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A study of food and nutrient intake of Punjabi adult males engaged in varied occupations

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The combination of a healthy weight, prudent diet and daily physical activity clearly plays a role in primary, secondary and tertiary prevention of chronic diseases. Occupational level greatly influences the physical activity which in turn has significant effect on body composition. The present scenario of high prevalence of life style diseases is a serious threat to health and wellbeing of Punjabi community, the males being more prone due to their genetic pre-disposition. The study was conducted to determine the food and nutrient intake of adult males engaged in varied occupations. Thirty adult male subjects in the age group of 40 to 50 years from each category *i.e.* field workers, laboratory workers and office workers were selected from Punjab Agricultural University, Ludhiana. The consumption of pulses, green leafy vegetables and other vegetables and fruits were inadequate while cereals, milk and milk products and fats and oils and sugars were adequate in all the three groups. Diets were inadequate for energy, protein but adequate for fat in all the three categories. The contribution of fats to total energy was higher *i.e.* more than 20 per cent in case of lab workers and office workers which was undesirable as it may lead to obesity and other degenerative disorders. Thiamine was found to be adequate while rest of the five vitamins namely niacin, folic acid, vitamin B_{12} and vitamin C were inadequate in all the three groups. Iron intake was adequate in field workers but marginally inadequate in lab and office workers while calcium was inadequate in field workers. Excess consumption of food especially in the form of cereals, pulses, sugar, fats and oils resulted in gaining total body weight which may result in increased risk of degenerative diseases. Hence, it is recommended that people must be educated to consume adequate diet so as to achieve desirable body weights.

Key Words : Food intake, Nutrient intake, Field workers, Laboratory workers, Office workers

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INTRODUCTION

Obesity and four of the leading causes of death *i.e.* heart disease, cancer, stroke and type 2 diabetes mellitus are related to lifestyle. The combination of a healthy weight, prudent diet and daily physical activity clearly plays a role in primary, secondary and tertiary prevention of other chronic diseases. Improved lipid profiles, blood pressure, insulin sensitivity and euglycemia are associated with weight loss or a normal body weight. To maintain a healthy weight, consumption of a diet high in fruits and vegetables with low-fat sources of dairy and protein and achieving appropriate physical activity levels is a universal recommendation. To have a diet high in fruits and vegetables with low-fat sources of dairy and protein and achieving appropriate physical activity levels. The importance of physicians discussing weight with clients and *vice versa* is stressed. The common features

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of lifestyle-related diseases make them amenable to similar lifestyle interventions (Ò Neil and Nicklas, 2010).Occupational level greatly influences the physical activity which in turn has significant effect on body composition. Adult males engaged in varied occupations may have different body compositions. Their body composition might be strongly influenced by their diet pattern and activity level. The present scenario of high prevalence of life style diseases is a serious threat to health and wellbeing of Punjabi community, the males being more prone due to their genetic pre-disposition. Therefore, the present study was done to study the food and nutrient intake of adult males engaged in varied occupations.

METHODOLOGY

The three occupational categories namely field workers, lab workers and office workers were chosen based on the physical activity level of the workers. Thirty adult male subjects in the age group of 40-50 years from each category were selected from different departments of Punjab Agricultural University, Ludhiana. A questionnaire was developed to collect general information, dietary intake and physical activity of the subjects. 24 Hour Recall Method' for three consecutive days were used to assess the food intake of the subjects. The nutrient intake was calculated using MSU Nutriguide computer software (Song *et al.,* 1992). The food intake was compared with the suggested intakes (Raghuram *et al.,* 2012) while nutrient intake was compared with Recommended Dietary Allowances (RDA) of ICMR (2010). Mean and standard errors for various parameters were computed. Analysis of variance was employed using Microsoft Excel (2003) Statistical Analysis Tool Pack.

OBSERVATIONS AND ASSESSMENT

Thirty adult male subjects in age group of 40 to 50 years from each category *i.e.* field workers, lab workers and office workers were selected for the study.

