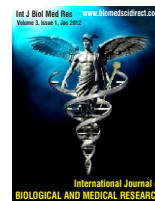


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### Original article

## Comparative study of fast foods induced changes in the blood biochemistry of mice

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#### ABSTRACT

The objective of this study was to observe the effect of thirty day feeding of fast foods (cheese burger, french fries and noodles) on the lipid profile and blood sugar level of mice. Comparative study shows that triglyceride, VLDL and blood sugar level increased more significantly in mice fed with noodles followed by french fries then cheese burger, while good cholesterol level (HDL) was found to be lowered more in mice fed with french fries followed by cheese burger then noodles. The cholesterol and bad cholesterol level (LDL) were noted more in mice fed with noodles followed by cheese burger then French fries. The obtained results reveal that the altered lipid profile and blood sugar level may disturb the biochemistry of the animal, as a result risk factor for obesity, type II diabetes and cardiovascular disease may increase.

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### 1. Introduction:

Food items which can be prepared and served in very less time are termed fast food. Fast food have low dietary fiber, high energy density, high fat value, high fructose and low dairy intake, which favour the development of CNS insulin resistance and obesity (7). Most fast food is delicious but it is dangerous to the health and may creates Diabetes, high blood pressure, hypercholesteromia, hypertension, gall bladder disease, liver damage, vomiting, headaches, depression etc. Fast food consumption has been associated with higher total energy intake, higher intake of fat, carbohydrates and carbonated soft drink and lower intake of micronutrient, fruit and vegetables (2,4,17). There are significant link between fast food consumption and increased BMI (2), increased body weight (8) and a higher probability of being overweight (4). Thus, be keeping the attention on health problem the present work is undertaken to observe the comparative impact of fast food (cheese burger, french fries and noodles) in the blood biochemistry of mice.

### 2. Material and method

Mice *Musmusculus albinus* were obtained from the College of Veterinary Science and Animal Husbandary, Mhow and acclimatized to the laboratory condition for twenty days during which they were regularly fed with normal diet (supplied by

Veterinary College).

Test food: Noodles, Cheese burger and French fries were used as test food. Noodles was purchased from Indian Coffee House, Bhanvar Kuan Square, Indore (M.P.) while Cheese burger and French fries were purchased from Mc Donald's Treasure Island, 11, Tukogang, M.G. Road Indore (M.P).

Experimental Design: Total 80 mice were used in the present investigation. They were divided in to the following two groups.

(A) Control group: In this group 20 mice were kept under normal diet and aqua guard water.

(B) Experimental group: In this group 60 mice were taken which were further subdivided into three groups-

Group 1: In this group 20 mice were taken and kept on Noodles (fast food) as diet and provided aqua guard water.

Group 2: In this group 20 mice were taken and kept on Cheese burger (fast food) as diet and provided aqua guard water.

Group 3: In this group 20 mice were also taken and kept on French fries (fast food) as diet and provided aqua guard water.

Autopsy: There were ten Mice from each experimental and control group were sacrificed after 0, 7, 15 and 30 days for blood collection by cardiac puncture-technique.

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Weight measurement: Weight of mice of each group was taken in gm after 0, 7, 15 and 30 days.

Biochemical assay

Lipid profile and blood sugar were analyzed by following biochemical technique.

- 1) Blood sugar was quantitatively estimated by Nelson-Somogyi method.
- 2) Estimation of triglyceride was done by O.R.G. Triglyceride method.
- 3) Total cholesterol was estimated by Ferric Chloride and Sulphuric Acid method.
- 4) LDL and VLDL were analyzed by Direct LDL/VLDL testing Kit.
- 5) Estimation of HDL was done by Phosphor-tungstate magnesium chloride method.

