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The nutritional assessment of selected pregnant and non-pregnant women from Kangra district (HP)

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Abstract
The study was conducted to assess and compare the nutritional status of the adult women of from Panchrukhi block of Kangra district. The sample consisted of 50 pregnant and 50 non pregnant women. A questionnaire-cum-interview schedule was used for collection of data. Majority of the respondents' i.eBody Mass Index (BMI), 47per cent women were normal and 47 per cent suffered from Grade-I Obesity. In comparison to RDA, a significant difference at 1 per cent level was observed in intake of pulses by adult women of Panchrukhi block.The intake of cereals (268.50 g), pulses (36.9 5g) and green leafy vegetables (45.60 g) by women of Panchrukhi block. Mean intake of different food groups *i.e.* pulses, fats, green leafy vegetables and sugars in comparison to RDI by selected women of Panchrukhi block was found to be 48.6 per cent, 92.36 per cent, 74.75 per cent and 68.57 per cent.With regard to nutrient intake, fat and phosphorus was found to be significant at 1 per cent level when compared with RDI. The mean daily intake of different nutrients such as energy (62.30%), fat (120.28%), calcium (43.5%) and vitamin (35.68%) was observed in adult women of Panchrukhi block. A non-significant difference was observed between the intake of food groups and nutrient intake. The diet of pregnant women is much better than the non-pregnant women. The intake of calcium, energy and phosphorous through food source is also good. Dietary and nutrient intake of pregnant and non-pregnant adult women varied significantly.

Keywords: Nutritional status, nutrient intake, food groups, dietary intake, adult women, RDI

1. Introduction
Food is the source of nutrients which nourishes the body. Nutrients are defined as those chemical substances which are supplied by the food and needed as structural material for every cell of the body and as source of energy. Nutrients must be supplied to the body in sufficient amounts in order to grow, reproduce and lead a normal healthy life. Faulty intake of nutrition may lead to malnutrition. When the intake is more than the required amount it may lead to over-nutrition and when less then under-nutrition. Hence the intake of balanced diet keeps the body nourished and healthy. A balanced diet is defined as the diet which contains different types of nutrients such as carbohydrates, fats, proteins, vitamins and minerals in proportion to meet the requirements of the body. Maternal nutrition is complex and is being influenced by many factors. In addition to the diet, genetic, environmental, social and economic factors and any infection or other diseases can also affect the foetal development. Among the economic factors, low-income level is the most influential factors as it causes undernourishment and the resultant micronutrient deficiencies. Among the various parameters, socio-economic status and the maternal factors like parity and low economic status of mothers are the most contributing factors for poor foetal development (Yegammai and Anuradha 2008) [16].
Women play a critical role not only in ensuring the health, nutrition and overall well-being of the entire family but have an inter-generational impact and significantly influence the health of the future generation. Unfortunately in India the nutritional status of the women is poor due to varied reasons (Geeta 2011) [4]. Nutrition is one of the key factors which help to attain full potential as an adult mainly depending to a great extent on the quality and quantity of food (Glawe 2008) [5]. It has been recognized that women especially pregnant and lactating constituting one of the most vulnerable segments of the population are affected from nutritional point of view.

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Numerous studies have shown that in chronically undernourished Women subsisting on unchanged low dietary intake during pregnancy and lactation have an adverse effect on maternal nutritional status. Maternal under-nutrition is associated with low birth weight and all its adverse consequences. Epidemiological studies from India documented the magnitude and adverse consequences of chronic energy deficiency (CED) on the mother and child (ramachandran 2006) [13].