Food intake :

The daily intake of major food groups by the subjects is shown in Table 1. The per cent adequacy of various foods in comparison to suggested values given by (Raghuram *et al.,* 2012) is shown in Fig. 1.

The cereal intake of field workers was significantly ($p \leq 0.05$) higher than the lab and office workers. The cereal intake was adequate in all the groups, the per cent adequacy being 163.7, 134.0 and 115.2 per cent, respectively when compared to the suggested values of 225 g. Batra (2014) reported the cereal intake of 395 and 434g in low and middle income group men. On the other hand, Miglani *et al.* (2014) observed that the intake of cereals was 299.6g in office workers of Ludhiana city. Consumption of pulses by all the three groups was lesser than the suggested intake of 60 g, the per cent adequacy being 50.5, 43.3 and 39.5 per cent, respectively. A higher consumption of pulses in low (57%) and middle (69%) income men was reported by Batra (2014).

There was an inadequate consumption of green leafy

Table 1 : Daily food intake of the subjects

Food intake, g	Field workers (n=30)		Lab workers (n=30)		Office workers (n=30)		Overall (n=90)		Suggested intake*	Critical difference at 5%
	Range	Mean ± SD	Range	Mean ±SD	Range	Mean ±SD	Range	Mean ± SD		
Cereals	240-400	368.3±28.8	200-440	301.6±57.5	200-380	259.3±51.7	200-400	309.7±65.2	225	28.37
Pulses	30-40	30.3±1.8	10-30	26.0±10.3	10-30	23.6±14.5	10-60	26.6±10.4	60	6.09
Green leafy vegetables	0-0	0±0	0-400	60.0±10.6	0-200	63.3± 92.8	0-400	41.1±85.9	200	48.67
Roots and tubers	50-250	155.0±121.0	75-400	186.0±123.1	75-350	136.7±97.3	50-400	159.4±115.1	100	NS
Other vegetables	100-250	90.0±120.0	75-250	43.3±86.8	100-250	95.0±116.9	75-250	76.1±110.4	200	NS
Fruits	0-0	0±0	0-100	20± 40.7	0-150	38.7± 50.2	0-150	19.5±40.16	100	22.21
Milk and milk products	100-850	379.9±196.2	110-860	440.8±206.6	150-780	490.7±175.1	100-860	437.1±190.2	300	NS
Fats and oils	10-20	20.0±2.7	20-35	23.2± 3.8	10-35	26.5± 6.3	10-35	23.2±4.9	20	2.5
Sugar	10-70	27.6± 9.7	10-40	35.8± 6.4	20-45	37.0± 8.0	10-70	34.0± 9.1	20	4.8

