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Effects of Vitamin E, Calcium Carbonate and Milk of Magnesium on Muscular Cramps in Pregnant Women

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Muscular cramp is a painful, local and unusual contraction of one or a group of muscles; more than half of pregnant women suffer from leg muscular cramps. The present study investigates the effect of vitamin E treatment, milk of magnesium suspension and calcium carbonate treatment on pregnant women with leg cramps. This is a descriptive cross-sectional interventional study on 120 pregnant multiparous women aged between 25 to 35 years which suffered from muscular cramps and were in 25-28th week of gestational age provisionally referred to shahrekord gynecology clinic between September 2004 and July 2005. They were randomly divided to three groups. The number, tensity and duration of cramps were registered for a term of 45 days the first group was given vitamin E, second group was given milk of magnesium suspension (oral) and third group was given calcium carbonate tablet. On 45th and 90th days of treatment, the number, tensity and duration of muscular cramps was repeatedly examined. Mean of cramp duration in each three groups was reduced in second visit but in third visit only that group which took vitamin E showed reduction in mean cramp duration. During the second visit of all three groups had reduction in the number of leg cramps in comparison with the first visit and means the tensity of cramp pains was reduced but in third visit (after 90 days of treatment) the severity and number of pains in first group remarkably was reduced in comparison with two other groups. It seems that vitamin E is more effective in reduction of number, severity and duration of leg cramps during the pregnancy in comparison with milk of magnesium suspension and calcium carbonate.

Key words: Muscular leg cramp, comparison, vitamin E, milk of magnesium suspension, calcium carbonate

INTRODUCTION

Muscular cramp is referred to exquisite involuntary, uncontrollable and painful contractions of one or group of muscles in non myopathic and non naturopathic involved persons (Mandle *et al.*, 1995). The exact reason of cramps is still unknown, but risk factors include weak physical condition, imbalance of electrolytes and minerals and firm and nonflexible muscles (Martin, 1998).

About half of pregnant women suffer from painful spasms in underneath organs, especially in legs. Nocturnal leg cramps are common and it is usually observed in the third trimester of pregnancy (Mandle *et al.*, 1995; Martin, 1998; Riley and Antany, 1995; Alan, 2003).

Repeated muscular cramps has high incidence during the pregnancy and they almost begin in the 25th week of pregnancy and are continued until the end of that.

These cramps cause a lot of troubles and annoyance to pregnant women and as they often cause mother's insomnia they not only have negative effects on mother's physical condition and activity abilities, but also may have bad effects on the embryo (Cunningham *et al.*, 2001).

In a study, it is mentioned that 45% of women suffer from leg cramps during their pregnancies, 45% of which begins on 25th week of pregnancy and 76% of them have cramps twice or less in a week and 81% of them experience these cramps only during the night (Cunningham *et al.*, 2001).

In another study it is remarked that a large number of women suffer from leg cramps during the second half of pregnancy (Young and Jewell, 2000, 2002).

In another study it is said that 9.5% of pregnant women experience muscular cramps are least once during their pregnancies, which is more common during the second half of pregnancy and among elder and multiparous women and there is no relation between muscular cramps and other pregnancies conditions or embryo's undesirable issues (Riss *et al.*, 1983).

In another study leg cramps incidence in pregnancy is reported less and it is observed only in 30% of women (Hammer and Larsson, 1981).

The mechanism of cramps is still unknown, but its probable reason may be reduction of serum calcium, phosphorus serum increases or a change in calcium metabolism, magnesium reduction. Exertion of more pressure (more weight) on leg muscles during the pregnancy, pressure on blood veins leading to legs caused by uterus enlargement and stress on nerves (Hammer and Larsson, 1981; Pittkin, 1983; Fung and Hokbrook, 1989).

In a study the effects of quinine and vitamin E have been examined for treatment of muscular cramps. Both of them were effective, but considering quinine side effects, vitamin E is suggested as optional treatment (Roca *et al.*, 1992).

For prevention and treatment of leg cramps increasing intake of carbonate calcium or lactate calcium or milk of magnesium suspension is recommended (Hammer and Larsson, 1981; Hammer *et al.*, 1987; Pittkin, 1983; Fung and Hokbrook, 1989; Roca *et al.*, 1992).

