Effect of Vitamin C Supplementation on the Levels of Related Hormones in Infertile Women with Polycystic Ovary Syndrome (PCOS) in Shiraz City

Sedighe Forouhari¹ Razie Hosseini², Moosa Salehi³ Bahia Namavar Jahromi⁴ Mehrab Sayadi⁵

Abstract

Infertility is one of the most problems in the world today. Polycystic ovary syndrome (PCOS) is a common cause of infertility in women. Vitamin C as a single chain antioxidant can stop the release of peroxidation processes in the body and increase of progesterone level as well as increase the effect of Clomiphene on ovary. This study aimed to determine the effectiveness of vitamin c in a balanced diet on the levels of related hormones in infertile women with Hay-polycystic ovary syndrome in Shiraz city. This study was a randomized clinical trial (RCT), double-blind cross-over between 2012-2013 infertile women with PCO were performed on 56 randomly into two groups, A, B, were carried out. Screening samples from infertile patients with PCO groups with the criterion of three criteria: the Rotterdam study and experiments, FSH, Testosterone, Progesterone, Estradiol primarily carried out and then the course of 2 months of placebo (B) and Vitamin C (A) the tests were given 3 times a month before and 2 months after the first intervention was performed and the results were evaluated in both groups. In the group treated with vitamin A and C in the first stage of the hormones FSH, estradiol, and more Testosterone treatment group B increased, but not statistically significant. Also, the effect of treatment with hormones FSH, Testosterone, Progesterone, Estradiol was found that the amount of drug effect is not significant. The findings of this study showed that vitamin C can cause changes in the levels of certain hormones, but hormones have no effect on the comparison of the mean scores.

Keywords: Vitamin C, related hormones in women, infertility, polycystic ovaries syndrome, balanced diet.

¹Community Based Psychiatric Care Research Center, Infertility Research Center, Shiraz University of Medical Sciences, Shiraz, Iran. Tel: +98 07116474258, Email: forouharism@yahoo.com
² Community Based Psychiatric Care Research Center, Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran
³Nutritional Science Center, School of Nutrition and Food, Shiraz University of Medical Sciences, Shiraz, Iran
⁴Infertility Research Center, Perinatology Research Center, Reproductive Endocrinology and Infertility Division, Department of OB-GYN, School of Medicine Shiraz University of Medical Sciences, Shiraz, Iran.
⁵ MSc Biostatistics. Centre for Research on Social Determinants of Health. Shiraz University of Medical Sciences, Shiraz, Iran
Introduction

Having a child is an event that plays a major role in the quality of life of each pair. (1) Infertility medical problems in the world today. Infertility is a common problem that one sixth of couples that have them. (2) By definition, infertility, pregnancy means a couple of years, no one has been closely guarded. (1) The main causes of infertility are due to sperm abnormalities, ovulation disorders investments such as polycystic ovarian syndrome, tubal damage, cervical factor and unexplained infertility. (3,4) In approximately 15-10% of couples experience infertility covers. (5,7,6) In the year 1955, approximately 15% of couples suffering from infertility. Evidence shows that not only Western countries but also in developing countries, fertility rates are falling man. (8) As mentioned above, such as infertility, PCOS is.

This syndrome is a disorder that primarily Oligomenorrhea or amenorrhea with clinical and laboratory evidence Hyprandrogeny is determined. (3) Ovulation disorders generally constitute 30-40% of infertility cases. Statistics syndrome criteria in Rotterdam 6/14% have been reported. (9) This syndrome is characterized by three Rotterdam criteria, which include: 1 - Low-ovulation or an ovulation which usually oligomenorrhea, amenorrhea, polynenorrhea 2 - Increased levels of circulating androgens, hirsutism 3 - polycystic ovaries on ultrasound that are observed. (3,9,6,5) The symptoms and treatment of infertility due to polycystic ovarian syndrome affecting the industry , nutrition is one of the most common and most often forgotten is the environmental factors that can affect the pregnancy . The relationship between good nutrition and reproduction is found. (2) at the onset and maintenance of good food is normal reproductive function . (10) However, the effects of nutritionnon human fertility have been studied less (11).

Antioxidants such as vitamin E (tocopherol), vitamin C (ascorbic acid) and vitamin a (carotenoids) play an important role in maintaining the balance of supply or oxidant - antioxidant in the body are responsible(12). Including antioxidants, vitamin c, which is a micronutrient with increasing fertility is associated. Vitamin C as an antioxidant single chain, can stop the spread of the peroxidative be. Largest gathering place for the vitamin Pituitary, adrenals and gonads Glands is. Vitamin in the gonads of ovarian Tecca the inner layer, granulosa and luteal accumulates (13). Half-life of vitamin c in the body 2 weeks. Mg/ kg1 daily vitamin in the body can be interchanged.
Among women of reproductive cycles in the middle, with the increasing temperature and the secretion of LH, causing changes in ascorbic acid secretion is increased excretion of ascorbic acid changes in the late follicular phase and decreased Quick before ovulation and after a rapid increase in body temperature is rising. (14,16,15,17).