* Suggested intake (Raghuram *et al.,* 2012)
NS=Non-significant

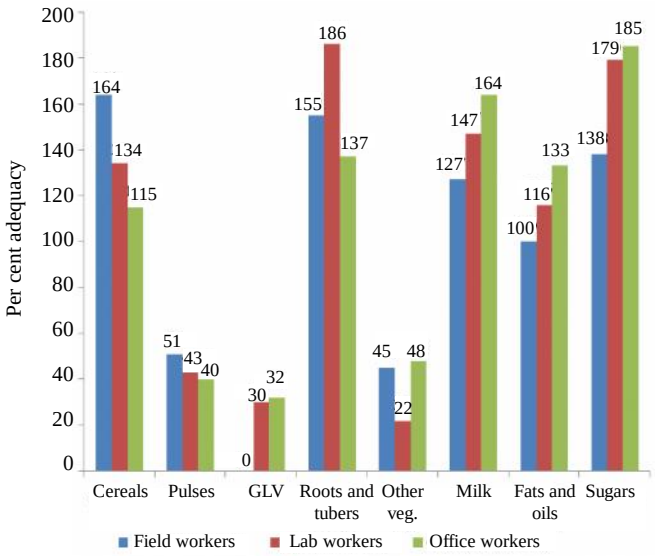

Fig. 1 : Per cent adequacy of food groups among the subjects

vegetables in all the three groups. The lower intake of green leafy vegetables was attributed to lesser availability of greens during summer season when the survey was carried out. There was a significant ($p \leq 0.05$) difference found in the consumption of roots and tubers among the three groups. The consumption of root and tubers was more than adequate in all the three groups. The consumption of other vegetables was much lower than the suggested intake of 200g, the adequacy being 45, 21.8 and 47.5 per cent, respectively. The average intake of other vegetables was 74 and 92g in low and middle income group men by Batra (2014) whereas, Miglani *et al.* (2014) found a much lower daily consumption of other vegetables *i.e.* 59.4 by the office workers.

The results indicated that the fruit consumption was inadequate by all the subjects as compared to suggested intake of 100 g. The lesser consumption of fruits by all the three groups could be either due to higher prices or the lack of awareness for nutritional importance of fruits in daily diets. The inadequate consumption of fruits by the adult men was also reported by Batra (2014) and Miglani *et al.* (2014).

The consumption of milk was significantly ($p \leq 0.05$) higher in office workers followed by lab workers. The results revealed that the daily consumption of milk and milk products was adequate in all the three groups, the adequacy being 126.7, 147.0 and 163.6 per cent, respectively. Milk and milk products consumption in field workers was significantly ($p \leq 0.05$) lesser as compared to office workers, attributed to the lower income of field workers in comparison to other two groups. An adequate consumption of milk was also reported by Batra (2014), the daily milk consumption being 231 and 342 ml in low and middle income group men. Similarly, Miglani *et al.* (2014) reported the daily consumption of milk as 318.8 ml. There was a significant ($p \leq 0.05$) difference in fats and oils consumption in all the three groups. The daily intake of fats and oils by the field workers was adequate (100.3%) against the suggested intake of 20 g, the intakes of fats and oils was found to be more than the suggested intake by both lab and field workers, the adequacy being 116.0 and 132.5 per cent, respectively. More than adequate consumption of fats and oils by Punjabi men was also reported by Batra (2014) and Miglani *et al.* (2014). Sugar consumption was significantly ($p \leq 0.05$) lower in field workers when compared to office workers. The maximum sugar was consumed by office workers closely followed by the lab workers while the least consumption of sugars was by the field workers. Batra (2014) reported a higher intake of sugar *i.e.* 38 and 35 g in low and middle income group men. Similarly, a much higher intake *i.e.* 41.9g by the office workers was reported by Miglani *et al.* (2014).

Nutrient intake :

The daily nutrient intake of major nutrients *viz.* energy, carbohydrates, protein, fat, has been shown in Table 2. The per cent adequacy of nutrients (ICMR, 2010) has been given in Fig 2. Inadequate consumption of energy as compared to Recommended Dietary Allowances (RDA) of ICMR (2010) was observed, the adequacy being 78, 67and 67 per cent, respectively. There was a non significant difference in the energy intake of the three groups. A higher *i.e.* 2535 and 2583Kcal of daily energy intake by in the low and middle income group men was reported by Batra (2014). Miglani *et al.* (2014) also found a higher consumption of energy (2398 kcal) in the office workers category. The carbohydrates were higher in office workers as compared to the other two groups. There was a non significant difference in the carbohydrate intake of the three groups. Batra (2014) observed a higher intake *i.e.* 332 g of carbohydrates by the low income men when compared to the field workers of the present study. The carbohydrate intake of 275g was reported in middle income group men which was close to the values of carbohydrate intake of lab and office

