

SERUM BIOCHEMICAL PROFILE OF GASTRIC CANCER PATIENTS

L. Inaotombi Devi, Lalsanglura Ralte and M. Ayub Ali*

Department of Medical Laboratory Technology, Regional Institute of Paramedical and Nursing Sciences, Aizawl,
Mizoram-796017.

*College of Veterinary Sciences & AH., CAU, Selesih, Aizawl, Mizoram – 796014.

*Corresponding Author: Dr. M. Ayub Ali

College of Veterinary Sciences & AH., CAU, Selesih, Aizawl, Mizoram – 796014.

Article Received on 27/02/2016

Article Revised on 20/03/2016

Article Accepted on 11/04/2016

ABSTRACT

Stomach cancer or gastric cancer develops from the lining of the stomach. It may spread from the stomach to other parts of the body, particularly the liver, lungs, bones, lining of the abdomen and lymph nodes. In the present investigation the serum biochemical profile of the gastric cancer patients were analyzed. The values observed were higher for total cholesterol, triglyceride, creatinine, alkaline phosphatase, SGOT and CKMB while the level of HDL-Cholesterol was lower than the normal range. The random blood glucose level was 92.50 ± 29.74 mg/dl. The total cholesterol, triglyceride and HDL-Cholesterol levels were 240.25 ± 52.62 mg/dl, 185.75 ± 65.23 and 36.25 ± 8.73 mg/dl respectively. The plasma total protein and albumin levels were 7.63 ± 0.17 g/dl and 4.27 ± 0.27 g/dl respectively. The total and direct bilirubin levels observed were of 0.4 ± 0.14 mg/dl and 0.23 ± 0.19 mg/dl. The observed BUN was 10.35 ± 1.27 mg/dl while uric acid observed was 6.52 ± 1.85 mg/dl. The observed creatinine, calcium and phosphorus were 2.2 ± 0.8 mg/dl, 8.78 ± 1.28 mg/dl and 3.95 ± 0.52 mg/dl respectively. The level of plasma enzymes were 135.0 ± 20.85 U/L for alkaline phosphatase, 41.5 ± 29.91 U/L for gamma glutamyl transferase, 39.0 ± 3.00 U/L for SGOT, 16.28 ± 10.58 U/L for SGPT, 88.75 ± 112.72 U/L for CK-MB, 260.5 ± 68.01 U/L for cholinesterase, 135.33 ± 6.51 U/L for LDH and 51.33 ± 4.51 U/L for amylase.

KEYWORDS: Gastric cancer, total cholesterol, HDLC, Alkaline phosphatase.**INTRODUCTION**

Stomach cancer or gastric cancer develops from the lining of the stomach. The early symptoms may include heartburn, upper abdominal pain, nausea and loss of appetite while the later symptoms may include weight loss, vomiting, difficulty in swallowing and blood in the stool among others. It may spread from the stomach to other parts of the body, particularly the liver, lungs, bones, lining of the abdomen and lymph nodes.^[1] Globally it is the fifth leading cause of cancer and the third leading cause of death from cancer making up 7% of cases and 9% of deaths. In 2012 it occurred in 950,000 people and caused 723,000 deaths (World Health Organization, 2014).^[2] Before the 1930s in much of the world, including the United States and the United Kingdom, it was the most common cause of death from cancer.^[3,4,5] Rates of death have been decreasing in many areas of the world since then. This is believed to be due to the eating of less salted and pickled foods as a result of the development of refrigeration as a method of keeping food fresh.^[6]

Gastric cancer is a multifactorial disease.^[7] *Helicobacter pylori* infection is an essential risk factor in 65–80% of gastric cancers.^[8] The mechanism by which *H. pylori* induces stomach cancer potentially involves chronic

