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Dehydrated greens as natural fortificant for Combating Micronutrient Deficiencies

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Abstract: ***Micronutrients are substances which are needed only in minuscule amounts. They are known as "magic wands" as they enable proper growth and development. These nutrients are needed by the body in minute amounts and play leading roles in the production of enzymes, hormones and other substances, helping to regulate growth activity, development and functioning of the immune and reproductive systems. Micronutrient deficiency is better known as hidden hunger, World Health Organization identified Iron, Vitamin A and Iodine as the "Big 3" that affect at least one-third of the world's population. Various researches done on food products in fresh or processed form has showed significant results in combating micronutrient deficiencies. In India, various types of under-utilized foods are available for eg green leafy vegetables which are rich in micronutrients but are discarded or used as animal fodder due to unawareness and ignorance. Among the plant foods green leafy vegetables are the cheapest, locally available food rich in micronutrients. Propagation and promotion of the less utilized green leafy vegetables is thus essential. Besides this because of lack of nutrition education and their perishable nature, people are unaware of their rich composition. Green leafy vegetables can be processed and preserved both at commercial and house hold level by simple methods like blanching and dehydration thereby improving their shelf life and ensuring their daily consumption.***

Keywords: Green leafy vegetables, Dehydration, Blanching micronutrient Deficiencies, food based approaches

I. INTRODUCTION

Micronutrients are those substances which are needed only in minuscule amounts. They are known as "magic wands" that are important for proper growth and development. **UNICEF (1998)** defined micronutrients as nutrients that are only needed by the body in minute amounts, which play leading roles in the production of enzymes, hormones and other substances, helping to regulate growth activity, development and functioning of the immune and reproductive systems. **(Ekweagwu, Agwu, & Madukwe, 2008)**. Micronutrient deficiencies rank among the top twenty risk factors for morbidity and impaired quality of life worldwide, with particular burdens falling on populations in poor countries. The statistics of micronutrient deficiency is alarming. It is an ecological problem that occurs along with its consorts like poverty, disturbed family structure, ignorance, lack of awareness and knowledge in view of nutrition **(Ecker, Agwu, & Madukwe, 2010)**. Numbers of individuals in the world suffering from clinical manifestation of micronutrient deficiency run into several millions. Moreover, these problems certainly overlap and interact; so many people must have multiple deficiencies **(Thu et al., 1999)**. Multiple micronutrient deficiencies are more common than single deficiencies in developing countries and the cause for their high prevalence is low dietary intake by populations and poor net bioavailability of nutrients. According to a new World Bank report, micronutrient deficiency is costing poor countries up to three percent of their yearly gross domestic product and malnourished children are at risk of losing up to ten percent of their lifetime earning potential **(Karva, Bharati, & Chimmad, 2010)**.

II. PREVALENCE OF MICRONUTRIENT DEFICIENCY

Micronutrient deficiency is widespread in the industrialized nations. They affects approximately one third of the world's population, even more so in the developing regions of the world. It is a silent massacre: every year some 11 million children – 6 million of them just five years old or younger – are dying from micronutrient deficiency **(Saradha & Rajeshwari, 2008)**. Micronutrient deficiency is found to be a widespread problem in developing countries irrespective of topographical description. In developing countries, where poverty prevails, deep rooted traditions, taboos and false beliefs have imprisoned the people, the serious deficiency disorders of micronutrients and its impact is more acute and profound. In 1990, the World Health Organization (WHO), United Nations Children's Fund (UNICEF), and the World Summit for Children endorsed the elimination of micronutrient deficiency in developing countries by the year 2000, specifically deficiencies of vitamin A and two trace elements – Iron and Iodine. Deficiencies of these micronutrients were estimated to affect the health, mental and physical function, and the survival of more than two billion people

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worldwide.

