INT. J. BIOL. BIOTECH., 15 (4): 795-800, 2018.

HEALTH HAZARDS OF FREQUENT JUNK FOOD CONSUMPTION IN YOUNG FEMALES

Samia Mushtaq*, Yumna Mussaddiq, Lubna Naz, Sadia Aslam, Nazish Iqbal Khan and Gulab Shahzadi

Department of Physiology, University of Karachi, Karachi-75270, Pakistan
**Corresponding Author: samtaq.physio@gmail.com*

ABSTRACT

Nowadays the attractiveness and appealing nature of junk/fast food has made it a popular meal; however, some devastating effects are also attributed to junk food consumption. Various studies revealed that young individuals are attracted more towards these away-from-home foods. Cardiovascular Disease (CVD) essentially, is the chief contributor to the increased mortality rate occurring in developing countries. The social and psychological factors are the main motivating power behind the global spread of junk food. Such trends contribute to the epidemics of dyslipidemia which leads to obesity, insulin resistance, cardiovascular diseases etc, for the reason that excess amount of salt, sugar, and fats are present in these foods. It has been observed that young individuals are attracted more toward the junk food which made them susceptible of having altered levels of lipids and blood sodium that may be involved in increasing their risk of developing cardiovascular diseases in future. The present study was carried out on young, undergraduate females, who consume junk food on regular basis. The study revealed that despite their young age, the study participants had unacceptably high waist-to-hip ratio (30%), systolic pre-hypertension (75%), diastolic pre-hypertension (40%) and hyperglycemia (20%); which might be suggestive of the fact that frequent fast food consumption can be a contributing part in the development of dyslipidemia and cardiovascular diseases in later ages.

Key-words: Dyslipidemia, cardiovascular diseases, junk food.

INTRODUCTION

Cardiovascular Disease (CVD) essentially, is the chief contributor to the increased mortality rate occurring in developing countries (Luo *et al*.; 2014). Globalisation, Urbanisation and industrialisation of developing countries have changed the lifestyle of people, that lead to decreased energy expenditure and high energy-rich food consumption (Yusuf *et al*., 2001). Nowadays, the appealing, tempting and satisfying nature of fast food has made it a popular meal. Various factors, including the changes in agricultural practices, in order to increase the productivity of food and to make the availability of food less season-dependent, have increased over the past fifty years. Especially in growing countries, where people have very busier lives and they couldn't find time for preparing food for themselves (Kearney, 2010). Junk foods are lacking in essential nutrients such as, fiber, vitamins, minerals, and poly-unsaturated fats that leads to deprivation of these vital nutrients in your body, due to this reason eating junk food once in a while would not affect ones' health but eating on regular basis would end up with malnutrition and major metabolic abnormalities (Ashakiran and Deepthi, 2012). The growing countries like Pakistan, Sri Lanka, Bangladesh, India and Nepal, are known to have elevated risk/threat of heart disease than the rest of the world (Nishtar, 2002; Nishtar and Voûte, 2007).

Cardiovascular disease is one of the most important and pre-dominant pathological conditions that lead to enhanced fatality rate day by day. It accounts for 56,000,000 deaths occurring worldwide annually, out of which less than 13% deaths are due to ischemic heart disease or coronary artery disease (Amin *et al*., 2010). The risk of CHD appears to be doubled for each three percent increase in Trans fat consumption (Sattar *et al*., 2013). In a study done on overseas settled South Asians, it was reported that the South Asians are at an elevated risk of having CHD and diabetes due to disturbances in their metabolism because of insulin resistance, as compared to the Europeans. It was suggested that by focusing on the preventive measures, such as restriction of the factors leading to obesity and increasing the physical activity of those subjects, the chances of having cardiovascular disease could be minimized (McKeigue *et al*., 1991).