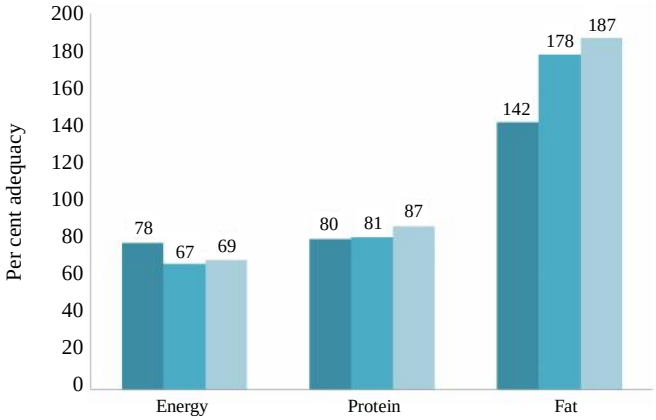

Fig. 2 : Per cent adequacy of energy, protein and fat among the subjects

workers. A much higher intake of carbohydrates (380g) by the office workers was reported by Miglani *et al.* (2014).

The results revealed no significant difference in consumption of protein by all the three groups. Inadequate protein was also observed, the per cent adequacy being 80, 81and 87, respectively. Batra (2014) observed that the protein intake was 41 and 67 g in low and middle income group men whereas, Miglani *et al.* (2014) found the protein intake of 53.1g in the office workers. The results showed that field workers consumed significantly ($p \leq 0.05$) lesser fat as compared to other two groups. The intake of fat in all the three categories was more than adequate when compared to the recommended levels. The contribution of fats to total energy in the three groups was 17, 26 and 27 per cent. The contribution of fat to total energy should be less than 25 per cent. The higher values observed for lab and office workers were undesirable for optimum body composition. Kaur (2011) also found a higher contribution of fat in the diets of adult Punjabi women. Similarly, Batra (2014) and Miglani *et al.* (2014) also observed that the contribution of fat to total energy intake was higher in Punjabi men. Batra (2014) observed that the intake of fats in low and middle income group men was 61 and 63g while Miglani *et al.* (2014) reported a fat intake of 69.9 g in the office worker category. The values of fat intake obtained in the present study were lesser than those reported in the

Table 2 : Daily intake of major nutrients by the subjects

Nutrient	Field workers (n=30)	Lab workers (n=30)	Office workers (n=30)	Overall (n=90)	RDA*	Critical difference at 5 %
Energy, kcal						
Range	1195-2232	1205-2295	1331-3399	1195-3399	2320[a], 2730[b],	NS
Mean ±SD	1803±271	1835±266	1889±367	1842±303		
Protein, g						
Range	31-81	28-69	37-74	28-74	60	NS
Mean ±SD	48.2±10.8	48.5±9.9	51.9±9.5	49.7±10.2		
Carbohydrates, mg						
Range	203-310	192-332	215-625	192-625		NS
Mean ±SD	258.3±27.6	258.6±35.79	280.6±78.5	265.8±52.8	-	
Total fat, g						
Range	19-60	18-97	30-130	18-130	25[a], 30[b]	6.4
Mean ±SD	35.4±10.7	53.3±18.3	55.0±14.7	47.9±17.2		
PUFA, mg						
Range	4-10	0-8	2-15	0-15	-	NS
Mean ±SD	4.5±1.5	4.1±1.5	4.8±2.4	4.5±1.8		
Saturated fats, mg						
Range	11-20	0-31	10-25	0-31		2.3
Mean ±SD	13.8 ± 2.7	14.9 ± 5.2	16.9 ± 3.5	15.2 ± 4.1	-	
Cholesterol, mg						
Range	0-94	0-84	0-75	0-94	-	20.5
Mean ±SD	35.6 ± 38.9	20.5 ± 34.8	14.0 ± 29.0	23.4 ± 35.3		

* RDA: Recommended Dietary Allowances (ICMR, 2010)
[a] Sedentary Indian men RDA, [b] Moderate Indian men RDA
NS=Non-significant

literature. The results showed that no significant difference was found in the intake of polyunsaturated fatty acids (PUFA), however a significantly ($p \leq 0.05$) higher intake of saturated fat was observed in the office workers when compared to other two groups. On the other hand, the maximum consumption ($p \leq 0.05$) of cholesterol was observed in field workers in comparison to office workers which were due to reported higher intake of *desi ghee* by the field workers.

