Long Term Effect of Diet Quality on Intelligence Quotient

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Abstract: This study entitled "Long Term Effect of Diet Quality on Intelligence Quotient "attempt to accumulate data regarding impact of nutrition on the Intelligence performance of secondary school children. The study was carried out in 6 different boarding schools (urban and rural) with 100 students from each school within the age group of 11-14 years of Indore district. In addition to the intensive review of related literature, data was collected through interviews, focus group discussions (parents teacher meeting) and observations. We assessed 116 children for eligibility and 48 were excluded because of variation in calorie consumption, variation in diet consumed loss of follow up or improper recording. Out of 68 student 27 receiving diet advice (cases) and 41 on just follow up (control) were having initial mean IQ of 85.5 points and 85.4 points respectively .With continuous monitoring and maintaining of higher diet quality in cases there was mean increase of IQ of cases by 1.2 points to 86.7 points. These increase was much lower in control where IQ increased by 0.1 point to 85.5. The result of the study underscores the importance of nutrition during early years of child intelligence. Increasing the nutritional Knowledge of parents, especially mothers are very important. Policymakers should design more legislation targeted at improving food availability (especially for poor families)..These findings also demonstrate the importance of helping everyone involved with children's early development to get the information and advice they need on good nutrition.
Keywords: Diet, Quality, Intelligent Quotient & School Children.
Study design: Observation Study.

INTRODUCTION

Children appetite and taste are notoriously difficult to control can be severely affected by continual consumption of low diet quality foods. According to the WHO, nutrition is "the intake of food, considered in relation to the body's dietary needs. Good nutrition—an adequate, well-balanced diet combined with regular physical activity—is a cornerstone of good health. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity"[1].

Many researchers conducted detail studies showed 'Poor diet quality has problematic consequences for students; an independent association between overall diet quality and academic performance has been demonstrated, especially in terms of diet adequacy and variety' [1]. More specifically, increased fruit and vegetable consumption and reduced dietary fat intake have been significantly linked to improved academic performance [1]. Furthermore, a direct and significant negative correlation between fast food consumption and academic performance has been found, independent of students' weight and parental income level [2].

Taras and Rampersaud conclude that the provision of a healthy breakfast through school breakfast programs is effective in improving cognitive functioning and academic performance, especially among undernourished populations [3, 4].

Therefore, it was proposed to carry out a study to asses and identify the prevalence and determinants of dietary patterns among school going children covering statistically adequate sample in schools of Indore city which is one of the economically, industrially and culturally fast growing city.

METHODOLOGY

This study entitled "Long Term Effect of Diet Quality on Intelligence Quotient "attempt to accumulate data regarding impact of nutrition on the Intelligence performance of secondary school children. The study adopted a qualitative phenomenological, randomized double blind prospective case control study, design in

order to explore and present the effects of nutrition on psychological performance.

The study was carried out in 6 different boarding schools (urban and rural) with 100 students from each school within the age group of 11-14 years of Indore district. In addition to the intensive review of related literature, data was collected through interviews, focus group discussions (parents teacher meeting) and observations. During the focus group discussion, social environment was created in which group members were stimulated by one another's perceptions and ideas. This technique was believed to increase the quality and richness of data, more than one-on-one interviewing could have done. Research instruments were validated & reliability of data was determined.

Permission to conduct the study was secured from the selected headmasters; school teachers; and their parents/guardian. The participants and their guardians were informed that their involvement in the study was voluntary and that they were free to withdraw at any stage of the interviews if they were not comfortable. Participants were assured of anonymity in the research report.

Participants were administered with three questionnaires: questionnaire on socio-economic status, education level, lifestyle factors, anthropometry and health status; diet recall questionnaires; and a validated quantitative FFQ. Socio-economic status was assist by modified kuppuswamy scale in urban area and pareek in rural area.

Initial assessment of diet was done based on remembrance of diet in past one month by guardian and student were classified as per Diet Quality Index-International (DQI-I) standard.116 Children belonging to DQII of 60 -70 were considered in our study and were assigned enrolment number of study. Intelligent quotient was assessed by Psychologist in all 116 children and was recorded. 58 Children were considered as case and were advice a balanced nutrient diet to increase their DQII to 80-90.While remaining student were allowed to continue same diet with DQII 60-70. Selection of case and control was done by random selection of enrol number. Both group were monitored and were promoted every fortnight by interviewer.

Diet Quality Index - International (DQI-I)

Diet Quality Component	Grouping of diet quality component	Scoring criteria	Score
Variety - food groups	5 food groups: meat/poultry/fish/egg, dairy/beans, grains, fruits, and vegetables	Each food group awarded 0 or 3 pts. 3 points awarded if at least 1 item from that group was consumed	0-15
Variety - protein sources	6 sources: meat, poultry, fish, dairy, beans, eggs	3 or more sources consumed: 5 pts 2 sources consumed: 3 pts 1 source consumed: 1 pts 0 sources consumed: 0 pts	0-5
Adequacy	8 groups: vegetables, fruit, grain, fiber, protein, iron, calcium, vitamin C	Between 0 and 5 points awarded for each of the 8 adequacy groups, depending on percentage of RDA met	0-40
Moderation	6 groups: total fat, saturated fat, cholesterol, sodium, empty calorie foods	Between 0 and 6 points awarded for each of the 5 moderation groups, depending on percentage of RDA met	0-30
Balance	2 groups: macronutrient ratio, fatty acid ratio	Between 0 and 6 points awarded, depending on ratio of macronutrients and between 0 and 4 points awarded depending on ratio of fatty acids	0-10

Once a score has been calculated for each of the components, the DQI-I is calculated by summing each of the four scores together, producing a number between 0 and 100.

