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# Effect of low dose vitamin C on public speaking stress during group presentation

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# Effect of low dose vitamin C on public speaking stress during group presentation

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**Abstract.** Vitamin C ascorbic acid is a well-known antioxidant that is involved in anxiety, stress, depression, fatigue and mood state in humans . The purpose of this study is to investigate the effect of vitamin C on decreasing the level of public speaking stress in term of heart rate, blood pressure and stress assessment . A purposive sample of (45) were included in this randomized placebo-placebo trial study, that was conducted at Faculty of nursing / university of Kufa. Public speaking stress was determined by a questionnaire scale developed from (public speaking anxiety scale) . Study group included volunteer  students who took a dose of 500 mg a day of vitamin C for one week before a group presentation, while the placebo group is given a placebo before one week of before a group presentation .  The result indicated that the blood pressure (systolic and diastolic) before presentation between the two groups ( student group  and placebo)  was not significantly different . In relation to heart rate, a significant decrease (p< 0.05) was recorded in student group as compared to placebo .The student group  has recorded significant difference in many items of stress assessment when comparing to placebo (e.g. increase of heart rate , dry mouth , GIT cramps and anxiety due to fear from failure) . The assessment of presentation stress between the two groups (student group and placebo) was determined by means of scores . The results revealed that there is a significant difference (P< 0.05) in presentation stress between student group  and placebo group .It was concluded that student group which took 500 mg vitamin C for one week express less presentation stress .The most stress signs that has been improved by vitamin C intake are  : increase of heart rate, dry mouth, GIT cramps and anxiety due to fear from failure .

Keywords : vitamin C , public speaking , stress , group presentation

## Introduction

Stress is defined as the response to threats that may disturb body equilibrium and life (Bryce, 2011) . Consequences of acute stress include  memory dysfunction (Sapolsky, 2000) , but long term stress may lead to more complicated problems like  anxiety and depression (Plotsky et al., 1998) . Psychosocial stress is a well-studied phenomenon which may occur in different social situations; one of these situations is public speaking (Kothgassner et al. 2016) . The advantages of public speaking may be understood as direct communication speaking between speakers and an audience for the purpose of effective communication (Beatty and Friedland, 1990) . It is a normal physiological state for even professional  public speakers to feel a bit nervousness before doing a performance or speech,  this level of normal stress gives them the enthusiasm to do their best. However, for many people the anxiety or intensive stress becomes so severe that it interrupt the ability to perform at all .

Fear of speaking is one of the most common types of phobia that leads to impair communication with an crucial impact on the person's social and emotional life (McCroskey and McCroskey, 1988) . The source of psychosocial stress can be explained by the task of standing and speaking in front of an unknown professional audience; this situation is stressful enough to elicit wide neuroendocrine responses through activating the HPA axis (Jezova et al., 2004) . Several studies have employed academic stress situations (including presentation and examination) as stressful conditions for investigating the effect of hormones and immune system during stress (Mutalka and Sidki, 1998) Ref.35                                                                                                          .

Many scales have been developed in order to give a quantitative estimation for PSA (public speaking anxiety), all of which are not free from limitations. Some of these scales include : the Personal Report of Confidence as a Speaker (Gilkinson, 1942) and the Personal Report of Public Speaking Anxiety (McCroskey, 1970). However, because stress is a physiological phenomenon, we did not find any scale to measure public speaking stress . In the current study, we have used a new scale for public speaking stress derived and developed from (public speaking anxiety scale) which was advocated by Bartholomay and Houlihan (2016) . The new scale focuses on the physiological aspects of the scale related to sympathetic and HPA axis activation , so that any sings associated with excessive       fear       ,       phobia       and       anxiety       have       be       excluded       .
Recently, researchers have used several techniques or procedures to decrease anxiety or signs of stress resulted from public speaking (Jangir and Govinda, 2017) . Nowadays, there is an increasing interest for investigating Vitamin C as a relieving factor for anxiety, stress, depression, fatigue and mood state in humans (Singh, 2016). It was found that individuals with high blood levels of vitamin C do not have the expected signs of stress when subjected to acute psychological stressful events (O'Keefe et al., 1999) . Many previous studies on human and laboratory animals have used high doses of vitamin C to induce biochemical and hormonal changes that enhance the physical and mental signs of stress including public speaking ;  Brody et al. (2002) investigated the supplement of 1000 mg of vitamin C three times a day to palliate the physical and psychological responses of stress .