The daily nutrient intake of vitamins and minerals has been shown in Table 3. The per cent adequacy of nutrients (ICMR, 2010) has been given in Fig. 3 and 4, respectively. The intake of thiamine was adequate in all the groups. On the other hand, riboflavin and niacin intakes were inadequate. Field workers had a significantly ($p \leq 0.05$) lower intake of riboflavin as compared to other two groups. The intake of niacin was however, significantly ($p \leq 0.05$) higher in field workers. Folic acid intake was marginally inadequate in all the three groups. Vitamin B_{12} was grossly inadequate in all the three groups, the per cent adequacy being 31, 40 and 65, respectively. The intake of vitamin C by all groups was less than the recommended level, the per cent adequacy was found to be 72, 89 and 94, respectively. Inadequate intake of riboflavin, niacin, folic acid, vitamin B_{12} and vitamin C was also reported by Batra (2014). On the other hand, Miglani *et al*. (2014) found adequate intake of most of B vitamins but inadequate intake of vitamin C. The results showed that out of six vitamins, only thiamine was found to be adequate, while rest *i.e*. riboflavin, niacin, folic

Table 3 : Daily intake of vitamins and minerals by the subjects

	Field workers (n=30)	Lab workers (n=30)	Office workers (n=30)	Overall (n=90)	RDA*	Critical difference at 5 %
Thiamine, mg						
Range	1.1-2.2	1-2.1	1.1-10.5	1-10.5	1.2[a], 1.4[b]	NS
Mean ±SD	1.63 ± 0.2	1.59 ± 0.3	2.20 ± 2.3	1.8 ± 1.3		
Riboflavin, mg						
Range	0.7-1.8	0.6-1.3	0.7-3.1	0.6-3.1	1.4[a], 1.6[b]	0.23
Mean ±SD	1.07 ± 0.32	1.54 ± 2.19	1.35 ± 0.42	1.19 ± 0.39		
Niacin, mg						
Range	10-23	1.2-17	8-15	1.2-23	16[a], 18[b]	1.97
Mean ±SD	14.3 ± 2.75	11.94 ± 3.05	11.7 ± 1.77	12.68 ± 2.8		
Folic acid, µg						
Range	103-371	76-339	76-309	76-371	200	NS
Mean ±SD	188.2 ± 65.4	192.3 ± 59.4	178.5 ± 53.1	186 ± 59		
Vitamin B12, µg						
Range	0-1.0	0-1.8	0-1.8	0-1.8	1	0.29
Mean ±SD	0.31±0.36	0.41±0.54	0.65±0.54	0.46±0.5		
Vitamin C, µg						
Range	13-45	27-67	27-70	13-70	40	4.2
Mean ±SD	28.8 ± 4.5	35.3 ± 3.8	37.6 ± 7.0	34.0± 5.2		
Iron, mg						
Range	13-23	18-29	10-26	10-29	17	NS
Mean ±SD	17.2 ± 2.5	18.3 ± 3.8	16.8 ± 3.1	17.4 ± 3.2		
Calcium, mg						
Range	197-911	595-1217	338-1914	197-1914	600	191.24
Mean ±SD	552 ± 220	754 ± 360	886 ± 363	731 ± 346		
Phosphorus, mg						
Range	863-1659	1702-1769	1016-2087	863-2087	600	NS
Mean ±SD	1329 ± 195	1464 ± 408	1451 ± 272	1415 ± 307		

* RDA: Recommended Dietary Allowances (ICMR, 2010)
[a] Sedentary Indian men RDA, [b] Moderate Indian men RDA
NS=Non-significant

