

# Role of Nutrition in Scholastic Achievement of Adolescents

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**ABSTRACT** Diet and Nutrition can have direct impact on the scholastic achievement of adolescents. The composition of dietary nutrients in the meal has long-term efficacious and abortive effect on academic attainment of adolescents. Inadequate supply of Carbohydrate rich food has deleterious impact on the task of Memory, Creativity and Maths. Protein-Energy malnourishment among children leads to retarded intellectual and motor abilities. Intake of excessive fat and Obesity has negative association with the scholastic performance. Basic dietary Vitamins like Vitamin A, Vitamin B-12 and Vitamin C play crucial role in growth and maturation, whose inadequacy among children may enhance their likelihood of cognitive deterioration and poor scholastic performance. Deficiency of iron among adolescents is accountable for Anemia, which also has close association with their degraded scholastic performance. Calcium and Zinc deficiency may be liable for deprived cognitive and psychological functioning among adolescents which in turn affect their academic grades. Therefore, role of Nutrition and Balanced diet is of prime importance during the growth years of children.

**Keywords:** Nutrition, Scholastic Achievement, Adolescents, Macro-Nutrient, Micro-Nutrient

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## INTRODUCTION

Education—a process of knowledge acquisition and skills development, which empower individual for critical analysis at the time of decision making. Education is a system through which societies pass on their culture, custom, knowledge and competencies to their next generations. Therefore, education play significant role in the development of the society as well as of the country. Education provides an opportunity to the children for identifying their hidden talent and true potential. The process of education begins from home, and therefor home is considered as the prime institution which inculcate moral etiquettes and manners in a child. As child grow, this informal institution is replaced by formal institution - School. School is an institution which not only comprised of metal infrastructure but also include nurturing environment, encouraging teachers aptitude, peers and supporting facilities which provide opportunities to the children for development of skills and educational attainment. In this highly competitive environment, performance and accomplishment are

considered as the prime indicator of individual's success. Therefore, the primary focus of school educational process is concentrated over the learner's Scholastic achievement.

Scholastic achievement is considered as the performance outcome, which represents the extent to which a child has successfully accomplished his goals especially in the school setting. It's a prime measure to analyze one's true potential and capacity therefore it upholds a very prominent place in education as well as in the learning process. Scholastic achievement is an index of a learner's degree of excellence which is based on the assessment of each learner's learning proficiency. According to Good (1959), "scholastic achievement is accomplishment or proficiency of performance in a given skill or body of knowledge". Collins dictionary define Scholastic Achievement as "child's ability of academic achievement or ability while at school". Scholastic achievement

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is a conventional process which is used to determine the level of knowledge, comprehension and skills acquired by the learner. It also indicates the magnitude and degree of learning attained by the child over a period of time.

Nutritive food is considered as a synonym for Health. Food—a substance which is taken by a living being to obtain energy, sustain growth and maintain other essential bodily functions. Food include essential Macro-nutrients (Carbohydrate, Fats, Proteins) and Micro-nutrients (Vitamins, Minerals) which are required to carry out several biochemical activities. Nutrition is the prime developmental force therefore, having balance diet (include adequate amount of Macro and Micro nutrients) is of prime importance especially during adolescence phase of life because, this phase is marked by physiological, psychological, hormonal, cognitive and emotional changes. Higher order of Psychological and Cognitive development was accountable for improved level of scholastic performance among adolescents, which in turn empower adolescents for acquisition of advance skill set. Study by Bellisle (2004), suggested that healthy and consistent dietary habits among children will ensure optimal mental and behavioral functioning, and under-nourishment among children will have deleterious impact on their cognitive performances. A review study by Taras (2005) summarized that Nutritive diet is associated with the development of cognitive abilities among children. Study conducted by Kim and Kang (2017) among Korean children's concludes that intake of nutritive foodstuff is correlated with their superior cognitive functioning.

