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## Serum biochemical profile of patients suffering from cervical cancer in Mizoram

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### Abstract

Cervical cancer is a type of cancer that occurs in the cells of the cervix. It is second most common cancer in developed regions and is one of the most common causes of cancer death in developing countries. In India, the cervical cancer ranks as the first most frequent cancer and the first most frequent cancer among women between 15 and 44 years of age. It is by far the most common Human papillomavirus infection (HPV) related disease and other risk factors includes smoking, a weak immune system, birth control pills, starting sex at a young age and having many sexual partners, but these are less important. In the investigation the serum biochemical profile of the cervical cancer patients undergoing treatment at Regional Cancer Hospital and Research Centre, Zemabawk, Aizawl, Mizoram was estimated. The serum levels of triglyceride, alkaline phosphatase, gamma glutamyltransferase and chloride are on higher side while the observed level of cholesterol, creatinine and potassium are on higher margin of the normal reference range. The level of serum HDL-cholesterol was lower while the levels of magnesium and sodium were on lower margin of the normal reference range.

**Keywords:** cervical cancer, triglycerides, GGT, alkaline phosphatase

### Introduction

Cervical cancer is a type of cancer that occurs in the cells of the cervix, the lower part of the uterus that connects to the vagina. It is due to the abnormal growth of cells that have the ability to invade or spread to other parts of the body. Among the women, cervical cancer is the second most common cancer in developed regions and both the fourth-most common cause of cancer and the fourth-most common cause of death from cancer in women (Ferlay *et al.*, 2008) [1]. In 2012, an estimated 528,000 cases of cervical cancer occurred, with 266,000 deaths. This is about 8% of the total cases and total deaths from cancer. About 70% of cervical cancers occur in developing countries and 90% of the deaths. In low-income countries, it is one of the most common causes of cancer death (World Cancer Report, 2014) [2]. In developed countries the widespread use of cervical screening programmes has dramatically reduced rates of cervical cancer (Canavan and Doshi, 2000) [3]. In medical research, the most famous immortalized cell line, known as HeLa, was developed from cervical cancer cells of a woman named Henrietta Lacks. In India, the cervical cancer ranks as the first most frequent cancer and the first most frequent cancer among women between 15 and 44 years of age (Farhath *et al.*, 2013; Thulaseedharan *et al.*, 2012) [4,5]. Initially, no typical symptoms are seen in cervical cancer but symptoms like abnormal vaginal bleeding, pelvic pain, or pain during sexual intercourse may be seen in later part. While bleeding after sex may not be serious but indicate the presence of cervical cancer (Tarney and Han, 2014) [6]. The cervical cancer is by far the most common Human papillomavirus infection (HPV) related disease (Kumar *et al.* 2007) [7]. Other risk factors includes smoking, a weak immune system, birth control pills, starting sex at a young age and having many sexual partners, but these are less important. Human papillomavirus vaccine protects against between two and seven high-risk strains of this family of viruses and may prevent up to 90% of cervical cancers. Other methods of prevention include: having few or no sexual partners and the use of condoms. Cervical cancer screening using the Pap test or acetic acid can identify precancerous changes which when treated can prevent the development of cancer. Treatment of cervical cancer may consist of some combination of surgery, chemotherapy, and radiation therapy. Outcomes, however, depend very much on how early the cancer is detected. (Cervical Cancer Treatment, NCI, 2014; Tran *et al.*, 2014, WHO, 2014) [8, 9].  
<sup>2</sup>. In cervical cancer patients a simple and easy blood based tumor marker system might be an

useful tool to know extent of tumor progression. Subsequently, such markers can be useful to correlate with the response to anticancer treatment and disease recurrence. Certain blood biochemical parameters are reported to be change in cervical cancer patients. Significant higher levels of serum Lactate dehydrogenase, Gamma glutamyltransferase and alkaline phosphatase activity is observed in cervical cancer (Ramteke *et al.*, 2014; Krishnamurthy *et al.*, 2008) <sup>[10]</sup>, <sup>[11]</sup>, In cervical cancer patients the total protein, glycogen, total lipid, cholesterol, triglycerides and fatty acids in neutrophils increased significantly compared to control subjects (Krishnamurthy *et al.*, 2008) <sup>[11]</sup>. In the investigation the serum biochemical profile of the cervical cancer patients undergoing treatment at Regional Cancer Hospital and Research Centre, Zemabawk, Aizawl.