inflammation, or the action of *H. pylori* virulence factors such as CagA.^[9] Smoking increases the risk of developing gastric cancer significantly, from 40% increased risk for current smokers to 82% increase for heavy smokers. Gastric cancers due to smoking mostly occur in the upper part of the stomach near the esophagus.^[10,11] Some studies show increased risk with alcohol consumption as well.^[12] Dietary factors are not proven causes but some foods including smoked foods^[13] salt and salt-rich foods, red meat, processed meat, pickled vegetables are associated with a higher risk of stomach cancer. Nitrates and nitrites in cured meats can be converted by certain bacteria, including *H. pylori*, into compounds that have been found to cause stomach cancer in animals. On the other hand, fresh fruit and vegetable intake, citrus fruit intake, and antioxidant intake are associated with a lower risk of stomach cancer. A Mediterranean diet is also associated with lower rates of stomach cancer as is regular aspirin use.^[8] Obesity increases the risk of gastric adenocarcinoma by contributing to the development of gastroesophageal reflux disease.^[14] Due to this, those that are obese have been found to have a risk of gastric cardia adenocarcinoma that is more than 2 times that of someone with a healthy weight. Obesity is also seen to increase mortality of this cancer in men.^[15] The

association of nutritional factors and life-style of the individuals with the incidence of gastric cancer has been reported in many studies^[10] and similar risk factors influence lipid profile and the genesis of gastric carcinoma. In the present study, an attempt was made to analyze the serum lipid profile and other biochemical parameters of the gastric cancer patients.

MATERIALS AND METHOD

The present study was conducted with the established and histopathologically confirmed gastric cancer patients being treated at Regional Cancer hospital and Research centre, Zembabawk, Aizawl. The blood samples (5 ml) each were collected from each patient aseptically in heparinized tubes. The samples were then centrifuged at 2500 g for 10 min. The plasma of the samples were then collected in sample vials and kept in the freezer till the

samples are analyzed for the biochemical profile. The collected samples were analyzed for various biochemical parameters including blood sugar, total cholesterol, triglycerides, HDL-C, total protein, albumin, globulin, A:G ratio, billirubin (direct & total), creatinine, BUN, uric acid, calcium, phosphorus, cholinesterase, SGOT, SGPT, alkaline phosphatase, gamma glutamyl transferase, lactate dehydrogenase, amylase etc. All the biochemical parameters were analyzed on a fully automatic dry clinical analyzer (Fujifilm-4000i). The observed results were then analyzed using a suitable statistical method.

RESULT AND DISCUSSION

The observed biochemical parameter in gastric cancer patients in the present investigation is given in the table 1.

Table 1: Serum Biochemical profile of gastric cancer patients.

Sl. No.	Test	Observed value	Range	Normal Reference range
01	Glucose (mg/dl)	92.5±29.74	68-135	70-110 (Fasting) 110-150 (PP)
02	Total Cholesterol (mg/dl)	240.25±52.62	211-319	150-219
03	Triglyceride (mg/dl)	185.75±65.23	134-276	50-149
04	HDL-Cholesterol (mg/dl)	36.25±8.73	26-47	37-67 (Male) 40-71 (Female)
05	Total Protein (g/dl)	7.63±0.17	7.4-7.8	6.7-8.3
06	Albumin (g/dl)	4.27±0.27	4.0-4.6	3.8-5.0
07	BUN (mg/dl)	10.35±1.27	8.8-11.9	8-23
08	Uric Acid (mg/dl)	6.52±1.85	4.7-8.5	4.0-7.0 (Male) 3.0-5.5 (Female)
09	Creatinine (mg/dl)	2.2±0.80	1.0-2.7	0.6-1.1
10	Bilirubin (Total) (mg/dl)	0.4±0.14	0.3-0.6	0.1-1.2
11	Bilirubin (Direct) (mg/dl)	0.23±0.19	0.1-0.5	0.1-0.4
12	Calcium (mg/dl)	8.78±1.28	6.9-9.8	8.4-10.2
13	Phosphorus (mg/dl)	3.95±0.52	3.3-4.5	2.6-4.4
14	Alkaline Phosphatase (U/L)	135.0±20.85	105-153	32-111
15	GGT (U/L)	41.5±29.91	23-86	16-73
16	SGOT (U/L)	39.00±3.00	36-42	8-38
17	SGPT (U/L)	16.28±10.58	9.0-31.43	4-44
18	LDH (U/L)	135.33±6.51	129-142	106-211
19	Cholinesterase (U/L)	260.5±68.01	192-354	170-420
20	CKMB (U/L)	88.75±112.72	18-257	<25
21	Amylase(U/L)	51.33±4.51	47-56	37-125

