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IMPACT OF NUTRITION EDUCATION ON SCHOOL STUDENTS

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ABSTRACT

While medications can aid in the healing process of illnesses, they are insufficient in addressing chronic problems like diabetes, hypertension, and cardiovascular disease. In such cases, nutrition plays a vital role and cannot be substituted by any form of treatment. Under such circumstances, phytochemicals can provide significant aid, as well as enhance cognitive function and bolster the immune system. This provides our body with the intrinsic vitality required to perform optimally in the workplace.

Research indicates that phytochemicals play a crucial role in enhancing the health and nutritional status of children. Veugelers P. and Heller L. (2008) found that consuming a diet rich in fruits and vegetables had a substantial impact on the academic performance of young individuals.

Optimal nutrition throughout infancy can establish long-lasting dietary patterns that enhance children's overall health, facilitate their maximum development, and empower them to lead a wholesome lifestyle. Teaching young individuals about proper dietary habits helps them be productive and sustain a healthy lifestyle throughout adulthood.

Implementing a school-based intervention that focuses on promoting nutritious eating and regular physical activity has the potential to decrease the occurrence of childhood obesity.

The impact of nutrition on health spans throughout all stages of life, thereby emphasizing the significance of initiating injury prevention measures at the earliest opportunity. Early in childhood, individuals form habits that greatly influence their dietary choices.

KEYWORDS: Nutrition Education, School Students, immune system, health and nutritional status, school-based intervention, childhood obesity.

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INTRODUCTION

The distinction between food and medicine is becoming more blurred as scientific research delves into the study of dietary constituents. When nutrition research transitioned its attention from the prevention of dietary deficits to the prevention of chronic illness, it uncovered astonishing insights. It is well acknowledged that consuming a nutritious diet helps prevent or preempt the development of several illnesses annually. The phytochemical, which refers to a "plant chemical," has been thoroughly examined in several research.

Phytochemicals are inherent substances discovered in fruits and plants. Every kind of fruit or vegetable may have several phytochemical compounds. They do not fall within the category of vitamins, proteins, carbs, fats, or minerals. Phytochemicals are plant compounds that do not provide nutrition but possess either defensive or disease-protective qualities. Consuming phytochemicals via diet might potentially provide health advantages by safeguarding against chronic degenerative conditions including cancer, cardiovascular illnesses, and neurological disorders. The majority of dietary items, including whole grains, legumes, fruits, vegetables, and herbs, contain phytochemicals. These phytochemicals, whether used alone or in together, provide significant therapeutic promise for treating a wide range of illnesses. Phytochemicals with nutraceutical qualities found in food are very significant owing to their advantageous impact on human health.

Epidemiological studies provide compelling evidence that a diet abundant in antioxidants is linked to a reduced occurrence of degenerative illnesses.Regularly consuming fruits, vegetables, and whole grains decreases the likelihood of developing chronic illnesses linked to oxidative damage. Although phytochemicals are not essential elements for supporting life, they have favorable effects on human health.

Phytochemicals evolved to enhance the survival of plants in an often challenging environment. In the early stages of Earth's existence, the atmosphere included a minimal amount of oxygen that was not bound to other elements. Plants, being capable of absorbing carbon dioxide and emitting oxygen, ultimately raised the oxygen levels. Additionally, these substances provide protection for plants against bacterial, fungal, and viral infections, as well as cellular damage. Phytochemicals of nutraceutical value are biologically active components that support

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or enhance health and are found at the crossroads of the food and pharmaceutical sectors. They have a significant influence on the healthcare system and may provide medical advantages that include the prevention and treatment of illnesses and physiological abnormalities. The majority of foods, including whole grains, legumes, fruits, vegetables, and herbs, contain nutraceutically significant phytochemicals. These phytochemicals, whether used alone or in together, provide significant therapeutic promise for treating a wide range of illnesses. The health advantages are determined by scientific research and ethical considerations, specifically related to health claims, functional foods, and the presence of certain phytochemicals. These substances have distinct pharmacological effects on human health, such as reducing inflammation, preventing allergies, acting as antioxidants, fighting bacteria and fungi, relieving muscle spasms, preventing cancer, protecting the liver, lowering lipid levels, safeguarding the nervous system, reducing blood pressure, combating aging, managing diabetes and osteoporosis, preventing DNA damage, and addressing heart diseases. They also promote cell death, act as diuretics, stimulate the central nervous system, provide pain relief, protect against UVB-induced cancer, and have carminative properties.

