

Effect of Vitamin E on Uroepithelial Cells and Changes of Urinary Sediments in Oncology Hospital Nursing Personnel

MAJID REZAEI-BASIRI¹, HASSAN REZAZADEH², IRAJ ASVADI-KERMANI³, MAHMUD GHAZI-KHANSARI⁴, MEHRI GOLCHIN⁵, MOJGAN SARMADE⁶

ABSTRACT

Introduction: Vitamin E is an important natural antioxidant, and its most common and biologically active form is α -tocopherol. The antiproliferative effects of alpha-tocopherol have been previously demonstrated. In this study we investigated the effects of vitamin E on urinary epithelial cells and urinary sediments of nursing from oncology hospital.

Material and Methods: Sixty-two female nursing personnel from oncology hospital participated in the study. They received orally 200mg of vitamin E per day for two weeks. Also prior to vitamin E and after vitamin E administration, the uroepithelial cells counts and other components of urinary sediments were carried out.

Results: There were significant differences in the epithelial cells count and treatment with vitamin E causing significantly more number of epithelial cells and urinary sediments to be excreted in the urine.

Discussion: Vitamin E significantly plays an important role on the excretion of uroepithelial cells and urinary sediments.

Conclusion: In conclusion we propose that use of vitamin E at nontoxic levels would significantly enhance its antioxidative properties, especially among individuals subjected to prophylaxis of occupational hazards.

Keywords: Nursing personnel, Vitamin E, Urinary sediments, Uroepithelial cells

INTRODUCTION

Several studies have performed on biological samples to detect genotoxic effects in humans in connection to their jobs or environment. It is of increasing concern that professional personnel involved in the preparation and administration of antineoplastic drugs are occupationally exposed to these substances which usually causes different body organs disorder or diseases [1-3].

The most requested routine tests are the general urine examination, which covers a chemical analysis (pH, glucose, urobilinogen, etc.), a physical analysis (colour, aspect). The microscopic analysis of urinary sediment in search of formed elements (erythrocytes, leukocytes, bacteria, casts, etc.) [4]. Urine examination has essential diagnostic role in patients with various diseases and provides the physician with very important data to support the diagnosis of several pathologies [5,6]. Additionally, there are vital uroepithelial cells in fresh urine and it has been shown that urinary epithelial cells have vitality function in vitro cell cultures. Given these characteristic differences in the nature of uroepithelial cells and the fact that the majority of adult human cancers are derived from epithelial tissues, the study of epithelial cell in urine has particular relevance toward understanding mechanisms of carcinogenesis in humans [7].

Among many antioxidants, vitamin E has a potential adjuvant in cancer therapy by their ability to induce programmed cell death (apoptosis) [8]. In contrast, tumor cells have been shown to be significantly more sensitive than normal cells to the anticancer effects of vitamin E and cell culture studies have shown that vitamin E significantly inhibits growth and initiates apoptosis in neoplastic cells using treatment doses that have little or no effect on normal cell growth or viability [9,10].

Also anti-oxidative activities of vitamin E stabilize cellular membrane and availability of vital uroepithelial cells in fresh urine and prevents from unsaturated fatty acids oxidation [10].

The aim of present study was to investigate the efficiency of vitamin E as an antioxidant reduce the possible genotoxic risk associated

with exposure to antineoplastic drugs on urine epithelial cells activity and urinary sediments of oncology nursing personnel [11].

MATERIAL AND METHODS

Selection of nursing personnel: All 62 healthy and non-pregnant nursing personnel from oncology hospital taking part in this study received detailed information documented by morality committee of the university and filled in consent form concerning the aims of the research study. This article is a part of research project and online available: www.irct.ir [12].

Sampling: Primary samples of all volunteers obtained from morning urine (100 ml) were transferred to laboratory in capped sterile beakers. Then they received orally 200mg of vitamin E daily for two weeks and at the end of 14th day second urine sample (100 ml) were also delivered to laboratory. The samples were maintained in refrigerator for investigation of microscopic urinary sediments.

Reagents: All chemicals used in this study were of analytical grade and obtained from (Merck co, Germany). Vitamin E (dL-alpha-tocopheryl acetate) pearl 200IU purchased from Zahravi pharmaceutical company, Tabriz, Iran.