In 2003, at the Medical University Hospital, Sapporo, as a study to evaluate the effect of ascorbic acid supplementation in patients with luteal phase defect case -control study. Women in the study were 313 patients with mid-luteal phase progesterone level less than 10 ng were chosen. Progesterone levels after ovulation on days 3,5, and 7 were measured during two consecutive cycles, and Then the patient during two consecutive cycles were taking 750 mg of vitamin c .hormone levels were evaluated again. The results showed that ascorbic acid supplementation increases the levels of progesterone and parity groups increased. (16) In study Minireview Martin et al (1995) found results that include: 1 - There is a strong correlation between the size of the follicles and concentrations of ascorbic acid 2 - Vitamin C is a regulator of fertility in women.3-In order to maintain high levels of ascorbic acid during fertilization and embryonic membrane resistance is essential. 4 - The use of 500 mg of vitamin C during pregnancy can reduce birth defects. (13) Many factors are associated with infertility character of these studies found different solutions for the recommended treatment, but the treatment of complications such as syndrome Over stimulated of the ovaries, multiple pregnancy Introduction pelvic pain discomfort, signs associated breast pain are gastrointestinal. Therefore, we intend to study the effects of vitamin C supplementation as therapy that minimizes side effects and yet is consistent and appropriate to the level of related hormones in infertile women with polycystic ovaries syndrome look balanced diet.

Material And Methods

In this study, 56 eligible women attending infertility clinics as well as hospitals, clinics, maternal and child martyr Shiraz were selected. This study was a randomized clinical trial by (RCT) crossover double blind, which is based on measuring the effectiveness of supplementation of vitamin C on hormone levels in infertile women with a balanced diet clinic Women's Hospital, mother and children), Ghadeer (and training center -lack of vitamin c. information about the importer (IRCT) study center clinical trial in Iran.
Certified Ethical conduct research to No. CT-91-6086 was obtained from the university. Were all infertile women with PCO and during He went to the center for the project, no history of chronic disease, and also at least one year of infertility and PCO confirmed he was the expert. Data and information collection process will include the following: Daily dietary recall questionnaire, demographic and serological data. The first questionnaire, demographic and medical questionnaire included questions on age / The number of marriages / Education / Career / age / number of pregnancies / abortions / number of years of infertility / age at menarche / distance between Menstruation / the bleeding / menstrual period / discharge of a breast / having met 2 Rotterdam / non-use of alcohol / drugs, no hormones / no abnormal bleeding / have mercy on normal / Normal sperm wife/ sex hormone disruption and ... Were measured. Questionnaire II, the daily number of meals per day recalls / use of alcohol or alcoholic beverages / Daily and Weekly meal were.

Results

During the treatment phase of the study in treatments A and treatment B, 42 patients have received. Based on these results before and after the first P-Value in any of the hormones studied are not significant. Based on the analysis of changes in FSH levels before and after the intervention in the first round in Group A 05/3 ± 06 / 1 and treatment group B 18/3 ± 21/0 , which shows the changes between the two groups, the first (316/ 0 = P) was not significant. Estradiol hormone changes in the first period after the intervention than before the intervention and treatment group A 8/9 ± 71/9 and treatment group B 18/10 ± 84/120 , which shows the change in the treatment of hormone B (placebo) was the most active drug a (vitamin C) is lower, but the results of the analysis show that within the group in the first period in both groups had significantly increased levels of as noted, the rate of change drug B is greater.

Testosterone hormone changes suggests that the hormone changes with treatment B (placebo) was greater using drug a (vitamin C) , though the change is less variation between the two groups during the first (428/ 0 = P) was not significant. However, the analysis results show that within the group in the first period, both groups had significant incremental changes. Changes in hormone Progesterone is also a significant difference between before and after intervention were found between the two groups ( 936 / 0 = P) , but the treatment group B (placebo) no significant difference was observed between pre-and post-intervention levels of the hormone.
(038/0 = P)7 reached the level of the hormone therapy group intervention BA 3/ 3 ± 76/ 5 and after treatment with vitamin C to 2/ 3 ± 62/ 7, and is therefore treated with FSH levels greater BA AB treatment group increased. Table1 shows the results of the second stage and Estradiol levels in Group A before 45/ 17 ± 66/ 42 and after the intervention to 6/ 13 ± 5/ 34 in group B reached before 25/ 16 ± 61/ 39 and after intervention 95/ 12 ± 63/ 33 and it has been shown that hormone levels decreased in both groups and this decrease was more marked in the group. In the study of hormone levels Testosterone according to Table1 also shows that the average level of this hormone before the second in the group A 41/ 0 ± 88/ 0 and after the intervention to 27/ 0 ± 72/ 0 is the mean surface hormone in Group B before 35/ 0 ± 85/ 0 and after intervention 34/ 0 ± 74/ 0 is reached and thus reduce the average Testosterone levels in the treatment group at than group B was treated.