III. FOOD BASED APPROACHES WITH FOCUS ON GREEN LEAFY VEGETABLES

Food based approaches for improving nutrition have often been overlooked by governments, researches, donors and the health sector sought solutions with rapid start up times and quick, measurable results. However, experiences in a number of developing countries have shown that well-designed food based interventions – combined with appropriate use of supplements and supported by health and nutrition education – can improve the diets of vulnerable populations in a relatively short period of time . **(Food and Agriculture Organization, 2011a; Arimond et al., 2010; Fanzo, Cogill, & Mattei, 2012; MacDonald, Bennett, Potter, & Ramankutty, 2011)**

Various researches done on food products in fresh or processed form has showed significant results in combating micronutrient deficiencies without any side effects. One such product is Green Leafy Vegetables. Green leafy vegetables are considered to be the major contributors of vitamins and minerals in the diet. According to available official figures leafy vegetables are grown in about 0.11 million hectors of land in India and the production is about 0.73 million tones. Despite the fact that green leafy vegetables are a store house of many micronutrients, their consumption is far from satisfactory **(Yeggammai & Unnithan, 1992)**.

Green leafy vegetables are rich source of beta carotene, ascorbic acid, riboflavin, folic acid and minerals like calcium, iron and phosphorus. In nature, there are many under-utilized greens of promising nutritive value, which can nourish the ever increasing human population. Many of them are resilient, adaptive and tolerant to adverse climatic conditions. Although, they can be raised comparatively at lower management costs even on poor marginal lands, they have remained under-utilized due to lack of awareness and popularization of technologies for utilization **(Edeoga, Omosun, & Uche, 2006; Hassan & Umar, 2006; Ekkop, 2007).. B**esides this because of lack of nutrition education and their perishable nature, people are unaware of their rich composition. In a country like India, where most of the people are engulfed in poverty and can't afford the expensive food products and suffer from various deficiency diseases there is an immediate need to identify cheap and easily available source rich in iron, vitamin A and other micronutrients and green leafy vegetable can be one of them **(Joshi & Mehta, 2010)**. Hence there increased consumption can play a role in control of anemia. Green leafy vegetables are offers a cheap but rich source of a number of micronutrients and other phytochemicals having antioxidant properties **(Tarwadi & Agte, 2003)**.

NNMB survey **(2000)** also reported mean consumption of green leafy vegetables to be only 37 percent of Recommended Dietary Intake. Besides this, the Green leafy vegetables are highly seasonal and are available in plenty at a particular season of the year. Abundantly supply during the season results in spoilage of large quantities. Preservations of these green leafy vegetables can prevent huge wastage as well as make them available throughout the year. There are number of processing technique which can be utilized for improving the shelf life of green leafy vegetables.

IV. PROCESSING TECHNOLOGY FOR GREEN LEAVES

Augmenting utilization and avoiding wastage calls for employing suitable preservation techniques that are user friendly and sustainable at the commercial and household level. Although there are number of techniques by which we can improve the nutritive quality, reduce the content of inhibitors like oxalate, phytate and shelf life of green leafy vegetables and ensure their consumption on daily basis. Preservation techniques can prevent huge wastage as well as make them available in the lean season at remunerative prices. Vegetables can be therefore processed and preserved by simple traditional inexpensive methods like blanching and dehydration (Mepba, Eboh, & Banigbo, 2007; Joshi & Mehta, 2010).

BLANCHING stops all life processes, inactivates enzymes, fixes green color and removes certain harsh flavors common in green leafy vegetables (Mepba, Eboh, & Banigbo, 2007). DEHYDRATION is one of the simplest method of preservating the green leafy vegetables. In dehydration, the moisture content of the food is reduced and the growth of microorganisms in the dried food is retarded. Removal of moisture from green leafy vegetables is the key to enhance their shelf life and dehydration works on the same principle (Gupta, Sehgal, Singh & Singh, 2012)

Blanching of green leaves help in reducing the anti nutrient content of leaves and dehydration makes green leafy vegetables equivalent to legumes in their nutrient content (Joshi & Mehta, 2010). Dehydration also makes them a concentrated source of vitamins and minerals and thus they become a very suitable "NATURAL FORTIFICANT". In addition to increasing variety in the menu and reducing wastage, dehydrated vegetables are simple to use and have a longer shelf life than fresh vegetables. The dried leaf powder can then be incorporated in various recipes in acceptable proportion (Joshi & Mehta, 2010). In this way we can ensure the consumption of micronutrient rich green leafy vegetables on daily basis.

