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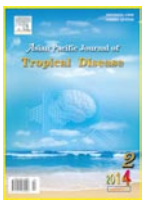

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Evaluation of CA-125 and other biochemical parameters in premenopausal and postmenopausal women with ovarian cancer: a hospital based study from Western Nepal

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ABSTRACT

Objective: To assess the status of carbohydrate antigen 125 (CA-125) and other biochemical parameters in premenopausal and postmenopausal ovarian cancer patients.

Methods: Total 64 cases, out of which 43 premenopausal and 21 postmenopausal ovarian cancer patients were included in the study. Twenty-five premenopausal and twenty postmenopausal age-matched healthy control subjects were selected. The variables collected were age, CA-125, total cholesterol, triglycerides, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), blood sugar, adenosine deaminase (ADA) and vitamin E. The data was analyzed by using Statistical Package for the Social Sciences for Windows Version 16.0.

Results: In premenopausal women, significant differences were noted for CA-125 (P<0.005), triglycerides (P<0.009), HDL-C (P<0.001), blood sugar (P<0.001) and ADA (P<0.002) and in postmenopausal women, significant differences were noted for CA-125 (P<0.001), triglycerides (P<0.001), blood sugar (P<0.001), ADA (P<0.005) and vitamin E (P<0.002) when compared with controls. Insignificant results were found for total cholesterol (P=0.100), LDL-C (P=0.104) and vitamin E (P=0.142) in premenopausal women and total cholesterol (P=0.670), HDL-C (P=0.472) , LDL-C (P=0.272) in postmenopausal women when compared with healthy control subjects.

Conclusions: Evaluation of CA-125 and other biochemical parameters may be important for control of ovarian cancer and to improved survival rate.

1. Introduction

Incidence of ovarian cancer is increasing in developing countries[1]. It is considered to be one of the deadliest killers of female pelvic malignancies and the worst prognosis among the gynecological cancers. One of the reasons for the high fatality rate of ovarian cancer is that more than 70% of women are diagnosed in advanced stage[2]. Risk factors include smoking, obesity, lack of exercise, talcum powder use, history of infertility, nulliparous women, early menarche and late menopause, genetics (BRCA1 and BRCA2)[3,4].

Carbohydrate antigen 125 (CA-125) is the most frequently used biomarker for ovarian cancer detection[5]. The specificity of CA-125 is limited, since it can be elevated in a range of common benign gynecologic or non-gynecologic conditions so it should not be used as a screening tool for picking up asymptomatic cases of ovarian cancer[6,7]. Oxidative stress in ovarian epithelial cells specifically can play an important role in initiator of tumourigenesis[8]. Vitamin E is a fat soluble vitamin so it is incorporated into cell membranes and protects them from oxidative damage[9]. Adenosine deaminase (ADA) is an enzyme involved in hydrolytic transformation of adenosine into inosine in the purine salvage pathway. This enzyme is important in the rapid proliferation of cells to prevent the accumulation of toxic metabolite[10]. Lipids are essential for various biologic functions including energy production, signaling, cell growth and division. Defect in lipid metabolism

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is associated with various diseases and cancer is one of them[11]. The exact mechanisms by which lipids and lipoproteins may contribute to carcinogenesis are not clearly understood[12]. In ovarian cancer, GLUT-1, a transmembrane protein responsible for glucose uptake is increased which has been related to shorter survival time[13]. The biochemical mechanism by which blood glucose is related with ovarian cancer is also not clearly mentioned. There are few reports regarding biochemical changes in ovarian cancer but it has not so far been reported among the Nepalese women in Nepal. So the present study is carried out to determine CA-125 and other biochemical parameters in premenopausal and postmenopausal women with ovarian cancer patients in Nepalese women.

2. Materials and methods

This study was carried out at Nepalgunj Medical College, Nepal from July 2011 to August 2012 for a period of 13 months. Histopathologically confirmed 43 (67.18%) premenopausal and 21 (32.81%) postmenopausal women were included in this study. Ethical approval for the study was taken from the Institutional Research Ethical Committee. Consent was taken from all the patients for additional biochemical tests. In our study we analyzed age, CA-125, biochemical tests including total cholesterol, triglycerides, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), ADA and vitamin E. CA-125 and ADA levels were estimated by using ELISA and enzymatic methods respectively. Total cholesterol, triglycerides, HDL-C was measured by using the kits supplied by Biosystems S.A. Costa Brava, 30 Barcelona (Spain). Serum LDL-C was calculated according to computational procedures of Friedewald *et al*[14]. Plasma vitamin E was estimated by the method of Barker *et al*[15]. The method involves the reduction of ferric ions to ferrous ions by α-tocopherol and the formation of a colored complex with 2, 2-dipyridyl. The mean age was 27.86±9.66 for premenopausal (range from 12-45 years) and 48.90±3.44 for postmenopausal (range from 46 to 60 years). Exclusion criteria were patients suffering from any other types of cancer, alcoholic cirrhosis, pelvic inflammatory disease, diabetes mellitus and dyslipidaemia. The data are presented as mean ±SD. Statistical significance is considered when a P value of <0.05. All the statistical analyses were performed using SPSS software, version 16.0.

