Original Research

Assessment of copper and zinc level in patients with endometrial cancer

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ABSTRACT:
Background: Endometrial cancer (EC) incidence and mortality rates have increased over the past decade. The present study was conducted to assess copper and zinc level in patients with endometrial cancer. **Materials & Methods:** Data records of 20 female patients, from the archives, of endometrial cancer were kept in group I and group II had control. All of the patients with endometrial cancer diagnosis underwent surgery including peritoneal washing, total abdominal hysterectomy, bilateral salpingo-oophorectomy. The level of copper (Cu) and zinc (zn) was obtained from data records in both groups. **Results:** The mean age in group I was 56.4 years and in group II was 51.6 years, BMI (kg/m2) was 32.5 in group I and 29.2 in group II, parity was 2 in each group, gravida was 3 in group I and 4 in group II, smoking was seen in 5 in group I and 8 in group II, diabetes mellitus 3 in group I and 4 in group II and hypertension 4 in group I and 2 in group II. The mean copper (mg/L) level was 3.76 in group I and 6.02 in group II, zinc (mg/L) was 1.72 in group I and 2.46 in group II and Cu/Zn ratio was 0.84 in group I and 2.54 in group II. The difference was significant (P< 0.05). **Conclusion:** Women with endometrial cancer showed altered serum Cu and Zn levels as compared with controls.
Key words: Copper, endometrial cancer, Women

INTRODUCTION

Endometrial cancer (EC) incidence and mortality rates have increased over the past decade with 61,880 cases and 12,160 deaths occurring in the U.S. in 2019.3 Approximately 80% of ECs present with stage I disease, with high 5-year survival. In contrast, 5-year survival for stage III and stage IV cancers is 69% and 16%, respectively, underscoring the promise of early detection.[1] Approximately 90% of EC cases are preceded by abnormal uterine bleeding in premenopausal or perimenopausal women (AUB) or postmenopausal bleeding (PMB), offering a potential opportunity to detect and cure ECs that are destined to metastasize with delayed diagnosis. However, abnormal bleeding is a common symptom of many benign diseases, and only indicates the presence of EC in approximately 9% of postmenopausal women and 1–2% of premenopausal women, suggesting that many women at low-risk undergo unnecessary invasive diagnostic procedures to rule out cancer.[2]

Endometrial cancer is the most common gynecologic malignancy and the forth most common cancer among women.[3] Copper (Cu) and zinc (Zn) are two minor biological elements that have critical roles as cofactors for various enzymatic reactions for antioxidant defence, DNA repair and integrity, cell division, as well as protein synthesis.[4] They are the components of Cu/Zn superoxide dismutase, an important antioxidant enzyme for cellular protection from reactive oxygen species.[5] Although Zn and Cu concentrations in serum and tissue samples of patients with and without various cancers such as colon, bladder, thyroid, breast, gynecologic and oral cancers are evaluated in the scientific literature, there are very few data regarding the effect of Cu and Zn on endometrial cancers. Cu/Zn ratio and systemic oxidant load have clinical importance for aging-related degenerative diseases, nutritional status, oxidative stress, inflammation, and immune abnormalities.[6] The present study was conducted to assess copper and zinc level in patients with endometrial cancer.

MATERIALS & METHODS

The present study comprised of data records of 20 female patients, from the archives, of Endometrial cancer. Data such as name, age, gender etc. was recorded. Detailed clinical history examining diabetes mellitus (DM), hypertension, and smoking was taken. 2 groups were made. Group I comprised of cases and group II were control. Body mass index (BMI) was calculated. All of the patients with endometrial cancer diagnosis underwent surgery including peritoneal washing, total abdominal hysterectomy, bilateral salpingo-oophorectomy.