Malnutrition worldwide includes a spectrum of nutrient–related disorders, deficiencies and conditions such as intrauterine growth retardation, protein-energy malnutrition, iodine deficiency disorders, vitamin A deficiency, iron-deficiency anaemia, and overweight/obesity and other diet-related non-communicable diseases. The severity of malnutrition was highlighted by United Nations Development Program (UNDP 2003) [14], which indicated that everyday 800 million people in developing countries *i.e.* about 18 per cent of the world's population go hungry; many of them without an access to adequate food. On the other hand, the Chronic Energy Deficiency (CED) is associated with impaired physical capacity, decreased economic productivity increased mortality and poor reproductive outcomes. Malnutrition may lead to death, disability, stunted mental and physical growth, and slow national socio-economic development (Durnin *et al.* 1990) [1]. In a developing country like India, nutritional status is directly related to several factors including; levels of education, standard of living and social status. Thus it could be said that over nutrition is widely prevalent among high socio economic status and under nutrition among low income category (Vatsala 2017) [15]. According to Govt. of India (2002), in India, anaemia is the 2nd most common cause of maternal deaths accounting for 19 per cent of total maternal deaths (Madhavi and Singh 2011) [11]. Iron deficiency is by far the most common nutritional cause of anemia. It may be associated with foliate deficiency, especially during pregnancy.

2. Material and Methods
The study was conducted on 100 adult selected women, from selected Panchrukhi block of Kangra district. The selected respondents were in the age groups of 20-50 years. Further 100 respondents from Panchrukhi block constituted 50 pregnant and 50 non pregnant selected women. The proforma was developed on various aspects such as general information regarding the subject and her family, anthropometric measurements, clinical investigation, their dietary pattern and consumption of nutrients.

2.1 Development of interview schedule
The proforma was formulated, pretested and the necessary modifications were incorporated for the finalization of proforma.

2.2 Anthropometric studies
Anthropometric studies involving height and weight of the subjects were taken by the standard methods of Jeliffe (1966) [9] as detailed below.

2.2.1 Height
The subjects were asked to stand upright against the wall on a flat surface, bare footed, with heels touching each other. It was ensured that the buttocks, shoulders and back of the head were held comfortably erect with arms hanging by the sides.

Marking was done on the wall with help of a scale and the height was then measured with a measuring tape calibrated in centimetres.

2.2.2 Weight
The weight of the selected women was taken with the help of a bath room types human weighing balance with maximum accuracy. The subjects were made to stand straight on the balance platform without touching anything around and the reading was taken after adjusting the marker. Weight was recorded three times and the mean was then calculated.

2.2.3 Determination of Body Mass Index (BMI)
Body mass index (BMI) was calculated from the body weight and height of the subjects by the expression suggested by Forbes (1988).

$$\text{BMI} = \text{Body weight (kg)} / \text{Height}^2 \text{ (m)}$$

Sr. No.	Category	BMI	Code
1.	Underweight	<18.5	1
2.	Normal weight	18.6-24.9	2
3.	Grade I obesity	25.0-29.9	3
4.	Grade II obesity	30.0-39.9	4
5.	Grade III morbid obesity	>40	5

2.3 Food consumption survey
Dietary survey helps in providing the data regarding the food attitude and beliefs food consumption pattern, food habits, food and nutrient intake and the source of nutrition. The dietary survey was conducted on the selected adult women.

2.3.1 Food Habits
The food habits of selected women were recorded which referred to whether the respondent was vegetarian or non-vegetarian. Under this part, two other aspects were also covered. The first aspect dealt with the number of meals taken per day by them. The second one consisted of information regarding food consumption pattern of various food items whether they consumed them daily, frequently, occasionally or never.

2.3.2 Food intake
The quantity of food taken by selected women was recorded for the three consecutive days by 24 hour recall method. The quantity of food consumed using household measures like glass, *katori, karchi* and spoonetc. Which were then converted to the standardised measures. The cooked food thus consumed was converted into raw equivalents and the average intake of each food group by each woman was estimated. The mean daily food intake was analysed with respect to different food group's *viz.*, cereals, pulses, green leafy vegetables, and other vegetables, fruits, milk and milk products, fats and oils and sweeteners. The respondents were asked to estimate the amount of different foods consumed in possible units such as glass of milk, slices of bread, number of *chapaties* and *katories* of *dals*/vegetables etc.

