

Relationship between Consumption of Convenience Foods and Health Status of the Working Women

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Authors' contributions

This work was carried out in collaboration among all authors. Author BD designed the study, performed the statistical analysis, wrote the protocol of the manuscript and managed the analyses of the study. All authors managed the literature searches, read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2020/v39i330518

Editor(s):

(1) Dr. Ekpenyong, Christopher Edet, College of Health Sciences, University of Uyo, Nigeria.

Reviewers:

(1) Arthur Chuemere, University of Port Harcourt, Nigeria.

(2) Nzeagwu Ogechi Chinyere, Michael Okpara University of Agriculture, Nigeria.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/54019>

Received 02 December 2019

Accepted 08 February 2020

Published 16 March 2020

Original Research Article

ABSTRACT

Consumption of convenience foods has been found to be inexorable in modern scenario due to rapid urbanization, changing life-style of women, rising purchasing power and adaptation to western culture. The chief objective was to assess the correlation between health status and frequency and consumption of convenience foods among working (employed) and non-working (unemployed) women. A total of 120 subjects aged 25-40 years including 60 working as school teachers, bank employees or those working in private sector for 6-8 hours per day and 60 non-working women with family monthly income ranging from Rs. 1-2 lakhs were selected randomly from Ludhiana city. Majority of working women (41.7%) spent more than 30% of their total food expenditure on convenience foods, while among non-working women, it was 8.3%. Working women consumed bakery products, ready-to-eat snacks, ready-to-cook products and beverages thrice a week; sandwich spreads and frozen foods twice a week; sweets rarely whereas non-working women consumed these products fortnightly/ rarely. The average body mass index (BMI), waist-hip ratio (W/H) and total lipid profile was found to be significantly ($p \leq 0.05$) higher among working women whereas a non-significant difference was observed for Glycated haemoglobin (HbA1c) and Haemoglobin (Hb) levels. BMI, waist-hip ratio, total blood cholesterol and triglycerides were found to be significantly ($p \leq 0.01$) correlated with consumption of convenience foods among women. Excessive consumption of convenience foods is one of the major factors for higher incidence of obesity and other non-communicable diseases among women.

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Keywords: Convenience foods; women; bakery products; lipid profile; body mass index.

1. INTRODUCTION

The emerging markets and increased migration from rural to urban areas has driven the food industry particularly in India. With traditional foods and cooking methods being abandoned, consumption is becoming more westernized with major emphasis on processed and packaged convenience foods. India's convenience food market is expanding rapidly at a compounded annual growth rate of 20% per year. India is the world's second largest producer of food next to China and has the potential of overtaking China and being the biggest food industry. Demand for frozen, instant, ready to cook and ready to eat food is increasing gradually, especially in metropolitan cities of India. About one-third of the India's food industry comprises of processed foods [1]. Modifications in lifestyle, busy schedule of both men and women in a family, rising purchasing power and adaptation to western culture has made consumers more attracted towards convenience foods [2]. Convenience foods are gaining popularity amongst all ages today [3].

However, the shift from traditional homemade foods to convenient foods in today's era has resulted in an increase in incidence of global obesity and various health complications [4]. Due to low nutrition value, consumption of ultra-processed foods has been related with obesity and diet-related chronic diseases [5]. With increase in the consumption of processed and unhealthy junk foods, a drastic increase in diseases like coronary artery disease and diabetes mellitus is observed, especially in developing countries. These foods have become an integral part of life, and coming with it is a huge burden of obesity and related problems [6]. Keeping in view, the study aimed to assess the health and nutritional status of women, assess the frequency and consumption of convenience foods among working and non-working women, examine the relationship between consumption of convenience foods and health status of women.

2. MATERIALS AND METHODS

The study was conducted in various localities of Ludhiana, Punjab. A total of 120 women (25-40 years) were selected, out of which 60 were working and 60 were non-working women (monthly family income ranging from Rs. 1-2