To the best knowledge of the researcher, this is the first study that used a new developed scale to assess public speaking stress . The aim of the current study was to investigate the role of low doses of vitamin C in decreasing the physiological signs and symptoms of public speaking stress .

**Methods**
**Public Speaking Stress Scale**

Public speaking stress was determined by a questionnaire scale suggested by Assistant professor  Dr. Ali Abdulzahra Mahdi / faculty of nursing / university of Kufa . the scale may developed from (public speaking anxiety scale) advocated by Bartholomay and Houlihan (2016) . Reliability of the scale was obtained by test-retest (Pearson's correlation coefficient = 0.78) ; while internal consistency of the was assess by Cronbach' alpha coefficients (= 0.82) .

**Design of the study**

Experimental randomized placebo trial study approach was designed to meet the previously mentioned objectives of the current study. A purposive  sample of (90) sample students was taken in this study .
The students were divided in to two groups :-
1- Study Group :- included 60 students given vitamin C ( 500mg per day) for one week before presentation .
2- Placebo :- included 30 students given placebo for one week before presentation.
Both groups had to give a group presentation as a requirement for their course evaluation, fear of failure , forgetting information and bad speech were the expected sources of stress .

Exclusion criteria included : chronic diseases (DM , hypertension), hormonal disturbances, psychotic disorders, kidney stones and anemia . Students that have previous experience of public speaking were also excluded .

The current study was approved by the State Medical Ethics Committee and by the University of Kufa Ethics Committee. All students were given informed instructions for all the procedures done by author .

**Statistical Analysis**

The following statistical approaches were used in order to analyze the data of the study under application of the statistical package Mega stat (version 2005) . **Descriptive Data Analysis :-** including Tables (Frequencies, Percentages) and figures . **Inferential Data Analysis** which included This approach`h used to test the statistical hypothesis, which includes : Student t-test was used for testing difference between studied groups, while post-hoc analysis was used for comparison between means of groups, and Pearson correlation coefficient for measuring the association between the studies quantitative variables **.**

**Results**

The current study showed that there is no significant difference in demographic characteristics, so that gender, residence , age , and previous experience in public speaking were not different between the study and placebo groups, so that it would not interfere with the results (Table 1) .

**Table (1) :** the Demographic Characteristics of the study and placebo Group

| Groups | | Placebo Group Freq. | % | Study Group Freq. | % | P value |
|---|---|---|---|---|---|---|
| Gender | Male | 47 | 73.34 | 22 | 78.34 | 0.59 |
| | Female | 13 | 26.66 | 8 | 21.66 | |
| Residence | urban | 25 | 83.33 | 43 | 71.67 | 0.22 |
| | rural | 5 | 16.67 | 17 | 28.33 | |
| Previous experience of public speaking | Yes | 0 | 0.00 | 0 | 0.00 | 0.16 |
| | No | 30 | 100 | 60 | 100 | |
| Age | Mean (years) | 22.13 | | 24.2 | | 0.25 |
| | SD     (years) | 0.99 | | 5.08 | | |
| | Range | 21-23 | | 21-40 | | |

According to table (2), the student group has recorded a significant difference in many items of stress assessment when comparing to placebo group (e.g. increase of heart rate, dry mouth, GIT cramps and anxiety due to fear from failure) . This result is reflected in the overall mean of scores of public speaking stress while a significant difference (P   0.05) is found between placebo group and student group (table 4)  .

Table (3) shows the assessment of presentation stress items between the two groups (student group and placebo group), the cut-off point for mean of scores is (1.5), any score more than this cut-off point is considered as (pass) which means that this sing of stress is not find in the individuals, while for mean of scores that is below (1.5) is considered as (fail) .

Table (3-9) shows the assessment of overall presentation stress between the two groups (student group and placebo), the cut-off point for mean of score is (1.5), any score more than this cut-off point is considered as (pass), and that below it is (fail) .