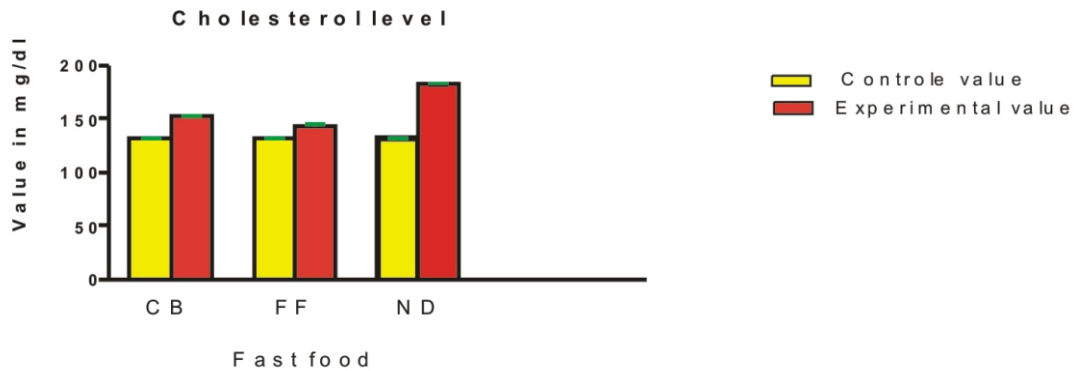
**3. Result and Discussion**

**Table 1 Cholesterol Level of mice fed Cheese burger (CB), French Fries (FF) & Noodles (ND).**

Name of Fast food	Controlvalue(C) (mg/dl) Mean+SD (SEM)	Experiment value (E) (mg/dl) Mean+SD (SEM)	Difference (C E)	% Alter	t value
Cheese burger	131±0.526 (0.235)	152±0.482 (0.215)	21	+ 16.03	664.0783
French Fries	131±0.526 (0.235)	144±0.792 (0.354)	13	+ 9.92	24.7840
Noodles	131±0.526 (0.235)	182±0.680 (0.304)	51	+ 38.93	138.9015

All the experimental value (N=5 for each) are statistically significant (two-tailed P value is less than 0.001).

Figure -1 Bar diagram showing Cholesterol Level in mice fed with Cheese burger, French Fries and Noodles.



**Table 2. Triglycerides Level of Cheese burger (CB), French Fries (FF) & Noodles (ND).**

Name of Fast food	Controlvalue(C) (mg/dl) Mean+SD (SEM)	Experiment value (E) (mg/dl) Mean+SD (SEM)	Difference (C E)	% Alter	t value
Cheese burger	79 ± 0.422 (0.189)	100±0.316 (0.141)	21	+ 26.58	90.5334
French Fries	79±0.422 (0.189)	102±0.451 (0.201)	23	+ 29.11	66.6737
Noodles	79±0.422 (0.189)	130±0.787 (0.352)	51	+ 64.55	101.5954

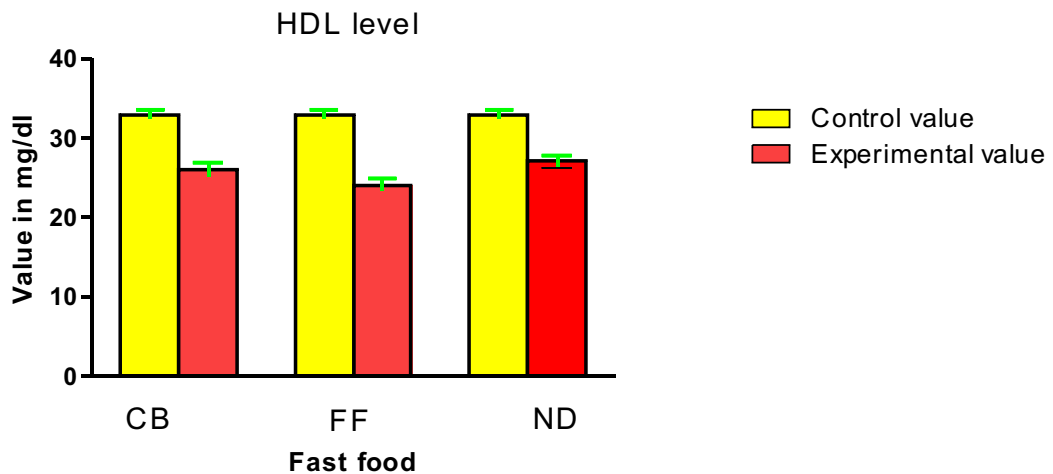
All the experimental value (N=5 for each) are statistically significant (two-tailed P value is less than 0.001).