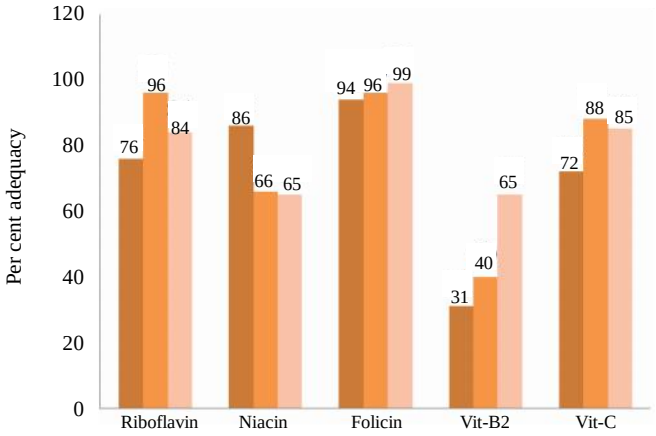

Fig. 3 : Per cent adequacy of vitamins among the subjects

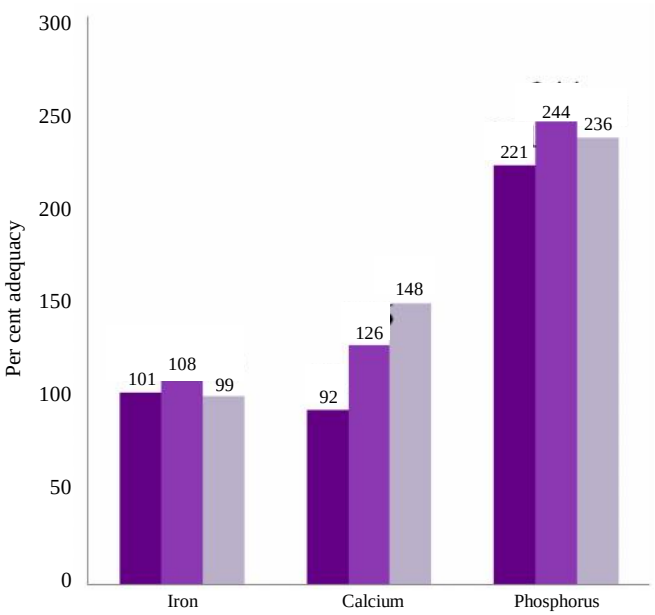

Fig. 4 : Per cent adequacy of minerals among the subjects

acid, vitamin B_{12} and vitamin C were inadequate.

The intake of vital minerals *i.e.*, iron was adequate in field and laboratory workers but marginally inadequate in office workers. Batra (2014) reported that the adequacy of iron in low and middle income men was 66 and 76 per cent. Calcium was marginally inadequate (92%) in field workers, while adequate in lab (126%) workers and office (148%) workers. Batra (2014) also observed inadequate consumption of calcium by low income men however, it was marginally inadequate in middle income group men. Phosphorus intake was adequate in all the three groups, the per cent adequacy being 221, 244 and 236, respectively.

The study concluded that diets were inadequate for energy, protein but adequate for fat in all the three categories. No significant differences in energy, protein and carbohydrates was found in the three groups, however, daily fat intake was least in the field workers while it was higher in labworkers and office workers . A significantly ($p \leq 0.05$) lesser fat was consumed by the field workers. The contribution of fats to total energy was higher *i.e.* more than 20 per cent in case of lab workers and office workers which was undesirable as it may lead to obesity and other degenerative disorders. Out of six vitamins, only thiamine was found to be adequate while rest of the five vitamins namely niacin, folic acid, vitamin B_{12} and vitamin C were inadequate in all the three groups. Iron intake was adequate in field workers but marginally inadequate in lab and office workers while calcium was inadequate in field workers. Excessive consumption of food especially in the form of cereals, pulses, sugar, fats and oils resulted in gaining total body fat as well as accumulation of fat in waist area which may result in increased risk of degenerative diseases. Hence, it is recommended that awareness of adequate and optimum nutrition needs to be promoted through various educational programs, so that masses strive to achieve optimum body composition and desirable body weights in order to prevent themselves from chronic degenerative diseases.

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