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Socioeconomic Status and its Influence on Nutrition and Cognitive Performance in Children Between the Age of 5 Years to 15 Years Old.

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ABSTRACT

Nutrition of growing children is very much influenced by the socioeconomic status of the parent, which in turn influences the child's cognitive development. Studies about the impact of nutrition on cognitive performance of children are less available. The present study is undertaken in a semi urban location (in urapakkam) where children of mixed socioeconomic status are living. The study is undertaken to assess various nutritional parameters and their influence on cognitive performance. The aim of this study is to correlate the cognitive performance of children with the parental socio economic status. Sixty children were selected randomly and classified according to modified kuppusamy's scale for socioeconomic status Anthropometric assessments such as height, weight and BMI were made. Hemoglobin was estimated using automated Robinsky's technique. Cognitive assessment was made using Binet Kamath's scale of intelligence. The children of lower socioeconomic status had lower cognitive performance as compared to the children of higher socioeconomic status.

Keywords: Anthropometric measurements, Hemoglobin, Modified Kuppusamy's scale, cognitive assessment.

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INTRODUCTION

The nutrition of growing children is very much influenced by the socioeconomic status of parents which in turn influences the cognitive performance of the children. This is very much appraised in developing countries like India and other Asian and African countries. Though India has reached an enormous growth in economy, about 48 percent of children under five years of age are stunted and about 43 percent of children are under weight. It is also found that the proportion of children who are severely undernourished (i.e., >3 SD below of median population is also notable [1].

The United Nations Development Programme (UNDP) defines progress in terms of three basic components.

They are

a) A longer and a healthier life
b) Education and knowledge
c) Economical standard of life.

India is still in the medium human development category, though it has improved in its performance with a rank of 119 out of 169 countries [2].

Socioeconomic status of an individual influences the health and the cognitive development of their progeny. Growth retardation, premature deliveries and low birth weight prevails in children of lower socio economical status. Also low socioeconomic status children have other nutritional deficiencies and stunting [3].

As the school going children are very dynamic in growth and development, the present study is conducted among them [4].

Aim

The aim of this study is to correlate the relation between nutrition and cognitive performance of children which is very much influenced by the parental socio economical status.

Objectives

The present study is an observational study undertaken in a semi urban location (in urapakkam) where children of mixed socioeconomic status are living. The study is taken to assess the BMI and hemoglobin its influence on cognitive performance.

MATERIALS AND METHODS

Participants

The children between the age of 5 years to 15 years old , both boys and girls studying in different schools were selected. The size of the sample was about 60, 26 boys and 34 girls were selected randomly according to the age. The study group was sub divided into five classes based on modified Kuppusamy's classification of socioeconomic status [5].

Exclusion Criteria

Children suffering from obesity, any chronic illness, profound mental retardation, known disorders of nutritional excess or deficiency were excluded from the study.

All the children and their parents were informed about the procedure and written consent was obtained. The approval for the study was obtained from the institution's ethical committee.

METHODS

Oral questionnaire was framed regarding the socioeconomic status of the parents of the participating children.
Modified kuppusamy's scale is based on

- Income of the family per month.
- Education of the head of the family.
- Occupation of the head of the family [5].

The study group was sub divided into five classes such as upper, upper middle, lower middle , upper lower and lower classes based on modified Kuppusamy's classification of socioeconomic status.

Various anthropometric measurements of the children like height, weight, using standard measuring scale was taken. The height was measured in meters and weight in kilograms.

The BMI was calculated using the formula weight divided by height in meters square. (quetelet's index) [6].

The hemoglobin of all the children were estimated using automated robinsky's apparatus and the results were expressed in gram percentage.

The cognitive assessment of children was done with Binet kamath scale of intelligence, an Indian version of Stanford Binet's intelligence scale [4].

The statistical analysis was done with pearson's correlation coefficient using software SPSS version 16.0. The p value less than 0.000 is found to be statistically significant.

RESULTS

Table 1: Baseline Characteristics of the Study.

CLASS	I	II	III	IV	V
AGE (MONTHS)	89.875	101.4118	125.1176	122.6	124.375
HEIGHT (METERS)	1.24625	1.264118	1.336471	1.323	1.28875
WEIGHT (KILOGRAMS)	28.9375	25.11765	27.97059	25.4	23.875
BMI (KG/M SQUARE)	16.74	15.14588	15.25529	14.397	14.3225
HB (GRAM %)	12.9125	11.62353	12.12353	13.01	12.5875
IQ	116.25	96.35294	78.17647	80.1	65.75

Table 2: Correlation of IQ, BMI and HB with Socio Economic Status.

PARAMETERS	SOCIO ECONOMIC	CLASS
	R VALUE	P VALUE
IQ	0.624	0.000***
BMI	0.217	0.096
HB	-0.078	0.556

***p<0.05 is considered significant

This is an observational study in which the influence of parents socioeconomic status on children's nutrition and cognitive performance were assessed.

Table 1. compares the baseline characteristics of the study group. Table 2. correlates the Hemoglobin, BMI and IQ with socioeconomic status . The children of the same age group in higher class of modified kuppusamy's scale performed well in all aspects of assessment tests as compared to the children of lower socioeconomic class. IQ had a significant positive correlation with socioeconomic status ($r = 0.624$, $p = 0.000$). however ,BMI and Hb% had no significant correlation with the socioeconomic status.

DISCUSSION

The socioeconomic status of the parents influence the cognition and nutrition of the children. This is confirmed in this study. The correlation of IQ with the socioeconomic status is significant. The performance of children of same age group differs in upper and lower social class.

Darci . N . Santos et al [7] have shown that psychosocial stimulation, home environment, neighbourhood influences the cognitive performance. Daniel A. Hackman and Martha J. Farah et al .,(8) explains that inadequate nutrition, prenatal substance, lead exposure , lack of psychological stimulation and stress as somatic causes influencing cognitive development. The parental education and occupation play a major role in determining cognitive performance and intelligence of their children as proved by Punia D. and Chhikara, S Poonam and Verma, S. K et al [9,10].

Bhoomika R. Kar. et al, prove that malnutrition affects myelination, reduces dendritic arborisation, which in turn damages the formation of neuronal circuits of developing brain.

Daniel T Willinghams [11] a cognitive scientist proposes 'Family investment theories'. He defines human capital and social capital for the family investment theories. Human capital is defined when someone improves their knowledge by pursuing higher education. When they acquire human capital by education they socialize and acquire social capital. The parental education imparts more human capital to their children i.e. they spend time, expend on teaching their children which is lacking in under educated parents. The children of lower social class are less exposed to knowledge and have less access to materials of education. The parents with higher education are attached and get involved in academic activities of their children, where as the parents with lower education are less involved.

The stress model which is another model proposed by Daniel., for the poor cognitive performance of children of low socioeconomic status. The stress theory was also captured by the American academy of pediatrics in their policy statement [12]. It is said that socioeconomic status and stress are inversely correlated as it is evidenced by the levels of stress hormones like cortisol and catecholomines [13].

The stressors affect parenting and this should be buffered by warm parenting. It is found that warm parenting and good nurturing relieves stress among parents and children which has a long term effect on cognition.

In our study we observed that children of higher socioeconomic status had better cognitive skills when compared to the children of lower socioeconomic status . this could probably due to the availability of human and social capital that helps in warm nurturing.

CONCLUSION

The socioeconomic status of parents which includes education, occupation, and income determines the cognition and intelligence of their progeny. The socioeconomic status also affects the nutrition of their children which influences the structural and functional development of brain.

We would further like to analyse the different aspects of cognition influence by the socioeconomic classes, in future.

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