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The indigenous plants for alleviating dietary deficiencies of tribal: A case study of Nandurbar District (Maharashtra)

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ABSTRACT
Present paper deals with the review of the malnutrition deaths in the Nandurbar district of Maharashtra (India). Possible measures to avert this phenomenon on a sustainable basis are also suggested. The paper focuses on methods of rural nutritional intervention identification, propagation and introduction of nutritionally rich, indigenous plant species in existing cropping system is also looked at**.**

Key words: Dietary deficiencies, Malnutrition, indigenous plants, Nandurbar, Maharashtra.

Introduction

Tribal dominated areas in Nandurbar District mostly has forests and are inaccessible having hilly terrain with poor infrastructure. These areas are bypassed by the process of development and even after 58 years of independence visible development have not taken place. On the contrary their livelihood has been threatened by the process of development. They had once upon a time, in recent past, lush green thick forests fulfilling their needs of food, fodder and livelihood. However, due to indiscriminate cutting of forests the area has become dry and barren. The locals, who were more dependent of forest than on agriculture to meet their nutritional needs, are now facing problem of feeding their young ones and the lactating and pregnant mothers. The locals cultivated ragi, jowar, bajara and other minor millets on the scanty unfertile and sloppy land. Their agricultural practices were of primitive type and hardly involved any modern methods of cultivation. Ashtekar et al (2004) has reported the causes of malnutrition as deficiency of essential components in diet leading to malnutrition, protein calorie malnutrition and micronutrient deficiencies (vitamin A, iron and iodine) are common. Goiter of various grades is also endemic in some of the tribal areas. Water borne and communicable diseases: Gastrointestinal disorders, particularly dysentery and parasitic infections are very common, leading to marked morbidity and malnutrition. The survey also showed that not only were the children malnourished, their mothers' were too. The weight of adult mothers ranged between 40-45 kg. Girls constituted around half the total number of malnourished children indicating the precarious condition of these future mothers.

The survey revealed that although generations of malnourished children are born in this region, the policy of the government still does not look beyond the singular health aspect of the problem, on the basis of which mitigation measures are designed. The issue of malnutrition is required to be addressed comprehensively otherwise the tribal community in this part of the country is headed for extinction (Bhatia, 2005). The tribals of Nandurbar are engaged in a continuous struggle for existence. Malnutrition and child mortality are part of their everyday life, even as issues related to rights over natural.

According to the report, deficiency of minerals and vitamins was the major cause of malnutrition related diseases. Shortage of protein in the daily diet also disturbed the normal growth of the child. The former two are related with the natural resistance capacity of the child that is under developed due to deficiency. The report also stated that the diet of the tribals, especially pregnant and lactating mothers needs to be strengthened. Other causes of malnutrition attributed by the report are socio-economical like

early marriage, status of women in the family, underfeeding the pregnant women, lack of education, non-use of family planning measures, lack of infrastructure, unavailability of employment, migration etc. also needs immediate attention. There is an urgent need for multidimensional and multi-pronged planning of a strategy to solve the problem of malnutrition of the tribal's of Nandurbar District (Maharashtra).

In order to solve the problem on a sustainable basis one needs to look for locally available potential resource that the tribals were using since many generations. If such resources are depleted or forgotten they need to be resorted. The natural resources including indigenous plants that provided food and nutrition to the locals need immediate intervention. Earlier work has been reported from this part of the country (Deore and Somani, (2005), Patil et al, 2005). Babu (2000) has suggested solution to a problem of vitamin A deficiency in Malawi of South Africa using locally available *Moringa oleracia*. In Nandurbar district also such an approach will be helpful in solving the problem of child death due to malnutrition. Adequate information on the existence and use of indigenous plants that provide protein, iron, calcium and vitamin A should be searched and made available to the rural households through better designed and implemented nutrition education and agricultural interventions. The tribals of the district were once cultivating minor millets including jowar, bajara, dadar, and ragi. Indigenous plants should therefore be protected as a source of food.