2.3.3 Nutrient intake
The average intake of nutrients like carbohydrates, proteins, fats, minerals and vitamins was calculated from the raw equivalent of food consumed in three consecutive days by using Diet Cal software.
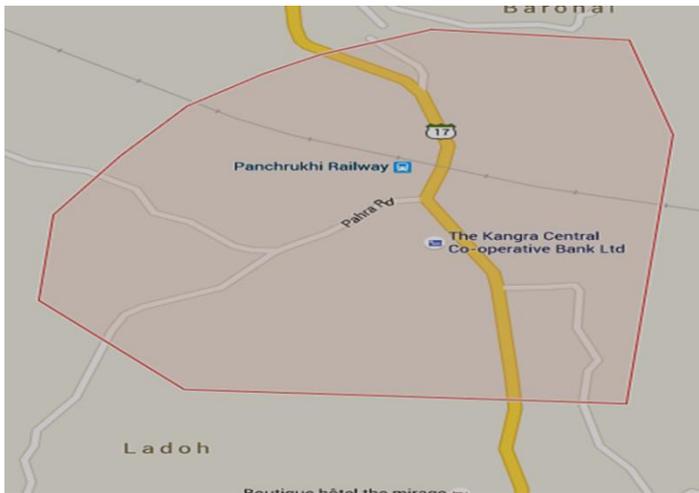
Fig 1: Geographical map of Panchrukhi district Kangra HP

3. Results and Discussions
3.1 Anthropometric measurements
Anthropometric measurements of the respondents were recorded by taking the height and weight of the respondents. The mean height of the respondents was 157.99 cm and the mean weight was 62.33 kg (Table 1). Higher proportion *i.e.* 47.0 per cent women were categorized under the Grade-I obesity, 47.0 per cent had normal BMI, 5 per cent were underweight and only 1 per cent had Grade-II obesity (Table 2). Ramachandaran (2006) [13] found that majority of samples had normal BMI and mean height was 155 cm and mean weight was 59.2 kg.

3.2 Food Intake
3.2.1 Comparison of the food intake by pregnant and non-pregnant women with Recommended Dietary Intakes
Table 3 presents the food intake of Panchrukhi block of Kangra district in comparison to Recommended Dietary Intakes (RDI). Per cent mean intake of different food groups by selected women of Panchrukhi block in comparison to RDI was found to be 48.60, 92.37, 74.75 and 68.20 for pulses, fats, green leafy vegetables and sugars, respectively. The intake of other vegetables, milk and milk products was at par in the block. As regard to earlier study reported by Garg and Kashyap (2006) [3], the mean percentage of intake for almost all the food stuffs was much below the recommended guidelines. Cereals and sugars met on an average 40-50 per cent of the recommendations, fats and milk 30-40 per cent of recommendations. Intake of pulses and other vegetables was poor being only about 20 per cent of the recommended intake. Green leafy vegetables and fruit intake was even less than 10 and 20 per cent of the desired levels, respectively. Table 4 shows the intake of different food groups by pregnant and non-pregnant women from Panchrukhi block of Kangra district. The intake of food groups by selected pregnant women of Panchrukhi block had more amount of cereals (278.74 g), other vegetables (77 g), and milk and milk products (158.56 ml) in comparison to non-pregnant women of same block *i.e* 258.26 g, 44.80 g and 117.90 ml of cereals, other vegetables, milk and milk products, respectively.