**Table 3: HDL Level of mice, fed with Cheese burger (CB), French Fries (FF) & Noodles (ND).**

Name of Fast food	Controlvalue(C) (mg/dl) Mean+SD (SEM)	Experiment value (E) (mg/dl) Mean+SD (SEM)	Difference (C E)	% Alter	t value
Cheese burger	33±0.490 (0.219)	26±0.801 (0.358)	7	-21.21	12.9082
French Fries	33±0.490 (0.219)	24±0.779 (0.348)	9	-27.27	30.5236
Noodles	33±0.490 (0.219)	27±0.801 (0.358)	6	-18.18	11.0589

All the experiment value (N=5 for each) are statistically significant ( two-tailed P value is equals 0.0002, less than 0.0001, equals 0.0004 respectively).

**Figure -3 Bar diagram showing HDL Level in mice fed with Cheese burger, French Fries and Noodles**

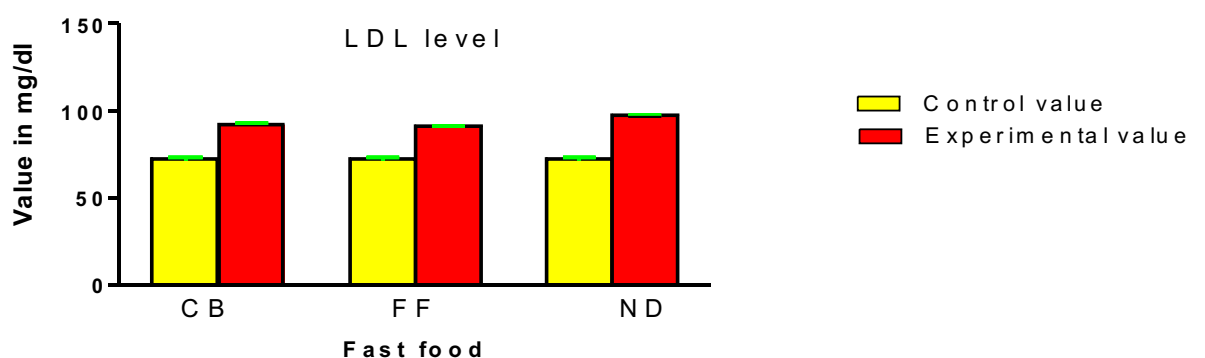


**Table 4: LDL Level of mice, fed with Cheese burger (CB), French Fries (FF) & Noodles (ND).**

Name of Fast food	Controlvalue(C) (mg/dl) Mean+SD (SEM)	Experiment value (E) (mg/dl) Mean+SD (SEM)	Difference (C E)	% Alter	t value
Cheese burger	72.5±0.752 (0.336)	92.5±0.731 (0.327)	20.0	+ 27.58	90.5334
French Fries	72.5±0.752 (0.336)	90.8±0.316 (0.141)	18.3	+ 25.24	66.6737
Noodles	72.5±0.752 (0.336)	97.1±0.800 (0.358)	24.6	+ 33.93	101.5954

All the experimental value (N=5 for each) are statistically significant (two-tailed P value is less than 0.001).

