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ijirset@gmail.com

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Study of Diet Quality and Academic Performance of School Going Children

Dr. Pallavi Kumari

Teacher, R.P.D.J. + 2 High School, Jitwarpur, Madhubani, Bihar, India

ABSTRACT: Diet is a key behavioral risk factor that can be modified to have an impact on health. Free living people consume whole foods, which contain both nutrient and non-nutrient substances. Dietary patterns have synergistic effects, which provide insights beyond the role of nutrients and single foods. For researchers, it can be difficult to quantify the diet, and any established values should only be used as an approximation. Diet quality is a composite measure of diet in its entirety, and involves the relationships between food groups. This qualitative perspective is an alternative approach to provide more detailed dietary information. It can give an indication to the types of food people consume, and therefore where the nutrients are derived from. Diet quality encompasses the central areas of dietary variety, balance, adequacy, and moderation. These have been found to contribute to a nutritious diet and can give a greater understanding of dietary habits. The relationship between diet and academic performance is often stated; however, few studies have examined the effects of diet quality on academic performance. Studies of nutrition and academic performance have typically focused on hunger, malnutrition, and micronutrient deficiency. Undernourished children have been shown to have decreased attendance, attention, and academic performance as well as experience more health problems compared to well-nourished children. More recently, studies have examined the impact of breakfast on cognition, behavior, and academic performance of school-age children. The single study not restricted to breakfast demonstrated a positive association between the consumption of regular meals and school performance.

KEYWORDS: Diet, Quality, Academic, Performance and school.

I.INTRODUCTION

Diet is a key behavioral risk factor that can be modified to have an impact on health. Free living people consume whole foods, which contain both nutrient and non-nutrient substances. Dietary patterns have synergistic effects, which provide insights beyond the role of nutrients and single foods. For researchers, it can be difficult to quantify the diet, and any established values should only be used as an approximation. Diet quality is a composite measure of diet in its entirety, and involves the relationships between food groups. This qualitative perspective is an alternative approach to provide more detailed dietary information. It can give an indication to the types of food people consume, and therefore where the nutrients are derived from. Diet quality encompasses the central areas of dietary variety, balance, adequacy, and moderation. These have been found to contribute to a nutritious diet and can give a greater understanding of dietary habits. Variety and balance involve the consumption of a range of options from the food groups, according to proportionality. Adequacy is attaining the recommended energy intakes to meet nutrient requirements, whilst moderation is regulating the intake of certain foods to prevent harmful effects on health (including convenience foods that are high in sugar and fat). It is widely recognised that a high quality diet should be safe, able to promote optimal development and reduce the risk of nutritional inadequacies. Diet quality describes how well an individual's diet conforms to dietary recommendations, and this differs according to country. Australia employs the 'Eat for Health' guidelines, which were developed through extensive research to provide information on the types and amounts of foods needed to promote health and wellbeing as well as reduce the risk of diet-related conditions.

The academic performance of children impacts their future educational attainment and health and has therefore emerged as a public health concern. Generally, as levels of education increase, there is an associated increase in income and social status. This associated increase in socioeconomic status affects health by influencing access to health care, quality of housing, work environment, lifestyle factors, such as nutrition and recreation, and social psychological factors, such as self-esteem and health awareness. Given the demonstrated importance of academic performance and resulting educational attainment to future health, it is imperative to understand the determinants of school performance. A number of factors are recognized as affecting school performance including gender, ethnicity, quality of school and school experience, nutrition, child health, and socioeconomic factors. In past decades, poor diet, characterized by excess intake of dietary fat and refined sugars and inadequate intake of fruits, vegetables, and whole grains, has been identified as one of the primary mechanisms underlying the rising prevalence of overweight and obesity in school-age children. The diminishing diet quality and increasing body weights among children draw renewed public health attention to the effects of diet on academic performance and future health.