3.2 Nutrient Intake
3.2.1 Nutrient intake by selected pregnant and non-pregnant subjects of Panchrukhi block of Kangra district
Table 5 indicates the comparison of nutrient intake by the respondents of Panchrukhi block of Kangra district with RDA. The mean daily intake of different nutrients for the subjects of Panchrukhi block was 62.30 energy, 120.28 fats, 43.5 calcium and 35.68 per cent vitamin C, respectively. Statistical analysis shows that there is significant value in fat intake. Khoushabi and Saraswati (2010) [10] studied nutritional status of 500 pregnant women in the third trimester of pregnancy in terms of energy and nutrient intake with reference. National Institute of Nutrition (2009) [12] consumption of energy and proteins per day were inadequate *i.e.* 69 and 68 per cent, respectively. Among minerals, intake was adequate and others *viz.* calcium and iron intake were inadequate. Almost similar findings are observed in the present study. Table 6 shows the nutrient intake by selected pregnant and non-pregnant women of Kangra District. In Panchrukhi block, pregnant women were taking more amount of energy (1423.18 kcal), carbohydrates (246.44 g), proteins (38.48 g), fats (31.54 g), calcium (91 mg), vitamin A (213.63 µg) and folic acid (108.10 µg), and the intake by non-pregnant women was 1357.21 Kcal energy, 238.12 g carbohydrates, 36.83 g proteins, 28.61g fats, 235.45 mg calcium, 193.23 µg iron, and 35.72 µg folic acid, respectively. The intake of iron by pregnant women is at par with the intake by non-pregnant women of Panchrukhi. Statistical analysis of Panchrukhi block between pregnant and non-pregnant women shows a significant difference in the intake ($p<0.01$) of calcium, iron, vitamin C and folic acid.

Table 1: Distribution of selected women according to Height and Weight

	Panchrukhi n=100
Height	157.99±4.99
Weight	62.33±9.44

Table 2: Distribution of selected women according to BMI Classification

BMI	Classification*	Panchrukhi n=100
< 18.5	Under weight	5
18.6-24.9	Normal	47
25-29.9	Grade I obesity	47
30-39.9	Grade II obesity	1
>40	Grade III morbid obesity	0.0
Total		100

Table 3: Food intake by selected women of Panchrukhi block of Kangra district in comparison to RDI

Food group (g/ml/day)	RDI	Panchrukhi	Per cent RDI (%)	t-value
Cereals	330	268.5±54.11	80.55	-11.37
Pulses	75	36.45±13.43	48.60	-28.33
Fats	25	23.09±4.87	92.37	-4.18
Green leafy vegetables	100	74.75±46.42	74.75	-10.57
Other vegetables	200	77.09±43.59	38.55	-27.85
Roots and Tubers	200	87.5±40.04	43.40	-26.07
Milk and milk products	300	143.99±105.21	47.55	-15.13
Sugars	30	20.57±3.05	68.20	-10.90

Table 4: Food intake by selected Pregnant and Non Pregnant women of Kangra District

Food groups (g/ml) per day	Pregnant n=50	Non-pregnant n=50	t-value
cereals	278.74	258.26	1.91
pulses	30.10	43.79	-5.90
fats	22.40	22.40	0.0
leafy vegetables	19.90	71.30	5.56**
other vegetables	77.00	44.80	3.39**
roots and tubers	78.00	76.00	0.21
Mmilk and milk products	158.56	117.90	1.92
sugars	20.20	19.70	054

**Value significant at 1 per cent level.
*Value significant at 5 per cent level

As is evident from the Table above, statistical analysis showed a significant variation ($p<0.01$) in intake of leafy vegetables as well as other vegetables between selected pregnant and non-pregnant women of Panchrukhi block.

Table 5: Comparison of nutrient intake by subjects of Kangra District with RDA.

Nutrients	RDA	Panchrukhi n=100	Per cent RDA (%)	t-value
Energy (Kcal)	2230	1390.19±228.59	62.30	-36.74
Proteins (g)	55	37.65±37.65	68.45	-27.43
Fats (g)	25	30.07±8.69	120.28	11.58**
Calcium (mg)	600	261.68±124.29	43.50	-27.22
Iron (µg)	21	10.50±1.89	5.00	-55.33
Vitamin C (mg)	40	14.27±9.55	35.68	-26.92

** Value significant at 1% level of significance

Table 6: Nutrient intake of selected pregnant and non-pregnant women of Kangra district

