Sthan Samshray), stage of clinical manifestation (Vyakta), and stage of complications (Bheda).^[11] Manasa mandata in children is considered as mental deficiency which is present from the time of birth, with symptoms of subnormal functions of mind.^[17] Hence, it is in the considered in the stage of clinical manifestation (Vyakta). Determination of phase of disease is important for treatment.^[18]

In the present study, we investigated the relationship between IQ, SQ, and performance quotient (PQ) as well

as the relationship of Ayurveda parameters (Prakriti) and maladaptive behavior of children who have intelligence lower than average (moderate to mild categories).

METHODOLOGY

Children with MR of mild to moderate severity, who participated in a research project “Clinical Evaluation of Ayurvedic Coded Drug (AYUSH MANAS) in the management of Manasa Mandata (MR)” funded by Central Council for Research in Ayurveda Sciences, Ministry of AYUSH, Government of India, at the Department of Psychiatry of a major teaching hospital in North India formed the sample for this study.

Children and parents attending psychiatry outpatient department and referred by the treating clinician for IQ assessment were informed about the study and if the parent and child agreed to participate were referred to research personnel for screening. They were also assured that nonparticipation would not affect their care in any way. Those who agreed provided written informed consent and all children provided assent to the extent possible. Following instruments were administered on children.

Instruments used

Hindi version of Stanford–Binet Intelligence Scale (SBIS) Third Revision^[9] for IQ: the scale assesses intelligence and cognitive abilities in children with the age norms of 2 years 6 months to 18 years.

VSMS Indian Adaptation^[19] measures social age and SQ and provides the SQ. It also indicates the social deficits and social assets of a growing child.

Behavioral Assessment Scale for Indian children with MR, Maladaptive Behavioral Scale (MBS) part B: This is a scale, used to assess behavioral problems in children with MR. This scale is divided into two parts. Part A deals with skill behaviors and has seven domains with 280 items. Part B deals with problem behavior and consists of 10 domains with 75 items. The information on the scale is collected through direct observation of the child and by interviewing parents.^[20]

Seguin Form Board Test (SFBT): It is a quick measure of general intelligence in children between 3 and 11 years and yields the PQ.^[21]

Ayurvedic parameters: We used a specific objective scale developed by the Central Council for Research in Ayurvedic Sciences – CCRAS-for assessing parameters such as primary dosha (Anubandhya) and secondary

dosha (Anubandha), stage of the disease (roga kriyakala), and psychological factors (Manovaha Srotas). This questionnaire consists of 57 items related to physical, physiological, and psychological features of the child. Prakruti of each child was determined based on physical, physiological, and psychological characteristics observed in the child as per predominance of doshas^[22] as judged by Ayurveda physician (AB). Manasika prakruti was determined as per the predominance of psychological features Satwika, Rajasika, and Tamasika characteristics.

Procedure

The study was carried out at a large tertiary care free government postgraduate teaching hospital from February 2010 to March 2014. All children were examined using SBIS and only those who scored between moderate and mild level of intellectual functioning (IQ: 36–69) were included in the study. Each child was also evaluated on the other three tests in the presence and with help of parents. All scales were administered by a single clinical psychologist (S).

All participants were examined as per Ayurvedic parameters such as doshaja prakruti (body constitution on basis of tridosha), manasika prakruti (psychological constitution on basis of triguna), anubandhya (primary dosha), and anubandha dosha (secondary dosha), doosha involved (body component which gets afflicted by dosha) roga kriyakala (stage of the disease) and Manovaha Srotas (psychological factors) in a special format developed by CCRAS. Excess of at least five characteristic features was considered for estimating the predominance of dosha in the child. These evaluations were carried out by a single Ayurveda physician.