The relationship between diet and academic performance is often stated; however, few studies have examined the effects of diet quality on academic performance. Studies of nutrition and academic performance have typically focused on hunger, malnutrition, and micronutrient deficiency. Undernourished children have been shown to have decreased attendance, attention, and academic performance as well as experience more health problems compared to well-nourished children. More recently, studies have examined the impact of breakfast on cognition, behavior, and academic performance of school-age children. The single study not restricted to breakfast demonstrated a positive association between the consumption of regular meals and school performance. The predominant approach to studying diet has focused on the role of individual nutrients or foods. However, individuals do not consume single nutrients but combinations of foods. In recognition of the multidimensional nature of diet, studies of the interrelations of nutrition and health have examined the effects of overall diet quality using summary measures of food and nutrient intake. The current study employs such an approach to investigate the association between diet quality and academic performance in a sample of 100 students of Uper Primary School of Madhubani District, Bihar.

II. REVIEW OF LITERATURE

Review of related literature makes the investigator fully aware with the previous work that has been done. It also provides an opportunity of gaining insight into the method, measures, subject and approaches employed.

Kramer, R.A, Allen, L, and Gergen, P.J.(1995) Health and social characteristics and children's cognitive functioning: results from a national cohort. The academic performance of children impacts their future educational attainment and health and has therefore emerged as a public health concern.

Ross, C.E, and W.u, C. (1995) The links between education and health Generally, as levels of education increase, there is an associated increase in income and social status.

Considine, G and Zappala, G.(2002) The influence of social and economic disadvantage in the academic performance of school students in Australia Given the demonstrated importance of academic performance and resulting educational attainment to future health, it is imperative to understand the determinants of school performance. A number of factors are recognized as affecting school performance including gender, ethnicity, quality of school and school experience, nutrition, child health, and socioeconomic factors.

Nicklas, T and Johnson, R. (2004) Position of the American Dietetic Association: dietary guidance for healthy children ages 2-11 years. In past decades, poor diet, characterized by excess intake of dietary fat and refined sugars and inadequate intake of fruits, vegetables, and whole grains, has been identified as one of the primary mechanisms underlying the rising prevalence of overweight and obesity in school-age children.

III. METHODOLOGY

The 100 Children's Lifestyle and School-performance Study is a large study of health, nutrition, physical activity, school performance, and socioeconomic determinants among students in Madhubani District of Bihar, where 98.4% of students attend public school. Height and weight of participating students were also measured in student classrooms. Height was measured to the nearest 0.1 cm after students had removed their shoes and body weight to the nearest 0.1 kg on calibrated digital scales. Generally, the administration of the surveys and measurement of heights and weights took less than 45 minutes to complete. At risk for overweight and its more severe form, overweight, were defined using the international body mass index cut off points established for children and youth by the World Health Organization's International Obesity Task Force. For the 100 students without these measurements, weight status was considered as a missing category. Sociodemographic factors including student gender, urban or rural residency, parental marital status, education, and income were assessed using the questionnaire completed by parents of the participating students. Multilevel logistic regression was used to examine the associations between indicators of diet quality and academic performance. Multilevel methods account for the clustering of student's observations within schools and allow for quantification of second-level factors. Gender of the student and parental marital status, income, and educational attainment were considered as first-level covariates.

IV. RESULTS AND DISCUSSIONS

There is increasing evidence that nutrition behaviours have an influence on academic performance, which in turn influences future successes. The aim of this review is to evaluate the association between dietary quality and

academic performance in School students. However, there is a limited amount of literature related to the population group of School students, which is why much of the following research relates to children and adolescents (school-aged students). Current research has established a relationship between overall diet quality and student academic achievement. Nutrition and health status have a complex and multifaceted effect on cognitive function. It has been identified that moderate associations exist between several aspects of diet quality and student performance. There are a number of factors which have a direct effect on diet quality, and therefore have been included in this review. They include a person's habitual eating patterns, fruit and vegetable intake, and convenience food (as well as take-away food) intake. The reviewed studies compared a variety of health behaviours to determine which are most significant to student outcomes. The majority reported statistically significant outcomes between diet and academic performance, which is likely a result of the relatively large numbers of participants. The results concerning dietary components strengthened the concept that diet quality has an influence on academic performance.

