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A study on the nutritional status of Jain women

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Abstract

Background: Dietary restrictions are emphasized as part of the religious canon; communities can utilize these rules to further control a woman's practice and body. Jains, whose identity is based on the rejection of many "sinful" foods.

Aim: This research was conducted to study the nutritional status of Jain women.

Methodology: A cross sectional study was conducted in Mumbai among 100 women aged between 30-45 years. Anthropometric measurement was measured. Eating habits were assessed by a structured questionnaire which included questions on eating habits, food frequency and three day diet recall. Analyses were performed by SPSS software (SPSS, version 16). Data was presented using Independent Sample Z-test, chi-square test, Pearson's correlation. P-value < 0.05 was considered to be statistically significant.

Results: It was observed from the study that participants fasted regularly resulting in nutrition deficiency among Jain women. It was observed that the BMI and WHR of the participants were normal. The study showed that the Jain women willingly restrict certain foods due to cultural beliefs. Macro and micro nutrient deficiency seen among the participants except iron may be due high consumption of green leafy vegetables during winter season.

Conclusion: Cultural beliefs, strict religious diet practices, restriction of certain foods willingly collectively might have led to nutrient deficiency in the Jain women.

Keywords: Jain women, cultural, religious beliefs, eating habits, nutrient deficiency

1. Introduction

Dietary restrictions are emphasized as part of the religious canon; communities can utilize these rules to further control a woman's practice and body. Jains, whose identity is based on the rejection of many "sinful" foods. Jain laywomen are especially involved in the cooking and consumption of this restrictive diet. (McConnell, Kristin 2014) [11]. The study outlined in this paper was intended to explore issue of restricted diet and nutrient deficiency, and in particular with the Jain women. A study conductd by A.S. Bhatti& et.all in which iron status of Brahmin, Jain and Muslim participants were assessed which resulted in iron deficiency to be highest in Jains. Rural women would have higher prevalence of anemia compared to urban women. A study among the lower income groups, and those women with low body mass index (BMI; <18.5 kg/m^2) would have a higher risk compared to normal or overweight women. Fifty-two percent of thin, 50% of normal BMI, and 41% of overweight women were anemic. Anu Ram Mohan and *et al.* (2012) [1] showed significant data that the vegetarian Indian women aged between 15-49 years are at risk of developing Anaemia. Vegetarian women in India are significantly more likely to be iron deficient compared with their omnivorous counterparts. A study conducted by Waldman A *& et al.* (2005) [15] among 154 German vegans to evaluate cardiovascular risk profile showed that due to vitamin B 12 deficiency may have unfavorable effect of developing Coronary Heart Disease risk. Helga Refsum *& et al.* (2001) [7] conducted study among 204 Indian man and women observed 75% of the participants had metabolic signs of Cobalamin deficiency which was partly explained by the vegetarian diets. Iodine deficiency disorders (IDD) is still a major public health problem and iodized salt remains the most effective means to control IDD in India (Longavah T *& et al.* 2013) [10]. Iodine content in food of plant origin is lower in comparison with that of animal origin due to a low iodine concentration in soil. Urinary iodine excretion was assessed in 15 vegans, 31 lacto- and lacto-ovo vegetarians and 35 adults on a mixed diet. One fourth of the vegetarians and 80% of the vegans suffer from iodine deficiency compared to 9% in the persons on a mixed nutrition (Krajcovicová M 2003) [9]. A study conducted by Appleby P *& et al.* (2007) [3] showed significant results that there is higher fracture risk in the vegans because of consequence of their considerably lower mean calcium intake. An adequate calcium intake is essential for bone health, irrespective of dietary preferences.

Vegetarian diets have been shown to contain lower amounts of calcium, vitamin D, vitamin B-12, protein, and n–3 (ω-3) fatty acids, all of which have important roles in maintaining bone health. Vegetarians, and particularly vegans, may be at greater risk of lower BMD and fracture (Katherine TuckerI, 2014) [8].

Methodology

A cross sectional study was conducted among 100 (female) of age 30-45 years who were selected from Mumbai city. Snowball sampling technique was used. A questionnaire was administered which included general information, anthropometric measurement (Body mass index (BMI) & waist to hip ratio). Question's related to eating habits and three day dietary recall was taken though an interview. The data was analysed by using

statistical package of social sciences (SPSS, version 16). Frequencies, percentages, measures of centre and measures of variability were computed. Advanced statistics was done by Chi square test was used to analyse the representation of cases across the values of a single variable and one sample Z test was used for comparing with reference standards. Findings were considered to be significant when $p \leq 0.05$ and were considered highly significant when $p \leq 0.01$.

Results

General Information

In the present study the age of the participants ranged from 30.00 - 45.00 years with the mean age of 40.66 years ±3.97.

