A Systematic Survey on required nutrients for a fit and healthy life

Prasad Narkhede
Information Technology
SSGMCE
Shegaon, Maharashtra

Pratham Paunikar
Information Technology
SSGMCE
Shegaon, Maharashtra

Gaurav Surkar
Information Technology
SSGMCE
Shegaon, Maharashtra

Prajwal Katakpure
Information Technology
SSGMCE
Shegaon, Maharashtra

Abstract-- Various factors are responsible for achieving and maintaining a healthy life and proper nutrition is an essential one among them. This research paper aims to provide in depth survey of literature regarding essential nutrients req. for maintaining optimal health and fitness. This Survey includes macronutrients such as carbohydrates, proteins, and fats, their roles in muscle maintenance, energy provision, and physiological wellbeing. It also includes Review on Micronutrients such as various vitamins, Minerals, and anti-oxidants and their roles in immune-regulation, cellular function, metabolic rates.

Keywords-- Nutrient survey, dietary proteins, body mass index, weight loss, energy expenditure, energy intake, exercise intensity

I. INTRODUCTION

In today's fast paced world, maintaining fitness and well-being is getting increasingly harder, leading to lots of health complications like obesity, asthma, arthritis, diabetes and other health issues. A large part of population is getting increasingly attracted towards fitness activities disregarding the nutrition. By summarizing our findings this survey aims in providing insights to design balanced diet to cater individual needs and fitness goals.

In order to pursue a fit and healthy life, nutrition plays a very important role, its influence on energy levels, physiological processes, and overall well-being. Proper Nutrition is very significant as it serves as fuel to power the body and also supports myriad bodily functions. But it is a very ardent task to find the essential nutrients necessary for optimal health and fitness amongst the abundant nutritional blogs and dietary advices. Thus, this paper aims to provide genuine data by conducting survey to identify and analyze the essential nutrients to maintain a fit and healthy life.

Nutrients can further be categorized as macronutrients and micronutrients. Macronutrients being carbohydrates, fats, and proteins, which are the primary sources of energy and structural components of body.

For a good healthy food recommendation system, it is required that we train the model to prioritize certain nutrients over other based on various factors. This paper summarizes the general nutrition requirements of the body in order to train and improve the recommendation models.

Beyond macronutrients, micronutrients such as vitamins, minerals, and antioxidants exert profound influences on health and fitness. These micronutrients act as cofactors in enzymatic reactions, regulate immune function, and protect against oxidative stress and inflammation. While required in smaller quantities compared to macronutrients, micronutrients are no less crucial, with deficiencies or imbalances leading to a host of health complications. Thus, a comprehensive understanding of both macronutrients and micronutrients is imperative for formulating diets that optimize health and support fitness goals.

II. LITERATURE SURVEY

Micronutrients, which comprise vitamins and trace elements, are critical for the proper functioning of enzymes and overall metabolism. When we are ill, our body redistributes these nutrients to maintain health. If we don't get enough micronutrients for an extended period of time, we can develop serious health issues. Researchers have discovered that a deficiency in these nutrients can lead to specific health problems, which has prompted the development of supplements to address these deficiencies. [2] The majority of participants in this overview of nutritional research eat a monotonous, cereal-based vegetarian diet, with dietary expense and intake differing depending on the subject's location and culture. Food intake is about below the Recommended Dietary Allowance (RDA), which increases the risk of nutrient deficiencies and illness and mortality in people, particularly in children. To prevent and manage micronutrient deficiencies, strategies and treatments are required. [1]

Despite the fact that growth and development are most crucial in the formative years, malnutrition affects a lot of kids. Preschoolers were found to consume less food and nutrients on average than is advised, with only 20.3% of them being classified as nutritionally normal. Study on this age group showed that they were only consuming a small percentage of what is recommended for children between the ages of six and thirty-six months in terms of cereals, fruits, vegetables, fat, and sugar. Adolescent girls' diets were found to be primarily made up of cereals and milk, with little intake of fruits, fats/oils, other vegetables, or green leafy vegetables. It was determined that the average daily intake of dairy products and leafy green vegetables was quite low. [3]

While intake of other food groups, such as fruits, vegetables, dairy products, fats and oils, and eggs, varied and often fell short of required levels, all areas had a significant share of cereals in their diets. Seasonal variations in Food Intake: During the winter and monsoon seasons, higher values were noted; the consumption of grains and pulses showed the greatest seasonal variations. Even yet, Southern Indian athletes consumed less milk, vegetables, and cereals than was reasonable for their level of physical activity. Instead, they ate meals high in antioxidants, such as fruits, milk, and green leafy vegetables. However, the type of sport played determined the variation in sugar intake, but the intake of fat was higher than required [3]

In India, micronutrient deficiencies are widespread and have a major effect on learning, productivity, and health. Iodine, iron, and vitamin A deficiency are among nutritional deficiencies that result in malnourishment. Despite government initiatives such as supplementation programs, iron-deficiency anemia remains a serious public health concern, particularly among youngsters and pregnant women. There is little research on other micronutrients such vitamin C, folate, copper, zinc, vitamin B12. While vitamin C deficiency is uncommon, zinc deficiency is frequent in young children and expectant mothers. In India, micronutrient deficiencies—particularly anemia—remain a serious health concern. Even though some gaps have been reduced, more development requires ongoing government support as well as strengthening the agricultural and health sectors. [4]