**Table (2) :** Differences in mean of scores of public speaking stress items among the student group and placebo

| ems | Student Group (Mean±SD) | lac Me ) |
|---|---|---|
| hen I'm in presentation , my heart beats more rapidly and/or ly | 1.4 ± 0.15 | 8 ± 0 |
| hen I'm in presentation , I suffer from dry mouth | 1.27 ± 0.64 | 73  0 |
| hen I'm in presentation , I have GIT cramps | 1 ± 0.0 | 33  0 |
| hen I'm in presentation , it is hard for me to concentrate | 1 ± 0.0 | 6 ± 0 |
| hen I'm in presentation , a horrific thoughts come to my mind | 1.07 ± 0.26 | 67  0 |
| hen I'm in presentation , fear from failure makes me more | 1 ± 0.0 | 6 ± 0 |
| hen I'm in presentation , I was sweating | 1.13 ± 0.35 | 53  0 |
| hen I'm in presentation , I forgot some information | 1.27 ± 0.47 | 67  0 |
| hen I'm in presentation , I can't look at the audiences' eyes | 1.13 ± 0.35 | 53  0 |
| hen I'm in presentation , my legs and/or hands are shivering | 1.2 ± 0.41 | 73  0 |
| hen I'm in presentation , my voice pitch changes | 1.13 ± 0.35 | 4 ± 0 |

**Table (3) :** Assessment of presentation stress items among the two groups (student group and placebo)

| Items | Student Group (Assessment) | Placebo (Assessment) |
|---|---|---|
| When I'm in presentation , my heart beats more rapidly and/or intensively | Pass | Fail |
| When I'm in presentation , I suffer from dry mouth | Pass | Fail |
| When I'm in presentation , I have GIT cramps | Pass | Pass |
| When I'm in presentation , it is hard for me to concentrate | Pass | Fail |
| When I'm in presentation , a horrific thoughts come to my mind | Pass | Fail |
| When I'm in presentation , fear from failure makes me more anxious | Pass | Fail |
| When I'm in presentation , I was sweating | Pass | Fail |
| When I'm in presentation , I forgot some information | Pass | Fail |
| When I'm in presentation , I can't look at the audiences' eyes | Pass | Pass |
| When I'm in presentation , my legs and/or hands are shivering | Pass | Fail |
| When I'm in presentation , my voice pitch changes | Pass | Pass |

**Table (4) :** Differences in Mean of Scores of Overall Presentation Stress among the three Groups  (Student Group   1 , Student Group 2 and Placebo)

| Items | Student Group (Mean±SD) | Placebo (Mean±SD) | P value |
|---|---|---|---|
| Overall Presentation Stress | 1.15 ± 0.25 | 1.6 ± 0.14 | 0.02 |

Table (5) : Assessment of Overall Presentation Stress among the three Groups
(Student Group 1 , Student Group 2 and Placebo)

| Items | Student Group (Assessment) | Placebo (Assessment) |
|---|---|---|
| Overall Assessment of Presentation Stress | Pass | Fail |

**Discussion**

Tables (1) shows the socio-demographic data of the two studied groups (student group and placebo), it reveals that the studied sample has a close range of ages, and all have no a previous experience of public speaking, because this experience may interact the results of this study .

The results of the current study confirmed that students given 500 mg of vitamin C for one week had low level of  stress-induced signs (e.g. increase of heart rate, dry mouth, GIT cramps and anxiety due to fear from failure) as compared to placebo group (tables 2 and 3) , this result agrees with the data recorded by many researchers which recorded the role of vitamin C in decreasing heart rate at stress situation, in spite that the majority of these studies have used high doses of vitamin C which may be harmful for individuals with chronic renal failure, cystinuria, gout, urate and oxalate calculosis (Halliwell, 1999), so that one advantage of this study is to avoid the adverse reactions that may result from the use of high doses of vitamin C .

According to the current study, when students took vitamin C  one week before presentation, they had felt a decrease in the heart rate compared to the placebo group (tables 2 and 3), de Oliveira et al. (2015) found that after the intervention with the vitamin C group had a decreased heart rate compared to the placebo group . This decreased rate may be explained by the effect of vitamin C in decreasing the sympathetic stimulation ; Bruno et al. (2012) indicated that acute administration of vitamin C is able to reduce cardiovascular adrenergic drive in hypertensive patients . Grigor'ev and neokesariiskii (1986) have worked on rats, they reported that the neurotransmitter   –aminobutyric acid  (GABA) is involved in cardiovascular regulation, they found that  intracerebroventricular  administration of (GABA) agonists decreases arterial blood and heart rate and vitamin C stimulates 3H-GABA binding indicating the role of vitamin C in decreasing hear rate  .

