

RESEARCH ARTICLE

Popularisation of Red Palm Oil in Food Uses

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ABSTRACT

Vitamin A deficiency (VAD) is a health problem in most of the developing countries, which causes blindness. Red Palm Oil (RPO) is one of the richest and cheapest sources of Vitamin A. In the present study, an attempt was made to increase the acceptability of RPO in food uses. For this purpose, RPO was used for preparing several recipes and blending with other edible oils in different proportions. A consumer trial was also conducted to know the acceptability of the above recipes and blends. It was observed that savoury items made of RPO were more acceptable than sweet items. RPO: Vanaspati in the proportion of 1:3 blend was 100% acceptable. RPO when blended with different vegetable oils in 1:1, 1:2, 1:3 and 1:4 proportion, 1:1 was acceptable in most cases and blending with sunflower oil showed highest acceptability. Cost effective blending with mixed vegetable oil and acceptability of different food items among pregnant women and children are also discussed.

Key words: red palm oil, food uses, blending

INTRODUCTION

Vitamin A deficiency is rampant not only in India but in most of the developing countries as well. Rough estimates indicate that every year nearly 30,000 to 40,000 children become victims of preventable blindness. About 15 million children the world over are blind, one fourth of whom live in India and in about 20% of these, the cause of blindness can be traced back to Vitamin A deficiency (VAD). Though the nutritional profile of the Indian population has shown improvement during the last 10-15 years, VAD is still a public health problem in the world.

To combat this problem, at present mega doses of Vitamin A (1,00,000/2,00,000 I.U.) once in every six months, are being administered to the children between the ages of six months and six years. However, it has been highlighted time and again at various conferences/deliberations that rather than a pharmaceutical approach, dietary improvements offer a more sustainable solution to combat VAD. Such improvements can be brought about by increasing the availability, accessibility and the consumption of Vitamin A/

β - carotene rich foods including dark green leafy vegetables (GLV), yellow fruits and vegetables as well as foods from animal origin. However, animal food sources are expensive and the high perishability as well as longer cooking time associated with GLV's result in their reduced consumption. Therefore, non-traditional food sources of β -carotene / Vitamin A, such as *Spirulina* and Red Palm Oil (RPO) can play a pivotal role in preventing and eradicating VAD (Sheshadri, 1996).

The virtues of RPO are not new to mankind. The history of the oil palm dates back to more than 5,000 years, the time of Egyptian pharaohs. Although originated in West Guinea many years back, the advent of oil palm on the Indian sub-continent was only in the 1970's. The fruit of the oil palm *Elaeis guineensis* can be processed to generate two different kinds of oils. From the mesocarp palm oil is extracted, whereas the palm kernel oil is derived from the seed / kernel of the fruit. Each fruit yields about 10 parts of palm oil to one part of palm kernel oil (Achaya, 1991). In our country, in the recent years, the impetus for

oil palm development has been due to:

- the additional internal requirements for edible oils
- the ever increasing international demand for oils and fat
- the need for diversification of oil seed crops

This cost effective wonder oil is a store house of many nutrients, especially β -carotene - precursor of Vitamin A (375 ppm). While the concentration of carotenoids in most of the vegetable oils (maize, groundnut, soyabean, rapeseed, linseed, olive, barley, sunflower and cotton seed oils) is generally low (less than 100 ppm), palm oil contains 15 to 300 times as many retinol equivalents as carrots, GLV's and tomatoes which are considered to have significant quantities of pro-vitamin A. Of the carotenoids present in palm oil, β -carotene constitutes nearly 56% of the total content (Kaimal, 1997). It is also an excellent source of Vitamin E (Tocopherols - 642 ppm and Tocotrienols - 492 ppm); (MPOPC, 1991). Since RPO is a concentrated source of β -carotene, merely one teaspoonful of RPO, if consumed daily, is enough to meet a child's day's requirement of Vitamin A. A regular intake of this oil can thus help in:

- maintaining normal vision and preventing VAD
- ensuring optimum functioning of the immune system
- facilitating proper growth and development since foetal stage
- reducing the incidence of abortions and congenital anomalies
- reducing the mortality rates among children

In view of its high anti-oxidant content and a balanced acid composition, RPO can help in preventing the incidence of various degenerative diseases especially CHD, cancer as well as cellular aging. It also plays an antithrombotic activity and helps in raising HDL cholesterol as well as in lowering total cholesterol.

Another highlight of this oil is its extremely stable nature due to the presence of Vitamin E (tocopherols), the natural antioxidants, which

make it less prone to rancidity and oxidative deterioration (Murthy *et al.*, 1996). Thus, RPO has a longer shelf-life as compared to other edible oils. Further, this oil is semi solid in nature and hence does not need to undergo hydrogenation - a process leading to the production of trans fatty acids which are harmful to human health.