Nutrients	Panchrukhi Pregnant n=50	Non-pregnant n=50	t-value
Carbohydrates(g)	246.44	238.12	0.99
Proteins (g)	38.48	36.83	1.31
Fats (g)	31.54	28.61	1.70
Energy(Kcal)	1423.18	1357.21	1.45
Minerals(mg)	7.07	6.44	2.62*
Calcium (mg)	287.91	235.45	2.14*
Iron (mg)	10.96	10.03	2.49*
Vitamin A (µg)	213.63	193.23	1.76
VitaminC (mg)	11.50	17.03	2.96*
Phosphorus (mg)	991.34	911.32	2.40*
Folic acid (µg)	108.10	35.72	21.15**

Fig 3: Nutrient intake of pregnant and non-pregnant women of Panchrukhi block
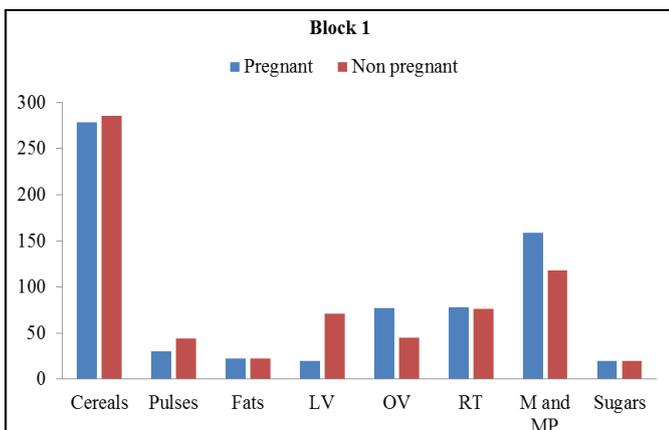
Fig 2: Comparison of food intake by selected women of Panchrukhi block
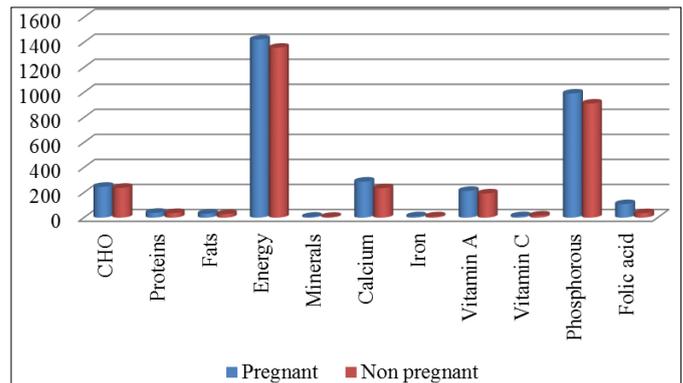
4. Conclusion
Women play a critical role not only in ensuring proper nutrition, good health and overall well-being of the entire family but to have an intergenerational impact and significantly influence the health of the future generation. Unfortunately in India the nutritional status of the women is poor due to varied reasons. Nutrition is one of the key factors which help to attain full potential as an adult mainly depending to a great extent on the quality and quantity of food. A sample of 100 adult women from Panchrukhi block Kangra district (H.P.) was selected. The sample consisted of 50 pregnant and 50 non pregnant women. The data was collected through a well-structured questionnaire-cum-interview schedule. Out of which it was concluded that 47 per cent were of normal BMI. The data revealed that the intake of cereals (268.50 g), pulses (36.9 5g) and green leafy vegetables (45.60 g) by women of Panchrukhi block. Mean intake of different food groups *i.e.* pulses, fats, green leafy vegetables and sugars in comparison to RDI by selected women of Panchrukhi block was found to be 48.6 per cent, 92.36 per cent, 74.75 per cent and 68.57 per cent. The mean daily intake of different nutrients such as energy (62.30%), fat (120.28%), calcium (43.5%) and vitamin (35.68%) was observed in adult women of Panchrukhi block. Dietary and nutrient intake of pregnant and non-pregnant adult women of both the blocks varied significantly. The diet of pregnant women is much better than the non-pregnant women. The intake of calcium, energy and phosphorous through food source is also good.

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