Table 1: General information of study

Variables	Categories	Percentage (%)	Chi-square	p value
Education qualifications	SSC	19	56.76	0.000**
	HSC	19		
	Graduation	56		
	Post-graduation	6		
Marital status	Married	95	171.10	0.000**
	Unmarried	3		
	Widow	2		
Type of family	Joint family	95	63.38	0.000**
	Nuclear family	3		
	Extended family	2		
Type of fast	Choviyaar	96	176.70	0.000**
	Ekashna	2		
	Beyashna	2		
Occupation	Service	1	276.50	0.000**
	Housewife	97		
	Business	1		
	Others	1		

Most of the participants were educated that is they were graduates {(56%) (χ^2=56.76, p<0.01)}. Most of the women were married (95%), unmarried (3%) and widow (2%) (p<0.001).In today's modern world were people believe in living in nuclear family but this community still believes in living in joint family. (95%) (p<0.001) It was observed from the data that most of the participants were housewives and hey mostly followed choviyaar (eating before sunset) (96%) (p<0.001). The type of work done has a great relation with our body system. People who are on heavy duties and housewife who do not perform much physical activity are at higher risk of having any disease condition. In the present study out of 100 participants 97% were housewife and 3% were service, business & others (p<0.001). It was observed from the above that most of the Jain women were educated, married and they belonged to joint family. It was also seen that hardly any participants were working and only few participants followed ekashna (eating once ad day before sunset) or beyashna (eating twice a day before sunset) fast. These differences were significant.

Anthropometric Measurement's

BMI Categories

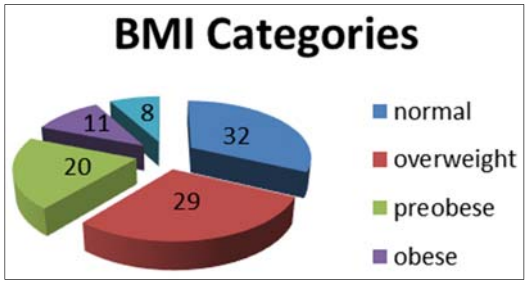

Fig 1: shows BMI of the study group

It was observed that the mean height of the women was 157±6.88 and weight 58.84±8.8 kg with the mean BMI of 23.75±3.30 kg/m^2. The BMI of most of the participants fall under normal category{(32%) (χ^2 = 22.50, p<0.001)}. Hence it was indicated that the participants had a normal BMI and nearly one third of jain women were at low risk for developing comorbidities in the near future.

Waist to Hip Ratio Categories

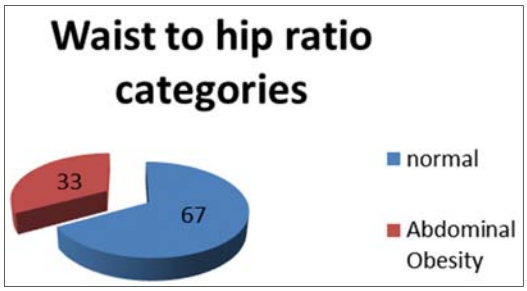

Fig 2: shows Waist to hip ratio of the study group

The mean waist to hip ratio of the women was 0.81±0.06. most of the women belong to normal category (67%) but it was also seen that some participants had waist to hip ratio more than 0.81 (33%) which indicates abdominal obesity. It was observed from the data that one third women are at the verge of having abdominal obesity whereas two thirds possessed normal WHR and was found to be statistically significant when compared to cases under abdominal obesity category (χ^2=11.56, p<0.01).

Table 2: Eating Pattern of Study Group.

Variables	Options	Percentage (%)	Chi- square	p value
Do you fast regularly?	Yes	100	-	-
	No	-		
Do you fast when you are ill?	Yes	86	51.84	0.000**
	No	14		
Do you consume green leafy vegetables?	Yes	88	135.00	0.000**
	No	9		
	None	3		
Do you restrict vegetables during Ashtami and chaudas? (if no please mention which all vegetables do you consume)	Yes	52	0.16	0.76
	No	48	96.04	0.000**
	Tomato	99		
	Raw Banana	1		
Have you restrict any food willingly? (If yes, which all you have restricted and why?)	Yes	86	51.84	0.000**
	No	14		
	Abhakshya	48	114.90	0.000**
	Sweets	46		
	Ice-cream	4		
	Cold drinks	1		
	Papad and pickles	1		
	Dikhsha (religious reason)	24	144.10	0.000**
	Fasting	76		
Do you consume milk and milk products?	Yes	90	64.00	0.000**
	No	10		
Do you consume dry fruits?	Yes	100		
	No			

The above table describes the eating habits of the participants. Highest frequency within each cereal has been highlighted. All the participants in the study fasted regularly that is they follow strict religious practices. Hence it was also observed that most of the participants even fasted when they were ill. The participants believe that fasting during illness feels physically and mentally healthy. Most of the participants consumed green leafy vegetables {(88%) (χ^2=135.00, p<0.001)} in their diet. According to Jain religious practices they consume green leafy vegetable during the winter season only.