lakhs). The study was focused on women as she is the essential part of a family where she needs to care of the meals of the family irrespective of her job or career. Working women included were school/ college teachers, bank employees or those working in private sector for 6-8 hours per day. A well-structured questionnaire was developed to elicit the general information, dietary habits, purchasing and consumption pattern of convenience foods. General information included age, educational qualification, occupation, working hours, monthly income, marital status, religion, lifestyle related information, medical history, food habits, family type, family size and family income. Detailed information on food intake was obtained for three consecutive days by using 24-hour recall method. Factors and attributes affecting the purchase of convenience foods were depicted and analysed to know the perception of women towards convenience foods by factor analysis. Various anthropometric measurements viz-height, weight, waist circumference and hip circumference was measured using standard methods [7]. BMI and waist to hip ratio were calculated by using the formula [8]. Haemoglobin was determined by using cyanmethaemoglobin method [9]. Glucose was estimated by the glucose oxidase method of Trinder [10]. Total cholesterol and triglycerides were analysed by enzymatic colorimetric methods of Allian [11] and Eggstein and Kuhlmann [12]. HDL- cholesterol was extracted by precipitation method described [13]. The LDL- cholesterol and VLDL- cholesterol were estimated by using Friedwald formula [14]. The data were analysed using various statistical tools such as frequency, percentages, mean, standard deviation., t-test, Karl Pearson's coefficient of correlation, Kaiser-Meyer-Olkin measure, Bartlett's test and Factor analysis using SPSS (Statistical package for the Social Sciences) software.

3. RESULTS AND DISCUSSION

3.1 General Information

Majority of the working women (WG) i.e. 83.3% were qualified up to post-graduate level. On contrary, among non-working women (NWG), 66.7% were graduates and 30% were educated up to post-graduate level. Majority of the women belonged to nuclear families i.e. 70% in WG and 63.3% in NWG. Majority of the WG subjects (41.7%) spent more than 30% on convenience

foods whereas majority of the NWG subjects (55%) spent only 10-20% on convenience foods, revealing a higher use of convenience foods by working women. The results were similar to the findings of Kaur and Singh [15], revealing that increase in income and change in lifestyle led to increase in expenditure on convenience foods by the consumers.

3.2 Anthropometric Measurements

BMI was found to be significantly ($p \leq 0.05$) higher in WG subjects i.e. $25.70 \pm 3.07 \text{ kg/m}^2$. WG women ($84.58 \pm 8.45 \text{ cm}$) had significantly ($p \leq 0.01$) higher waist circumference than NWG women ($81.55 \pm 7.81 \text{ cm}$). The average waist/hip ratio of WG subjects was significantly higher than NWG subjects (Table 1). Comparing the BMI of both groups, it was inferred that NWG had double the number of women than WG within normal BMI range i.e. 40 and 20% in NWG and WG respectively. Majority (80%) of the working women belonged to overweight and pre-obese category in comparison to non-working women (58.3%), depicting the higher prevalence of obesity among the working women due to more sitting hours and less physical activity (Fig. 1). A study had reported that 57.6% of Ludhiana women aged 30-40 years had their BMI below 23

kg/m^2 whereas 42.4% had their BMI above 23 kg/m^2 [16].

3.3 Biochemical Measurements

The average haemoglobin was found to be $10.44 \pm 1.27 \text{ g/dl}$ among working women and for non-working women, the average haemoglobin was $10.45 \pm 1.50 \text{ g/dl}$, revealing higher prevalence of mild anaemia among both working and non-working women. Glycated haemoglobin (HbA1c) were found to be within the normal range (Table 1). The lipid profile (total cholesterol, LDL-C, VLDL-C, triglycerides, total cholesterol: HDL-C ratio, LDL-C: HDL-C ratio) was found significantly higher in WG subjects as compared to NWG subjects whereas there was a non-significant decrease in the levels of HDL-C among WG subjects as depicted in the Table 3. The mean values of total cholesterol: HDL-C ratio and LDL-C: HDL-C ratio were found to be significantly ($p \leq 0.01$) higher among WG subjects as compared to NWG subjects. Higher levels of total cholesterol, triglycerides and LDL-C among working women showed a higher intake of excess calorie and fat. Average cholesterol of the women in Punjab is higher as compared to male i.e. 184 mg/dl whereas males have 179.5 mg/dl [7].

Table 1. Anthropometric and Biochemical profile of the selected subjects (N=120)