Similar to plants, human bodies undergo oxidation, leading to the gradual deterioration of our physical condition and increased vulnerability to illnesses. Free radicals, sometimes referred to as harmful chemicals, are our body's own molecules that target the genetic information inside our cells. The provided text indicates the presence of Figure 1.1. Free radicals have the ability to negatively modify lipids, proteins, and DNA, and have been linked to the process of aging and other human illnesses. The source of this information is Devagayyam T.P. (2004). They induce a condition referred to as "oxidative stress." The process of metal oxidation leads to the formation of rust in a similar manner. Free radicals induce oxidation of bodily tissues, leading to accelerated aging, degradation of joints, and heightened susceptibility to cancer, heart disease, and other ailments. Phytochemicals function as antioxidants and stabilize free radicals by providing them with an electron. (Refer to Figures 1.2 and 1.3)

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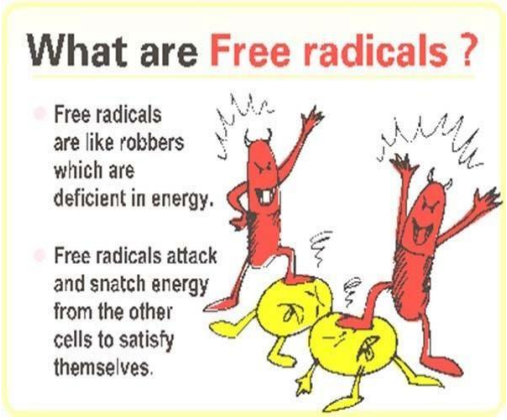

Figure 1

Phytochemicals acts as antioxidants and stabilizes these free radicals by donating an electron to them. (Figure 2 and 3)

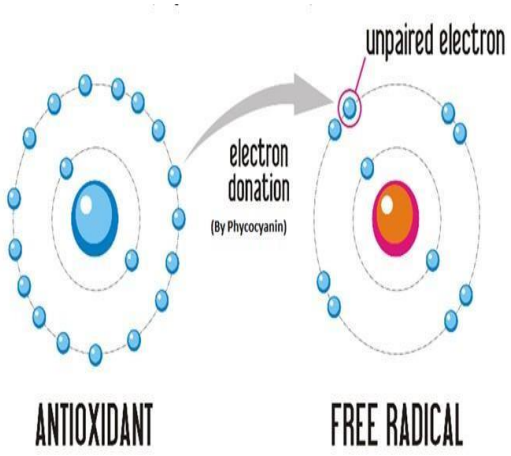

Figure 2 Source: www.blogspot.com

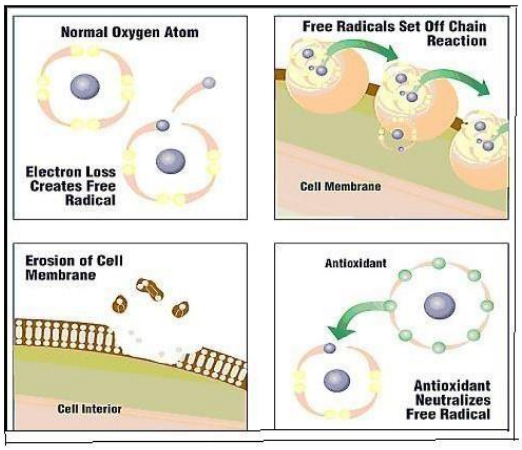

Figure 3 Source: www.infobarrel.com

In order to give optimal protection inside the cell, these antioxidants are strategically localized in certain compartments and provide protection that may be categorized as follows:

First Line of Defence: It consists of inhibiting antioxidants that function by extinguishing O2, breaking down H2O2, and binding metal ions, as well as enzymes including superoxide dismutase (SOD), catalase, glutathione peroxidase, and non-enzymatic compounds.