Few  studies focused on the role of vitamin C on student stress, Arm et al. (2013) ; they investigated effects of oral vitamin C supplements in 42 high school students, in a randomized, double-blind, placebo-placebo trial. The students were given either vitamin C (500 mg day) or placebo, results showed that vitamin C reduced anxiety levels the mean heart rates were also significantly different between vitamin C group and placebo group . It is known that students with public speaking apprehension most often experience a variety of symptoms in a public performance situation, including palpitations, sweating, gastrointestinal uneasiness, diarrhea, muscle tension, and confusion states (Burnley et al., 1993 ; North and Rives; 2001) . The results of the current study indicated a possible role of vitamin C in decreasing the physiological sings of stress . Previous data showed that both emotional and physical stress may be affected by a person's vitamin C status. Stress can increase requirements for vitamin C to maintain normal blood levels ; when stress depletes vitamin C levels in the body, it reduces the body's resistance to infection and disease, and increases the likelihood of further stress. When vitamin C intake is increased, the harmful effects of the stress hormones are reduced and the body's ability to cope with the stress response improves. Vitamin C helps to recover more quickly from emotional and physical stress, which may otherwise weaken adrenal glands and increase fatigue (Brody et al., 2002) .

The supplement of vitamin C may have a protective role against public speaking anxiety, as prolonged or high level of stress may lead to anxiety . In a comparative study, Mazloom et al (2013) who made a study in which vitamin C had significantly decreased stress level and improved anxiety level compared to the placebo group . The result also agrees with al'- Absi et al .(1995) , they found that high-dose sustained-release vitamin C lessened subjective stress, and state of anxiety in response to an acute interpersonal psychological stressor  . The result of same table also comes in agreement with Guney et al. (2014), they recorded that the vitamin C supplementation can act as an antioxidant

leading to biochemical and behavioral changes reducing anxiety and in a similar mechanism can relief fatigue and mood state .

The effect of vitamin C in reducing the state of stress and anxiety can be interpreted by the inhibiting effect of vitamin C on sympathetic stimulation, and its role in decreasing the levels of cortisol hormones . Aburawi et al. (2014) found that ascorbic acid can modulate catecholaminergic activity and decrease stress reactions .

This can also be supported by the work of Brody et al. (2002) , they found that treatment for 14 days with high doses of vitamin C (1000 mg three times per day) lowered cortisol and reduced subjective responses associated with acute psychological responses associated with acute psychological stress .

It was concluded that student group which took 500 mg vitamin C for one week express less presentation stress than placebo group . The most stress signs that has been improved by vitamin C intake are : increase of heart rate, dry mouth, GIT cramps and anxiety due to fear from failure .

## References

[1] **Aburawi, SM. , Ghambirlou, FA. , Attumi, AA. , Altubuly, RA. and Kara, AA.** (2014) Effect of Ascorbic Acid on Mental Depression Drug Therapy: Clinical Study. J Psychol Psychother, 4:131. doi:10.4172/2161-0487.1000131

[2] **al'Absi, M. , Everson, SA. and Lovallo, WR.** (1995) Hypertension risk factors and cardiovascular reactivity to mental stress in young men. Int J Psychophysiol, 20:155–160 .

[3] **Amr, MA. , El-Mogy,T. , Shams, K., Vieira and Lakhan, S.E.** (2013) Efficacy of vitamin C as an adjunct to Fluoxetine therapy in pediatric major depressive disorder : A randomization, double-blind, placebo-placeboled pilot study . Nutr.J, 12 : 31 .

[4] **Bartholomay, E. M. and Houlihan, D. D.** (2016) Public Speaking Anxiety Scale: Preliminary psychometric data and scale validation . Personality and Individual Differences, 94, 211–215

[5] **Beatty, M.J. and Friedland, M. H.** (1990). Public speaking state anxiety as a function of selected situational and predispositional variables. Communication Education, 39, 142-147.

[6] **Brody, S. , Preut, R. , Schommer, K. and Schürmeyer, T.** (2002) A randomized placeboled trial of high dose ascorbic acid for reduction of blood pressure, cortisol, and subjective responses to psychological stress. Psychopharmacology (Berl), 159: 319-324.

