

INTRODUCTION

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Expectant and nursing women form one of the nutritionally most vulnerable groups and therefore need special attention. Diet surveys carried out in different parts of India (John 1983; Rajalakshmi, 1983; NIN, 1981) have well established that the diets of underprivileged pregnant and lactating women are not much different from the diets of the nonpregnant, nonlactating women which in themselves are deficient in calories, protein and other essential nutrients. The average deficit is of the order of 1000 kcal and 20 g of protein. The poor dietary intakes manifest in clinical signs and lowered blood constituents such as hemoglobin, proteins and vitamins.

As a result of poor dietary intakes, the weight gain during pregnancy is not more than 5-6 kg as compared to a minimum of 10 kg for well-nourished women (Prema et al, 1981 a). A poor weight gain during pregnancy is a cause of concern because it is generally associated with a low birth weight which in turn may affect the subsequent growth and development of the child. Although, most of the attention is focussed on the woman's capacity to bear the child and breast-feed him, the health of the woman herself cannot be ignored because of the multiple role she is required to play in the household and also as a productive worker.

One of the short term measures to improve the nutritional status of the pregnant and lactating women is food supplementation, especially with an energy and protein rich food during pregnancy and lactation.

Investigators from several countries including India have reported beneficial effects of the supplementary foods given during pregnancy and lactation. Improved maternal weight gain, increased birth weight and reduced perinatal mortality have been reported (Lechtig et al 1979; Bhatnagar et al 1983).

In India, the Integrated Child Development Services (ICDS) is the most promising program for preschool children, pregnant women and nursing mothers from underprivileged sections. One of the major aims of this program is to provide supplementary nutrition to the mother and child target groups. A good deal of attention has been given to the preschool children but not much has been done to improve the nutrition of the pregnant and lactating women.

The supplement for mothers is required to provide approximately 500 Kcal and 25 g protein per day per subject. The supplements usually consist of foods such as **Sukhadi**, cereal -pulse mixes, CSM or Ready-to-Eat extruded foods such as **Murmura**. It has been observed that whenever the food is given to the mother to be 'taken home' she invariably consumes only a part of the ration, a major portion being given to the children or other family members.

Program evaluation of Project Poshak (Gopaldas et al 1975) revealed that when the food was given to mothers to be consumed at home, on an average, a pregnant woman got only one-tenth and the lactating woman got one-fourth of the daily ration (200g) given to them. Similarly, in the 'India Population Project' carried out in Karnataka (NIN, 1981), it was observed that nearly 80% of the mothers shared the food supplement given to them. It was postulated that mothers would have received only half to one-third or even less of the total ration of 400 Kcal. The most common sharers in both the projects were children between 3-6 years of age.

Various reasons for sharing of the maternal food supplement have been suggested, and they are (1) a background of extreme poverty of the recipients (2) psychological and traditional compulsions which prevent the mother from consuming the food herself and (3) lack of awareness among mothers that their dietary requirements are increased during pregnancy and lactation. One of the reasons for restricting the food intake during pregnancy is the fear that the baby will grow big and cause a difficult labor.

Thus, there is a need to prevent or reduce sharing of the food supplement given to the mothers - in other words a need to target the food supplement.

Certain food avoidances and the use of special foods during pregnancy and lactation have been recommended almost everywhere in the world. While, the food avoidances can be one of the causes of poor nutritional status because several nutrient rich foods like eggs, curd and vegetables may be avoided, the practice of consuming special foods is beneficial and should be encouraged. It can be used to provide extra foods to the pregnant and lactating women.

In a project conducted in Anand, Gujarat (India), the Protein Foods and Nutrition Development Association of India (PFNDAI, 1977) sought to examine whether the problem of sharing could be overcome by formulating foods that were based on special preparations eaten during pregnancy and lactation. The concept of special mother foods to minimize sharing was used for two reasons :

1. Since these foods are recognised for their therapeutic value, the mothers might not be psychologically inhibited from consuming them without sharing with other family members especially the children.
2. Characteristic strong flavors of spices (such as the bitter flavor of fenugreek seeds), which are generally added to these foods might render the food less acceptable to children resulting in reduced sharing.

In the PFNDAI (1977) study, the special food products used were methi biscuits and cut squares, ginger biscuits and ginger cut squares. The traditional **methipak*** was used as the control or yardstick. These foods were tested for preference and acceptance

Methi - Hindi name of fenugreek (*Trigonella foenum graecum*.) **Pak** - a sweet-meat. **Methipak** - a bitter-sweet confection containing methi.

among pregnant and lactating women. The data revealed that methi biscuits were the most preferred food supplement. The sharing of methi biscuits was much less (only 10%) compared to 25% for other sweeter foods such as ginger biscuits and ginger cut-squares.

Since the PFNDAI study was only a pilot trial and was conducted on a small sample, the purpose of the present study was to formulate a similar food supplement (methi biscuit) for the pregnant and lactating women beneficiaries with an aim to reduce sharing of the food supplement among other members of the family, and to investigate the feasibility of using it in the ICDS program situation.

Four inter-linked studies were carried out to achieve the above aim.

These studies were :

1. Habits, beliefs and consumption practices of **methipak**-the traditional mother food of Western India. This study was conducted because the food to be developed i.e. methi biscuit utilised the concept of methipak.
2. Animal experiments to investigate the effect of fenugreek (methi) seed based diets on the birth outcome and lactational performance in albino rats.

This study was carried out because one of the findings of the habit survey (study 1) was the belief among the pregnant women that methi seeds if consumed during pregnancy could cause abortions because of their heating nature. And therefore it was considered necessary to establish the safety of consuming methi in pregnancy.

3. Product development : Although, the PFNDAI (1977) formulated a methi biscuit, the basic ingredients used were different. They used **balahar** whereas in the present study, wheat/soya flour were used. Also, the selection of the level of methi seed powder was not clearly stated by PFNDAI. Therefore, the methi biscuits had to be developed in such a way that they were acceptable to the pregnant and lactating women and at the same time least acceptable to the preschool children i.e. main sharers of the supplement. The product development consisted of sensory evaluation trials, shelf life and nutrient composition studies.
4. Extended product testing in the ICDS community to study the 'take-home' acceptability, collections, consumption and sharing characteristics of the methi biscuits formulated in study 3.

In the sections that follow, each study has been presented separately under the heads of objectives, methodology, results/discussion and conclusion. A common review of literature precedes the four studies.