Frequent intake of fast food surely contributes to an elevated risk of obesity and insulin resistance, reported in the American Population Study, Cardia (Pereira *et al*., 2005). Consuming fast food very often is suggestive of the indication of an unhealthy lifestyle, for instance, food preferences that are high in sodium content, trans fats and sugars, less-restraint ingesting behavior and sedentary lifestyle, were found to be the main culprits in weight gain and diabetes (Stender *et al*., 2007).

According to the American Association of Clinical Endocrinologist's (AACE) Report, 2012, elevated total serum cholesterol levels, an advancing age, elevated LDL-C levels and decreased serum HDL-C levels are among the major threat factors for Coronary Artery Disease (CAD). In the same guidelines, it is also mentioned that young individuals with more than 16 years of age having risk factors associated with CAD or are overweight or have a family history of CAD, should get screened every five years (Jellinger *et al*., 2012).

A number of studies conducted in Pakistan, have revealed an elevation in CHD in South Asian countries. Some researchers studied a combined population in Karachi, Pakistan and revealed that sixteen percent of men and more than twenty one percent women had high cholesterol (Dennis *et al*., 2006), and in another study it was concluded that the population of South Asian countries have been shown to have raised levels of lipids, raised rate of obesity and other risk factors at a younger age as compared to persons of other nations (Joshi *et al*., 2007). Furthermore, it has been suggested that fast food may lead to obesity by interfering with the hormonal regulation of hunger and appetite phenomena. Overfeeding can be a consequence of leptin resistance (Crujeiras *et al*., 2015), and more hungriness due to alterations in grehlin secretion (Wren *et al*., 2001). Large portion size and high energy density of junk food are the two main issues that lead to obesity (Stender *et al*., 2007). A decline in the release of adiponectin (a hormone which increases insulin sensitivity) and resistin contribute to diminished effectiveness of insulin and leads to type II diabetes (Isganaitis *et al*., 2005). It has been observed through various studies done by different nutritionists that the main target audience of the fast food restaurants is younger people and in this regard there has been a crucial role of television advertisements, taste, attractiveness, time factor and marketing practices (Qasmi *et al*., 2014).

The likelihood of consuming fast food is increased in persons who are employed, younger and living in a large family (Rydell *et al*., 2008). We therefore investigated the fast food consumption frequency among young, apparently healthy, undergraduate females and tried to figure out their risk of having cardiovascular disease in future, focusing on their lifestyle, and blood parameters mainly the fasting lipid profile, sugar and sodium levels.

MATERIALS AND METHODS

Present investigation was carried out on normal, apparently healthy undergraduate females with the mean age of 22.05 ± 0.3 from middle to moderate income with no known manifestation of any disease or evidence of metabolic abnormalities or coronary disease. Approval was obtained from the study participants. Subjects with history of smoking or on any medication were excluded from the study. Peripheral blood was drawn from anticubital vein of the study participants after an overnight fast. Anthropometric attributes and other food preferences were asked using a structured questionnaire. Biochemical investigations include lipid profile assessment, sodium levels, fasting blood glucose levels; whereas, BMI, Waist-to-hip ratio and blood pressure was also measured. Statistical analysis was done using student t-test.

RESULTS AND DISCUSSION

Findings for the present study were that despite the young age, the study participants had unacceptably high waist-to-hip ratio (30%), systolic pre-hypertension (75%), diastolic pre-hypertension (40%) and hyperglycemia (20%); which might be suggestive of the fact that frequent fast food consumption can be a contributing aspect in the development of dyslipidemia and cardiovascular diseases in later ages. Noteworthy elevation in the levels of lipids (Total Cholesterol, Triglyceride) was observed while a decrease in HDL level was noticed ($p < 0.05$) (Table 2).

Table 1. Quantitative Attributes of Junk Food Consumers.

Variable	(Mean±S.D.)
Waist to hip ratio	0.8285±0.01*
Body mass index	23.095±0.75
S.B.P. (mmHg)	126.2±2.047*
D.B.P. (mmHg)	84.25±1.823*
Fasting blood glucose (mg/dl)	87.30±2.20
Sodium(meq/l)	144.65±7.42

**= p-value<0.05 (single sample t test), n=60*

Table 2. Lipid Profile of the Junk Food Consumers.