Since the digestibility and quantity of essential amino acids in vegetable proteins are poor, a higher intake of vegetable protein is necessary to meet daily requirements for amino acids. The majority of Indians are anemic and iron deficient, which is a common occurrence in underdeveloped nations. Iron is an important trace mineral. According to recent estimates, surface-containment irons, which the body is unable to absorb, account for approximately one-third of the iron concentration found in grains. [5]

Each of the macronutrients—carbohydrate, protein, and fat—has a unique set of properties that influences health, but all are a source of energy. The optimal balance of their contribution to the diet has been a long-standing matter of debate. The digestive products and/or circulating metabolites of macronutrients have been viewed as (a) signals to initiate eating events, thus determining eating frequency; (b) signals to terminate ingestive events, thereby controlling portion size; and (c) signals that activate brain reward systems that may dysregulate healthful eating. [6]

Pregnancy increases the body's demand for certain nutrients to support both the growing fetus and the mother, including a balanced diet of protein and energy. Supplements of calcium and vitamin D are necessary for the development of the fetus's bones and mother reserves, while iron and folic acid aid prevent anemia and neural tube abnormalities. Limiting Vitamin A intake is advised to prevent birth abnormalities, and abstaining from alcohol and excessive caffeine will lower the hazards to the developing fetus. Although zinc, B-complex vitamins, and the vitamins C and E are necessary, a balanced diet is the best source of these nutrients. To

support the use of these nutrients as supplements during pregnancy, more study is required. [7]

III. RESULTS

An alarming trend has been identified by analysing dietary imbalances and micronutrient deficits in India's different age groups. Cereals make up a large portion of the diet, which is frequently monotonous and causes intake to be below the Recommended Dietary Allowance (RDA). This increases the risk that nutritional deficits, particularly in children, will exacerbate issues related to growth and development. Iron-deficiency anemia, which primarily affects pregnant women and children, is still a severe public health concern in spite of supplementing programs. Deficits in zinc and vitamin A are also common, but there is little study on deficiencies in vitamin C, folate, copper, and vitamin B12. Because of the heavy reliance on cereals and the low consumption of fruits, vegetables, dairy products, and other essential food categories, it is difficult to achieve a balanced diet.

Following tables describe various nutrients required generally by a human body.

Nutrient	Male	Female
Protein	60 g/d	55 g/d
Fat	20 %E	20 %E
Calcium	600 mg/d	600 mg/d
Iron	17 mg/d	21 mg/d
Zinc	12 mg/d	10 mg/d
Vitamin-A (Retinol)	600 mcg/d	600 mcg/d

IV. CONCLUSION

The research has identified several nutrients that require modifications in a food recommendation framework to address prevalent dietary inequalities. Inadequate consumption of dairy, fruits, and vegetables, combined with deficiencies in micronutrients like iron, zinc, and vitamin A, is causing health problems and hindering development, particularly in children and expectant mothers. In light of this information, foods high in nutrients should be given priority in our food recommendation system in order to provide a balanced intake of essential vitamins and minerals. Increased dietary diversity and foods rich in vital nutrients can lower the risks associated with these deficiencies and improve overall health outcomes. Incorporating government-funded educational initiatives and supplementation programmes into our system is crucial to promoting healthy nutrition and meeting specific dietary needs.

V. REFERENCES

[1] A. Shenkin, “The key role of micronutrients” Clinical Nutrition, vol. 25, no. 1, pp. 1–13, Feb. 2006, doi: 10.1016/j.clnu.2005.11.006.

[2] M. G. Vecchio et al., “Types of food and nutrient intake in India: a literature review,” Indian Journal of Pediatrics/Indian Journal of Pediatrics, vol. 81, no. S1, pp. 17–22, Jun. 2014, doi: 10.1007/s12098-014-1465-9.

[3] Z. Gonmei and G. S. Toteja, “Micronutrient status of Indian population,” Indian Journal of Medical Research, vol. 148, no. 5, p. 511, Jan. 2018, doi: 10.4103/ijmr.ijmr_1768_18.

[4] Rao BN. Nutrient requirement and safe dietary intake for Indians. Nutrition Foundation of India Bulletin. 2010;31(1): 3–5.

[5] A. Mousa, A. Naqash, and S. Lim, “Macronutrient and Micronutrient Intake during Pregnancy: An Overview of Recent Evidence,” Nutrients, vol. 11, no. 2, p. 443, Feb. 2019, doi: 10.3390/nu11020443.

[6] S. Howell and R. Kones, “‘Calories in, calories out’ and macronutrient intake: the hope, hype, and science of calories,” Endocrinology and Metabolism/American Journal of Physiology: Endocrinology and Metabolism, vol. 313, no. 5, pp. E608–E612, Nov. 2017, doi: 10.1152/ajpendo.00156.2017.