Parameters	WG (n=60)		NWG (n=60)		t-value
	Range	Mean \pm SD	Range	Mean \pm SD	
Height (cm)	152-170	160 ± 4.061	150-175	159 ± 4.579	1.898 ^{NS}
Weight (kg)	50-85	66.3 ± 7.51	47-83	62.55 ± 6.878	2.852 ^{**}
BMI (kg/m^2)	19.37-34.48	25.70 ± 3.07	17.90-33.67	23.69 ± 2.48	1.975 ^{**}
Waist circumference (cm)	66-111.76	84.58 ± 8.45	66.04-106.68	81.55 ± 7.81	1.914 ^{**}
Hip circumference (cm)	76.2-119.38	100.38 ± 7.49	76.2-124.46	98.47 ± 9.42	1.226 ^{NS}
Waist-Hip ratio	0.77-0.95	0.86 ± 0.048	0.75-0.90	0.81 ± 0.036	6.092 [*]
Haemoglobin (g/dl)	7.2-13.0	10.44 ± 1.27	7.8-14.0	10.45 ± 1.50	0.46 ^{NS}
Random blood glucose (mg/dl)	66.0-184.0	109.23 ± 59.52	78.0-420.0	110.35 ± 42.81	0.136 ^{NS}
HbA1c	3.90-8.00	5.41 ± 0.64	4.34-8.20	5.47 ± 1.48	0.314 ^{NS}
Total cholesterol (mg/dl)	123.9-277.0	192.45 ± 31.41	120-232.0	149.34 ± 25.90	4.075 [*]
HDL- cholesterol (mg/dl)	28.80-68.20	40.28 ± 7.90	32.80-64.20	42.68 ± 8.79	1.124 ^{NS}
LDL-cholesterol (mg/dl)	54.73-185.00	117.96 ± 31.57	14.0-162.40	96.40 ± 28.55	3.922 [*]
VLDL-cholesterol (mg/dl)	12.11-113.57	35.81 ± 15.39	6.40-90.30	30.19 ± 12.10	2.224 ^{**}
Triglycerides (mg/dl)	60-348	173.41 ± 54.53	66.4-261.0	149.17 ± 45.17	2.652 [*]
Total Cholesterol: HDL-C ratio	2.48-8.35	5.05 ± 1.18	2.42-6.22	4.09 ± 0.90	4.059 [*]
LDL-C: HDL-C ratio	1.01-6.27	3.11 ± 1.04	0.29-4.40	2.35 ± 0.83	4.396 [*]

*Significant at 1% level, ** Significant at 5% level, ^{NS} -Not significant

3.4 Purchasing and Consumption Pattern of Convenience Foods

Table 2 highlighted that majority (56.7%) of the NWG subjects bought convenience foods only when needed from the nearest store whereas majority (58.3%) of WG subjects made their purchase along with the monthly grocery purchases. Majority (15%) of the WG subjects consumed convenience foods daily. On contrary, majority (51.7%) of NWG subjects consumed convenience foods monthly. Convenience foods were mostly consumed in snacks among NWG subjects (70%) whereas as breakfast (56.7%) by WG subjects. A study had supported the present study by publishing the increased intake of processed cereal foods especially for breakfast

in the form of cornflakes or porridge [15]. Majority (43.3%) of the WG subjects preferred Ready to eat (RTE) products followed by Ready to cook (RTC) products (36.7%). On contrary, among NWG subjects, majority (40%) preferred Ready to drink/ serve (RTS) products followed by Ready to eat (RTE) products (33.3%). Majority of the WG subjects bought/consumed snack items (76.7%), biscuits (75%) and breakfast cereals (70%) the most whereas NWG subjects frequently bought/consumed sauces (66.7%), confectionary items (60%) and juices (58.3%). A study had also reported that working women (52%) preferred more of RTE and RTC products such as lays, chips, tomato soups powder, Punjabi channa masala, desserts as compared to non-working women (30%) [18].

Table 2. Purchasing and consumption pattern of convenience foods

Characteristics		WG (n=60)	NWG (n=60)
Category of convenience foods preferred*	Ready to eat (RTE)	26 (43.3)	20 (33.3)
	Ready to cook (RTC)	22 (36.7)	16 (26.7)
	Ready to drink/ serve (RTS)	12 (20)	24 (40)
Meal in which convenience foods are consumed*	Breakfast	34 (56.7)	9 (15)
	Lunch	10 (10.7)	5 (8.3)
	Dinner	15 (25)	8 (13.3)
	Between meals (snacks)	23 (38.3)	42 (70)

(Figures in the parenthesis represent the percentages)

Table 3. Extracted factors affecting purchase and consumption of convenience foods

S.no.	Extracted factors	Mean score		t-value
		WG (n=60)	NWG (n=60)	
1.	Time convenience and taste	16.19 ± 2.18	11.74 ± 2.51	5.17**
2.	Usefulness and diverse cuisine	14.79 ± 2.00	12.97 ± 2.68	4.47**
3.	Affordable price and re-usability	13.60 ± 2.33	11.36 ± 2.77	4.07**
4.	Quality and Health issues	10.73 ± 1.61	10.28 ± 1.61	1.75 ^{NS}
	Overall score	54.31 ± 8.12	45.35 ± 9.57	8.07**