Parameter	Consumers (Mean±S.E.)
Total Cholesterol(mg/dl)	189.78±2.77*
Triglyceride(mg/dl)	131.23±2.094*
HDL(mg/dl)	36.30±2.208*
LDL(mg/dl)	127.07±2.196

***=p-value<0.05 (single sample t test), n=60*
Abbreviations: LDL, Low Density Lipoprotein; HDL, High Density Lipoprotein.

The current study was aimed to evaluate the possible effects of taking junk food on the cardio vascular risk. Unhealthy ingredients of fast food such as Trans/ saturated fats, refined sugar & refined salt promotes the development of Hypertension, CVD, and Type 2 diabetes in later phases of life, if it is consumed frequently or on daily basis (Grier *et al*., 2007). Despite its deleterious effects on individuals' health, it is hard for the individuals to resist junk food. Various factors, such as easiness to prepare and eat, taste factor due to food additives and excess oil, sugar and salt, attractive packaging, and marketing and promotions, contribute to the appealing nature of junk food (Ashakiran and Deepthi, 2012).

An alternative approach to BMI could be the calculation of WHR and waist circumference which are usually practiced in research and clinical scenario. A simple means of the measurement of total fat and intra-abdominal fat mass has shown to be the waist circumference (Dalton *et al*., 2003).

Table 3. Waist to Hip Ratio of the Study Participants.

Categories	Percentage of the Study Participants
Acceptable Excellent	5%
Acceptable Good	25%
Acceptable High	40%
Unacceptable High	30%

Our data showed that 30% of the study participants had unacceptably high WHR, 25% acceptable good and only 5% acceptable excellent WHR (Table 3). The selected junk food consumers (30%) had high waist to hip ratio which strengthen their chances of having cardiovascular complication in future.

The intake of white sugar in diet is relatively recent, before the introduction of white sugar the primary sweetener was brown sugar and sucrose. White sugar and sucrose increases serum triglyceride and systolic blood pressure in young men, receiving a diet supplement with 200g sucrose/day. High sugar intake principally fructose, have a participatory role in cardiovascular disease (Johnson *et al*., 2007). Although the fasting blood glucose levels of our study participants were within normal range (Table 1), but this might be due to their young age and relative active life style as our study participants were university students. Furthermore, 75% of the participants consume white sugar on regular basis (Table 4), whereas 20% of the participants were hyperglycemic (Table 5), which may suggests that consumption of junk food has affected their health attributes from mild to moderate degree but can predispose the study participants to health problems in future with continued fast food consumption.

Elevated levels of sucrose in diet is suggested to be directly connected to high triglyceride levels in plasma, which is due to restricted clearance of VLDL as well as elevated secretion from the liver. The response of Triglyceride to dietary sugar might vary, however, according to the quantity of sugar and the presence of other nutrients (Howard and Wylie-Rosett, 2002).

High sodium ingestion is self-sufficiently related with an amplified threat of cardiovascular disease and all-cause mortality (He and MacGregor, 2009). High sodium intake accelerates renal tubular sodium reabsorption and sodium retention (He and MacGregor, 2007). Excessive salt ingestion alters blood pressure and hypertension enhancing the risk of cardiovascular diseases (Strazzullo *et al*., 2009). Categorization of our study participants on the basis of systolic and diastolic blood pressure, revealed that 75% of the study participants were systolic pre-hypertensives (Table 7); whereas, 40% were diastolic pre-hypertensives (Table 6).

In junk food, a high content of refined salt is used for taste and preservation. Fluid imbalance in junk food consumers is attributed to the excess refined salt, which may lead to hypertension and raise the chance of stroke and myocardial infarction (He and MacGregor, 2007). Excess sodium in the blood, causes the adrenal medulla to release

oubain like compounds and marinobufagenin, which are sodium-potassium ATPase inhibitors; this inhibition causes sodium retention. Plasma volume is increased leading to hypertension. Inhibition of sodium-potassium ATPase also causes calcium accumulation within the cell causing myosin contraction which leads to vasoconstriction (Jaitovich and Bertorello, 2010).