**Figure -4 Bar diagram showing LDL Level in mice fed with Cheese burger, French Fries and Noodles.**

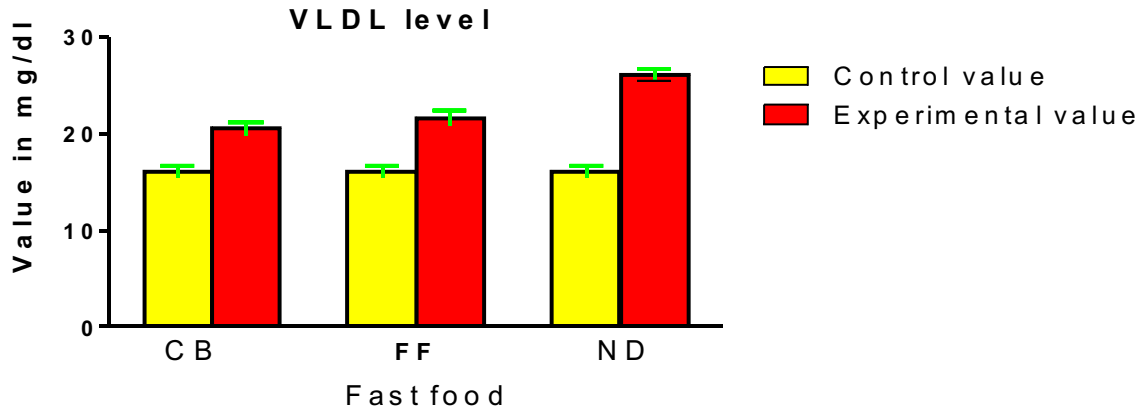


**Table 5 VLDL Level of mice fed with Cheese burger (CB), French Fries (FF) & Noodles (ND)**

Name of Fast food	Controlvalue(C) (mg/dl) Mean+SD (SEM)	Experiment value (E) (mg/dl) Mean+SD (SEM)	Difference (C E)	% Alter	t value
Cheese burger	33±0.490 (0.219)	16 ±0.583 (0.261)	20.5±0.731 (0.327)	-21.21	4.5
French Fries	33±0.490 (0.219)	16±0.583 (0.261)	21.6±0.825 (0.369)	-27.27	5.6
Noodles	33±0.490 (0.219)	16±0.583 (0.261)	26.1±0.626 (0.280)	-18.18	10.1

All the experiment value (N=5 for each) are statistically significant (two-tailed P value is equals 0.0006, equals 0.0003 and less than 0.0001 respectively)

**Figure -5 Bar diagram showing VLDL Level in mice fed with Cheese burger, French Fries and Noodles.**

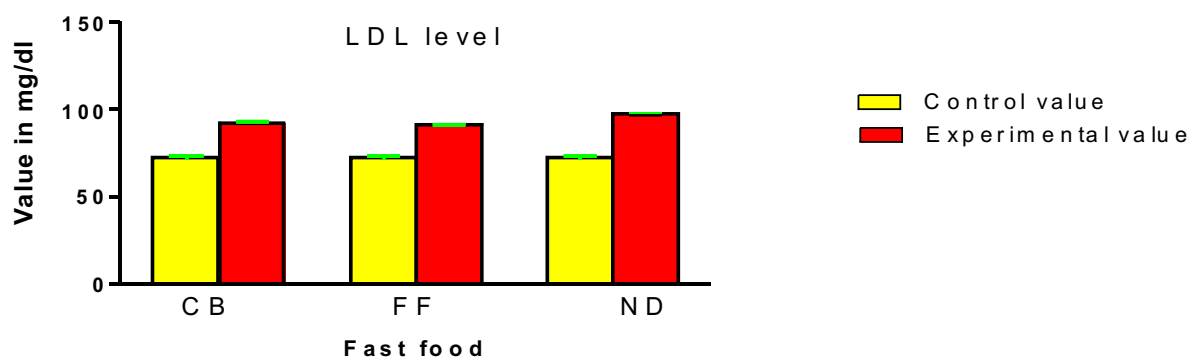


**Table 6 Blood Sugar Level of mice fed with Cheese burger (CB), French Fries (FF) & Noodles (ND).**

Name of Fast food	Controlvalue(C) (mg/dl) Mean+SD (SEM)	Experiment value (E) (mg/dl) Mean+SD (SEM)	Difference (C E)	% Alter	t value
Cheese burger	130 ±1.142 (0.511)	227±1.307 (0.584)	+ 27.58	+ 27.58	90.5334
French Fries	130±1.142 (0.511)	241±0.963 (0.431)	+ 25.24	+ 25.24	66.6737
Noodles	130±1.142 (0.511)	273±0.832 (0.372)	+ 33.93	+ 33.93	101.5954

All the experimental value (N=5 for each) are statistically significant (two-tailed P value is less than 0.001).

**Figure -4 Bar diagram showing LDL Level in mice fed with Cheese burger, French Fries and Noodles.**



All the experimental value (N=5 for each) are statistically significant (two-tailed P value is less than 0.001).

Observation related with lipid profile, blood sugar level and body weight are summarized in table 1 to 6 and presented by fig 1 to 6. These results showed that constant use of Cheese burger, French Fries and Noodles as a diet content altered the biochemistry of lipid profile and blood sugar. All the tested food decreases the good cholesterol HDL level and increases the bad cholesterol LDL level along with cholesterol, triglyceride and very low density lipoprotein along with blood sugar in experimental mice. Comparative study showed CHL, TGL, VLDL and B.S. were increased more significance in the mice fed with Noodles than French Fries followed by Cheese burger. The good cholesterol (i.e. HDL) was lowered more in the mice fed with French fries followed by cheese burger and then noodles. The bad cholesterol was found increase more in mice fed with Noodles, than cheese burger followed by French fries. This showed that use of noodle is more harmful than the French fries and Cheese burger. As for as lipid profile and blood sugar level is concerned all the studied fast food is harmful to health in long term use as they increases the bad cholesterol and decrease the good cholesterol and this increases those risk factors which are responsible for the cardiovascular disease and DMT2.