Preparation of urinary sediments: All the urine samples from the nurse volunteers were centrifuged for 5 minutes using large falcon tubes (2500g). A mixture of 20 μ l of urinary sediments plus 20 μ l trypan blue color was used to count epithelial cells by neobar lam and Olympus 30 X of 10 microscope lens. Under microscope, wide epithelial cells with specified nucleus were counted in vital and as well as death forms. Death and vital cells can be distinguished by blue and lemon yellow cytoplasm respectively. Other components of urinary sediments such as urinary casts, mucus, calcium oxalate crystals, uric acid and urates amorph were studied.

STATISTICAL ANALYSIS

The statistical analysis of data was done with SPSS followed by student t-test. The level of significance was chosen at $p < 0.05$.

RESULTS AND OBSERVATIONS

In this study, urinary samples of 62 female nursing personnel were evaluated with their consent in before and after orally administration of vitamin E (200 mg). A comparison in urinary epithelial cells count obtained from these two stages is given in [Table/Fig-1].

As it evident after administration of vitamin E there was more excretion of urinary death cells in the urine. The effect of vitamin E

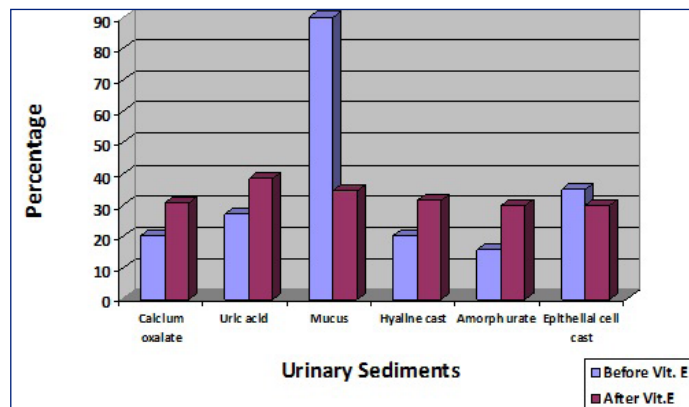
Age	Before Vitamin E		After Vitamin E	
	Death	Vital	Death	Vital
34	26	76	34	105
41	5	15	6	18
30	14	60	18	75
49	11	15	12	19
42	7	15	8	17
53	6	95	5	200
46	3	19	4	26
33	8	6	16	248
39	5	76	5	140
30	96	550	224	1367
42	8	340	10	806
32	215	207	250	235
36	30	500	203	907
37	17	91	22	121
27	54	256	76	353
33	67	891	72	2006
52	40	16	20	859
41	21	380	27	676
31	111	296	156	405
32	14	2	221	574
34	3	15	3	19
41	40	84	60	24
40	96	86	125	97
50	180	90	21	323
48	8	14	10	15
38	50	20	57	41
36	120	176	11	2204
27	10	16	33	256
35	175	187	202	259
38	4	23	4	29
40	101	397	131	508
25	171	892	187	1066
35	59	161	77	248
26	103	697	156	1887
35	10	37	12	50
14	14	27	5	41
36	17	139	29	857
40	136	403	305	958
38	25	48	26	41
30	15	215	37	814
35	5	15	11	35
28	10	38	13	59
30	20	191	29	253
38	54	1680	237	4190
27	58	295	125	95

[Table/Fig-1]: Uroepithelial cells count of women nursing group (N=62, Age between 25-53)

p<0.05 significant to increase of urinary epithelial cell count after 200 mg daily consumption of Vitamin E.

on urinary sediments i.e. pharmaceutical and epithelial cells casts as well as granular casts in their urine is shown in [Table/Fig-2], vitamin E treatment resulted significantly in the excretion of urinary sediments such as calcium oxalate, uric acid, hyaline cast, urates amorph.

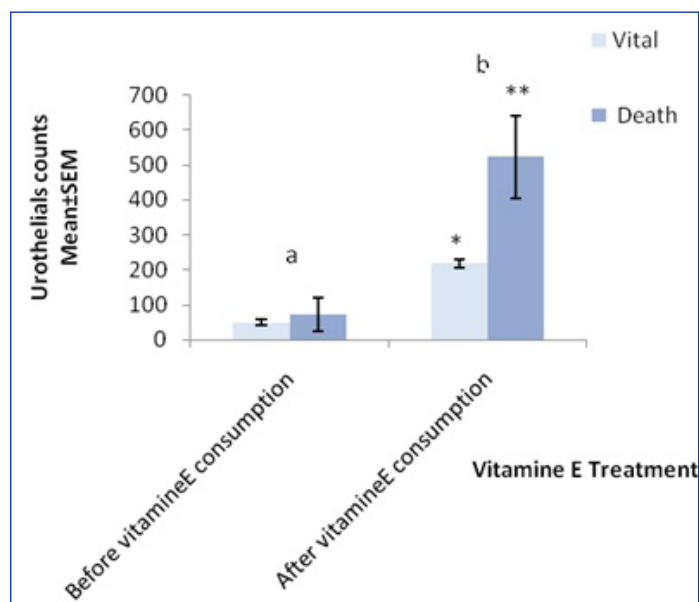
As shown in [Table/Fig-3 and 4], vitamin E significantly effects on urothelial cells counts and the number of vital and death cells were increased from (49.82 ± 8.38 to 73.22 ± 12.65) and (218.93 ± 47.22 to 522.8 ± 117.1) respectively (p<0.01).