Table 4. Types of Sweeteners Used by the Study Participants.

Categories	Percentage of the Study Participants
Artificial Sweeteners	10%
Brown Sugar	15%
White Sugar	75%

Table 5. Fasting Blood Glucose Levels of Junk Food Consumers.

Categories	Percentage of the Study Participants
Normal	70%
Hypoglycemic	10%
Hyperglycemic	20%

Table 6. Categorization According to Diastolic B.P.

Categories	Percentage of the Study Participants
Normal	15%
Pre-hypertensive	40%
Hypertensive	45%

Table 7. Categorization According to Systolic B.P.

Categories	Percentage of the Study Participants
Normal	15%
Pre-hypertensive	75%
Hypertensive	10%

Junk food comprise of high amounts of fats so as to enhance its flavor and addiction (Asghari *et al*., 2015). Trans fats in junk food causes insulin resistance by binding to glucose transporter 2 (GluT2) on the pancreatic beta cells; so there is impaired release of insulin which leads to persistent high blood glucose yielding type 2 diabetes. Frequent consumption of trans and saturated fat seems to be linked with an elevated risk factor for CHD, while a higher intake of polyunsaturated and monounsaturated fats was linked with a decreased risk (Hu *et al*., 1997). In the present study, 90% subjects were using vegetable oil whereas only a small fraction (10%) of the study participants were using olive oil (Table 8) which has been linked to reduced frequency of cardiovascular disease (Masella *et al*., 2004).

Fig. 8. Type of Oil Used by the Study Participants.

Categories	Percentage of the Study Participants
Vegetable oil	90%
Olive oil	10%

In the present study Lipid profile was assessed, total cholesterol of junk food eater was slightly elevated, High density lipoprotein levels were found to be declined while serum low density lipoprotein levels were not significantly high due to the young ages of the study population. The reason behind these results might be excess consumption of Trans/saturated fats rich junk food items. Trans fatty acids have markedly adverse effects on serum lipids. The consumption of Trans fatty acids increases the level of low density lipoprotein (LDL) cholesterol, reduces level of high density (HDL) cholesterol, a powerful predictor of the risk of CVD. Trans fat also increases the blood triglycerides level, lipoprotein [a] and reduces the particle size of LDL cholesterol (Mozaffarian *et al*., 2006). Welsh *et al.* (2011) studied the relationship between added sugar consumption and cardiovascular diseases. He found that long term use of added sugar can lead to some impairment in blood cholesterol levels that increases the risk factor for the progression of cardiovascular problems. He concluded that excess consumption of added sugar increases the LDL levels and triglyceride levels were also elevated. Many biological phenomena give a reasonable elucidation for the relationship between CVD and post-prandial blood TG levels. Higher TG levels (post-prandial), reflects either a delay in elimination of TG-rich particles or an elevated peal levels, may progress to atherogenic particles deposition (Bansal *et al*., 2007). These findings are consistent with our elevated serum triglyceride levels. Among the chief determinants of CHD are the HDL and Total cholesterol. Consumption of trans and saturated fats causes an elevation in LDL and total cholesterol whereas the opposite occurs with unsaturated fats. A defensive effect of N-3 polyunsaturated fatty acids on CHD has been suggested. The importance of dietary antioxidants has been suggested because of their role in preventing the oxidation of cholesterol-laden LDL particles (Kromhout *et al*, 2001).

CONCLUSION

Frequent fast food consumption in young age along with other risk factors such as, sedentary lifestyle, may lead to dyslipidemia and cardiovascular problems in future.

REFERENCES

Amin, F., A. Al Hajeri, B. Civelek, Z. Fedorowicz and B.M. Manzer (2010). Enhanced external counterpulsation for chronic angina pectoris. *Cochrane Database Syst Rev.*, 17(2): CD007219. doi: 10.1002/14651858. CD007219.pub2

Asghari, G., E. Yuzbashian, P. Mirmiran, B. Mahmoodi and F. Azizi (2015). Fast food intake increases the incidence of metabolic syndrome in children and adolescents: tehran lipid and glucose study. *PloS one*, 10(10): e0139641.