** Significant at 5% level, ^{NS} -Not significant

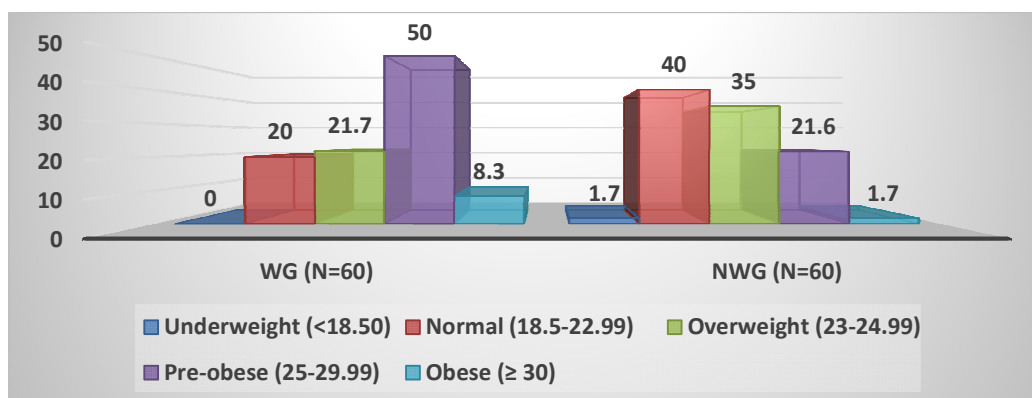


Fig. 1. Distribution of the selected subjects (N=120) according to BMI category

Table 4. Frequency of consumption of various categories of convenience foods

S No.	Convenience foods	Category of Women	Daily	Thrice a week	Twice a week	Weekly	Fortnightly	Rarely	Never
1	Bakery products	WG	14(23.3)	29 (48.3)	7(11.7)	7(11.7)	2(3.3)	6(10)	1(1.7)
		NWG	5(8.3)	12(20)	7(11.7)	6(10)	15(25)	15(25)	0(0)
2	RTE snacks	WG	12(20)	17(28.3)	5(8.3)	4(6.7)	10(16.7)	10(16.7)	2(3.3)
		NWG	6(10)	9(15)	4(6.7)	7(11.7)	7(11.7)	16(26.7)	4(6.7)
3	RTC food	WG	8 (13.3)	12(20)	8(13.3)	15(25)	9(15)	7(11.7)	1(1.7)
		NWG	3(5)	6(10)	6(10)	12(20)	9(15)	20(33.3)	3(5)
4	Sandwich spreads	WG	3(5)	7(11.7)	9(15)	9(15)	18(30)	4(6.7)	12(20)
		NWG	0(0)	2(3.3)	3(5)	3(5)	12(20)	28(46.7)	12(20)
5	Sweets	WG	5(8.3)	2(3.3)	4(6.7)	11(18.3)	15(25)	18(30)	5(8.3)
		NWG	4(6.7)	2(3.3)	7(11.7)	13(21.7)	14(23.3)	19(31.7)	1(1.7)
6	Frozen products	WG	5(8.3)	8(13.3)	11(18.3)	14(23.3)	4(6.7)	12(20)	6(10)
		NWG	3(5)	3(5)	3(5)	6(10)	11(18.3)	23(38.3)	11(18.3)
7	Beverages	WG	13(21.7)	15(25)	19(31.7)	6(10)	2(3.3)	2(3.3)	2(3.3)
		NWG	8(13.3)	9(15)	16(26.7)	17(28.3)	4(6.7)	3(5)	3(5)

(Figures in the parenthesis represent the %age)

Table 5. Correlation of consumption of convenience foods with various health parameters

Health parameters convenience foods	Weight	BMI	Waist-Hip ratio	HbA1c	Total cholesterol	Triglycerides	LDL-C
Bakery products	0.28*	0.40*	0.31*	0.22 ^{NS}	0.35**	0.31**	0.31**
RTE snacks	0.18*	0.19*	0.22*	0.02 ^{NS}	0.44**	0.34**	0.24**
RTC food	0.17 ^{NS}	0.09 ^{NS}	0.11 ^{NS}	0.04 ^{NS}	0.23**	0.20*	0.07 ^{NS}
Sandwich spreads	0.20*	0.31*	0.28**	0.05 ^{NS}	0.38**	0.43**	0.29**
Sweets	0.06 ^{NS}	0.05 ^{NS}	0.20*	0.01 ^{NS}	0.37**	0.33**	0.17 ^{NS}
Frozen	0.30**	0.32**	0.36**	0.09 ^{NS}	0.33**	0.35**	0.30**
Beverages	0.16 ^{NS}	0.10 ^{NS}	0.35*	0.21*	0.32**	0.33**	0.15 ^{NS}

*Significant at 1% level, ** Significant at 5% level, ^{NS} -Not significant

3.5 Attributes Affecting the Purchase and Consumption of Convenience Foods

From the results of factor analysis, it was stated that the major influencers during the purchase and consumption of convenience foods among the subjects were time convenience and taste, usefulness and diverse cuisine, affordable price and re-usability, quality and health issues. The finding proved to be highly significant ($p \leq 0.05$) for WG subjects, revealing that the t-value for the dimensions i.e. time convenience and taste, usefulness and diverse cuisine, affordable price and re-usability and also overall attitude was significantly higher among WG subjects as compared to NWG subjects (Table 3). Increased time pressure had led to increase in the consumption of convenience foods, especially by working women [19].

