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EVALUATION OF ASCORBIC ACID LEVELS IN WAR WOUNDED PATIENTS

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ABSTRACT

This investigation determined that vitamin C intake of C.W. was higher than O.P., S.C. and C.

Statistically, there was a significant difference between C.W.and C.

Blood ascorbic acid levels of O.P. and S.C. were lower than C.W. and C., a significant difference was observed.

Urinary vitamin C in all groups was lower than controls and this indicates that even though vitamin C intake was high, the demand for vitamin C was increased.

INTRODUCTION

Vitamin C(ascorbic acid) is a strong, natural reducing

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agent. With the loss of two hydrogen atoms it is converted to dehydroascorbic acid(8,9).

In cases of trauma, surgery and burns, the level of the reduced form of vitamin C in blood, as well as urinary excretion decrease. This decrease is perhaps caused by an increased demand for vitamin C metabolism in the body (5).

The role of this vitamin in wound healing has been well documented. The hydroxylation of proline and lysine and collagen synthesis are two of its major functions(10). Ascorbic acid inhibits nitrite and prevents the toxicity of this substance. Also nitrosomine formation, which is a known carcinogen, has been shown to be suppressed(1,2, 6,7,11).

Recent investigations have shown that the level of hepatic aminopyrine (N-dimethylase) and Cytochrome P-450 in subjects with low ascorbic acid intake is decreased (1,11).

Vitamin C in immune response has also been studied and documented, Administration of one gram of vitamin C a day increases immunoglobulin (IgM).

Ascorbic acid also depresses the toxicity of heavy metals such as lead, as does EDTA (2).

The purpose of this study was to determine whether chemically wounded patients would have an increased requirement for vitamin C. If it is concluded that it is so, then vitamin C can be used in treating such patients.

METHODS AND SUBJECTS

The subjects were injured patients hospitalized in 2 hospitals in Tehran, that is, Baghyyatollah and Imam-Khomeini Hospitals.

Subjects setected were divided into three groups of war injured patients:

1) Chemically wounded (C.W.) with mustard gas; patients suffering from orthopedic injuries (O.P); and 3) patients suffering from subcutaneous wounds (S.C) (bullets, metal fragments, etc). A fourth group consisted of controls(C), Sepah combattants working as hospital employees (see table I). Twenty-four hour urinary ascoric acid levels were determimed by the 2,4-dinitrophyenyl hydrazine method(3) and blood ascorbic acid levels by the method of Lowery(4). Urinary creatinine was determined with the Jaffe reaction. To estimate the daily vitamin intake the 24-hour dietary recall method was used. Data were statistically evaluted using the t-test for inter- group comparisons.

RESULTS AND DISCUSSION

Results of this study indicate that the intake of vitamin C of orthopedic patients and of those with subcutaneous wounds was similar that of the controls, whereas the Vitamin C intake of chemically wounded patients was higher than that of the controls with a mean value of 78. 46 mg. (see table 2).

Table 3 shows the frequency distribtion and relatine

frequency of different groups on the basis of vitamin C Content of their diets. Table 4 lists the mean values and standard deviations for vitamin C levels in blood of the four groups. Total ascorbic acid in S.C. and O.P. groups was lower ($P < 0.01$) as compared to the control value.

Even though the intake of vitamin C was higher in the C.W. than the C group, there was no significant difference in their blood ascorbic levels.

Table 5 gives the frequency distribution and relative frequency on the basis of blood vitamin C levels of the patients and the controls.

Measurement of ascorbic acid in urine showed that 76% of patients had ascorbic acid levels of less than 2 mg/100ml; 45.5% of controls had less than 2mg/100ml.

Table 6 shows the mean values and standard deviations of vitamin C levels in urine. Table 7 lists the frequency distribution and relative frequency in the different groups according to the level of urinary vitamin C. Table 8 shows vitamin C intake, vitamin C levels in blood and urine and creatinine levels in urine. As this table indicates, urinary creatinine levels were lower in all patient groups as compared to controls ($P < 0.01$).

As table 8 shows, the mean value of dietary vitamin C inke of C.W. was higher that of controls and other patient groups, and a significant difference was found ($P < 0.1$). This finding indicates that the C.W. group patients required more vitamin C for their metablolism and wound healing.

Comparison of urinary vitamin C levels of patient groups with that of the controls shows that excretion was less in the patients. This also indicates an increased requirement for vitamin C.