Ashakiran, D. R. and R. Deepthi (2012). Fast foods and their impact on health. *Journal of Krishna Institute of Medical Sciences University*, 1(2): 7-15.

Bansal, S., J.E. Buring, N. Rifai, S. Mora, F. M. Sacks and P.M. Ridker (2007). Fasting compared with nonfasting triglycerides and risk of cardiovascular events in women. *Jama*, 298(3): 309-316.

Crujeiras, A. B., M.C. Carreira, B. Cabia, S. Andrade, M. Amil and F.F. Casanueva (2015). Leptin resistance in obesity: an epigenetic landscape. *Life sciences*, 140: 57-63.

Dalton, M., A.J. Cameron, P. Z. Zimmet, J. E. Shaw, D. Jolley, D.W. Dunstan and T.A. Welborn (2003). Waist circumference, waist–hip ratio and body mass index and their correlation with cardiovascular disease risk factors in Australian adults. *Journal of Internal Medicine*, 254(6): 555-563.

Dennis, B., K. Aziz, L. She, A.M. Faruqui, C. E. Davis, T. A. Manolio, G. L. Burke and S. Aziz (2006). High rates of obesity and cardiovascular disease risk factors in lower middle class community in Pakistan: the Metroville Health Study. *J Pak Med Assoc*, 56(6): 267-72.

Grier, S. A., J. Mensinger, S.H. Huang, S. K. Kumanyika and N. Stettler (2007). Fast-food marketing and children's fast-food consumption: Exploring parents' influences in an ethnically diverse sample. *Journal of Public Policy & Marketing*, 26(2): 221-235.

He, F. J. and G.A. MacGregor (2007). Salt, blood pressure and cardiovascular disease. *Current opinion in cardiology*, 22(4): 298-305.

He, F. J. and G.A. MacGregor (2009). A comprehensive review on salt and health and current experience of worldwide salt reduction programmes. *Journal of human hypertension*, 23(6): 363.

Howard, B. V. and J. Wylie-Rosett (2002). Sugar and cardiovascular disease a statement for healthcare professionals from the committee on nutrition of the council on nutrition, physical activity, and metabolism of the American heart association. *Circulation*, 106(4): 523-527.

Hu, F. B., M. J. Stampfer, J. E. Manson, E. Rimm, G. A. Colditz, B. A. Rosner, C. H. Hennekens and W. C. Willett (1997). Dietary fat intake and the risk of coronary heart disease in women. *New England Journal of Medicine*, 337(21): 1491-1499.

Isganaitis, E. and R.H. Lustig (2005). Fast food, central nervous system insulin resistance, and obesity. *Arteriosclerosis, thrombosis, and vascular biology*, 25(12): 2451-2462.

Jaitovich, A. and A.M. Bertorello (2010). Salt, Na+, K+-ATPase and hypertension. *Life sciences*, 86(3): 73-78.

Jellinger, P., D. Smith, A. Mehta, O. Ganda, Y. Handelsman, H. Rodbard, M. Shepherd and J. Seibel (2012). American Association of Clinical Endocrinologists' guidelines for management of dyslipidemia and prevention of atherosclerosis. *Endocrine practice*, 18 (Supplement 1): 1-78.

Johnson, R. J., M.S. Segal, Y. Sautin, T. Nakagawa, D.D. Feig, D. H., Kang ….. and L. G. Sánchez-Lozada (2007). Potential role of sugar (fructose) in the epidemic of hypertension, obesity and the metabolic syndrome, diabetes, kidney disease, and cardiovascular disease. *The American journal of clinical nutrition*, 86(4): 899-906.