Mokhtari *et al.* (2002) study the effect of vitamin E and placebo in the treatment of muscular cramps during the pregnancy has been compared and they showed that vitamin E is more effective in reduction of the number and severity of leg muscular cramps during the pregnancy in comparison with placebo.

In controlled studies the comparison between calcium effect and placebo (Young and Jewell, 2002), quinine (Brasic, 1999), edible magnesium combinations (Dahel *et al.*, 1995) and comparison between calcium and vitamin C (Hammer *et al.*, 1987) edible calcium prescription itself (Hammer and Larsson, 1981) are used.

Young and Jewell (2002) calcium and placebo treatment effects on muscular cramps during pregnancy were inspected on 325 pregnant women, which no was showed any reason to calcium benefits on cramp reduction.

Considering my personal experiences regarding vitamin E's effect on reduction of leg cramps' number, severity and duration during pregnancy, it was decided to study the effect of vitamin E and its comparison with milk of magnesium and calcium carbonate's effects on pregnant women with leg muscular cramp.

MATERIALS AND METHODS

This is a descriptive cross-sectional interventional study that is performed on pregnant women who referred to gynecologic clinic in shahrekord between September 2004 and July 2005.

The method sampling was randomized non presumptive and minimum volume of sample according to minimum volume of sample needed for biological studies, 30 persons were considered in each group and due to possibility of sample loss at the beginning of the study 10 more persons were added to each groups. The total number of samples was 120 persons, whose divided into three groups and each group was included 40 persons which were divided randomizly and turn of coming. Conditions for entry criteria:

Multiparous pregnant women aged between 25-35 years old being in 25th-28th weeks of pregnancy suffering

from leg cramps with normal pregnancy pattern, absence of twin pregnancy, over weight gain and homodynamic background disease, unused medications causing cramp, patients satisfaction conditions of exit from the study were as including criteria for study.

Inconstant consultation, irregular use of medications, observation of medication side effects, termination of pregnancy before EDC and preterm labor deadline of study. And cramp generative medications, diagnose of a certain illness during the study and patient's dissatisfaction to continue considered as excluding criteria.

A form containing demographic information, age of pregnancy, number, severity and duration of muscular cramps were registered for each patient and then a written prescription was given to each of them in order to provide and take it for a term of 45 days.

The first group was given a 100 mg vitamin E oral pill a day, second group was given 8 cc milk of magnesium suspension 8%, oral three times a day before meal and the third group was given a 500 mg calcium carbonate oral pill a day for 45 days. After 45 days, patients were visited again and information about the number, severity and duration of cramps was registered in the form and after 90 days from beginning the treatment patients were visited again and the some information about cramps was gathered and registered. Obtained information was statistically with the help of ANOVA and K² trial analyzes and was done by SPSS, version 10.

The number of cramp during each 24 h was registered by pregnant women, cramp duration was registered per second and cramp severity was shown on a 10 cm ruler, on which number 10 represented maximum pain and number 1 minimum pain. According to these numbers, mother reported low pain rate from 1 to 5 and high pain rate from 6 to 10. These mothers had routine pregnancy care. Mc Caffery's M questionnaire was used in assessment of pain severity.

RESULTS

In the first group with vitamin E treatment, 2 persons were excluded from study because of digestive intolerance, 2 persons because of not consulting any more and one person because of preterm labor were also excluded from the study.

In the second group taken milk of magnesium suspension, 4 persons because of digestive problems (diarrhea) and 3 persons because of absence in next consultations were excluded from the study.

In the third group, given calcium carbonate 5 persons because of intolerance, 2 persons because of constipation and one person because of absence in next consultations were excluded from the study.

Table 1: Frequency of pain severity in 3 groups medication

Visit time	Pain severity	1st group	2nd group	3rd group	Remarkable rate
First visit	Low	1	5	1	0.08
(First consultation)	High	29	25	29	
Second visit	Low	13	10	7	0.26
(After 45 days)	High	17	20	23	
Third visit	Low	21	8	4	0.001
(90 days after the first visit)	High	9	22	26	

Table 2: Comparison of change in duration cramps in 3 group's medication

Change duration cramps	Groups	Statistical index		
		Change average	Criteria error	Meaningful rate
2nd visit to 1st visit	1st group	-15.8	12.4	0.033
	2nd group	-6.8	12.4	
	3rd group	-12.2	14.1	
3rd visit to 2nd visit	1st group	-6.5	12.4	0.046
	2nd group	+0.03	10.2	
	3rd group	-1.5	9.7	

Mean age of the patients was 29.2±3.4 and there was no difference between three groups (p<0.05).