Table1: Comparison of the observed mean difference between before and after the first and second treatment groups A and B

<table>
<thead>
<tr>
<th>Variable</th>
<th>The first period</th>
<th>The second period</th>
<th>Changes before and after Intervention</th>
<th>P-Value (Intergroup)</th>
<th>Changes before and after Intervention</th>
<th>P-Value (Intergroup)</th>
<th>A Mean ±SD</th>
<th>B Mean ±SD</th>
<th>P-Value (Between the group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.033</td>
<td>1.35 ±2.71</td>
<td>0.126</td>
<td>1.06±3.05</td>
<td></td>
<td></td>
<td>A Mean ±SD</td>
<td>B Mean ±SD</td>
<td>P-Value (Between the group)</td>
</tr>
<tr>
<td></td>
<td>0.186</td>
<td>2.68± 0.80</td>
<td>0.757</td>
<td>0.21±3.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;0.001</td>
<td>-0.22± 0.010</td>
<td>0.072</td>
<td>0/ 08±0.20</td>
<td></td>
<td></td>
<td>A Mean ±SD</td>
<td>B Mean ±SD</td>
<td>P-Value (Between the group)</td>
</tr>
<tr>
<td></td>
<td>0.054</td>
<td>0.374</td>
<td>-</td>
<td>0.428</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>progesterone</td>
<td>0.002</td>
<td>-0/ 21± 0/ 16</td>
<td>0.015</td>
<td>0.140±24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.003</td>
<td>-5.98 ± 8.26</td>
<td>&lt;0.001</td>
<td>9.71±9.8</td>
<td></td>
<td></td>
<td>A Mean ±SD</td>
<td>B Mean ±SD</td>
<td>P-Value (Between the group)</td>
</tr>
<tr>
<td>Testosterone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>estradiol</td>
<td>&lt;0.001</td>
<td>-8.15±7.51</td>
<td>&lt;0.001</td>
<td>12.84±10.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.377</td>
<td></td>
<td>&lt;0.001</td>
<td>0.316</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In contrast to the treatment of hormone FSH, estradiol and Testosterone in Table 2 is also observed that the amount is not significant likely effects on the level of these hormones. (Table 2).

Table 2. Compared hormone levels in women treated with AB and BA both the first and second post-intervention

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Hormone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment effect</td>
<td>FSH</td>
</tr>
<tr>
<td>Treatment effect</td>
<td>Estradiol</td>
</tr>
<tr>
<td>Treatment effect</td>
<td>Testosterone</td>
</tr>
</tbody>
</table>

Discussion

Researcher in basic research-the application was designed to be the first time the relationship between the use of vitamin supplements and a balanced diet on the level of certain hormones in infertile women with polycystic ovary syndrome is unknown. The overall objective of this study was to evaluate the effect of vitamin C supplementation on the levels of related hormones in infertile women with polycystic ovaries syndrome associated with a balanced diet in order to better understand the levels of related hormones in infertile women by providing practical effective in the prevention and education counseling in fertile women with the polycystic ovary., one of the issues discussed in PCO disrupt hormone levels in these patients. Research findings on the pathology of polycystic ovary syndrome and the effect of vitamin supplements and a balanced diet on levels of related hormones in infertile women with polycystic ovaries syndrome, which is a balanced diet women training center-maternal and Child health hospital, Motahari and Gynecology Clinic(Ghadeer) was a Persian date Shahrivar 1391 to May 1392.

Because each person in the study group and control group were (cross), the profile of AB and BA are the same in both groups, and both groups were similar in terms of the above criteria. The matched groups, possible differences in the results reduce. Meals used in this study by both groups was not significantly different but they’re balanced diet with foods list vitamin C was given. Appears to be due to the fact that PCOS is common to both groups, there was no difference in the regularity of cycles in terms of logic is acceptable.
In the first study we found that changes in FSH after 1 month baseline $3 \pm 76/5$ in the treatment group AB and vitamin C to $2 \pm 82/6$ is increased although the change in the time but the change is not statistically significant in terms of the distance change between pregnancy and menstrual bleeding menstrual period should be considered as well as the quantity and the changes of a in the treatment group is B. Although mean changes observed after 1 month of treatment between the two groups was not significant. But this change in treatment group A is greater than B. It seems that the second stage of the study and handling of the two groups change these parameters were greater in the treatment group AB.