In the present analysis of serum biochemical profile of the gastric cancer patients the random blood glucose level was 92.50±29.74 mg/dl and the level ranges between 68.0 and 135.0. The plasma total protein and albumin levels were 7.63±0.17 g/dl and 4.27±0.27 g/dl respectively and levels ranges between 7.4 and 7.8 for total protein and 4.0 and 4.6 for albumin. The total and direct billirubin levels observed were of 0.4±0.14 mg/dl and 0.23±0.19 mg/dl. The level of total billirubin and direct billirubin varies from 0.3 to 0.6 and 0.1 to 0.5 respectively. The observed blood urea nitrogen (BUN) level was 10.35±1.27 mg/dl and level ranges between 8.8 and 11.9. The uric acid level observed was 6.52±1.85 mg/dl. The level of uric acid observed ranges from 4.7

and 8.5. The observed value for creatinine was 2.2±0.8 mg/dl and the level ranges between 1.0 and 2.7. Plasma calcium and phosphorus levels observed were 8.78±1.28 mg/dl and 3.95±0.52 mg/dl. The plasma calcium level ranges from 6.9 to 9.8 while the phosphorus level ranges between 3.3 and 4.5.

The total cholesterol, triglyceride and HDL-Cholesterol levels were 240.25±52.62 mg/dl, 185.75±65.23 and 36.25±8.73 mg/dl respectively. The level of total cholesterol ranged from 211 to 319 while the level of triglyceride ranges between 134 and 276 and that of HDL-Cholesterol from 26 to 47. The observed levels of total cholesterol and triglyceride were higher than the

normal values reported while the observed HDL-Cholesterol level was lower than the normal range. The increase level of serum total cholesterol and decrease in HDL-Cholesterol among the gastric cancer patients compared to the normal and controls was also reported by Monharan and his colleagues.^[16] Environmental factors and lifestyle of the individuals have been implicated in the genesis of stomach cancer. Alterations in blood lipids in smokers have been reported by Craig and colleagues.^[17] Pugalendi and Ramakrishnan^[18] reported increased total cholesterol with concomitant decrease in HDL-Cholesterol among smokers. Alcohol is also known to cause changes in the concentration of lipoprotein cholesterol.^[19] The enhanced plasma total cholesterol level in gastric cancer patients can cause an increase in plasma LDL with suppression of LDL receptor activity, resulting in a further increase in plasma cholesterol levels. The observed increased in the plasma total cholesterol and decrease in HDL-Cholesterol among the gastric cancer patients in the present investigation may be related to the lifestyle of the patients as most of the Mizo people are heavy smokers and also consumes the smoked meat.

Among the diagnostically important enzymes the level of serum alkaline phosphatase and CKMB is higher than the normal level while the level of SGOT is marginally higher than the normal value. The plasma enzymatic activities observed were 135.0 ± 20.85 U/L for alkaline phosphatase, 41.5 ± 29.91 U/L for gamma glutamyl transferase, 39.0 ± 3.00 U/L for SGOT, 16.28 ± 10.58 U/L for SGPT, 88.75 ± 112.72 U/L for CK-MB, 260.5 ± 68.01 U/L for cholinesterase, 135.33 ± 6.51 U/L for LDH and 51.33 ± 4.51 U/L for amylase. The observed values for alkaline phosphatase ranged from 105 to 153, GGT from 23 to 86, SGPT from 9 to 31.43, Cholinesterase from 192 to 354, CK-MB from 18 to 257.

CONCLUSION

The gastric cancer is closely associated with the environmental factors and life-style of the individuals. As these factors also affect the serum lipid profile, it is likely that plasma lipid profile of the cancer patients is affected. The serum triglycerides, total cholesterol, alkaline phosphatase and CKMB levels were higher in gastric cancer patients while the HDL-Cholesterol level was lowered.

ACKNOWLEDGEMENT

We are thankful to the Director, Regional Institute of Paramedical & Nursing Sciences, Aizawl for providing all the required reagents and facility to conduct the present investigation.