All included research was adjusted for the modifiable and non-modifiable factors which affect student academic performance. The studies acknowledge that the health behaviours relating to academic work are multifactorial, and involve several influencing variables. It should be noted there were some common limitations amongst the reviewed studies. The majority of the studies were cross-sectional in design, and were not able to determine an independent association between diet quality and academic achievement. This impedes any inferences that can be made about causality. It was important that authors controlled for significant confounding factors, including attendance, economic status, social support and family background. The nature of these studies left open the possibility that other intervening variables may have been related to the observed pattern of results.

Overall diet quality was found to be associated with student academic performance. Across all studies, dietary habits that were in accordance with guidelines were related to better student outcomes. Furthermore, an improvement in overall diet quality score increased likelihood of an improved academic performance. Students with a high intake of 'high quality' nutrient-dense foods, and a low intake of 'low quality' nutrient poor foods, had increased odds of a favorable school performance. The strongest outcome would be achieved through the combined effects of meeting multiple dietary recommendations. When controlling for the key health behaviors of physical activity and weight status, diet quality was a leading contributor to academic performance. Emerging evidence indicates that diet quality may have the strongest correlation to high academic achievement, though this warrants further research. The study by Florence et al. on school aged Canadian children found an independent association between diet quality attributes and academic achievement. Furthermore, dietary adequacy and variety were identified as specific components of diet quality which influence academic performance. These outcomes reflect the value of consuming a diverse range of foods from the core food groups.

The studies with the best depth in information conducted a full assessment of diet quality, and used a validated tool. It is difficult to make sound comparisons when studies do not use similar diet quality parameters and scoring systems. Different cultures have a diverse range of cuisines which means they differ in how diet quality scores were measured. There were also vast variations in the reporting time period for the outcome measures for frequency of food consumption and academic achievement. Poor nutritional intakes do not meet macronutrient and micronutrient requirements, and this can impede on a person's health status. Diet quality has been shown to be important for health and wellbeing, and may be beneficial to concentration and productivity levels. The consistency of this association across various indicators of diet quality gives emphasis to the importance of nutrition. An improvement in diet quality may be linked to enhanced learning and outcomes beneficial to students and institutions.

Eating patterns and Behaviours:

Specific eating patterns have an influence on academic performance, as they contribute to the overall balance of a diet. It was found that adhering to a 'healthy' Mediterranean style diet pattern (high in fruit, vegetables, whole grains, legumes, fish and olive oil), as well as regularly consuming three meals per day, were positively associated with academic outcomes. There is evidence that suggests habitual breakfast intake, compared to a period of fasting, is moderately related with an improved school performance. Through a regular eating pattern, a person is more likely to consume the recommended serves from the core food groups, which contributes to an enhanced nutritional status. Eating behaviours influence the quality of a person's diet, and generally account for whether a person is consciously controlling what they eat. In the studies regarding university students, eating patterns described uncontrolled eating (food consumption is attached to emotions) or cognitive restriction (highly controlling food intake). Overall, the results indicate that lower levels of uncontrolled or emotional eating is associated with a higher grade point average.³⁴ Students reporting to be strict dieters, with a high amount of restrictive practices, were found to have a lower grade point average. On the other hand, the use of more 'flexible' cognitive restriction, which still involves self-regulation of food intake, but has allowances for all types of foods, may have the best indication to improving academic achievement.

Fruit and vegetable intake:

A higher fruit and vegetable intake is another aspect of diet quality which has a positive relationship with academic performance. When the self-reported daily intake of fruit and vegetables increased, there was a relatable increase in student grade point averages. The main message is that an adequate fruit and vegetable intake is beneficial to health, and a vital component to good diet quality. Although, results in this area are inconsistent, with a small number of studies reporting no association between consumption of fruit and vegetables and academic performance. This may be attributed to their study design, as these may have lacked sufficient power to detect certain effects. It was difficult to detect differences between students when a large proportion did not meet the initial recommendations for fruit and vegetable consumption.