### Materials and Methods

The present study was conducted with the established and histopathologically confirmed cervical cancer patients being treated at Regional Cancer hospital and Research centre, Zemabawk, 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 were analyzed for the biochemical parameters. The collected samples were analyzed for various biochemical parameters including blood sugar, total cholesterol, triglycerides, HDL-C, total protein, albumin, globulin, A:G ratio, bilirubin (direct & total), creatinine, BUN, uric acid, calcium, phosphorus, sodium, potassium, chloride, magnesium, cholinesterase, SGOT, SGPT, alkaline phosphatase and gamma glutamyltransferase. 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.

### Results and Discussion

The blood samples collected from the clinically established and histopathologically confirmed cervix cancer patients were analyzed for various blood biochemical parameters including glucose, total cholesterol, triglycerides, HDL-C, total protein,

albumin, globulin, A:G ratio, bilirubin (direct & total), creatinine, BUN, uric acid, calcium, phosphorus, magnesium, sodium, potassium, chloride, cholinesterase, SGOT, SGPT, alkaline phosphatase, CKMB and gamma glutamyl transferase. The observed biochemical profile in cervix cancer patients is given in the table 1. In the present investigation, the serum levels of triglyceride, alkaline phosphatase, gamma glutamyltransferase and chloride are on higher side while the observed level of cholesterol, creatinine and potassium are on higher margin of the normal reference range. The level of serum HDL-cholesterol was lower while the levels of magnesium and sodium were on lower margin of the normal reference range. The random blood glucose level observed was 99.63±49.57 mg/dl and the level ranges from 52 to 212 mg/dl. The total cholesterol level was 217.00±59.63 mg/dl and the value ranges between 42-298 mg/dl while the triglyceride level was 218.25±91.35 mg/dl and ranges from 121 to 389 mg/dl. The observed cholesterol level is on the higher margin while level of triglyceride level is much higher than the normal reference range. This finding is supported by the findings reported in literature. The increased level of cholesterol and triglyceride in neutrophils of the cervical cancer patients was reported by Krishnamurthy *et al.*, 2008 <sup>[11]</sup>. The HDL-Cholesterol level was 36.88±21.76 mg/dl and the value ranges from 22 to 61 mg/dl. This observed value is on lower margin of the normal reference range. The plasma total protein, albumin, globulin and A:G ratio levels were 7.38±0.79 g/dl, 4.13±0.61 g/dl, 3.25±0.71 g/dl and 1.33±0.35 respectively. The total protein level ranges from 6.4 to 8.4 gm/dl. The albumin level ranges between 3.6 and 5.1 gm/dl while the globulin level ranges between 2.6 and 4.2 gm/dl. The total and direct bilirubin levels observed were of 0.36±0.10 mg/dl and 0.19±0.12 mg/dl respectively and level ranges from 0.2 to 0.5 mg/dl for total bilirubin and 0.1 to 0.4 mg/dl for direct bilirubin. The blood urea nitrogen (BUN) was 9.31±4.43 mg/dl and the level ranges between 6.1 and 17.4 mg/dl while the uric level observed was 5.81±1.33 mg/dl and the level ranges between 4.5 and 6.8 mg/dl. The observed value for creatinine was 1.15±0.54 mg/dl mg/dl and the level ranges from 0.5 and 1.9 mg/dl. The observed creatinine level is on higher margin of the normal reference range.

**Table 1:** Serum Biochemical profile of Cervix cancer patients

Sl. No.	Test	Observed value	Range	Normal Reference range
01	Glucose (mg/dl)	99.63±49.57	52-212	70-110 (Fasting) 110-150 (PP)
02	Cholesterol (mg/dl)	217.00±59.63	142-298	150-219
03	Triglyceride (mg/dl)	218.25±91.35	121-389	50-149
04	HDLC (mg/dl)	36.88±21.76	22-61	37-67 (Male) 40-71 (Female)
05	Total Protein (g/dl)	7.38±0.79	6.4-8.4	6.7-8.3
06	Albumin (g/dl)	4.13±0.61	3.6-5.1	3.8-5.0
07	Globulin (g/dl)	3.25±0.71	2.6-4.2	
08	A:G	1.33±0.35	0.80-1.92	
09	BUN (mg/dl)	9.31±4.43	6.1-17.4	8-23
10	Uric Acid (mg/dl)	5.80±1.33	4.5-6.8	4.0-7.0 (Male) 3.0-5.5 (Female)
11	Creatinine (mg/dl)	1.15±0.54	0.5-1.9	0.6-1.1
12	Bilirubin (Total) (mg/dl)	0.36±0.10	0.2-0.5	0.1-1.2
13	Bilirubin (Direct) (mg/dl)	0.19±0.12	0.1-0.4	0.1-0.4
14	Calcium (mg/dl)	9.23±1.19	7.1-10.7	8.4-10.2
15	Phosphorus (mg/dl)	3.74±0.52	3.1-4.4	2.6-4.4
16	Magnesium (mg/dl)	1.78±0.18	1.5-2.0	1.8-2.4
17	Sodium (mmol/L)	136.4±2.70	133-140	136-149
18	Potassium (mmol/L)	5.08±3.15	3.2-10.7	3.8-5.0
20	Chloride (mmol/L)	105±5.24	100-112	98-106
21	Alkaline Phosphatase (U/L)	110.13±64.63	56-234	32-111