Material and methods

A survey was conducted in 10 villages, five each from Akkalkuwa and Dhadgaon talukas of Nandurbar district of Maharashtra in April- May 2009. From each village ten respondents were randomly selected for recording the indigenous plants they used as food. All the 100 respondents were tribals and had one or more of their children undernourished. The information given by the respondent regarding the plants they used in local language was scientifically translated into binomials. Inquiries were made about the staple food that the respondents are consuming now and their cultivation practices.

Results and discussion

Earlier the farmers used to cultivate minor millets, jowar and maize. Slowly over a period of time the area under the cultivation of minor millet has been reduced and is now occupied by High Yielding Varieties (HYV) of jowar and paddy. Patil and Bhaskar (2003) had reported that the area under cultivation of minor millet and local breeds of jowar is reducing at an alarming rate. They had reported that the Nandurbar district had 61 land races of jowar and 87 land races of minor millets that were not recorded earlier. This means that the area was once represented by a large number of land races of jowar and minor millets. This treasure of biodiversity is found to be slowly drying up as farmers are now turning towards HYV of jowar and rice. The HYV requires more inputs of water, insects and pest control and chemical fertilizers than the local breeds. Also the quality of food items prepared from the local breeds is superior to HYV. Moreover, the produce from the HYV was sold in the market instead of self consumption.

Nutritional composition of rice, wheat, jowar and other minor millets is given in table -1. The figures reveal that the energy levels of all the grains are almost similar ranging from 309 kcal in kodo millet to 349 kcal/100 g seed in jowar. Significant differences were, however, found in the protein content ranging from 7.5 g to 12.5 g/100g seeds of proso millet. Also there were significant variations in the content of iron, calcium and phosphorous within the grains scanned. Deficiency of iron, calcium and phosphorous in the daily die of the tribals of this region is a matter of great concern. Along with the protein energy deficiency,

mineral deficiency also plays a major role in malnutrition. Minerals like iron, calcium and phosphorous play a major role in growth, development and food metabolism.

Local races of jowar and minor millets require low inputs and can withstand scarcity of water. They can grow in any type of soil and are resistant to common diseases and pests of the crop. Thus cultivation of local jowar and minor millets should receive priority in planning for averting protein-energy-mineral deficiency. The farmer needs to be introduced with improved agro technologies developed in the country through intensive extension programme to popularize the forgotten crops and also to increase its production for preventing malnutrition sustainably at local level. Minor millet is getting attention world wide as a weaning food and as a food for future (FAO, 1995). Surplus grains grown by the tribals can be sold in the market to get cash money for fulfilling other needs.

TABLE 1**: Nutrient composition of sorghum, millets and other cereals (per 100 g edible portion; 12 percent moisture)**

Food	Protein[a] (g)	Fat (g)	Ash (g)	Crude fiber (g)	Carbohydrate (g)	Energy (kcal)	Ca (mg)	Fe (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)
Rice (brown)	7.9	2.7	1.3	1.0	76.0	362	33	1.8	0.41	0.04	4.3
Wheat	11.6	2.0	1.6	2.0	71.0	348	30	3.5	0.41	0.10	5.1
Maize	9.2	4.6	1.2	2.8	73.0	358	26	2.7	0.38	0.20	3.6
Sorghum	10.4	3.1	1.6	2.0	70.7	329	25	5.4	0.38	0.15	4.3
Pearl millet	11.8	4.8	2.2	2.3	67.0	363	42	11.0	0.38	0.21	2.8
Finger millet	7.7	1.5	2.6	3.6	72.6	336	350	12.6	0.42	0.19	1.1
Foxtail millet	11.2	4.0	3.3	6.7	63.2	351	31	2.8	0.59	0.11	3.2
Common millet	12.5	3.5	3.1	5.2	63.8	364	8	2.9	0.41	0.28	4.5
Little millet	9.7	5.2	5.4	7.6	60.9	329	17	9.3	0.30	0.09	3.2

Sources*:* Hulse, Laing and Pearson. 1980: United States National Research Council/National Academy of Sciences. 1982. USDA/HNIS. 1984.