[7] **Bruno, RM. , Daghini, E. , Ghiadoni, L., Sudano. I. , Rugani, I., Varanini, M., Passino, C. , Emdin, M. and Taddei, S.** (2012) Effect of acute administration of vitamin C on muscle sympathetic activity, cardiac sympathovagal balance, and baroreflex sensitivity in hypertensive patients. Am J Clin Nutr.,96(2):302-8.

[8] **Bryce, CP.** (2011) Insights into the concept of stress. Pan American Health Organization, pp: 1-80.

[9] **Burnley, M., Cross, P., and Spanos, N.** (1993). The effects of stress inoculation training and skills training on the treatment of speech anxiety Imagination, Cognition and Personality 12:355-366.

[10] **de Oliveira, IJ. , de Souza, VV. , Motta, V. and Da-Silva, SL.** (2015) Effects of Oral Vitamin C Supplementation on Anxiety in Students: A Double-Blind, Randomized, Placebo-Placeboled Trial. Pak J Biol Sci, 18: 11-18.

[11] **Gilkinson, H.** (1942). Social fears reported by students in college speech classes. Speech Monographs, 9, 131–160.

[12] **Grigor'ev, I.P. and Neokesariiskii, A.A.** (1986) Effect of ascorbic acid on the binding of 3H-GABA and 3H-glutamic acid to synaptosomes of the rat cerebral cortex). Biulleten Eksperimental noi biologii Meditsiny 102:288-2889,(In Russian) .

[13] **Guney, E. , Ceylan, M.F. , Taktas, A. , Alisik M. , Ergin, M. , Goker, Z., Senses Dinc, G., Ozturk, O., Korkmaz, A., Eker, S. , Kizilgun, M. and Erel, O.** (2014) Oxidative stress in children and adolescents with anxiety disorders .J. Affect. Disord, 156:62-66 .

[14 ] **Halliwell B.** (1999) Vitamin C: poison, prophylactic or panacea? Trends Biochem Sci,24:255-9.

[15 ] **Jangir, S K, and Govinda, R B** (2017). Reducing Public Speaking Anxiety with Behavior Modification Techniques among School Students: A Study. International Journal of Indian Psychology, 5, (1) : 91-97 .

[16 ] **Jezova D, Makatsori A, Duncko R, Moncek F, Jakubek M.** (2004). High trait anxiety in healthy subjects is associated with low neuroendocrine activity during psychosocial stress. Prog Neuropsychopharmacol Biol Psychiatry 28:1331–6.

[17 ] **Kothgassner, O. D. , Felnhofer, A., Hlavacs, H., Beutl, L., Palme, R., Kryspin-Exner, I., Glenk, L. M.** (2016) Salivary cortisol and cardiovascular reactivity to a public speaking task in a virtual and real-life environment . Computers in Human Behavior, 62 : 124-135 .

[18 ] **Matalka, K. z. and Sidki, A.** (1998) Academic Stress - Influence on Leukocyte Distribution, Cortisol, and Prolactin . Laboratory Medicine, 29(11) : 697-701 .

[19 ] **Mazloom, ZA. , Ekramzadeh M. and Hejazi, N.** (2013) Efficacy of supplementary vitamin C and E on anxiety :A randomized , single-blind, placebo- placeboled trial .Pak. J.Biol. Sci, 16:1597-1600 .

[20 ] **McCroskey, J. C.** (1970) Measures of communication-bound anxiety . Speech Monographs,37(4) : 269–277.

[21 ] **McCroskey J and McCroskey L.** (1998) Self-report as an approach to measuring communication competence. Commun Rep.;5:108–113.

[22 ] **North, M., and Rives, J.** (2001). Virtual reality therapy in aid of public speaking. International Journal of Virtual Reality, 3:2-7.

[23 ] **O'Keefe MP, Scholz C and Campbell PS** (1999) Vitamin C attenuates the physiological response to stress. Paper presented at the 218th American Chemical Society Meeting, New Orleans, 22–26 .

[24 ] **Plotsky. P.M., Owens M.J., Nemeroff C.B.** (1998) Psychoneuroendocrinologym of depression. Hypothalamic-pituitary-adrenal axis. Psychiatr Clin N Am, 21:293–307 .

[25 ] **Sapolsky, RM.** (2000) Stress hormones: good and bad. Neurobiol Dis, 7: 540-542.

[26 ] **Singh, K.** (2016) Nutrient and Stress Management . J Nutr Food Sci, 6:4 .