The level of copper (Cu) and zinc (zn) was obtained from data records in both groups. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Assessment of parameters

Parameters	Group I	Group II	P value
Age (mean) (years)	56.4	51.6	0.91
BMI (kg/m2)	32.5	29.2	0.12
Parity	2	2	1
Gravida	3	4	0.92
Smoking	5	8	0.05
Diabetes mellitus	3	4	0.17
Hypertension	4	2	0.05

Table I shows that mean age in group I was 56.4 years and in group II was 51.6 years, BMI (kg/m2) was 32.5 in group I and 29.2 in group II, parity was 2 in each group, gravida was 3 in group I and 4 in group II, smoking was seen in 5 in group I and 8 in group II, diabetes mellitus 3 in group I and 4 in group II and hypertension 4 in group I and 2 in group II. The difference was significant (P< 0.05).
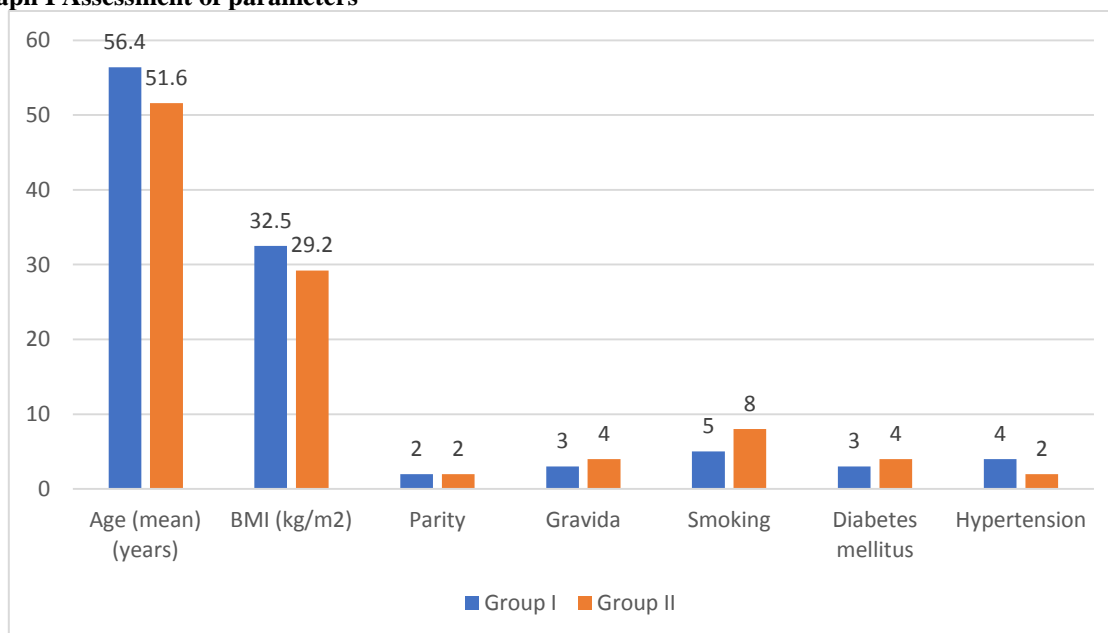
Graph I Assessment of parameters

Table II Assessment of copper and zinc

Parameters	Group I	Group II	P value
Copper (mg/L)	3.76	6.02	0.02
Zinc (mg/L)	1.72	2.46	0.05
Cu/Zn ratio	0.84	2.54	0.05

Table II, graph II shows that mean copper (mg/L) level was 3.76 in group I and 6.02 in group II, zinc (mg/L) was 1.72 in group I and 2.46 in group II and Cu/Zn ratio was 0.84 in group I and 2.54 in group II. The difference was significant (P< 0.05).