Statistical analyses

Descriptive statistics was used for different Ayurveda as well as psychological parameters. Pearson’s correlation was computed to examine relationship between various measures of intelligence. Regression analyses were used to look for association of prakriti variables with various intelligence scores. We used Statistical Package for Social Sciences (SPSS v21)(IBM Corp, Released 2012).^[23]

RESULTS

A total of 120 (78 boys and 42 girls) children aged between 6 and 13 years participated in the study. Demographic variables of the sample are described in Table 1 in addition to means of Ayurvedic parameters and intelligence scores as measured by different tests. There was no statistically significant difference between the two sexes on IQ, SQ, and PQ although there were more boys than girls in the study. There was no gender

difference on maladaptive behavior also. There was no significant difference between males and females on prakriti, doshas, and intelligence scores.

Association of IQ and SQ with Ayurveda parameters: Separate regression analyses were carried out to study association of Ayurveda parameters and IQ scores as measured by VSMS and SBIS tests. IQ and SQ scores were taken as dependent variables and age, gender, doshas, and prakriti as independent variables. Only significant variables are presented in Table 2. VSMS scores were associated with Anubandha dosha ($P = 0.002$) and state of disease ($P = 0.015$). SBIS scores were also associated with Anubandha dosha ($P = 0.008$). Lesser the score on VSMS or SBIS, greater was the Anubandha dosha. There was significant negative association between SFBT and manasika prakriti ($P = 0.020$) suggesting higher score on mansika prakriti were associated with MR (low scores on SFBT). However, scores on maladaptive behavior checklist were not associated with any of the doshas.

Correlation between IQ, SQ, and maladaptive behavior: The IQ and SQ scores on MBS and PQ were considered as variables and correlation among these were computed [Table 3]. There was positive correlation between scores on MBS with SBIS ($r = 0.567$, $P = 0.0001$) and negative correlation with VSMS ($r = -0.212$, $P = 0.02$). SBIS scores showed positive correlation with SFBT scores ($r = 0.302$, $P < 0.01$) and positive correlation with VSMS scores ($r = 0.567$, $P = 0.0001$). As the SQ decreased, the maladaptive behavior scores increased. If the child scored high on SBIS, she/he scored high on SFBT and VSMS also suggesting increase in IQ denoted increase in SQ as well as PQ.

DISCUSSION

In the present sample, there was no significant difference between male and female participants with mild to moderate MR on any of the intelligence tests and Ayurveda parameters. This is in accordance with reports that males and females do not differ on IQ and SQ measured by any test.^[24]

Maladaptive behavior scores were positively correlated with IQ on SBIS and negatively correlated with SQ on VSMS. SBIS was positively correlated with both PQ on SFBT and SQ on VSMS; hence, the VSMS scores decreased as maladaptive behavior increased. Thus a child with greater social maturity could show less maladaptive behavior. This could be due to the child learning acceptable behavior in the process of social maturation. If the child scored high on SBIS, she/he had similarly high score on

Table 1: Demographic variables, Prakriti, Dosha, and intelligence scores

| Variable | Means±SD | | F | P |
|-----------------------|--------------|---------------|-------|-------|
| | Male (n=78) | Female (n=42) | | |
| Age (years) | 9.85±2.075 | 9.79±1.982 | 0.029 | 0.865 |
| IQ | 48.57±8.559 | 49.15±9.467 | 0.110 | 0.741 |
| SQ | 59.40±11.797 | 58.98±14.861 | 0.630 | 0.865 |
| Maladaptive behaviour | 14.58±10.916 | 13.02±8.767 | 0.138 | 0.429 |
| PQ | 56.62±14.873 | 57.81±12.983 | 0.138 | 0.711 |
| Sareera prakriti | 5.38±0.996 | 5.43±0.887 | 0.057 | 0.811 |
| Manasika prakriti | 5.95±0.357 | 5.93±0.261 | 0.104 | 0.748 |
| Anubandhya dosha | 1.10±0.444 | 1.40±1.211 | 3.907 | 0.050 |
| Anubandha dosha | 2.87±0.671 | 2.83±0.581 | 0.098 | 0.755 |
| Dushya | 1.00±0.001 | 1.10±0.617 | 1.871 | 0.174 |
| State of the disease | 5.00±0.001 | 4.90±0.617 | 1.871 | 0.174 |