This study was also conducted during winter season hence it was seen that there is good consumption of green leafy vegetable. An increase in non-communicable disease (NCD) in India has been attributed to an epidemiologic transition where by, due to urbanization, there is an increase in traditional cardiovascular disease risk factors such as obesity. Asian Indians enrolled in the Adventist Health Study 2 that raises the possibility of how specific whole plant foods (eg, nuts) in a vegetarian dietary pattern could potentially prevent obesity and NCDs in a target population of >1 billion persons (Singh *et al.,* 2014) [13].

The participants restricted certain foods during particular days (Asthami- the eight day of the month of hindu calender and Chaudas- it is the 14 day of the hindu month) of the month and also willingly, this is because of strict religious practices and their beliefs. This results were highly singnificant (p<0.01).

Most of the participants consumed milk and milk products {(90%) ((χ^2=64.00, p<0.001)}. The best source of calcium is milk and milk products.

But it was observed in a study where vegetarians consume milk but it seems that the amount is not enough to improve vitamin B-12 status or vitamin B-12 concentration in milk itself may be low. Regular intake of milk improved vitamin B-12 status of vitamin B-12 deficient vegetarians indicating a potential dietary strategy to improve the vitamin status (Naik *et al.,* 2013) [12].

The strict follower's of Jains only eats only dry fruit during winter season. This study was conducted during that time, so it was seen that all the participants consumed dry fruits (100%).

Nuts are nutrient-dense foods with complex matrices rich in unsaturated fatty acids and other bioactive compounds, such as L-arginine, fibre, healthful minerals, vitamin E, phytosterols and polyphenols Thus, it is clear that frequent nut consumption has a beneficial effect on CVD risk that is likely to be mediated by salutary effects on intermediate risk factors (Ros, 2015) [14].

Table 3: Eating Habits of Study Group

Questions	Mean	Standard deviation (SD)	p value
From how many years are you fasting?	10.57	±8.25	0.000**
How many meals do you consume a day?	3.69	±0.58	0.000**
When do you have your breakfast?	8.44	±0.62	0.000**
When do you consume your last meal of the day?	5.22	±0.41	0.000**
What time you sleep at night and wake up in the morning	11.00	±2.01	0.000**
	5.66	±0.72	

It was also observed from the data the women fasted for 10±8.25 years. This explains that the participants are strict followers of religious practices and were fasting from many years. The meals consumed by the participants were 3.69±0.58 which is less as compared to other time of the year. During winter days are short and night is long, hence there could be short span before sunset so the meals are less during this time of the year. It was also observed that the dinner of the participants was early as compared to other time of the year (5.22±0.41).

It was observed from the data that the participants had almost six hours of sleep which may have effect on the health status of the participants.

There was association between sleep problems and chronic disease in older adults. A majority of the participants (83%) reported one or more medical conditions and nearly one in four

elderly respondents had major comorbidity (i.e. four or more conditions) (Foley *et al.*, 2004) [5].

Food Frequency

It was observed from the food frequency questionnaire that the participants consumed cereals, legumes and pulses, vegetables and fruits almost daily. Though the vegetables were consumed daily but green leafy vegetable and dryfruits were consumed only during the winter season. The foods like junk food, beverages, bakery item and sweets and desserts were avoided from outside.

Nutrient Intake

Table 4: Nutrient Intake of Study Group.

Nutrient	Mean	Mean difference	Z value	P value	RDA
Energy (kcal)	1254.10±234.74	-648.88	-27.514	0.000**	1900
Protein (gms)	36.16±10.00	-18.83	-18.83	0.000**	55
Iron (mg)	50.80±15.45	29.80	19.29	0.000**	21
Calcium (mg)	353.12±329.44	-246.87	-7.49	0.000**	600
Fibre (gms)	26.71±7.70	-13.28	-17.24	0.000**	40

(Gopalan C. ICMR 2016) [6]

Macronutrient and Micronutrient intake was assessed by 3 Day Dietary Recall. The Study results indicated highly significant lower differences when compared with reference RDA. The mean energy was 1254.10 kcals and the participants were deficient by -648.88 (Z= -27.514, $p<0.01$) when compared with the energy intake of RDA value, mean Protein was 36.16g and was deficient by -18.83 g (Z= -18.83, $p<0.01$) when compared with RDA. The mean fibre intake was around 26.71g and was deficient by -13.28 (Z= -17.24, $p<0.01$) for fibre intake when compared with RDA. The mean iron was 50.80 mg as compared to RDA OF 19.29 mg (Z= -19.29, $p<0.01$). This may be because the study took place in winter season where the consumption of green leafy vegetable is highest so the iron requirement was more than the RDA. Mean calcium was 353.12 mg and was deficient by -246.87 mg (Z= -7.49, $p<0.01$) for calcium intake when compared with RDA. Thus for both macro and micro intake was significantly below reference standards except for iron intake which was significantly greater than the RDA.

Conclusion

It can be concluded from the above study that the energy, macronutrient and micronutrient consumption was low among Jain women. It was also observed that consumption of iron was high than the recommended dietary allowance. Cultural beliefs, strict religious diet practices, restriction of certain foods willingly collectively may lead to nutrient deficiency in the Jain women.

Limitation

There were fewer researches were based on Jain diet.

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