Graph II Assessment of copper and zinc
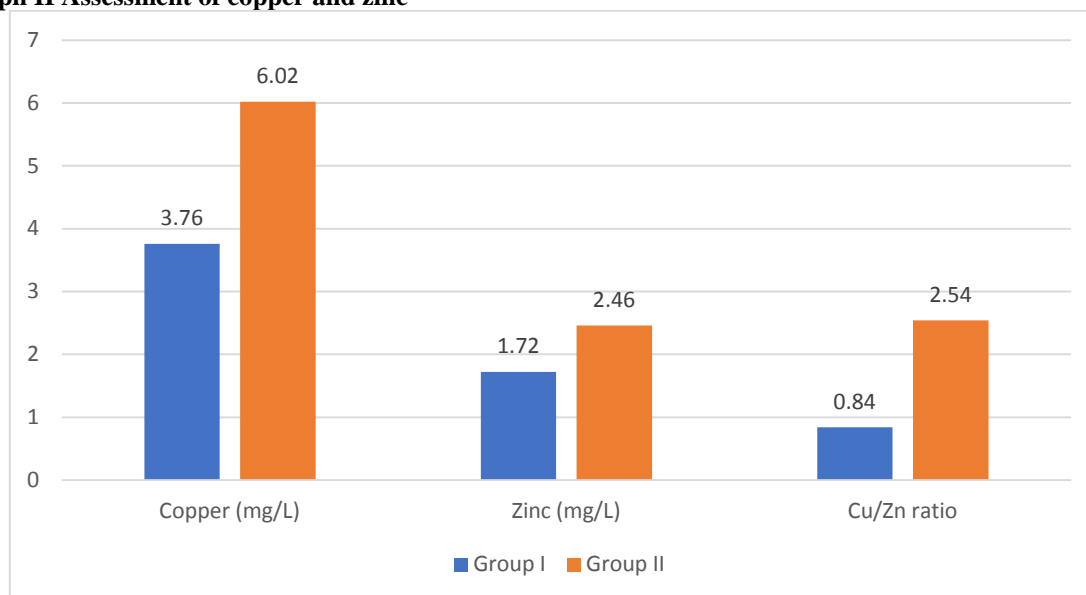
DISCUSSION

From biomedical perspective, trace elements are fundamental micronutrients which take part in several important biological mechanisms such as functioning as cofactors of antioxidant enzymes, cell proliferation, and differentiation.[7] Imbalances in levels of trace elements may affect human health in a disadvantageous manner. There is a subtle balance between free radical generation and the antioxidant defence in healthy conditions.[8] Oxidative stress may occur in the event of alteration in optimal levels of trace elements causing metabolic disturbances and changes in the cellular structure.[9] Exposure to reactive oxygen radicals can cause DNA damage, mutation, and carcinogenesis on the basis of altered trace element levels.[10] The present study was conducted to assess copper and zinc level in patients with endometrial cancer.

In present study, mean age in group I was 56.4 years and in group II was 51.6 years, BMI (kg/m2) was 32.5 in group I and 29.2 in group II, parity was 2 in each group, gravida was 3 in group I and 4 in group II, smoking was seen in 5 in group I and 8 in group II, diabetes mellitus 3 in group I and 4 in group II and hypertension 4 in group I and 2 in group II. Atakul et al[11] evaluated serum concentrations of copper (Cu) and zinc (Zn), in relation with metabolic profile and clinicopathologic features of patients with endometrial cancer. A total of 47 women with endometrial cancer and 45 controls were eligible for the study. Clinicopathologic features and metabolic profile as well as serum copper and zinc levels were evaluated in each subject. Patients with endometrial cancer (Cu mean 3.72 ± 2.15 mg/L, median 3.54 [0.41–9.16] mg/L and Zn mean 1.83 ± 0.71 mg/L, median 1.77 [0.71–4.02] mg/L) exhibited lower Cu and Zn levels than those of controls (Cu mean 6.06 ± 1.79 mg/L, median 6.32 [2.95–9.05] mg/L and Zn mean 2.48 ± 0.89 mg/L, median 2.23 [1.23–4.54] mg/L) (p <

0.001). Cu/Zn ratio was also higher (0.85 ± 1.96 vs. 2.57 ± 0.73) in controls as compared with patients with endometrial cancer. While Cu levels showed no significant correlation with age, body mass index, gravidity, and parity, a positive correlation was found between Zn levels and parity. When cancer patients were evaluated on their own, both Cu and Zn levels showed positive correlation with age. Additionally, the cancer patients with myometrial invasion > 1/2 exhibited lower Cu levels compared with the cancer patients with myometrial invasion < 1/2.