Table 1- Frequency destsibution and relative frequency of sabjects acconding to type of injury

Severity / group	mild		Moderate		Severe		Total	
	No	%	NO	%	NO	%	NO	%
Chemically wounded (C.W)	1	4.5	7	31.8	14	63.4	22	100
Orthopedic(OP)	3	7.5	13	32.5	24	60	40	100
Subcutaneous (SC)	4	10	16	40	20	50	40	100
Control(C)	-	-	-	-	-	-	-	-
Total	8	7.8	36	35.3	58	56.9	102	100

Tabel 2- Mean ± SD of vitamin C intake (mg) in differenr groups

Group / $\bar{X}$	CW	OP	Sc	C	Total
No.	22	40	40	33	102
$\bar{X}$	78.46*	56.67	50.58	51.12	58.23
S.D	53.23	39,86	47.40	32.38	45.10

* 0-02 $P < 0.05$ (between C.W. and C groups)

Table 3- Frequency distribution and relative frequency of the subjects acconding to vitamin C intake (mg)

Group / mg	CW		OP		SC		C		Total	
	NO	%	NO	%	NO	%	NO	%	NO	%
0-34.99	6	27.2	17	42.5	20	50	12	36.4	43	42.2
35-74.99	5	22.7	11	27.5	13	32.5	9	23.3	29	28.4
75^{+}	11	50	12	30	7	17.5	12	36.4	30	29.4
total	22	100	40	100	40	100	33	100	102	100

Table 4- Mean ± SD of blood aocorbic acid in different groups

Group / $\bar{X}$	CW	OP	SC	C	Total
NO	22	40	40	33	102
$\bar{X}$(mg/100ml)	0.93	0.83*	0.74*	0.92	0.81*
SD	0.40	0.26	0.25	0.26	0.20

* $P < 0.01$(between OP and controls, and SC and controls)

Table 5-Frequency distribation and relative frequency of the subjects acconding to blood vitamin C Levels(mg%)

Group / mg%	CW		OP		SC		C		Total	
	NO	%	NO	%	NO	%	NO	%	NO	%
0-0.59	3	13.6	7	17.5	13	32.5	2	6	23	22.5
0-6-1.99	8	36.4	25	62.5	20	50	18	54.5	53	51-9
1^{+}	11	50	8	20	7	17.5	13	34.4	26	25.5
Total	22	100	40	100	40	100	33	100	102	100

Table 6- Mean ± SD of urinary vitamin C in different groups(mg)

Group / $\bar{X}$	CW	OP	SC	C	Total
NO	22	40	40	33	102
$\bar{X}$	1.28*	1.72*	1.32*	3.04	1.46
SD	1.32	1.97	0.99	2.53	1.72

* $P < 0.01$ (between a group and the controls)

Table 7- Frequency distribition and relative frequency of the subjects according to urinary vitamin C levels

Group / mg%	CW		OP		SC		C		Total	
	NO	%	NO	%	NO	%	NO	%	NO	%
0-1.99	18	82	30	75	30	75	15	45.5	78	76.5
2-4.99	3	13.2	6	15	10	25	10	3.3	19	18.6
5^{+}	1	4.5	4	10	0	0	8	24.2	5	4.9
Total	22	100	40	100	40	100	33	100	102	100

Table 8-Comparison of $\bar{X} \pm$ SD of different parameters measured in different groups

Parameter \ Group	CW		OP		SC		C	
	NO	$\bar{X} \pm$ SD	NO	$\bar{X} \pm$ SD	NO	$\bar{X} \pm$ SD	NO	$\bar{X} \pm$ SD
24-h vit. C intake(mg)	22	78.64* ±53.23	40	54.67 ±39.86	40	50.58 ±47.40	33	51.12 ±32.38
Blood vit. C (mg/100ml)	22	9.93 ±0.40	40	0.83 ±1.26	40	0.47 ±0.25	33	0.92 ±0.26
Urinary vit.C (mg/100)	22	1.28* ±1.32	40	1.72* ±1.97	40	1.32 ±0.99	33	3.04 ±0.53
Urinary creatinine(mg/100ml)	22	1.72* ±0.46	40	1.26* ±0.59	40	1.20* ±.37	33	2.00 ±0.62

* $P < 0.01$ (between a group and the controls)

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