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Review article

Use of soybean fortified mixture among under-five malnourished children

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Abstract

Malnutrition is one of the major health problems in developing and underdeveloped countries especially in children and it is inextricably linked with poor feeding practices and poverty. When the parents fail to meet the minimum daily requirement of nutritious food for their children it results into malnutrition. The poverty is the main culprit there is a need to adopt the cheap but highly nutritious foods as a supplement in their daily diet. Hence soybean fortified mixture is one of the best supplementary diets to fulfill the daily minimum nutritional requirement of the child and enhance appropriate growth and development. Soybean is a rich source of protein and its involvement in the diet with appropriate processing can have highly beneficent effects on the growth of the child. The aim of the study was to review the beneficent effects of using the soybean-fortified mixture for malnourished under-five children residing in the rural area. Dietary interventions include soybean-fortified mixture. Each dose/laado of Soya fortified mixture (contain roasted soybean flour, wheat flour and groundnut and jaggery) will give 14.09 gm of protein and 313.76 Kcal of energy. 200 gm of mixture given for one week into 4 divided doses gives 32.77 gm of protein and 727.25 Kcal of energy. **Conclusion:** The children below five years of age need the diet that is rich in protein and gives sufficient energy required for appropriate growth and development. Soybean fortified mixture used as supplementary diet is the best method to overcome the deficiency of protein among malnourished children.

Key words: malnutrition, under-five children, soybean fortified mixture, wasting, stunting.

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1. Introduction

Malnutrition refers to the situation where there is an unbalanced diet in which some nutrients are in excess, lacking or wrong proportion. India is a developing country, India ranks 4th in the list of a number of billionaires in a country. Today, India ranks second worldwide in farm output. As per the 2010 FAO world agriculture statistics, India is the world's largest producer of many fresh fruits and vegetables, milk, major spices, select fibrous crops such as jute, staples such as millets and castor oil seed.

India is the second largest producer of wheat and rice, the world's major food staples. [1] It is seventh largest agricultural exporter worldwide and the sixth largest net exporter [2]. But it is the most drastic thing that More than one-third of the world's malnourished children live in India. Among these, half of them under 3 are underweight [3]. World Bank estimates that India is one of the highest-ranking countries in the world for the number of children suffering from malnutrition. The prevalence of underweight children in India is among the highest in the world and is nearly double that of Sub Saharan Africa with dire consequences for mobility, mortality, productivity and economic growth. [4]

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The 2017 Global Hunger Index (GHI) Report ranked India 97th out of 118 countries with a serious hunger situation. Amongst South Asian nations, it ranks third behind only Afghanistan and Pakistan with a GHI score of 29.0. [5]

Some of the major causes of malnutrition in India are Economic inequality. Due to the low social status of some population groups, their diet often lacks in both quality and quantity. Women who suffer malnutrition are less likely to have healthy babies. In India, mothers generally lack proper knowledge in feeding children. Consequently, newborn infants are unable to get an adequate amount of nutrition from their mothers. Deficiencies in nutrition inflict long-term damage to both individuals and society. Compared with their better-fed peers, nutrition-deficient individuals are more likely to have infectious diseases such as pneumonia and tuberculosis, which lead to a higher mortality rate. [6]

A recent Food and Agriculture Organization (FAO) review of future world food production (FAO, 2009) predicted that the world's population will increase by a third, or 2.3 billion people, by 2050. Most of this growth will be in developing countries. To meet expected demand, global food production will need to increase by 70%, and in developing countries, it will need to almost double. While cereal production will need to increase by a third to meet demands, the production of commodities that are more responsive to increases in income will have to increase even further [7].

According to a cross-sectional study conducted in rural Bangalore by MVJ medical college and research centre in December 2012 it was found that Soy is a good source of protein, amongst many others, for vegetarians and vegans or for people who want to reduce the amount of meat they eat, according to the US Food and Drug Administration soy protein is the nutritional equivalent of meat, eggs, and casein for human growth and health.[8]

In Nigeria, the use of soybean has a great impact on the health status of children as per a study conducted to analyze the social impact assessment (SIA) framework to examine the level of adoption and impact of soybean on farm households in Nigeria based on a survey of 203 households in Benue State. The results show that the nutritional status of children was significantly better in soybean producing/using households than in those that did not use soybean. [9]

Dietary intervention:

One of the best methods of using soybean is as a fortifier. Soybean fortified diets can be very beneficent in improving the health status of children. Soybean is the cheapest legume and richest for its nutritional value. 100 grams of soybean contains about 36 gram of protein. Soybean used with other commonly available grains like wheat and best and cheap sources like ground and Jaggery can give very impressive results in the health status of malnourished children. The Glycine max fortified mixture includes four ingredients in the following proportions

Soybean: 16 gm, Wheat 40gm, Ground nut10gm, Jaggery 20gm.