We found that mean copper (mg/L) level was 3.76 in group I and 6.02 in group II, zinc (mg/L) was 1.72 in group I and 2.46 in group II and Cu/Zn ratio was 0.84 in group I and 2.54 in group II. Yaman et al[12] reported similar Cu and lower Zn tissue measurements in endometrial cancer and higher Cu and similar Zn levels in ovarian cancerous tissues. On the contrary, Nasiadek et al[13] found similar Cu and Zn tissue levels in patients with myoma uteri and uterine cancer. Recently, Rzymski et al[14] evaluated metal accumulation in the human uterus in connection with pathologic state and smoking habits.

CONCLUSION

Authors found that women with endometrial cancer showed altered serum Cu and Zn levels as compared with controls.

REFERENCES

1. Soliman PT, Cui X, Zhang Q, Hankinson SE, Lu KH (2011) Circulating adiponectin levels and risk of endometrial cancer: the prospective Nurses' Health Study. Am J Obstet Gynecol 204(2): 167.
2. Khoshdel Z, Naghibalhossaini F, Abdollahi K, Shojaei S, Moradi M, Malekzadeh M (2016) Serum copper and zinc levels among Iranian colorectal cancer patients. Biol Trace Elem Res 170(2): 294–299.

3. Mao S, Huang S (2013) Zinc and copper levels in bladder cancer: a systematic review and meta-analysis. Biol Trace Elem Res 153(1– 3):5–10.

4. Dragutinović VV, Tatić SB, Nikolić-Mandić SD, Tripković TM, Dunđerović DM, Paunović IR (2014) Copper as ancillary diagnostic tool in preoperative evaluation of possible papillary thyroid carcinoma in patients with benign thyroid disease. Biol Trace Elem Res 160(3):311–315.

5. Adeoti ML, Oguntola AS, Akanni EO, Agodirin OS, Oyeyemi GM (2015) Trace elements; copper, zinc and selenium, in breast cancer afflicted female patients in LAUTECH Osogbo, Nigeria. Indian J Cancer 52(1):106–109.

6. Yaman M, Kaya G, Simsek M (2007) Comparison of trace element concentrations in cancerous and noncancerous human endometrial and ovary tissues. Int J Gynecol Cancer 17(1):220–228.

7. Pecorelli S (2009) Revised FIGO staging for carcinoma of the vulva, cervix, and endometrium. Int J Gynaecol Obstet 105(2):103– 104.

8. Cobanoglu U, Demir H, Sayir F, Duran M, Mergan D (2010) Some mineral, trace element and heavy metal concentrations in lung cancer. Asian Pac J Cancer Prev 11(5):1383–1388.

9. Marinov B, Tsachev K, Doganov N, Dzherov L, Atanasova B, Markova M (2000) The copper concentration in the blood serum of women with ovarian tumors (a preliminary report). Akush Ginekol (Sofiia) 39(2):36–37.

10. Kaba M, Pirincci N, Yuksel MB, Gecit I, Gunes M, Ozveren H, Eren H, Demir H (2014) Serum levels of trace elements in patients with prostate cancer. Asian Pac J Cancer Prev 15(6):2625–2629.

11. Atakul T, Altinkaya SO, Abas BI, Yenisey C. Serum copper and zinc levels in patients with endometrial cancer. Biological trace element research. 2020 May;195(1):46-54.

12. Yaman M, Kaya G, Simsek M. Comparison of trace element concentrations in cancerous and noncancerous human endometrial and ovary tissues. Int J Gynecol Cancer 2007;17(1):220–228.

13. Nasiadek M, Krawczyk T, Sapota A. Tissue levels of cadmium and trace elements in patients with myoma and uterine cancer. Hum Exp Toxicol 2005;24(12):623–630.

14. Rzymski P, Niedzielski P, Rzymski P, Tomczyk K, Kozak L, Poniedziałek B (2016) Metal accumulation in the human uterus varies by pathology and smoking status. Fertil Steril 105(6): 1511–1518.