3. Results

The study was conducted on 64 diagnosed cases of ovarian cancer, 43 (67.18%) were premenopausal women and 21 (32.81%) were postmenopausal women. The age group of patients range from 12 to 60 years. Control group consists of 25 premenopausal and 20 postmenopausal normal females with similar age group of ovarian cancer patients.

Table 1 shows comparison of biochemical tests (mean± SD) between premenopausal ovarian cancer patients and controls. CA-125 (P<0.005), triglycerides (P<0.009), HDL-C (P<0.001), blood sugar (P<0.001) and ADA (P<0.002) for ovarian cancer patients when compared with control subjects showed statistically significant. Total cholesterol (P=0.100), LDL-C (P=0.104) and vitamin E (P=0.142) were insignificant when compared with control subjects.

Table 1
Biochemical parameters in premenopausal women.

Parameters	Control (mean±SD)	Ovarian cancer patients (mean±SD)	P value
CA-125 (IU/mL)	13.52±6.77	32.90±32.93	<0.005
Total cholesterol (mg/dL)	183.20±17.12	165.19±31.24	0.100
Triglycerides (mg/dL)	89.52±32.07	69.72±27.40	<0.009
HDL-C (mg/dL)	73.16±26.46	48.69±16.69	<0.001
LDL-C (mg/dL)	102.16±8.91	96.09±17.03	0.104
Blood sugar (mg/dL)	98.40±15.68	80.77±21.43	<0.001
ADA	22.76±4.78	33.04±15.26	<0.002
Vitamin E	0.91±0.35	0.77±0.40	0.142

Table 2 shows comparison of biochemical parameters among postmenopausal ovarian cancer patients and healthy control subjects. The data showed significant difference in CA-125 (P<0.001), triglycerides (P<0.001), blood sugar (P<0.001), ADA (P<0.005) and vitamin E (P<0.002) when compared with controls healthy subjects. Insignificant results were found for total cholesterol (P=0.670), HDL-C (P=0.472) and LDL-C (P=0.272).

Table 2
Biochemical parameters in postmenopausal women.

Parameters	Control (mean±SD)	Ovarian cancer patients (mean±SD)	P value
CA-125 (IU/mL)	14.83±5.19	55.35±52.14	<0.001
Total cholesterol (mg/dL)	185.90±21.57	167.95±36.99	0.670
Triglycerides (mg/dL)	87.40±22.21	63.00±23.14	<0.001
HDL-C (mg/dL)	56.40±13.62	53.28±16.26	0.472
LDL-C (mg/dL)	96.30±8.76	91.14±19.00	0.272
Blood sugar (mg/dL)	95.60±15.07	68.90±17.71	<0.001
ADA	23.00±5.56	35.14±17.62	<0.005
Vitamin E	1.14±0.40	0.68±0.47	<0.002

4. Discussion

In our study we found out that CA-125 and ADA levels were significantly increased in both premenopausal and postmenopausal ovarian cancer patients when compared with healthy control subjects which is consistent with the results of Pragathi *et al.*, Thakur *et al.*, Hamed *et al.* and Urunsak *et al*[10,16-18]. In a woman with known ovarian cancer, a rise in CA-125 usually means that the disease has progressed[19]. CA-125 has limited specificity for ovarian cancer because elevated CA-125 levels can be found in individuals without ovarian cancer[6,7]. The specificity of CA-125 is particularly low in premenopausal women because many benign conditions that cause fluctuations in CA-125 levels, such as menstruation, pregnancy, and pelvic inflammatory disease[20]. ADA enzyme is involved in nucleotide breakdown so its level is expected to change in malignant conditions of any tissue[10]. In our study lipid profiles have no significant association with ovarian cancer and it is consistent with the results of Melvin *et al*[21]. Triglycerides level is significantly decreased in both premenopausal and postmenopausal ovarian cancer patients which are consistent with the results found by Qadir and Malik, Gercel-Taylor *et al.*, but Li *et al.* reported elevated triglycerides levels in ovarian

cancer patients[22-24]. HDL-C is significantly decreased in premenopausal women when compared with control subjects, which is also correlated with the study done by Qadir and Malik[21]. The exact mechanism how lipids and lipoproteins may contribute to carcinogenesis has not been fully explored[12]. HDL-C may supply cholesterol to cancer cells by removing excess cholesterol from peripheral tissues to the liver for excretion[25]. In both premenopausal and postmenopausal ovarian cancer patients blood sugar level is significantly decreased. Increased expression of GLUT-1, a transmembrane responsible for glucose uptake has been related to shorter survival time in ovarian cancer patients[13]. In postmenopausal women vitamin E is significantly decreased which is correlated with studies conducted by Manimarom and Rajneesh[26]. Low levels of vitamin E in postmenopausal ovarian cancer patients may be due to their increased utilization to scavange lipid peroxides as well as their sequestration by tumor cells[26].

Our study was done in freshly diagnosed ovarian cancer patients. Further studies are required to be done regarding pre- and post-therapeutic changes. This study was a hospital based study so the results may not be applicable to general population. Larger sample size may give clear view regarding this. Efforts should be made to detect ovarian cancer at an early stage by educating the population about the risk factors. Early diagnosis of ovarian cancer would improve the survival rate.

Conflict of interest statement

We declare that we have no conflict of interest.

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