Joshi, P., S. Islam, P. Pais, S. Reddy, P. Dorairaj, K. Kazmi, M. R. Pandey, S. Haque, S. Mendis, S. Rangarajan and S. Yusuf (2007). Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *Jama*, 297(3): 286-294.

Kearney, J. (2010). Food consumption trends and drivers. *Philosophical transactions of the royal society B: biological sciences*, 365(1554): 2793-2807.

Kromhout, D. (2000). Diet and cardiovascular diseases. *The journal of nutrition, health & aging*, 5(3): 144-149.

Luo, C., Y. Zhang, Y. Ding, Z. Shan, S. Chen, M. Yu ….. and L. Liu (2014). Nut consumption and risk of type 2 diabetes, cardiovascular disease, and all-cause mortality: a systematic review and meta-analysis. *The American journal of clinical nutrition*, 100(1): 256-269.

Masella, R., R. Varì, M. D'Archivio, R. Di Benedetto, P. Matarrese, W. Malorni, B. Scazzocchio and C. Giovannini (2004). Extra virgin olive oil biophenols inhibit cell-mediated oxidation of LDL by increasing the mRNA transcription of glutathione-related enzymes. *The Journal of nutrition*, 134(4): 785-791.

McKeigue, P. M., B. Shah and M.G. Marmot (1991). Relation of central obesity and insulin resistance with high diabetes prevalence and cardiovascular risk in South Asians. *The Lancet*, 337(8738): 382-386.

Mozaffarian, D., M.B. Katan, A. Ascherio, M.J. Stampfer and W.C. Willett (2006). Trans fatty acids and cardiovascular disease. *New England Journal of Medicine*, 354(15): 1601-1613.

Nishtar, S. (2002). Prevention of coronary heart disease in south Asia. *The Lancet*, 360(9338): 1015-1018.

Nishtar, S. and J. Voûte (2007). Women and heart disease: time for change.*Nature Clinical Practice Cardiovascular Medicine*, 4(5): 231-232.

Pereira, M. A., A.I. Kartashov, C. B. Ebbeling, L. Van Horn, M.L. Slattery, D. R. Jacobs and D.S. Ludwig (2005). Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. *The lancet*, 365(9453): 36-42.

Qasmi, S. Z., U. Akhtar, U. Akram, H. Raza, A. Ali and T. Rana (2014). Fast food consumption Drift in Pakistani population. *Journal of Food and Nutrition Sciences*, 2(1): 13-18.

Rydell, S. A., L.J. Harnack, J.M. Oakes, M. Story, R.W. Jeffery and S.A. French (2008). Why eat at fast-food restaurants: reported reasons among frequent consumers. *Journal of the American Dietetic Association*, 108(12): 2066-2070.

Sattar, M. U., F.M. Anjum, A. Shahzad and R.M. Amir (2013). Trans fat intake: A silent threat to human health—A review. *Pakistan Journal of Food Sciences*, 23(1): 33-36.

Stender, S., J. Dyerberg and A. Astrup (2007). Fast food: unfriendly and unhealthy. *International journal of obesity*, 31(6): 887-890.

Strazzullo, P., L. D'Elia, N.B. Kandala and F.P. Cappuccio (2009). Salt intake, stroke, and cardiovascular disease: meta-analysis of prospective studies. *Bmj*, 339: b4567.

Welsh, J. A., A. Sharma, S.A. Cunningham and M.B. Vos (2011). Consumption of added sugars and indicators of cardiovascular disease risk among US adolescents. *Circulation*, 123(3): 249-257.

Wren, A. M., L.J. Seal, M. A. Cohen, A.E. Brynes, G. S. Frost, K.G. Murphy, W.S. Dhillo, M.A. Ghatei and S.R. Bloom (2001). Ghrelin enhances appetite and increases food intake in humans. *J Clin Endocrinol Metab.*, 86(12): 5992.

Yusuf, S., S. Reddy, S. Ôunpuu and S. Anand (2001). Global burden of cardiovascular diseases. *Circulation*, 104(23): 2855-2864.

(*Accepted for publication September 2018*)