Second Line of Defence: The antioxidants in this defensive group consist of glutathione (GSH), mostly ascorbic acid, alpha-tocopherol (Vitamin C & E), carotenoids, and flavonoids.

Third line of Defence: Antioxidants are a diverse set of enzymes that play a crucial role in mending DNA, proteins, and lipids that have been damaged. They also have the ability to halt the spread of peroxyl lipid radicals.

Fourth Line of Defence: The fourth line of defense is the immune system, which becomes active after all other forms of protection have failed.

Phytochemicals such as polyphenols, flavonoids, isoflavonoids, anthocyanidins,

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phytoestrogens, terpenoids, carotenoids, limonoids, phytosterols, glucosinolates, and fibers have the potential to provide health advantages.

Currently, the adult nutrition plan follows a defensive nutrition paradigm that emphasizes the consumption of plant-based foods that are rich in phytochemicals and antioxidants. These substances aid in the prevention of damage produced by free radicals. This aids in safeguarding against ailments such as cardiovascular disorders and cancer. Additionally, it strengthens the immune system and improves cognitive function. Incorporating these foods into our diet from an early age is particularly advantageous, since it establishes a solid basis for maintaining good health in old age.

Consuming a higher quantity of fruits and vegetables might perhaps hinder the development of illness and slow down the progression of aging.

Consuming a plentiful amount of plants on a daily basis may significantly improve one's vitality, overall well-being, and reduce the likelihood of sickness, perhaps extending one's lifespan.

There exists a multitude of phytochemicals, each exerting distinct mechanisms of action. Here are many potential courses of action:

Antioxidant - Phytochemicals often exhibit antioxidant properties, safeguarding our cells from oxidative harm and diminishing the likelihood of certain cancer forms. The phytochemicals that possess antioxidant properties include allyl sulfides found in onions, leeks, and garlic, carotenoids found in fruits and carrots, flavonoids found in fruits and vegetables, and polyphenols found in tea and grapes.

Hormonal action - Isoflavones, present in soy, mimic human estrogens and aid in alleviating menopausal symptoms and preventing osteoporosis.

Stimulation of enzymes - Indoles, present in cabbages, activate enzymes that inhibit the effectiveness of estrogen, potentially lowering the likelihood of developing breast cancer. Additional phytochemicals that disrupt enzyme activity include protease inhibitors found in soy and beans, as well as terpenes present in citrus fruits and cherries.

Interference with DNA replication - Beans contain saponins, which hinder the replication of cellular DNA, thereby impeding the proliferation of cancer cells. The compound capsaicin, which is present

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in spicy peppers, acts as a safeguard for DNA against cancer-causing substances.

Anti-bacterial effect - Garlic contains the phytochemical allicin, which has antimicrobial effects.

Physical action - Certain phytochemicals exhibit physical binding to cell walls, effectively inhibiting the attachment of pathogens to human cell walls.

Cranberry's anti-adhesion abilities may be attributed to proanthocyanidins.

Ingesting cranberries may decrease the likelihood of developing urinary tract infections and enhance oral hygiene.

CHILDHOOD HEALTH AND NUTRITION

The rationale for categorizing children separately is due to their tendency to be selective eaters, typically favoring certain meals, vegetables, and fruits. This often establishes the recurring behavior of their dietary patterns throughout their lifetime.