SD – Standard deviation; IQ – Intelligence quotient; SQ – Social quotient; PQ – Performance quotient

Table 2: Association of Doshas with different measures of intelligence (significant variables only)

| Dependent variable | Independent variables | B | Level of significance | CI: Lower-upper |
|--------------------|-----------------------|--------|-----------------------|-----------------|
| SQ | Anubandha dosha | -0.275 | 0.002 | -9.075--2.027 |
| | State of the disease | -0.217 | 0.015 | -13.840--1.505 |
| IQ | Anubandha dosha | -0.248 | 0.008 | -5.851--0.915 |
| PQ | Manasika prakriti | -0.251 | 0.020 | -17.079--1.533 |

IQ – Intelligence quotient; SQ – Social quotient; PQ – Performance quotient; CI – Confidence interval

Table 3: Correlation among scores on different measures of intelligence and maladaptive behavior scale

| | MBS correlation coefficient (P) | SBIS score | SFBT score | VSMS score |
|------------|---------------------------------|----------------|----------------|------------|
| MBS score | 1.00 | - | - | - |
| SBIS score | 0.567 (0.0001) | 1.00 | - | - |
| SFBT score | -0.027 (0.774) | 0.302 (0.005) | 1.00 | - |
| VSMS score | -0.212 (0.020) | 0.567 (0.0001) | 0.389 (0.0001) | 1.00 |

MBS – Maladaptive behavioral scale; SBIS – Stanford–Binet Intelligence Scale; SFBT – Seguin Form Board Test; VSMS – Vineland Social Maturity Scale

SFBT and VSMS. When a child scores high on one measure of intelligence, the score increases on other measures too.^[5] While it suggests that SQ test could be a substitute where detailed IQ tests cannot be carried out, results need to be replicated in much larger samples. This could make disability benefits available to children who cannot undertake IQ tests since IQ assessment is mandatory for disability certification in India.

Intelligence scores measured by different intelligence scales were associated with Anubandha dosha and state of disease. Scores on SBIS were associated with Anubandha dosha while SFBT was associated with manasika prakriti. Thus, predominance of a specific dosha may be associated with intellectual functioning even in those who are mentally retarded. Tridosha, the

biological humors are said to govern psychobiological and physiopathological changes in the body. Vitiated doshas may produce negative behavioral qualities in persons. Knowledge about involvement of primary and secondary dosha helps in understanding the condition better.

The deha prakriti and temperamental (mansika prakriti) types of body depending on the doshas help in diagnosis and treatment of illnesses and could help in designing suitable preventive approaches against various illnesses, in better understanding of the illness and defining prognosis. Manifestation of disease, severity, and prognosis is closely related to both deha prakriti and mansika prakriti. Association of state of disease, i.e., signs of clinical manifestation from Ayurveda with SQ shows that social maturity is an index of extent of the problem present in MR. Maladaptive behavior was not found to be associated with any of the doshas. The reason for this could be that the maladaptive behavior is acquired behavior, which child learns from environment, family, and peers. Through proper parenting and teaching skills, this can be addressed.

CONCLUSION

This pilot study attempted to reexamine previously reported correlation between intelligence, social development, and maladaptive behavior. It is the only study we know of, which examined various Ayurveda parameters with IQ and SQ in a pilot sample. While IQ and SQ were correlated among themselves and with Anubandha dosha and manasik prakriti, they were not correlated with maladaptive behavior scores. Limitations of our study were that the sample size was small and restricted to those with mild or moderate retardation only. Girls were much fewer although there were no significant differences between the sexes on any scores.

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Conflicts of interest

There are no conflicts of interest.

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