The patients were visited three times for cramp severity, duration and the number, once at the beginning of study, second time on 45th day of treatment and third time after 90 days of treatment.

Pain severity (tensity) was registered as low or high by the patients and at the beginning of study, at first visit and after 45 days of treatment, no difference was observed in pain severity (tensity) among the groups (Table 1).

Using ANOVA trial in comparing each group with two other groups, p<0.05 and in all groups the number of patients with cramps with high tensity had a reduction on second visit in comparison with the first visit. But after cutting of treatment and patients' visit on 90th days later, pain rate in the group given vitamin E was remarkably lower than two other groups (p<0.001) and during this term, the number of patients with exquisite pain had been reduced in the first group (it was reduced from 17 to 9 persons). In two other groups this number had been increased (in second group from 20 to 22 persons and in third group from 23 to 26 persons).

As can be shown from Table 2, mean of cramp duration in every three groups is reduced in the second visit and in the third visit reduction is observed only in the first group.

At the beginning of study mean cramp duration in first group was 42.2±16.9, in the second group 32.5±7.1 and in the third group 43.8±5.4.

Cramp duration is reduced in each group after 45 days, this reduction in first group is, 15.8±12.9, in second group is -6.8±12.4 and in third group is, 12.2±14.1 Considering remarkable observed rate between three groups, the group taking vitamin E showed most reduction in cramp duration after 45 days of treatment. After cutting of treatment on all groups and assessment

Table 3: Comparison of number leg cramps in 3 group medication

Visit time	Group	Statistical index		
		Average	Criteria error	Meaningful rate
1st visit	1st group	5.5	2.2	0.482
	2nd group	4.7	3.4	
	3rd group	4.9	1.7	
2nd (after 45 days)	1st group	2.8	1.3	0.089
	2nd group	3.6	1.9	
	3rd group	3.6	1.5	
3rd visit (After 90 days)	1st group	2.2	1.4	0.008
	2nd group	3.7	2.7	
	3rd group	3.4	1.4	

of cramp change rate in third visit in comparison with the second one, cramp duration in first and third groups had still been reduced, but in second group it was almost stable, cramp duration change rate from second visit to the third one in first group was -6.5 ± 12.4 , in second group: $+0.3 \pm 10.2$ and in third group it was -1.5 ± 9.7 .

The results are meaningful and show that the group taken vitamin E had more reduction in cramp duration after the cut of treatment compared to two other groups.

The number of cramps on each day (according to patient registration) was assessed. As showed in Table 3, at the beginning of study the mean of cramp numbers was 5.5 ± 2.2 , 4.7 ± 3.4 and 4.9 ± 1.7 , in first, in second and in third group, respectively which shows no remarkable difference between groups. In second visit the number of cramps in first group was 2.8 ± 1.3 in second group, 3.6 ± 1.9 and in third group 3.6 ± 1.5 . In third visit the number of cramps was 2.2 ± 1.4 , 3.7 ± 2.7 and 3.4 ± 1.4 in first, second and third group, respectively.

In second visit the number of cramps in all three groups is reduced comparing with the first visit and this reduction in two groups no showed meaningful difference with another group, but in third visit after discontinuance of treatment and patient assessment after 45 days, the group taken vitamin E showed least cramp number with average of 2.2 ± 1.4 .

DISCUSSION

At the beginning of the study, patients' age was registered in each group and statistical data shows that mean age in all groups had been almost the same and there was no meaningful difference between groups, regarding age.

Severity (tensity), number and duration are three criteria, which were suggested for cramp and in each treatment; changes were assessed by these three criteria.

