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Nutrient intake and anthropometric indices of farm women entrepreneur: A study in Hassan district of Karnataka

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Abstract
Good nutrition is the cornerstone for survival, health and development for current and succeeding generation**.** Good nutrition or nutritional status is the outcome of many complex and interrelated determinants such as access to adequate, safe, affordable and nutritious food, care and health services. A women entrepreneur is one who innovates, initiates or adopts a business activity. Women Entrepreneur is a person who accepts challenging role to meet her personal needs and become economically independent. The study was conducted in Hassan district of Karnataka state. The district Comprises of 8 Taluk`s *viz.*, Hassan, Arakalagudu, Alur, Sakaleshpura, Channarayapatna, Holenarasipura, Belur and Arasikere. The farm women entrepreneurs from all these taluks were randomly selected for the study. The mean nutrient intake of farm women entrepreneurs in comparison with recommended dietary allowance of protein (41.18 g), fat (18.5 g), fiber (23.08 g), calcium (730.50 mg), iron (12.24 mg), β carotene (1821.61 µg) and vitamin C (26.15 mg) were low. Waist to hip ratio of farm women entrepreneurs shows that more than three fourth of respondents were belongs to normal category whereas only 14 per cent of them were obese. The diet pattern of the farm women entrepreneurs found to be monotonous lacking variety and they care for more bulk food rather than nutritious food.

Keywords: Nutrient intake, anthropometric indices, women entrepreneur

Introduction
A nation's development depends on the health and well-being of the people who live in the country. Among the people, good health of woman is very important as women are not only the carriers of coming generation, but civilization and sustainable development rest on them (Jain and Parveen, 2014) [5]. They are the best upholders of environment, ecological and social balances and because of these factors it is of great importance that women should get adequate care and attention in the matter of health, nutrition, education or matters related to their social and economic development.

Good nutrition is the cornerstone for survival, health and development for current and succeeding generation (Tontisirin and Yamborisut, 1995) [13]. Good nutrition or nutritional status is the outcome of many complex and interrelated determinants such as access to adequate, safe, affordable and nutritious food, care and health services.

Nutritional status is categorized as under nutrition and over nutrition which together is known as malnutrition. World Health Organization defines malnutrition as a term used to refer to a number of diseases, each with a specific cause related to one or more nutrients (for example, protein, iodine or iron) and each characterized by cellular imbalance between the supply of nutrients and energy on the one hand, and the body's demand for them to ensure growth, maintenance and specific functions on the other. Under nutrition in women of reproductive age may hamper the generations to come as because in an undernourished mother the supply of essential nutrients is insufficient. Under nutrition during adolescence and during pregnancy may lead to maternal mortality, low birth weight infants and infant mortality the latest statistical report (RGI, 2013) on MMR states that MMR of Assam is 257 against national average of 178. The reduction of mortality of women is an area of concern for the governments across the globe.

In addition, seventy per cent of farm work is being performed by women. The work participation rate of women is 23 and 27 per cent respectively for urban and rural areas; beside 19 per cent of the total population work as unpaid family workers.

Of the total workers, 94 per cent are concentrated in the informal sectors associated in low skill, low status and poor paid jobs in the country (Census of India, 1981). The population of women in India was 405.1 million and in Karnataka the same was 34 million and out of these, 28 million women belong to rural area (Anon., 2011).

A women entrepreneur is one who innovates, initiates or adopts a business activity. Women Entrepreneur is a person who accepts challenging role to meet her personal needs and become economically independent. A strong desire to do something positive is an inbuilt quality of entrepreneurial women (Mohan *et al*., 2013).

Hence an attempt was made to analyze the extent of involvement of Farm women's nutrient intake and anthropometric measurements. With this background, the present study "Nutrient intake and anthropometric indices of FW entrepreneur: A Study in Hassan District of Karnataka.

Materials and Methods

The study was conducted in Hassan district of Karnataka state. The district Comprises of 8 taluk`s *viz*., Hassan, Arakalagudu, Alur, Sakaleshpura, Channarayapatna, Holenarasipura, Belur and Arasikere. The farm women entrepreneurs from all these taluks were randomly selected for the study.

Nutrient intake

Baseline diet survey of the selected subjects was conducted by using 24 hours recall method. Standardized cups, vessels, paper discs and rubber balls were used to obtain the foods consumed by the women. Subjects were asked to recall the type of preparation made for breakfast, lunch, evening tea and dinner etc. for the previous day (other than feasting and fasting day). Information on account of raw ingredients used for each preparation and also on the total cooked amount of each preparation was recorded in terms of standardization tools (standardization as per the procedure indicated by Bamji *et al*. (1996) [1]. The average raw ingredients in all the meals consumed by each subject per day were calculated.