Inadequate level of Nutrition during adolescence phase result is development of dietary deficiencies, chronic illnesses and cognitive deficits among adolescents. This, further reduces adolescent's potential for optimum growth and development, and enhances their tendency of poor health by reducing immunity. This deficit growth pattern will slow down adolescent's scholastic performance which ultimately lead them to become inefficacious adults. Study by Levitsky and Strupp (1995) suggested that Malnourishment is accountable for everlasting alterations in brain function, which could be associated with cognitive impairments. Study by Demirezen and Cosansu (2005) suggested that insufficient nutrition among adolescents is accountable for short attention span, delayed learning, develop behavioral dysfunction and absenteeism that decrease overall scholastic achievement. Study by Florence, Asbridge and Veugelers (2008) summarized that students with poor quality of diet were more likely to show substandard performance on the assessment.

## **MACRONUTRIENTS AND SCHOLASTIC ACHIEVEMENT**

Macronutrients are those nutritive components of our diet

which are required by our body in substantial proportion to carry-out day to-day activities, which include Carbohydrates, Proteins and Fat. Carbohydrate - a major Macronutrient which is primarily breakdown into glucose, which act as a principal source of energy for brain and its associated functions. Study by Michaud, Musse, Nicolas and Mejean (1991) among adolescents concludes that intake of High energy Breakfast has profitable impact on immediate recall in short-term memory. An experimental study conducted by Wyon, Abrahamsson, Järtelius and Fletcher (1997) among school children summarized that high energy breakfast is significantly associated with improved performance in Creativity and Mathematical addition tasks. Consumption of high Carbohydrate breakfast among children was associated with better performance in short term memory task (Mahoney, Taylor, Kanarek and Samuel, 2005). Study by D'Anci, Watts, Kanarek and Taylor (2009) suggested that diet with low carbohydrate level is accountable for substandard performance on memory-related tasks. Thus, lack of ample amount of carbohydrate in dietary regime of individuals will affect their cognitive abilities, which in future slowdown their scholastic performance.

Protein—a macronutrient comprised of long chains of amino acids, which plays pivotal role for growth and development during childhood and adolescence stage. Study conducted by Hoorweg and Stanfield (1976) summarized that Protein-energy deficiency is accountable for delayed intellectual and motor abilities during childhood and adolescence period. An Indian study by Kar, Rao and Chandramouli (2008) concludes that persistent Protein-energy insufficiency during growth years may lead to indelible cognitive deterioration among children. Adolescents who have experienced chronic Protein-energy deficiency will have tendency toward lower IQ levels, underdeveloped cognitive abilities and scholastic achievement. Study by Ghosh, Rakshit and Bhattacharya (2013) among college students of North Tripura obtained a positive correlation between intake of Protein and their Academic success. Patel and Issac (2019) also indicated that Protein energy deficiency show delays in growth and development of motor activities.

Fat—another macronutrient which play principal role in attainment of scholastic achievement among adolescents. Study by Ghosh and Saha (2013) obtained a strong negative correlation between intake of Fat and academic status of the adolescents, which indicates adequate intake of fat is associated with good academic performance but excess consumption may have detrimental impact on academic performance. Studies by (Shah and Maiya, 2017; and Alghawrien, Al-Hussami and Ayaad, 2020) also obtained a significant negative association between obesity and academic performance of the students. Study by Shore *et al.* (2008) demonstrated that

students who are overweight have poor scholastic achievement in comparison to the students who are Non-overweight. Thus, consumption of fat also uphold crucial role in the scholastic achievement of adolescents.