Cramp severity in all patients of three groups at the first visit was the same and there was no meaningful difference between them. After 45 days of treatment in first group with vitamin E, in second group with milk of magnesium suspension and in third group with calcium carbonate, obtained results from data analyses showed, although all three groups had reported a reduction in

cramp severity after the treatment, this reduction is almost the same in all three groups. Concerning previous studies, which suggest magnesium is effective in cramp reduction (Riley and Antony, 1995; Alan, 2003) this study reached the same conclusion and magnesium had reduced cramp severity after 45 days of treatment. There are some studies indicating selflessness of calcium carbonate in pregnancy cramp reduction, but obtained results from this study contrast with it, however there are other studies indicating calcium carbonate is useful (Young and Jewell, 2002) and our results may be an approval of it.

Vitamin E was also effective patients' cramp severity (tensity) and its effect is almost the same with the effect of milk of magnesium and calcium carbonate treatment during 45 days of treatment and it didn't have any predominance.

In the second visit there is no reason to consider vitamin E predominant over other treatments in reduction of cramp severity, but after cutting treatment and visiting patients after 45 days, patients cramp tensity-severity in first group still had a reduction, but in the second group, this tensity-severity not only had no reduction but also it was increased and the results of three groups were meaningful regarding cramp tensity in third visit.

The persistence of vitamin E's effect in cramp even after cutting, its result may be of vitamin E's long term maintenance in body (Conolly *et al.*, 1992) or its distinct effect on muscular cramps (Martin, 1998; Mir Hossein and Rafiyan, 2002) (considering that there is no placebo effect after the treatment discontinuance (cut). Therefore this study suggests vitamin E as a more effective medication in comparison with other medications in treatment of cramps.

The results showed that at the beginning of study considering randomized allocation of cases to groups and concentration only on patient's age, cramp duration was different between three groups in the first visit and the least mean of cramp duration belonged to the second group. Therefore cramp duration differences of a person were compared from second visit with the first one and in third visit with the second one and this comparison had also been analyzed.

Cramp duration in all these groups has been reduced after 45 days of treatment, but the rate of this reduction didn't show a special predominance for any treatment and the effect of 3 above mentioned medications was the same on cramp duration. But assessment of cramp duration change rate in third visit in comparison with second visit showed a meaningful difference in each group, which reveals that vitamin E is more effective in cramp duration in comparison with other medications.

After treatment cut and patient visit 45 days later, cramp duration in the group taken vitamin E was still reduced, but in two other groups it remained without any change. Vitamin E's effect resistance even after 45 days

after treatment cut shows that this medication is more effective in cramp reduction than other options. Also the assessment of change rate in third visit in comparison with second visit approves the better effect of vitamin E in cramp duration. The effect of vitamin E on cramp and its long term reservation derived from this study is correspondent with other studies (Hammer *et al.*, 1987; Brasic, 1999; Dahel *et al.*, 1995; Mokhtari *et al.*, 2002; Mir Hossein and Rafiyan, 2002). The effect of vitamin E and two other medications on the number of muscular cramps of patients was also assessed.

In the 1st visit, the mean number of cramps in all three groups was the same. During the second visit all three groups had a reduction in cramp number, which was almost similar, but in the third visit despite treatment cut, cramp number was still reducing in first group, but two other groups were remained without any change. This result also showed that the best treatment of cramps number is vitamin E, which is one more approval for my articles and my personal experiences about vitamin E's treatment effect on pregnancy cramp. The review of third visit's results about the effect of vitamin E on severity-tensity duration and number of cramps are definite.

Also considering the increase of pregnancy cramp related to the rise of pregnancy age (Riss *et al.*, 1983; Fung and Hokbrook, 1989), the results showed that all three above mentioned medications are however plays a role in controlling the cramp, but vitamin E is more effective and this fact approves the previous presented study (Roca *et al.*, 1992; Conolly *et al.*, 1992; Mir Hossein and Rafiyan, 2002; Alan, 2003).

Concerning cramp appearance in such conditions like dehydration, Hypoxia, electrolyte disorder and microscopic environment change of cells, oxidants may be one of the factors of its appearance, (Martin, 1998; Riley and Antony, 1995) and vitamin E's effect as antioxidant may be explanation to the effectiveness of vitamin E on cramps, however this issue implies laboratory studies.

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