The schedules were sorted out after verification and serially numbered. Data on intake of foods - cereals, pulses, vegetables etc. were evaluated. Using the quantity of foods consumed per day nutrient intake for protein, fat, calories, calcium, iron, β-carotene, thiamin, riboflavin and niacin per day was calculated using the ICMR/NIN publication "Nutritive value of Indian Foods" (Gopalan *et al.*, 2007) [4]. These figures were compared against the RDA to provide a measure of adequacy or inadequacy of food and nutrient consumption.

$$\% \text{ adequacy} = \frac{\text{Intake of each nutrient}}{\text{Recommended allowances}} \text{X } 100$$

Nutritional Anthropometry

Nutritional status is the level of nutrients in the body and the ability of levels to maintain normal metabolic integrity (Magied and Abdul, 2007) [8]. The nutritional status of subjects was assessed by nutritional anthropometry, diet survey and hemoglobin level. The anthropometric measurements *viz*., height in cm, weight in kg, waist and hip circumference and waist and height circumference of each respondent were recorded. The nutritional status was assessed by calculating BMI (Body mass index) and WH ratio (Waist to hip ratio). The respondents were categorized into underweight, normal at risk of obesity and obese categories depending upon the BMI classification.

Anthropometric status

Anthropometry is concerned with the measurement of the variations of the physical dimensions and the gross composition of the human body at different age level and degrees of nutrition (Jelliffe, 1966) [6]. Following were the selected anthropometric measurement recorded. (Plate1)

Height (cm): Height was measured accurately to the nearest 0.1cm using vertical rod. The subject were made to remove the shoes and stand on the height rod platform by the scale with foot parallel with heals, shoulders and back of head in upright posture.

Weight (kg): Weight of the selected subjects was measured to the nearest point of 0.1 kg using a standard weighing scale (Jelliffe, 1966) [6]. The accuracy of the weight was ascertained by using standard weight. The zero adjustment of the scale was checked prior to each measurement.

Body Mass Index

Height and weight of the subjects were used to calculate the body mass index. The subjects classified based on standard BMI (NIN, 1999) [10].

$$\text{Body Mass Index (BMI)} = \frac{\text{Weight (kg)}}{\text{Height (m}^2\text{)}}$$

Further individuals were classified into different classes based on the BMI

Table: Further individuals were classified into different classes based on the BMI

BMI Classification	Presumptive Diagnosis
<18.5	Undernourished
18.5 – 22.9	Normal
23 – 27	Overweight
>27	Obese

Waist

The waist is measured with the subject standing erect. The circumference is measured either at an anatomical reference point such as 12 cm below the xiphisternum.

Hip

The hip is also measured with the subject standing erect, taking in the maximal gluteal circumference.

Waist- Hip Ratio

Define the distribution of adipose tissue in the body, classified into category according to Rao (1995) [12].

$$\text{Waist- hip ratio} = \frac{\text{Waist (cm)}}{\text{Hip (cm)}}$$

Waist circumference and hip circumference were used to calculate the waist to hip ratio. The abdominal obesity was judged by using the reference ratio given by (Lean *et al*., 1995).

Table: The abdominal obesity was judged by using the reference ratio

	At Risk	No Risk
Female	>0.80	<0.80

Results and Discussion

The mean nutrient intake of farm women in comparison with recommended dietary allowance was evident in Table 1. The mean intake of protein (41.18 g), fat (18.56g), fibre (23.08g), calcium (730.50 mg), iron (12.24mg), β carotene (1821.61 µg) and vitamin C (26.15 mg). The statistical analysis showed a significant difference in 'z' test at one per cent level of significance. The per cent adequacy of nutrients intake of women respondents was also depicted in the same table. The mean percent adequacy of calcium (121.33%), energy (81.58%), vitamin C (65.38%) and β carotene (37.95%) of farm women found to be low. The adequacy of protein, fat, iron, fibre was 74.87, 61.87, 58.29 and 76.93 per cent respectively.

Nutritional status usually measured by anthropometry was found to be influenced by large number of factors. One of the important factors is food consumption. The meal pattern and the foods actually consumed by the farm women were recorded for three different alternate days during the entire period of study. The diet of the respondent families was found to be monotonous lacking variety and they care for more bulk food rather than nutritious and protective food. The common meal pattern of the rural families was cereals for breakfast and rice with vegetables or Samber and finger millet dumpling for dinner. The mean intake of nutrients by women respondents namely protein, fat, energy, calcium, iron, β carotene, vitamin C and fibre were presented in Table 1. The adequacy of nutrients intake shown in table and found to be below RDA. The intake of energy 2325 kcal, protein 41.18 g, fat 18.56 g, iron 12.24 mg, β-carotene 1821.61 µg were found to be low compared to RDA. But calcium 730.50 mg intake was higher than RDA due to the daily consumption of Ragi ball (finger millet) which is the main staple food crop in Hassan district**.** Maruthesh (2014) [9] reported that majority of the rural women were deficit in all the nutrients except calcium. An increment in food intake is always associated with an increment in energy intake. It was observed that the mean intake of energy by women in the study were not up to the recommended level. These findings were in line with Maruthesh (2015) Dobhal and Raghuvanshi (2011) [3]. However, the diet of farm women was both deficient in calories and protein. These results were in conformity to the observations made by Pushpa *et al* (2008) [11] who reported that the diet of south farm women was both deficient in calories and protein.