Student were instructed to record daily consumption, which was checked by teacher daily and investigator on fortnight basis .Subjects were followed for 1 year on fortnight basis for collection of data on diet quality consumed. Calories were calculated. Subject that showed consistency in calorie consumption and diet quality in more than 90 percentage of days without drop out for follow up and with complete maintenance of recordfor one year were considered for second psychological analysis. Diet was assist by Diet

Quality Index-International (DQI-I) standard. 27 cases and 41 controls have maintained consistency of DQII of 80-90 and DQII of 60-70 respectively. Psychological performance was assessed again by Milin's Intelligence Scale in Children (MISIC) by psychologist inthese 68 students.

Data analysis was conducted with SPSS version 13.0. The socio-demographic data and details regarding pattern of diet use were tabulated. The

relation between Diet quality andintelligent quotients was assessed using regression test& *P* values < 0.05 were considered significant.

RESULTS

Table-01: Eligibility of Children

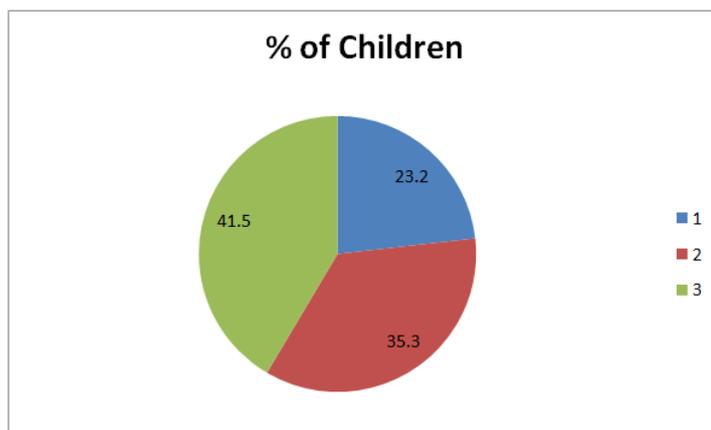| S. No.	Parameter	No. of Children	% of Children
1	Diet Advice (Case)	27	23.2
2.	Follow Up (Control)	41	35.3
3.	Variation in calorie consumption, Variation in diet consumed & Loss of follow up	48	41.5

N=116

Fig-01: Eligibility of Children

Table 01: We assessed 116 children for eligibility and 48 were excluded because of variation in calorie consumption, variation in diet consumed loss of follow up or improper recording. Out of 68 students 27 receiving diet advice (cases) and 41 on just follow up (control) were having initial mean IQ of 85.5 points and 85.4 points respectively. With continuous monitoring and maintaining of higher diet quality in cases there was mean increase of IQ of cases by 1.2 points to 86.7 points. These increase was much lower in control where IQ increased by 0.1 point to 85.5.

DISCUSSION

Several studies contradict the fact that the malnutrition-IQ link is eliminated after controlling psychosocial and environmental factors. In a study by Ivanovic and colleagues, head circumference was the only anthropometric indicator of postnatal nutritional status that was significantly decreased in undernourished boys and girls. This study compared two groups of 16-year-old adolescents, in which one group had severe undernutrition in the early years of life (1). In the mentioned study, undernourished children had lower VIQ and PIQ than normal 16-year-old in both sexes. MRI findings showed that undernourished boys and girls had decreased brain volume, and corpus callosum parameters compared to the normal group, especially in boys. This study showed that in the brain tissue of undernourished children, the head circumference decreased and anatomical abnormality was evident [5].

Well-functioning pathways correlate to better brain functioning, brain efficiency and information processing, which all point to better IQ scores[6,7]

There is evidence that providing a high nutrient diet to very premature babies, particularly males, can help to reduce the loss of brain size and IQ often experienced by these babies. Zinc, Iron, folate, iodine, B12 and protein deficiency can also result in low IQ [8].

Intelligence Quotient scores of children who were fed a formula containing LC-PUFAs did not differ at age 6 years old. However, children who received were faster at processing information compared with children who received unsupplemented formula. This variation in the dietary supply of in the first few months of life may have long-term effects for cognitive development in later childhood [9].

CONCLUSION

The result of the study underscores the importance of nutrition during early years of child intelligence. Increasing the nutritional Knowledge of parents, especially mothers are very important. Policymakers should design more legislation targeted at improving food availability (especially for poor families).These findings also demonstrate the importance of helping everyone involved with children's early development to get the information and advice they need on good nutrition.

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