In the study, Douglas et al on patients with PCOS with diet low in carbohydrates was found that the weight loss and reduced insulin concentrations in these patients, no significant change in FSH does not exist. (19) As well as the study of Moran and there was no significant difference in BMI of our subjects. Sash and Associates study also showed that the protein and carbohydrate diet with a reduced glycemic load, FSH levels did not change significantly in Ayjadknd. (22), and therefore these studies are consistent with our results. But no evidence of a study consistent with the study found. The next variable is the hormone estradiol. Firstly, this study showed that the hormone estradiol changes after a month in the treatment group AB baseline $62/11 \pm 9/29$ and then taking Vitamin C $25/16 \pm 61/39$ in the treatment group but increased by BA after a month with a baseline $35/12 \pm 81/29$, with placebo to $45/17 \pm 66/42$ increased the levels of this hormone in the first stage of BA and although the mean difference changes observed after 1 month of treatment between the two groups was significant, but changes in treatment group B than A is.

The second stage of the study and handling of the two treatment groups was seen in the changes of these parameters in the treatment group B A was higher. Study of Moran et nutrition or weight loss correlated to the estradiol in patients with an ovulation no (20). These studies are in agreement with the results of our project. But Henmi and Associates study that was conducted on the effect of ascorbic acid supplementation showed that estradiol levels significantly after ascorbic acid supplementation increases. (16) This is in agreement with our study. The study also investigated the effect of vitamin C on hormone levels Testosterone. Study showed that the hormone level changes in the hormone therapy group AB with baseline $27/0 \pm 70/0$ after a month of taking Vitamin C to $35/0 \pm 85/0$ BA and spent a month in the placebo group reached the baseline $41/0 \pm 79/0$ to $41/0 \pm 88/0$ is increased.
There were no statistical significant levels of these hormones and the changes in the AB group were significantly higher than BA. The second stage of the study and handling of the changes in these parameters were observed in both treatment groups decreased in both groups was higher in the treatment group AB. The study JEFF and colleagues examined the results of several projects show that dietary fats have a significant effect on testosterone's (23) that this study, our results are consistent, however, in this study, Douglas et al on patients with PCOS using low-carbohydrate diet was found that the weight loss and reduced insulin levels in these patients, no significant changes in total testosterone (19). also Moran et al study also found no significant association between food components on testosterone (20). these studies are inconsistent with our results.

The next variable in this study was designed to examine the effect of vitamin C on serum hormone is progesterone. Study showed that the hormone level changes in the hormone therapy group AB, with baseline 83/4 ± 23/9 After a month of vitamin C 15/4 ± 34/10 reached the BA group and the placebo group consumed a quarter of the baseline 34/4 ± 79/8 to 52/5 ± 96/9 has increased. told the media that changes were observed in both groups and the difference is significant at the level of the hormone in BA and AB are significantly higher than the rate of change in BA. Gl decreased progesterone levels did not change significantly in Ayjadknd (22). Although the overall effect of the diet is as though we are in agreement with the study. But Henmi et al study on the effect of ascorbic acid supplementation on serum progesterone was performed on patients with luteal phase defect progesterone levels showed a significantly increased after ascorbic acid supplementation (16). The study is inconsistent with our results. According to the fore mentioned studies because vitamin C and vitamin volatile and easily oxidized upon exposure to air and heat caused by high alkaline copper is destroyed. Remember that the context is quite limited. The vitamins in people, who are under stress, are consumed more quickly. Also, due to degradation during processing and cooking loss, dietary vitamin C in foods is much less than the calculated value (24).

**Conclusions**

Our high doses of vitamin C on hormone levels in infertile women with PCO, but we review our results, vitamin C, the changes in the levels of certain hormones, but did not show any effect on the comparison of mean hormones.
Given the above, in order to reach a final decision on PCO and vitamin C supplementation as therapy to introduce still has a long way to clarify this association studies with the greater volume and treatment of at his field is required.

Acknowledgments:

This study was approved by the research project No. 6086-91 on 03/25/91 by Shiraz University of Medical Sciences. This is sincerely appreciated. It is also part of a thesis paper for a master's degree in midwifery and approved by the University Of Shiraz Medical University Of Medical Sciences Research Deputy Hereby as the part of all personnel and this is sincerely appreciated. Outstanding at the end of the junior professors and university faculty strongly support Mrs. Forouhari we finally thanks and gratitude.

References


Comhaire F. The role of food supplementation in the treatment of the infertile couple and for assisted reproduction. Department of Endocrinology, Ghent University Hospital, Belgium. Andrologia. 2010; 5. P. 331-40.