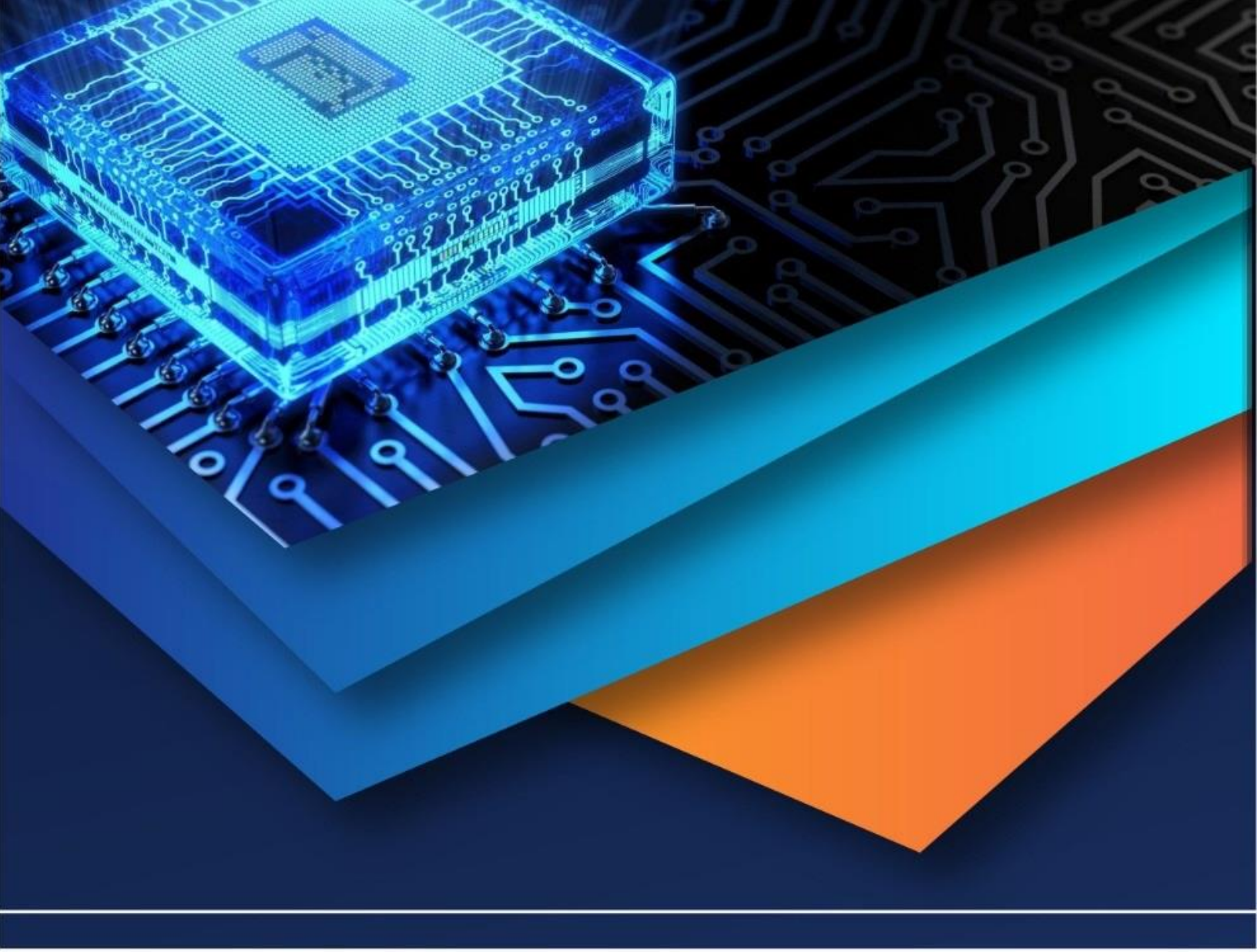
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Hence food can be used as a major tool to overcome micronutrient deficiency, especially of Iron and Vitamin A. By focusing on the use of less utilized , inexpensive green leafy vegetables as well as other fruits and vegetables and by application of different processing technologies which are easily available we can combat micronutrient deficiencies.

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