3.6 Frequency of Consumption of Convenience Foods

Table 4 revealed that majority of working women (48.3%) consumed bakery products such as biscuits, bread, rusk and cold sandwiches thrice a week as compared to non-working women (20%). RTE snacks like bhujia, diet mixture, chips, karkure, popcorns and wheat/ corn flakes were consumed thrice a week by 28.3% WG subjects followed by 20% consuming daily. Intake of RTC foods such as oats, maggi, noodles, packed soups, macaroni, panipuri, upma, canned vegetables, sausage and gravy veg. mixes was higher among WG subjects (25%) on weekly basis whereas majority of NWG subjects (33.3%) took RTC foods occasionally/ rarely. Consumption of sandwich spreads such as jams, sauces, cheese slices, chutney spreads, mozzarella/processed cheese was found to be higher among WG subjects (15%). The lesser intake of sweets such as candies, chocolates, custard, fruit cake, instant desserts, ice-creams correlated with lesser HbA1c among the subjects. Consumption of frozen products like french-fries, vegetables, parantha, veggie fingers, pakoras, frozen samosa, smileys, aloo tikki, potato bites was found to be higher among WG subjects on weekly basis). The consumption of beverages like juices, soft drinks, coffee, tea, squashes, soy milk, flavoured milk was also found to be consumed higher among WG subjects. Convenience foods contributed 29.66% to total energy intake of working women whereas among non-working women, the contribution from convenience foods was less than half of working women (13.71%). Mean intake of

convenience foods in diet of working women (446.41 ± 208.72 g/day) was three times significantly ($p \leq 0.01$) higher as compared to non-working women (141.37 ± 116.91 g/day). had also proclaimed that employed women used more frequently convenience food products as compared to non-employed women.

3.7 Correlation of Consumption of Convenience Foods with Various Health Parameters

Table 5 revealed that weight and BMI was found to be significantly correlated with bakery products, RTE snacks, sandwich spreads and frozen foods. Waist-hip ratio was positively correlated with all convenience foods except RTC foods whereas HbA1c was significantly ($p \leq 0.01$) correlated with bakery and beverages only. Total cholesterol and triglycerides were significantly correlated with all convenience foods respectively. LDL-C was significantly ($p \leq 0.05$) correlated with bakery products, RTE snacks, sandwich spreads and frozen foods. Out of all significant ($p \leq 0.05$) relationships, of the most relevance were between intake of RTE snacks with total cholesterol ($r = 0.44$) followed by sandwich spreads with triglycerides ($r = 0.43$). Bakery products were the only convenience food to be positively correlated with all health parameters: BMI, waist-hip ratio, HbA1c and lipid profile respectively. RTE snacks and frozen foods were also positively correlated with BMI, waist-hip ratio and lipid profile, except HbA1c. Intake of beverages and sweets were significantly correlated with waist-hip ratio and lipid profile. However, RTC foods were significantly correlated with total cholesterol and triglycerides only. A study had also reported a positive association between anthropometric and higher consumption of ultra-processed instant foods, contributing to long-term obesity [20]. A study cited that plasma triglyceride levels and blood glucose levels were higher among frequent consumers of instant foods such as noodles, sweets, beverages than infrequent consumers [21].

4. CONCLUSIONS

Based on the present database regarding health implications of convenience foods among women, it can be concluded that consumption of convenience foods is inexorable in modern scenario. With the busy lifestyle of Indian women coping both home and work, the demand for

convenient foods has risen steadily. Excessive consumption of convenience foods is one of the major factors for higher incidence of obesity and other non-communicable diseases among women. Therefore, they need to be made aware about the nutritional facts of these foods and their effect on the health and nutritional status.

DISCLAIMER

Some parts of the manuscript was previously presented in the following conference as a poster.

IDACON 2019- Ahmadabad, Gujarat. Web Link of the proceeding:
https://www.researchgate.net/publication/338670616_Relationship_between_consumption_of_convenience_foods_and_health_status_of_the_working_women_CONVENIENCE_FOODS

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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- Available:<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5723430/>

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Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/54019>