RPO has a deep orange-red colour and characteristic peculiar odour which dissuades the consumer from accepting this oil in their daily culinary practices. Although it has an excellent oxidative stability, in cold weather it becomes cloudy and tends to crystallize partially which detracts its appearance, even though its quality remains unaffected (Chadha and Sharma, 1997). The present study was therefore conducted with the following objectives:

- To develop and standardise recipes using RPO, keeping in mind the appearance, texture and taste of the food items
- To test the blends of RPO with other edible oils so as to find out the most suitable and acceptable combination
- To conduct consumer acceptability trials for the food items prepared in RPO/ its blends

METHODOLOGY

- With the a view to popularising the use of RPO, a number of food items commonly prepared and consumed in LIG and MIG Indian households as well as those which can conveniently be prepared for feeding programmes and institutional kitchens were identified. Nutritional adequacy, economic viability and ease in preparation as well as distribution were the major aspects kept in mind.
- In order to assess the acceptability level of RPO in its pure form, these identified dishes were prepared using standardised recipes by substituting edible oils with RPO. The prepared food items were subjected to sensory evaluation by a panel of judges for colour, flavour, odour, taste, mouth feel and appearance. Majority of the food items thus prepared had a peculiar strong odour.

- To tone down the objectionable characteristics of RPO (colour and odour), it was felt desirable to blend RPO with commonly used edible fats and oils. The above standardised recipes were prepared by blending RPO with hydrogenated fat (because of its neutral odour and flavour) and other edible oils (groundnut oil, sunflower oil, coconut oil, til oil, mustard oil and mixed vegetable oil) in different proportions (0.5:1, 1:1, 1:2, 1:3 and 1:4) in order to find the most acceptable blend for each dish. The food items thus prepared were subjected to sensory evaluation by a panel of judges using a 5-point scale. Visual evaluation of RPO blends with other edible oils / fat was also carried out.
- In these pilot trials RPO:MVO emerged as the most useful blend and restandardization of the recipes of all the food items tried during the research work was carried out using RPO:MVO blends in different proportions (2:1, 1:1, 1:2, 1:3 and 1:4).
- Consumer acceptability trials were conducted for some of the dishes found most acceptable such as spinach peanut namakparas, bajra ladoos, vegetable poha and suji laddoo. These acceptability trials were conducted among children and women beneficiaries of ICDS, anganwadi workers and slum dwellers.
- After analysing the results of consumer acceptability trials and by conducting a brief market survey regarding the commonly available snacks in the local markets catering to LIG, sale trials were carried out. These products were made available to consumers at subsidised rates and later on at cost-to-cost basis. Large scale production of mathris was carried out and these food items (bajra laddoo, paushtik laddoo, namakparas, mathris, carrot pickle and pop corn) were sold at local markets, college counters, school canteens and an NGO-CASPLAN.

RESULTS AND DISCUSSION

Since vitamin A deficiency is particularly prevalent among the LIG segment of our society,

all the commonly consumed dishes by this particular strata were prepared using crude RPO. The results revealed that only some of the food items thus prepared were acceptable. RPO was better accepted in food items with low fat content than the ones with high fat; and that its acceptance was better in savoury preparations than in the sweet ones. In case of savoury items, perhaps the addition of spices and other sourish ingredients helped in masking the peculiar odour of RPO.

To tone down these objectionable attributes and keeping in view similarity of texture with vanaspati as well as its high popularity in LIG, a total of 66 food items were prepared using RPO and vanaspati blends in 2: 1, 1: 1, 1: 2 and 1: 3 proportions. The acceptability level was 46.9%, 77.3%, 81.8% and 100% respectively.

However, in order to obtain a blend containing nearly 1: 1: 1 of monounsaturated, polyunsaturated and saturated fatty acids, RPO was blended with other commonly consumed edible oils in 1: 1, 1: 2, 1: 3, 1: 4 and 1: 5 proportions. In a majority of the cases 1: 1 blend of RPO with various oils was found to be most acceptable. The acceptability level for RPO: Sunflower oil blend was 89.5% while that of RPO: MVO was 63.16% (Table 1).

In view of the wide use, relatively low cost, production and marketing by government agencies as well as its neutral colour, odour and taste, further trials were carried out using RPO: MVO blends. Sensory evaluation trials of 87 food items prepared using RPO: MVO blends indicated 85.1% acceptability. Higher dilutions of RPO were required only in case of either the high fat preparations or the sweet ones or the high fat sweet preparations (Table 2).

Consumer acceptability trials among children, pregnant and lactating women indicated that acceptance of such food items was 97% among children and 100% among women and children expressed greater acceptability for suji halwa and bajra ladoos.