22	GGT (U/L)	143.50±88.51	13-249	16-73
23	SGOT (U/L)	31.50±16.02	21-68	8-38
24	SGPT (U/L)	20.96±9.39	6-51	4-44
25	CKMB (U/L)	13.50±1	6-29	<25

The serum magnesium level was 1.78±0.18 mg/dl and the level ranges between 1.5 and 2.0 mg/dl. The magnesium level estimated is on the lower margin of the normal reference value. The calcium level was 9.23±1.19 mg/dl and level ranges between 7.1 and 10.7 mg/dl while the phosphorus level was 3.74±0.52 and level ranges from 3.1 to 4.4 mg/dl. The levels of plasma electrolytes were sodium 136.40±2.70 mmol/L, potassium 5.08±3.15 mmol/L and chloride 105.0±5.24 mmol/L. The level of sodium ranges from 133 to 140 mmol/L and potassium ranges between 3.2 and 10.7 mmol/L while the level of chloride ranges from 100 to 109 mmol/L. The level of sodium is on lower margin while the level of potassium and chloride are on higher margin of the normal reference range.

The level of gamma glutamyltransferase (GGT) was 143.50±88.51 U/L and value ranges from 13 to 249 U/L. The value observed is much higher than the normal reference range. The higher level of gamma glutamyltransferase observed in the present investigation is in agreement with the findings of Ramteke *et al.*, 2014<sup>[10]</sup>, Malkin *et al.*, 1978<sup>[12]</sup>, Desai and Chetna, 2009<sup>[13]</sup>, Polterauer *et al.* 2011<sup>[14]</sup>. Serum GGT within its normal range might be an early and sensitive enzyme related to oxidative stress (Lee *et al.*, 2004, Lee *et al.*, 2008)<sup>[15, 16]</sup>. It is well known that cervical cancer is a state of oxidative stress showing statistically significant increase of lipid peroxidation (LPO) while the antioxidant status was depicted by decreased glutathione (GSH) and superoxide dismutase (SOD) (Kim *et al.*, 2002; Srivastava *et al.*, 2009; Nirmala and Narendhirakannan, 2011; Subramanyam *et al.*, 2013)<sup>[17-20]</sup>. Thus, as an adaptive response to protect against oxidative stress by facilitating intracellular recovery of cysteine from extracellular glutathione (GSH), the expression of GGT is significantly increased in rapidly dividing neoplastic cells of cervix for synthesis of proteins and intracellular glutathione (GSH). The presence of elevated GGT levels seems to reflect a state of persistent oxidative stress as a part of biological pathway related to cancer development. Elevated serum GGT might be produced from the tumor itself as a part of tumor microenvironment (Ramteke *et al.*, 2014)<sup>[10]</sup>. The observed mean SGPT level was 20.96±12.58 U/L and the value ranges between 13 and 51 U/L. The mean SGOT observed was 31.50±16.02 U/L and the level ranges from 21 to 68 U/L. The CK-MB level observed was 13.50±9.39 U/L and the level ranges from 6 to 29 U/L. The mean alkaline phosphatase activity was 110.13±64.63 U/L and the level ranges between 56 and 234 U/L. This observed level is on the higher margin of the normal reference range. The higher serum alkaline phosphatase activity in cervical cancer patients is also reported by Krishnamurthy *et al.*, 2008.<sup>[11]</sup> The level of cholinesterase observed was 378.00±93.50 U/L and the level ranges between 284 and 471 U/L.

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