Consumption of fast food on a regular basis leads to many health hazards like obesity, hypertension, hypercholesterolemia, cardiac disease and diabetes (13,18,21). Sitole (22) described that 30 days constant feeding of Noodle to mice increases cholesterol level 40.62 per cent. Prakash (13) reported increase of cholesterol level up to 12.30 per cent in 30 days feeding of French Fries. In the present investigation 30 days feeding of fast food viz Noodle, Cheese burger and French Fries enhance the cholesterol level 38.93 per cent, 16.03 and 9.92 per cent respectively. These results are very similar to previous researchers.

Triglyceride is main energy storage compound found in the tissue and blood. Sitole (22) described 64.14 per cent increase in triglyceride after 30 days feeding of noodles to mice. Prakash (13) noted 29.48 per cent increase in triglyceride after 30 days feeding of French fries. In the present study triglyceride level after 30 days feeding of noodle, cheese burger and French fries to mice enhanced triglyceride 60.55, 26.58 and 29.11 per cent respectively, the maximum increase in triglyceride was observed in noodle fed mice and lowest increase in cheese burger fed mice. However, status of French fries was in between there two fast food. Lee (10) Noorouz (16) and MacRury (12) described increase in triglyceride is associated with risk factor of cardiovascular disease.

In the present comparative study LDL level was found increased after 30 days feeding of noodle, cheese burger and French fries upto 33.93, 27.58, and 25.24 per cent respectively, whereas HDL level was found decreased 18.18, 21.21 and 27.27 per cent respectively, while noodle, cheese burger and French fries feeding to experimental mice up to 30 days increased in the VLDL upto 63.12, 28.12 and 35.0 per cent respectively. Similar result was obtained by Sitole (22) and Prakash (13). Increase in

bad cholesterol and decrease in good cholesterol level suggests that constant long term feeding of this food may increase risk factor for the cardiac disease.

High levels of blood sugar (glucose) considered as a significant factors which leads development and proliferation of many disease like diabetes, heart disease, stroke etc. In the present study random blood sugar was investigated in experimental mice. The blood sugar was found increased 110 per cent after noodle feeding, 74.61 per cent after feeding of cheese burger and 85.38 per cent after feeding of French fries for 30 days. All the tested fast food enhanced the blood sugar upto reasonable level. The maximum increase was noted with noodle fed and minimum increase was observed with cheese burger. Pereira (19), Anderson and Whitaker (1), Edelstein (6) reported that fast food promote the weight gain and insulin resistance. Similarly Jeffery (9); French (8) Satia (20); Bowman (3) Maddock (14); Pereira (18); Duffey (5) and Mehta and Chang (15) described that fast food consumption has been linked to weight gain, poorer dietary indicators, insulin resistance and obesity. The causal link between obesity and insulin resistance are complex and controversial. Experimental and clinical studies suggested that obesity promotes insulin resistance, which further facilitates weight gain (11). Insulin resistance is a condition in which people's insulin does not process food effectively which causes abnormal amount of sugar circulate in the blood stream. Thus high blood sugar levels make the individual more prone to diabetes, high blood pressure and heart disease. This finding seems true in the present study as all the present studied fast food increases the blood sugar level which may be the result of insulin inhibition due to constant eating of fast food. These results suggest that fast food which studied have some constituent which inhibit the proper functioning of insulin.

#### 4. Conclusion

Constant feeding of Fast food like Cheese burger, French Fries and Noodles increases CH,TRG,VLDL,LDL level except HDL, which suggests that constant long term use of these food will increase the risk factor of health, while on other side it also increases the chances of cardiac vascular disease. Elevated blood sugar level also indicates that constant use of fast food (cheese burger, French fries and Noodles) may arrest the insulin function and thus may increase the chances of diabetes. Obtained result also suggested that noodles are more harmful than cheese burger and French fries. Therefore author suggested that user while eating the fast food keep in mind its composition specially the fat content and its type. If possible avoid or restrict the use of such foods.

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