REFERENCES

1. Ruddon RW: *Cancer biology* (4th ed.). Oxford: Oxford University Press., 2007; 223.
2. *World Cancer Report*: World Health Organization, 2014; Chapter 5.4.
3. Hochhauser, Jeffrey Tobias and Daniel: *Cancer and its management* (6th ed.). Chichester, West Sussex, UK: Wiley-Blackwell., 2010; 259.
4. Roland T, Skeel, Samir N: *Handbook of cancer chemotherapy* (8th ed.). Philadelphia: Wolter Kluwer. 2011; 127.
5. Joseph A Knight: *Human Longevity: The Major Determining Factors*. Author House. 2010; 339.
6. Rhonda J, Spiegel D: *Cancer, culture, and communication*. New York: Kluwer Academic. 2004; 139.
7. Lee YY, Derakhshan MH: Environmental and lifestyle risk factors of gastric cancer. *Arch Iran Med.*, 2013; 16(6): 358-365.
8. González CA, Sala N, Rokkas T, Sala and Rokkas: "Gastric cancer: epidemiologic aspects". *Helicobacter*, 2013; 18(Supp1): 34-38.
9. Hatakeyama M, Higashi H, Higashi: "Helicobacter pylori CagA: a new paradigm for bacterial carcinogenesis". *Cancer Science*, 2005; 96(12): 835-843.
10. Nomura A, Grove JS, Stemmermann GN, Severson RK, Grove, Stemmermann, Severson: "Cigarette smoking and stomach cancer". *Cancer Research*, 1990; 50(21): 7084.
11. Trédaniel J, Boffetta P, Buiatti E, Saracci R, Hirsch A, Boffetta, Buiatti, Saracci, Hirsch: "Tobacco smoking and gastric cancer: Review and meta-analysis". *International Journal of Cancer*, 1997; 72(4): 565-573.
12. Thrumurthy SG, Chaudry MA, Hochhauser D, Ferrier K, Mughal M, Chaudry, Hochhauser, Mughal: "The diagnosis and management of gastric cancer". *British Medical Journal*, 2013; 347(16): 1695-1696.
13. Jakszyn P, González CA, Gonzalez: "Nitrosamine and related food intake and gastric and oesophageal cancer risk: A systematic review of the epidemiological evidence". *World J Gastroenterol*, 2006; 12(27): 4296-4303.
14. Crew K, Neugut A: "Epidemiology of gastric cancer". *World Journal of Gastroenterology*, 2006; 12(3): 354-362.
15. Buckland G, Agudo A, Luján L, Jakszyn P, Bueno-de-Mesquita HB, Palli D, Boeing H, Carneiro F, Krogh V, Sacerdote C, Tumino R, Panico S, Nesi G, Manjer J, Regner S, Johansson I, Stenling R, Sanchez M, Dorronsoro M, Barricarte A, Navarro C, Quiros JR, Allen NE, Key TJ, Bingham S, Kaaks R, Overvad K, Jensen M, Olsen A, Tjønneland A, Peeters PHM, Numans ME, Ocke MC, Clavel-Chapelon F, Morois S, Boutron-Ruault MC, Trichopoulou A, Lagiou P, Trichopoulos D, Lund E, Couto E, Boffeta P, Jenab M, Riboli E, Romaguera D, Mouw T, Gonzalez CA: Adherence to a Mediterranean diet and risk of gastric adenocarcinoma within the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort study". *American Journal of Clinical Nutrition*, 2009; 91(2): 381-390.

16. Manoharan S, Kavitha K, Nagini S: Role of life-style on plasma and erythrocyte Membrane lipid profile in gastric cancer patients. *Indian J. Physiol. Pharrnocol*, 1997; 41(1): 62-66.
17. Craig WY, Palamaki GE, Hadow JE: Cigarette smoking and serum lipid and lipoprotein concentrations. Analysis of Published Data. *Brit Med J*, 1989; 298: 781-788.
18. Pugalendi KV, Ramakrishnan S: Blood cholesterol and HDL cholesterol in cigarette smokers. *Ind J Physiol Pharmacol*, 1991; 35: 138-140.
19. D'Antonio JA, Porte RL, Dai SW, Horn DL, Wonziczak M, KuHer LH: Lipoprotein cholesterol, vitamin A and vitamin E in an alcoholic population. *Cancer*, 1986; 57: 1798-1802.