## MICRONUTRIENTS AND SCHOLASTIC ACHIEVEMENT

Micronutrients are those nutritive elements of our diet which are required by our body in small proportion, to achieve appropriate level of growth and development. Micronutrients include Vitamins and Minerals, which play pivotal role in biochemical and metabolic activities of the brain. Vitamin B-12 (also called Cobalamin), is of prime importance for the production of red blood cells, myelination and functioning of brain and CNS. Study by Duoatng, Mora-Plazas, Marín and Villamor (2015) summarized that deficiency of Vitamin B-12 among school children was associated with the higher risk of their grade repetition. Study conducted by Mustafaa, Al-Atramb and Mousleh (2014) among Majmah University students obtained a significant negative association between insufficiency of Vitamin B-12 and their corresponding academic performance. Deficiency of Vitamin A is accountable for learning and memory deficits which in future delays the cognitive performance (Olson and Mello, 2010).

Vitamin C (also called ascorbic acid), an important micronutrient play critical role for nurturance of immune system, nourishment of bones and regulation of neurotransmitter in brain. Inadequate supply of Vitamin C will have an impact on infant's neuronal development, which may impair their cognitive abilities in future (Tveden-Nyborg and Lykkesfeldt, 2009). A review study by Plevin and Galletly (2020), summarized that individual with lower level of Vitamin C had a tendency for cognitive deficits. Vitamin D, which is closely associated with the maintenance of bone health, deficiency of which results in deteriorated cognitive abilities and substandard scholastic achievement among children (Nassar *et al.*, 2012).

Minerals such as Iron, Calcium, Zinc, etc. which are required by our body in trace amount but they uphold critical responsibility for appropriate growth and maturation of it. Iron upholds a very crucial function of carrying oxygen in the hemoglobin of red blood cells, to each and every cell of the body for the production of energy. Children and adolescents also need ample amount of dietary Iron for proper nurturance of brain. Study by (Li, 2009; and Soleimani and Abbaszadeh, 2011) recommended that insufficiency of Iron among school children has deleterious impact on their scholastic achievement. Iron deficiency put direct impact on brain enzymes as a result intellectual and

cognitive abilities decelerate. An Indian study by (Shivkumar, Gangane and Shende, 2013) also concludes that iron deficient adolescent school girls has shown substandard performance in IQ test, test of memory and attention, and scholastic assessment in comparison to the non-iron deficient adolescent school girls.

Calcium plays central role for the formation and nurturance of bones, nerve excitability and neurotransmission. Study by Patil *et al.* (2018) summarized that adolescent girls with inadequate calcium level were high on psychological impairment. Zinc as a mineral, regulate the process of DNA and RNA synthesis, cell division, and maintain immune system. Deficiency of Zinc is responsible for compromised cognitive performance as it cause alterations in attention, concentration and different facet of neuropsychological functioning (Black, 1998). Study by Amani, Tahmasebi, Nematpour, Nazari, Ahmadi and Mostafavi (2019) among high school Iranian girls obtain a significant positive association between serum Zinc levels and their cognitive functioning.

## CONCLUSION

Adolescence is a prolific stage which demands adequate amount of nutrition not only for optimum growth and development but also for eminent performance in the field of education and learning. In this progressive world, academic attainment among adolescence is considered as a key aspect to evaluate their success in life. High academic grades also act as a gateway for diverse opportunities and career perspectives. Studies indicated that insignificant intake of major dietary nutrients like Carbohydrate, Proteins and Fats during childhood and adolescence phase of life is accountable for rudimentary brain development which in future may degrade their cognitive and scholastic performance. Persistent deficit in Macro-nutrients is liable for protein-energy malnourishment among children, which slow down their cognitive and motor development. This inconsistent pattern of development will act as a barrier for the process of learning and knowledge acquisition, which eventually impact scholastic achievement. Like Macronutrients, contribution of Micronutrients (Vitamins and Minerals) is also upholds prime importance for attainment of optimum scholastic performance. Children and adolescents with inadequate supply of Vitamins and Minerals is liable for delays in memory, attention, and neuronal development, which in future accountable for deprived cognitive and scholastic achievement. Insufficient allocation of nutrients makes adolescents weak, fragile and prone to illnesses which may responsible for higher rate of absenteeism and school drop-out among them. This clearly indicates that Nutrition play prominent role for the attainment of scholastic achievement among adolescents.

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