Original Research Article

Assessment of multiple factors affecting intelligence quotient of children of rural and urban areas of Rajasthan, India

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ABSTRACT

Background: Children are the future of our country and hence their mental and physical wellbeing should be our upmost priority. Undernutrition is a major public health problem in our country and is one of the most common reasons for morbidity and mortality in children under 5yrs of age. The first few years of life are particularly important because vital development occurs in all domains. Therefore, this study has aimed to study the Intelligence Quotient (IQ) of the children of the age group 3-5 in urban and rural areas and study the factors associated with it.
Methods: A cross section study of the children group of population was performed. Two sections of the children group were taken for the study- children population residing in an urban area and children population residing in a rural community of Rajasthan, India. The data was compiled and analyzed using appropriate statistical methods.
Results: In our study, we have found that The following chosen demographic factors were found associated with children Intelligence quotient (IQ) - nutritional status, socioeconomic status, and age, while gender was not found to be associated with IQ.
Conclusions: As, cognitive development is fairly important to children and their future, it should be paid more acknowledgment, as well as early preventive methods of it's associated factors.

Keywords: Children, Intelligence, Quotient

INTRODUCTION

It is found that more than 200 million children under 5 years fail to reach their potential in cognitive development because of poverty, poor health and nutrition, and deficient care.[1]

It is by now well established that children of the world's less developed countries (LDCs) living in disadvantaged environments play deficits in cognitive development. Children are the future of our country and hence their mental and physical wellbeing should be our upmost priority. Undernutrition is major public health problem in our country and is one of the most common reasons for morbidity and mortality in children under 5 years of age. The first few years of child development are extremely crucial. The initial years is of rapid brain development, brain develops through neurogenesis, axonal and dendritic growth, synaptogenesis, cell death, synaptic pruning, myelination, and gliogenesis. These ontogenetic events happen at different times and build on each other, such that small perturbations in these processes can have long-term effects on the brain's structural and functional capacity.[2]

It is fairly seen that in developing countries, national statistics on children's cognitive or social-emotional development are not available although it is of extreme

value. This study is aimed to evaluate and study the cognitive function via the Intelligence quotient and study the factors leading to a significantly low IQ in those children.

There have been multiple researches that demonstrated the role of breakfast; they demonstrated that breakfast influences specific components of cognitive function, including concentration level 3, school performance, attention, and memory.[4-12] Further, it was found that the type of breakfast consumed by Japanese children and adolescents can be linked to brain gray and white matter volumes and IQ.[13] Childhood is a critical period in which dietary and lifestyle patterns are initiated, and these habits can have important immediate and long-term implications.[14]

Therefore, this study has aimed to study the Intelligence Quotient (IQ) of the children of the age group 3-5 in urban and rural areas and study the factors associated with it.

METHODS

A cross section study of the children group of population was performed. Two sections of the children group were taken for the study- children population residing in an urban area and children population residing in a rural community of Rajasthan, India. Inclusion criteria of the study was children of the age group- 3 - 5 year old, also those whose parents gave a valid verbal consent. Exclusion criteria was children aged below 3 years and above 5 years old and those whose parents did not provide a consent. The sample size of the study was 200- 100 participants from the urban area and 100 participants from the rural area.

The urban area selected for the study was- Jodhpur, Rajasthan, India and rural area selected was Barmer, Rajasthan, India. The population was contacted in urban and rural Anganwaadis'. A valid verbal consent was taken from each parent of the participant of the study before the data collection and the forms were filled by non disclosure of the participant. Several factors including nutritional status, gender, age and socioeconomic status were taken into consideration to find the root cause of below average Intelligence quotient (IQ) in children. For assessment, there was a complete head to toe examination, weight and height measurement taken to access nutritional status. A form was used for data collection which included demographic information

and socioeconomic status. For Intelligence quotient (IQ), good enough draw a man test was used. Limitations of the study were- small sample size. The sampling technique used was purposive. The data was compiled and analysed using Google Spreadsheets. A null hypothesis was formed with no association taken into consideration and Chi-square values and P- value was calculated to find the possible association between the decided factors. The confidence interval taken for P-value is 95% with 0.05 level of significance. Values corresponding <0.05 are found significant, the null hypothesis stands void and the factors are found to be associated for 95% confidence level.

RESULTS

After data analysis the following results were obtained. Initially, the distribution of various selected factors of the demographic factors population was studied. Initially, the demographic of distribution of age group was taken. Out of the total 200 participants of the study- 49.5%, 22%, 57% children belonged to the 3 year old, 4 year old, 5 year old age groups respectively (Table 1).

The next demographic factor studied was the distribution of gender in the study, both rural and urban areas had male predominance. In the study, 30.5% were females and 69.5% were males (Table 2). The next factor demographic factor studied was the socioeconomic status of the family. Majority of the families of the urban as well as the rural area belonged to a lower middle class group (Table 3).

Table 1: Distribution of children according to age groups.