Deficiency of vitamin A is also a serious problem in this tribal area of Maharashtra. The World Health Organization (WHO) and UNICEF have defined the prevention and control of vitamin A deficiency as one of the priorities in their nutrition programmes (WHO, 1989,; UNICEF, 1990). High level of vitamin A deficiency has also been identified as a major causal factor for young child morbidity and mortality (Martorell, 1989). In Nandurbar district though detailed study about effects of vitamin A deficiency is not available intervention of UNICEF is noticed through its distribution of vitamin A capsules in the area. A

study needs to be conducted about the impact of this intervention. External supply of vitamin a capsules is a short term strategy. Such programmes of distributing vitamin A capsules have failed in other countries (Tielsch and Sommer, 1984; Babu, 2000).

The sustainable approach of intervention would be identifying vitamin A rich indigenous plants found in the region, developing methods of multiplication, cultivation and extension services. Indigenous Knowledge System (IKS) that include a system of collecting, documenting and using indigenous knowledge for development interventions, IKS on nutritious plant species can be utilized as nutrition intervention. Several international non-government organizations have shown interest in documenting and utilizing indigenous knowledge system of farmers in implementing agriculture and rural development projects (Warren et al. 1988) and in natural resource management (Rajasekaran et al 1990). A great deal of emphasis has also been given to identify local plants that are rich in one or more nutrients and use them in local diets to increase food security and nutrition (Ogle and Grivetti, 1983, Hussain 1998). Therefore, documentation of indigenous knowledge and dissemination of information relating to indigenous plant food utilization is very essential for solving nutritional problems. This requires the coordination of appropriate institutions involved in this activity.

During our study it was found that depending on their availability in the nearby area leaves of ***Acalypha indica***, ***Achyranthus aspera***, ***Cassia tora, Amaranthus* spp.**, ***Chenopodium album, Corchorus capsularis, Dioscoria pentaphylla, Ipomoea aquatica, Moringa oleifera, Oxalis carniculata, Oleracia Portulaca, Polygonum glabra, Tribulus terrestis,*** and ***Vigna unguiculata*** were used by the locals as vegetable. Of these Moringa is a tree species bearing leaves throughout the year while rest of the plants are annuals and are available only up to the end of October-November. It is reported that the leaves of Moringa contains 3767 iu of vitamin A per 100 g of edible portions of the leaves. Also it has 440 mg Calcium, 220 mg vitamin C and 70 mg phosphorous per 100 g edible portion of the leaves (Gopalan et. al. 1985). In spite of the fact that Moringa leaves contains a large amount of vitamin A, calcium and phosphorous, it was not included by the tribal in their regular diet. Babu (2000) had enumerated cost effectiveness of Moringa leaves with other available vegetables in East African country Malawi. He had reported use of Moringa leaves in solving the problem of vitamin A deficiency in Malawi. The agro-climatic condition of Nandurbar district is suitable for growing Moringa. While cultivation is possible only on the irrigated land one sapling per household can be easily sustained on the waste water from the house.

There are two problems that we anticipate in making Moringa popular as a food supplement providing vitamin A in Nandurbar district. First problem is to convince the local people to plant a sapling in their backyard and the second one is acceptance of its leaves in their diet. The importance of taste in food acceptance has recently been recognized play a crucial role in determining the success of food and nutrition intervention programmes (Babu and Rajasekaran, 1991). It is well-known that the quality of food taken is the major factor determining its nutritional impact (Kennedy and Alderman, 1987). Various recipies need to be developed to make Moringa leaves accepted by locals. This may include mixing leaves with roti, dal or as an independent dish. Whole hearted rigorous extension work need to be carried out to popularize Moringa in the area so that people accept it in their regular diet and also grow it in their backyard. Planting material in the form of stumps or saplings can be provided free of cost to every household. Also people should be made aware of the care to be taken while growing the plant.

Thus indigenous crops like jowar and minor millets, indigenous food plants and Moringa has a great potential in fighting the problems of protein-energy-mineral and vitamin A deficiency in the malnutrition affected area of Nandurbar district of Maharashtra. With proper planning and coordination between various government and non-government agencies the problem of hunger deaths of children can be solved on a sustainable basis with minimum input from the external sources.

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