[Table/Fig-2]: Effect of vitamin E on the excretion of urinary sediments of nursing personnel

Urothelials	Before vitamin E Consumption		2 week after vitamin E Consumption	
	n	Mean ± SD	n	Mean ± SD
Vital	n=62	49.82 ± 8.38	n=62	73.22 ± 12.65 p=0.018*
Death	n=62	218.93 ± 47.22	n=62	522.8 ± 117.1 p=0.02

[Table/Fig-3]: Effects of vitamin-E on urothelial counts of (n=62) women oncology hospital nurses
p<0.05 significant importance



[Table/Fig-4]: Effects of vitamin E on urothelial cell counts of (n=62) women oncology hospital nurses

a n=62, t-test, p=0.01

b n=62, t-test, p=0.02

DISCUSSION

In this study, we evaluated urinary sediments, especially uroepithelial tract cells to use them as a main marker; it was appeared that their quantity will change by receiving vitamin E. After receiving vitamin E there were significant increase in the number death urinary epithelial and vital cells among the nursing personnel and also vitamin E caused more excretion of urinary sediments.

In this study, we evaluated urinary sediments, especially uroepithelial tract cells to use them as a main marker; it was appeared that their quantity will change by receiving vitamin E. After receiving vitamin E there were significant increase in the number death urinary epithelial and vital cells among the nursing personnel and also vitamin E caused more excretion of urinary sediments. Vitamin E in both cases before and after receiving has essential roles on epithelial cells counts [13].

Accordingly, Antioxidants, especially vitamin E is the most effective chain-breaking lipophilic antioxidant within biological membranes, can prevent biological damage and has antioxidant property of unsaturated fatty acids of body's membrane cells and stabilize and preserves membrane of uroepithelial tract cells, and increases their culturing and construction, so these interactions enhance the number of above cells in the urine [14], which is quiet comparable with our results. Hence, since oncology nurses are subjected to chemical therapeutics drugs such as cyclophosphamide etc. which has been shown to have potent carcinogenic activity on cells of urinary tract, and several antineoplastics drugs in job setting, resistance of their body cells may decrease and they may encounter with oxidation stress of cellular components of different types of body cells. Also, the results showed that mucus and urinary casts was used as a second marker in this study.

It seems increases as a result of culturing and construction of urinary tract cells and separation of death epithelial cells, and increased trace value of renal casts and mucoproteins in urinary tracts [15,16].

In summary the count of urinary epithelial cells and urinary sediments in nurses could not be in a fixed range and depends on several factors likes being subjected to job pollutants, antineoplastics drugs, physiological states of a person, age and nutrition.

ACKNOWLEDGEMENT

The authors acknowledge hematology and oncology research center, Tabriz university of medical sciences, Iran, for funding the project. Also would like to thank Dr. Seyed Latif Mousavi, Shaheed University-Tehran, for his helpful comments.