Mass acceptability trials conducted among pregnant and lactating women, beneficiaries of an NGO-CASPLAN and among

Table 1: Acceptability of food items prepared in RPO : Edible oil blends (Pilot Trials)

OIL BLENDS AND FOOD ITEMS	RPO : EDIBLE OIL BLENDS USED IN FOOD PREPARATION				
	1:1	1:2	1:3	1:4	1:5
RPO: GROUNDNUT OIL					
Vegetable Poha	A	A	A	A	A
Spinach Peanut Namakparas	A	A	A	A	A
Paushtik Ladoo	A	A	A	A	A
Suji Halwa	A	A	A	A	A
RPO: SUNFLOWER OIL					
Vegetable Poha	A	A	A	A	A
Spinach Peanut Namakparas	A	A	A	A	A
Paushtik Ladoo	A	A	A	A	A
Suji Halwa	A	A	A	A	A
RPO: COCONUT OIL					
Vegetable Poha	NA	NA	NA	FA	FA
Spinach Peanut Namakparas	NA	NA	NA	NA	FA
Paushtik Ladoo	NA	NA	NA	FA	FA
Suji Halwa	NA	NA	NA	FA	FA
RPO: TIL OIL					
Vegetable Poha	NA	NA	NA	NA	NA
Spinach Peanut Namakparas	FA	FA	FA	A	A
Paushtik Ladoo	NA	NA	NA	FA	FA
Suji Halwa	NA	NA	NA	FA	FA
RPO: MUSTARD OIL					
Vegetable Poha	A	A	A	A	A
Spinach Peanut Namakparas	A	A	A	A	A
Paushtik Ladoo	NA	NA	FA	FA	FA
Suji Halwa	NA	NA	NA	FA	FA
RPO: MIXED VEGETABLE OIL					
Vegetable Poha	A	A	A	A	A
Spinach Peanut Namakparas	A	A	A	A	A
Paushtik Ladoo	A	A	A	A	A
Suji Halwa	A	A	A	A	A

A: Acceptable FA: Fairly Acceptable NA: Not Acceptable

children attending a government school indicated an acceptance level ranging from 98.3% to 100% among women and 98.9% among children. The sale trials carried also indicated an encouraging response.

CONCLUSION

The results of this study indicate that RPO, an extremely rich source of β -carotene, holds a great potential for being used as an alternative cooking medium both at household level and for quantity food production at the institutional level. To ensure this, blends of RPO

with other edible oils need to be marketed especially through the public distribution system (PDS). For blending RPO: MVO in particular would be most feasible as it is being widely used by the economically weaker strata and is being currently produced and marketed by government institutions. However, concrete techniques for blending and a strong infrastructure for distribution of RPO blends need to be created. Along with this education/ awareness creation among the masses can serve a long term effective strategy for combating varied nutritional problems including VAD.

Table 2: Acceptability of food items (N=87) prepared in RPO/RPO : MVO blends

RPO Alone	RPO:MVO::1:1		RPO:MVO::1:2
Snacks (Savory) Dhokla Khandvi Besan Suji Cheela Veg. Sandwich Snacks (Sweet) Panjiri Wheat flour Dal Burfi Peanut Chikki Cereal Preparations Paushtik Dalia Veg. Khichri Veg. Preparations Dry Potato Sabzi Dals & Curries Washed Moong Dal Pea Potato Curry Kamal Kakri Curry South Indian Preparations Sambhar Preserves Carrot Pickle Cauliflower- Turnip Pickle Cauliflower- Green Pickle Tomato Chutney Other Preparations Veg. Chowmein	Snacks (Savory) Veg. Poha Paushtik Tikki Pao Bhaji Popcorns Veg. Preparations Spinach potato Sabzi Cauliflower Pea Sabzi Stuffed Capsicum Carrot Pea Sabzi Stuffed bhindi Baked vegetables South Indian Preparations Rava Idli Baked Preparations Sweet Plain Biscuits Peanut Biscuits Til Biscuits Salty Biscuits Masala Biscuits Weaning Foods Most are acceptable	Snacks (Sweet) Bajra Ladoos Besan Ladoos Suji Halwa Dals & Curries Khatta Channa Rajmah Curry Soyabean Curry Lobia Curry Mutton Curry Fish Curry	Snacks (Savory) Mathri (2:3) Khasta Kachori Spinach Peanut Namakparas Other Preparations Mayonnaise Russian Salad Coleslaw RPO:MVO::1:3 / 1:4 South Indian Preparations Masala Vada Baked Preparations Plain Cramed Cake Orange Cake Cereal Preparations Channa Dal - Paranthas

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