Age group	Community	
	Urban	Rural
3 year old	56 (56%)	43 (43%)
4 year old	17 (17%)	27 (27%)
5 year old	27 (27%)	30 (30%)
Total	100	100

Table 2: Distribution of children according to gender.

Variable	Gender		Total
	Female	Male	
Urban	29 (29%)	71 (71%)	100
Rural	32 (32%)	68 (68%)	100
Total	61	139	200

Table 3: Distribution of economic status of the population in urban and rural area of the study.

Variable	Socio economic status					Total
	Upper class	Upper middle class	Middle class	Lower middle class	Lower class	
Urban	0 (0%)	3 (3%)	24 (24%)	63 (63%)	10 (10%)	100
Rural	1(1%)	5 (5%)	36 (36%)	52 (52%)	6 (6%)	100

Table 4: Distribution of children according to nutritional status.

Variable	Nutritional status			Total
	Well-nourished	Acute nourished (at risk)	Under- nourished	
Urban	27 (27%)	67 (67%)	6 (6%)	100
Rural	11 (11%)	63 (63%)	26 (26%)	100

The next factor studied was the nutritional status of the children, majority of the children of both rural and urban areas were acutely nourished, while more children in the urban area were well nourished and more children in the rural area were found Under- nourished (Table 4).

Further, Intelligence quotient (IQ) status of the children was studied. In both urban and rural area, IQ of the children was found in majority of the population, while 17% of urban population and 15% of rural population had below average IQ (Table 5).

Table 5: Distribution of children according to Intelligence Quotient (IQ) status.

Variable	IQ status		Total
	Normal	Below average	
Urban	83(83%)	17(17%)	100
Rural	85(85%)	15(15%)	100
Total			200

Table 6: Association between Intelligence Quotient (IQ) status and nutritional status.

Nutritional status	IQ status		Total
	Below average	>= average	
Normal	10	90	100
Under-nutrtion	55	45	100
Total	100	60	200

Table 7: Association of Intelligence Quotient (IQ) status and age group of the children.

Age	IQ status		Total
	Below average	>= average	
3 Year	71	28	99
4 year	20	24	44
5 Year	25	32	57

Further, association between Intelligence Quotient (IQ) status and age group of the children was studied. A null hypothesis was formed indicating no association between the factors, after statistical analysis, Chi-square test found was 15.1684, and the p-Value found was 0.00508. As, p-value found was <0.5, the null hypothesis stands void and there is a positive association between Intelligence Quotient (IQ) status and the age group of the children found (Table 7).

Further, association between Intelligence Quotient (IQ) status and gender of the children was studied. A null hypothesis was formed indicating no association between the factors, after statistical analysis, Chi-square test found was 0.3933, and the p-value found was 0.53074. As, p-value found was >0.5, the null hypothesis stands and there is no association between Intelligence Quotient (IQ) status and the gender the children found (Table 8).

Table 8: Association of Intelligence Quotient (IQ) status and gender of the children.

Gender	IQ status		Total
	Below average	>= average	
Male	20	41	100
Female	52	87	100
Total	100	60	200

At last, association between Intelligence Quotient (IQ) status and socioeconomic status of the children's family was studied. A null hypothesis was formed indicating no association between the factors, after statistical analysis, Chi-square test found was 15.055, and the p-Value found was 0.004587. As, p-value found was <0.5, the null hypothesis stands void and there is a positive association between Intelligence Quotient (IQ) status and the socioeconomic status of the children's family found (Table 9).

Table 9: Association of Intelligence Quotient (IQ) status and socioeconomic status of the children's family.

Socio-economic status	IQ status	
	Below average	>=average
Upper class	0	1
Upper middle class	2	6
Middle class	40	20
Lower middle class	45	70
Lower class	7	9

DISCUSSION

In this study, authors have found that the following chosen demographic factors were found associated with children Intelligence quotient (IQ) - nutritional status, socioeconomic status, and age, while gender was not found to be associated with IQ (Table 10) Since, in developing countries it is extremely important to have sustainable future, it is important that children of the

country are growing with healthy cognitive capabilities. this study is consistent with other studies which also showed that adequate nutrition in early childhood has been linked to increased IQ through childhood, which is related to decreased childhood behavioral disorders, better career satisfaction, and socioeconomic success in adults, breakfast consumption could ultimately benefit long-term physical and mental health outcomes as well as quality of life.[15-20]

Table 10: Association of Intelligence Quotient (IQ) with chosen factors.

Variable		Intelligence Quotient(IQ)		Chi-Square value	p-value	Association
		Below average	>= Average			
Nutritional status	Normal	10	90	15.1684	0.00508	Yes
	Undernutrtion	55	45			
Gender	Female	20	41	0.3933	0.004587	No
	Male	82	57			
Socio-economic Status	Upper class	0	1	15.055	0.004587	Yes
	Upper middle class	2	6			
	Middle class	20	40			
	Lower middle class	45	70			
	Lower class	7	9			
Age	3 Year old	71	28	5.854	0.0155	Yes
	4 year old	20	24			
	5 year old	25	32			

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