86 gram of soybean fortified mixture will give 14.09 gram of protein and 313.76-kilo calories of energy.

Preparation of the intervention

1. Roasting of wheat, soybean and ground nuts and grinding them once they attain room temperature.
2. Roasting the grinded flours.
3. All the flours and Jaggery are mixed thoroughly.
4. Ladoos are prepared from the mixture; each ladoo is made of 50 gm of the mixture.
5. Each child is given 4 ladoos a week

Many studies have proved the effectiveness of soybean fortified mixture in overcoming malnutrition among children. The under-five children with moderate and mild malnutrition are in high need of protein diet to improve weight and zinc to improve their proper mental development. The soybean fortified foods provide these two contents insufficient amount.

The government of India has undertaken several measures to combat malnutrition where nutritious diet is given to children in Anaganawadi's under ICDS programme but still many children are reported with mild and moderate malnutrition. The malnutrition measured in term of stunting and wasting in children shows a perfect measure of nutritional status

Rural India is witnessing more malnutrition among Children < 5 years as higher than an urban area. Female infants experienced a higher mortality rate than male infants in all major states. According to the report by the Ministry of Statistics and Programme Implementation - Children in India 2012 - 48 percent children under the age of five are stunted which indicates that half of the country's children are chronically malnourished

Soybean fortification diets given as supplementary diet are expected to enhance the speed of growth and development in an excellent manner. Soybean is not consumed because of its allergic (antitrypsin) effect. This allergic effect can be reduced by roasting the soybean before grinding them to flour. Soybean is a cheap source of protein and very good source for all other nutrients. Soybean contains complete protein that is it is among the few sources of protein other than milk and egg that contain all the essential amino acids. Soybean flour can be mixed with any other flour and jaggery is added to mask its slightly odd taste.

Intervention: each malnourished child is given 200 gm of soybean fortified mixture per week. The diet will be given 4 days a week with 50gm of mixture per day.

The nutrition provided by the mixture is

Table No. 1 The nutritive value of soybean fortified mixture.

	Quantity of soybean fortified mixture	Protein in grams	Energy in kilocalories
Preparation quantity	86 gm	14.09	313.76
Per day	50 gm	8.2	182.25
Per week	200 gm	32.77	727.25

Soybean fortified mixture is a supplementary diet for the children. 3 months of consistent intervention can bring a remarkable improvement in the nutritional status of the children. The children with mild malnutrition will show an improvement in nutritional status progressing to a normal level

Exchange of information:

In India 44% of children below 5 years of the age are malnourished. There are so many factors that are causing the malnutrition among children, like poor diet, unhygienic environment, poverty etc. The condition is still worst in rural areas of India where the traditional practices and superstitious believes hinder the growth of children. One of the best options is to provide such diets to these children that are cheap, less in quantity but rich in nutrition. Soybean is one of such foods. It has a rich amount of calcium, protein, zinc and all other required nutrients. Soybean has an allergic factor (Antitrypsin) which hinders its use commonly. Its bitter taste is one more reason for its decreased use. But these hindering factors can be overcome by roasting the soybean to reduce its allergic effect. A study was conducted to assess the effect of soybean fortification on consumer acceptability of Hausa Koko. Hausa Koko was prepared from a mixture of soaked millet grains and pre-soaked, blanched and dehulled and roasted soybeans. The results showed that the fortification with soybeans up to 40% yielded a product most acceptable to consumers. The study concluded that use of soybean will make a significant contribution towards the alleviation of protein-energy malnutrition in communities of developing countries.[10] The bitter taste of soybean can be overcome by mixing the soybean flour with jaggery to mask its bitter taste. Soybean used a fortifier has given better results in Improving the health status of children with malnutrition

Conclusion:

In India, the children, especially below 5 years of age, need special attention in their diet particularly during their developing age. Protein is the crucial and most essential part of the diet. The protein supplied by economical and protein-rich diet can benefit as a best for appropriate growth and development of the children. Soybean can be used in many ways as a fortifier. The best one is a soybean fortified mixture for children.

Conflict of interest: None

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