Convenience foods :

An increased consumption of convenience or ‘take-away’ foods and beverages has a strong link to poorer academic performance. There were consistent results amongst all studies which measured these associations, as well as across all age groups. Convenience foods are highly refined, and generally rich in salt, simple sugars or saturated fats, and included: sugar sweetened beverages, confectionary items and fried foods. Serve sizes and options for convenience and take-away foods differed between studies, and thus interpretations may be difficult to generalise. Students who frequently consumed convenience snacks were less likely to pass standardised tests, in comparison with those who consumed healthier options. Poor dietary habits are shown to be a significant predictor of health and weight status, which contribute towards school performance. Even a moderate reduction in convenience food intake may lessen the negative influence it has on academic performance. Current recommendations advise that discretionary foods should only be included in a diet once the other food group recommendations are met, to ensure that a high proportion of a person’s energy intake is comprised of nutritious sources.⁶ They should only be considered in the diet in moderation, with the consumption of foods from the core food groups being the priority.

Students with an increased fruit and vegetable intake and lower caloric intake of fat were significantly less likely to fail the assessment. Relative to girls, boys were twice as likely to fail their literacy assessments. Increased parental income and educational attainment were significantly associated with decreased odds of poor academic performance. Parental marital status was also associated with academic performance: those children living in a lone-parent household had increased odds of failing 1 or both assessments. Students attending school in an urban area were significantly less likely to fail than those living in rural areas. Additionally, school neighborhood income was found to be significantly associated with academic performance.

These findings demonstrate an independent association between overall diet quality and academic performance among students in Darbhanga district. Dietary adequacy and variety were identified as specific aspects of diet quality important to academic performance, thereby highlighting the value of consuming a diverse selection of foods in order to meet the recommended number of servings from each food group. Additionally, fruit and vegetable consumption and dietary fat intake, critical nutritional concerns among children, were demonstrated as important to academic performance. The contribution of diet to academic performance is frequently stated; however, the focus of much of the research has been on hunger, malnutrition, micronutrient deficiency, and the effects of breakfast on cognition. This study extends current knowledge in this area by demonstrating the independent importance of overall diet quality to academic performance and by identifying specific dietary factors that contribute to the association between nutrition and academic performance. The consistency of this association across various indicators of diet quality gives emphasis to the importance of children’s nutrition not only at breakfast but also throughout the day.

The socioeconomic benefits of educational attainment carry forward to future generations as children from socio-economically advantaged backgrounds are more likely to succeed in school. Moreover, as increased levels of educational attainment and income facilitate increased understanding of nutrition messages and access to healthy food, children from socio-economically advantaged families are more likely to consume healthy diets.

Increased diet quality among these children will provide further benefit to their academic performance and, in terms of health, contribute to healthy child development, which influences health throughout the life course. In addition, healthy eating behaviors adopted in childhood are likely to continue through adolescence and adulthood and result in decreased risk of chronic diseases. Alternatively, children from socio-economically disadvantaged backgrounds are more likely to have poor diets and poor academic performance resulting in lower levels of educational attainment and poorer health outcomes. This research supports previous research demonstrating that academic performance varies according to the student’s gender and that male students are more likely to perform poorly in terms of literacy. This relationship has been observed as steady across different levels of socioeconomic status.

V. CONCLUSION

In summary, we demonstrated that, above and beyond socioeconomic factors, diet quality is important to academic performance. This association is important to children’s future educational attainment and herewith future

income, socioeconomic status, and health. These findings support the broader implementation and investment in effective school nutrition programs that have the potential to improve student's diet quality, academic performance, and, over the long term, their health. The findings from this review indicate that there is a positive association between diet quality and student academic performance. Furthermore, some evidence suggests that this is a dose-response relationship, as the higher the diet quality score, the higher the effect on academic outcomes. Diet quality and variety involve food groups and how a dietary pattern aligns with national recommendations. Several variables which impact on diet quality were investigated and shown to also be associated with academic performance. A number of gaps in the literature have been identified throughout this review. Research in this area is still developing, and there are limitations of the published research investigating the relationship between diet and academic outcomes. It is yet to be determined what specific aspects of diet quality have the greatest effect on student performance. Further investigation is needed to establish if the components of overall diet quality, variety, adequacy, balance and moderation have an independent relationship with academic performance. Longitudinal research is necessary to compare these associations over time. Public health investigations should consider whether interventions aiming at promoting healthy dietary behaviours could have a positive impact on academic performance.

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