Iron intake was deficient in rural women 12.24 mg (58.29%). This may be due to less consumption of green leafy vegetables. This observation is in line with the findings of Maruthesh (2014) [9] who reported that the intake of iron by farm women was inadequate to meet the daily requirements.

A deficit in the intake of vitamin C and β-carotene was found to be less among the respondents compared to RDA. Majority of the farm women in the study area had inadequate consumption of citrus and other vegetables. The low intake of β-carotene among farm women might be due to less consumption of yellow and orange fruits and vegetables and milk and milk products.

Table 1: Mean Nutrient intake of selected farm women in comparison with RDA (n=90)

Nutrients	RDA	Mean	SD	% adequacy	'Z' value
Protein (g)	55	41.18	5.4	74.87	41.71**
Fat (g)	30	18.56	4.24	61.87	23.94**
Fibre (g)	30	23.08	3.21	76.93	39.33**
Energy (Kcal)	2850	2325	345	81.58	36.86**
Calcium (mg)	600	730.50	278	121.66	22.05**
Iron (mg)	21	12.24	3.52	58.29	19.02**
β-Carotene (µg)	4800	1821.61	542	37.95	18.38**
Vitamin C (mg)	40	26.15	4.58	65.38	31.23**

Table 2: Mean anthropometric measurement of the farm women Entrepreneurs (n=300)

Attributes	Mean	SD	'z' test
Height (cm)	157.36	5.95	153.71
Weight (kg)	53.86	5.66	73.75
BMI	21.82	8.52	19.85
Waist to hip ratio	0.76	0.38	17.54

Nutrition and health status of farm women entrepreneurs the mean anthropometric measurements of farm women entrepreneurs were presented in Table No2. The mean height of women was 157.36 cm and mean weight was 53.86 kgs. The average body mass index was 21.82 and average waist to hip ratio was 0.76. The result implies that farm women entrepreneurs were normal, healthy and fit to manage both farm and enterprise activities. The value of waist to hip ratio is less than one clearly indicates the physical fitness of rural women and they were not differ4ent from general women population in their nutrition and health status. Similar findings were reported by Chandrakala (2015) [2] and Maruthesh (2014) [9].

Table 3: Anthropometric indices of farm women Entrepreneurs (n=300)

Indices	Categories	Number	Per cent
BMI	Underweight <18.5	26	26.00
	Normal (18.5-22.9)	65	65.00
	Overweight (23-27.4)	9	9.00
WHR	Normal (< 0.85)	86	86.00
	Obesity (> 0.85)	14	14.00

Body mass index and waist to hip ratio of farm women entrepreneurs According to BMI, farm women were categorized into normal, under weight and over weight as presented in Table 3. Nearly 65 per cent of the farm women had normal BMI, about one fourth of the farm women were under weight and only nine per cent of them are overweight.

According to waist to hip ratio, farm women were categorized into normal and obese. It was observed that about 86 per cent of the farm women were normal and 14 per cent of them were found to be obese. Similar finding has been observed by Maruthesh (2014) [9]. He had reported that body mass index of SHG women showed lower weight normal grade (18.50 to 22.99). and concluded that SHG women belongs to low socio-economic group in general, the reasons for prevalence of under nutrition could be due to the fact that women are over exhausted by the combination of reproductive demands and long term intake of lower amount of food. The similar results

were observed among farm women by Chandrakala (2015) [2]. The waist to hip ratio of farm women shows that more than ¾th of respondents were belongs to normal category whereas only 14 per cent of them are obese. Estimates of waist to hip ratio provides a useful indication of nutritional status in under developed countries like India, where population is often malnourished with little fat reserves, a change in this measurement reflects the total body stress. It is also observed that measurement of WHR has been used as a measure of total body subcutaneous fat. This observation was in concurrence with the findings of Maruthesh (2014) [9] and Menon *et al* (2011) [10]. The possible factor of variations in waist to hip ratio directly related to their height and weight which are having significant linear correlation. Most of the farm women were under nourished due to low intake of food during early childhood and socio-economic status.

Conclusion

The mean nutrient intake of farm women entrepreneurs in comparison with recommended dietary allowance of protein (41.18 g), fat (18.5 g), fiber (23.08 g), calcium (730.50 mg), iron (12.24 mg), β carotene (1821.61 µg) and vitamin C (26.15 mg) were low. The diet pattern of the farm women entrepreneurs found to be monotonous lacking variety and they care for more bulk food rather than nutritious food. Waist to hip ratio of farm women entrepreneurs shows that more than three fourth of respondents were belongs to normal category whereas only 14 per cent of them were obese. The possible factor of variations in waist to hip ratio directly related to their height and weight which are having significant linear correlation. Most of the farm women were under nourished due to low intake of food during early childhood and low socio-economic status.

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