REFERENCES

- [1] Valanis B, Vollmer WM, Labuhn K, Glass A, Corelle C. Antineoplastic drug handling protection after OSHA guidelines / *Occup Med*. 1992;34:149-55.
- [2] Sessink PJ, Boer KA, Scheeffhals AP, Anzion RB, Bos RP. Occupational exposure to antineoplastic agents at several departments in a hospital. Environmental contamination and excretion of cyclophosphamide and ifosfamide in urine of exposed workers. *Int Arch Occup Environ Health*. 1992;64:105-12.
- [3] Auer H, Oehler R, Lindner R, Kowalski H, Sliutz G, Orel L et al. Characterization of genotoxic properties of difluorodeoxycytidine. *Mutat Res*. 1997;393:165-73.
- [4] Martha E. Laredo B, Carlos A. Lvarez N, Cabiedes J. Urinary sediment analysis. *Reumatol Clin*. 2010;6:268-72.
- [5] Kim Y, Jin DC, Eun Jung Lee EL, Lee DH, Chung HH, Kim M, Lim J, Lee A, Lee K, Kang CS, Pai SH. Quantitative Analysis of Urine Sediment Using Newly Designed Centrifuge Tubes. *Ann Clin Lab Sci*. 2002;32:55-60.
- [6] Graff L. A handbook of routine urinalysis. Philadelphia: *Lippincott*; 1983.
- [7] Christian BJ, Loretz LJ, Oberley TD, Catherine A, Reznikoff CA. Characterization of Human Uroepithelial Cells Immortalized in Vitro by Simian Virus 40. *Cancer Res*. 1983;47:6066-73.
- [8] Zimmermann KC, Bonzon C, Green DR. The machinery of programmed cell death. *Pharmacol Ther*. 2001;92:57-70.
- [9] Sigounas G, Anagnostu A, Steiner M. Dl-alpha tocopherol induces apoptosis in erythroleukemia, prostate and breast cancer cells. *Nutr Cancer*. 1997;28:30-35.
- [10] Thamilselvan S, Menon M. Vitamin E therapy prevents hyperoxaluria-induced calcium oxalate crystal deposition in the kidney by improving renal tissue antioxidant status, Vattikuti Urology Institute and Henry Ford Health Sciences Center, Detroit, Michigan, USA, 2005.
- [11] Martha E. Laredo B, Carlos A. Lvarez N, Cabiedes J. Urinary sediment analysis. *Reumatol Clin*. 2010;6:268-72.
- [12] Evstigneeva RP, Volkov IM, Chudinova VV. Vitamin E as a universal antioxidant and stabilizer of biological membranes. *Membr Cell Biol*. 1998;12(2):151-72.
- [13] Rezei-Basiri M, Rezazadeh H, Aswadi-Kermani I, Eghbal MA. Study on the antimutagenicity effects of Vitamin E in hospital nursing personals and control group using Ames assay and Comet assay. 2012; <http://www.ircr.ir/user.php>.
- [14] Mc Pherson: Henry's Clinical Diagnosis and Management by Laboratory Methods, Basic examination of urine. Richard A. McPherson, Jonathan Ben-Ezra , 22nd ed. 2011 Saunders, Elsevier. PP 445-79.
- [15] Kagan VE, Serbinova EA, Bakalova RA, Stoytchev TS, Erin AN, Prilipko LL, Evstigneeva RP, Mechanisms of stabilization of biomembranes by alpha-tocopherol. The role of the hydrocarbon chain in the inhibition of lipid peroxidation. *Biochem Pharmacol*. 1990;40:2403-13.
- [16] Villacorta L, Graça-Souza AV, Ricciarelli R, Zingg JM, Azzi A. alpha-Tocopherol Induces Expression of Connective Tissue Growth Factor and Smooth Muscle Cells Antagonizes Tumor Necrosis Factor. Mediated Down regulation in Human. *Circ Res*. 2003;92(1):104-10.
- [17] Tran K and Chan AC. R,R,R-alpha-tocopherol potentiates prostacyclin release in human endothelial cells, Evidence for structural specificity of the tocopherol molecule. *Biochim Biophys Acta*. 1990;1043(2):189-97.

PARTICULARS OF CONTRIBUTORS:

1. Research Scholar, Department of Pharmacology and Toxicology, School of Pharmacy, Tabriz University of Medical Sciences, Tabriz-Iran.
2. Associate Professor, Department of Pharmacology and Toxicology, School of Pharmacy, Tabriz University of Medical Sciences, Tabriz-Iran.
3. Professor, Hematology and Oncology Research Center, Tabriz University of Medical Sciences, Tabriz-Iran.
4. Professor, Department of Pharmacology, Faculty of Medicine, Tehran University of Medical Sciences, Tehran-Iran.
5. Hematology and Oncology Research Center, Tabriz University of Medical Sciences, Tabriz-Iran.
6. Hematology and Oncology Research Center, Tabriz University of Medical Sciences, Tabriz-Iran.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Hassan Rezazadeh,
Associate Professor, Department of Pharmacology and Toxicology, School of Pharmacy, Tabriz University of Medical Sciences / Iran.
Phone: +98 - 411 - 3341315, Fax: +98 - 411 - 3344798, E-mail: rezafar81@hotmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Mar 02, 2013**

Date of Peer Review: **May 23, 2013**

Date of Acceptance: **Sep 01, 2013**

Date of Publishing: **Nov 10, 2013**