As an example, the ex-president of the United States of America, George Bush, said that he disliked broccoli throughout his childhood and never acquired a like for it in his adulthood. His apathy for this remarkable vegetable was so profound that he opposed its inclusion on the White House menu. Broccoli is a very nutritious vegetable that contains a wide range of vitamins, minerals, and phytonutrients.

Food habits are an essential component of an individual's lifestyle and are linked with other behavioral patterns. The age range of 8-14 years is significant in terms of dietary habits, since children's preferences and aversions grow more pronounced throughout this period. The selection of meals is heavily influenced by environmental and psychological variables. The peer group's attitudes and views have a significant impact on the dietary choices made by youngsters.

In order to prevent children from developing a dislike for vegetables, fruits, grains, and other essential food items that contain beneficial phytochemicals, it is important to encourage their consumption. Regular consumption of these foods can help children establish a solid foundation to better handle stress and prevent degenerative diseases in the future. Additionally, consistent intake of these foods can lead to improvements in physical and academic performance, as well as increased resistance to infections.

The development pattern is determined by both genetic inheritance and extrinsic circumstances. Children see an annual

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increase of around 2 to 3 inches in height and 5 pounds in weight. Girls often have minor periods of rapid development at years 8.5 and 10, whereas males experience these growth spurts somewhat later at ages 4.5, 7, 9, and 10.5. Between the ages of 6 to 8, girls exhibit a modest decrease in height and weight compared to males. However, by the age of 9, this pattern is reversed. During this age period, the bottom region of the body has the most rapid growth, resulting in youngsters seeming to have long legs. Females possess a somewhat higher proportion of adipose tissue, whereas males have a greater amount of muscular tissue.

During this phase, the skeletal structure undergoes elongation and expansion, although the attachment of ligaments to the bones is not yet fully established. Consequently, children are endowed with exceptional freedom of motion. From the ages of 6 to 12, all 20 primary teeth are replaced by permanent teeth. Maintaining excellent oral hygiene is crucial throughout the school years, since it directly impacts a child's physical appearance, speech, and ability to chew effectively.

The onset of puberty often occurs at the age of 10, however some girls may experience it as early as eight, while others may not begin until thirteen. Girls have their most significant growth spurt, characterized by increases in height, weight, muscle mass, and similar factors, around one year following the onset of puberty. The beginning of menstruation typically happens around two years following the commencement of puberty. On average, females have their first menstrual period shortly before reaching the age of thirteen. Puberty consists of a distinct series of phases that impact the skeletal, muscular, reproductive, and almost all other physiological systems. Approximately 25% of the increase in human height takes place during the period of puberty.

NUTRITION FOR SCHOOL GOING CHILDREN

Energy: Calorie needs increase with the metabolic demands of growth and energy expenditure**.** Childhood is the period of continuous growth and development.

Protein: During the pre-adolescent period the child grows, on an average, 6-7 cm in height and 1.5 to 3 kg in weight every year and simultaneously development and maturation of various tissues and organs take place. The requirement of protein exceeds 1 gm protein per Kg body weight to meet growth needs.

Vitamins and Minerals: Growing children and adolescents particularly require more

calcium and iron. It is desirable to give higher quantities of calcium to achieve high peak bone mass.

The need of thiamine, riboflavin and niacin increases directly with increased intake of calories. Skeletal growth requires vitamin D while the structural and functional integrity of newly formed cells depend the availability of vitamin A, E and C. Tissue growth involves amino acids so the requirements for vitamin B6 is increased.

CONCLUSION

Proper nutrition in childhood can reinforce lifelong eating habits that contribute to children's overall well-being and help them to grow up to their full potential and a healthy life. Nutrition education through any route either by school nutrition education or by diet counselling has potential for motivating nutritious food choices. To introduce the children to the colourful world of the fruits and vegetables which can also be called as '**Nutrition rainbow'** was one of the aims of the research. Healthy eating habits help children to stay efficient and also help them to maintain a healthy lifestyle when they are adults. This study has been focused on commonly consumed fruits and vegetables in the children, and to determine its health effects.

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