

# **The efficacy of omega-3 supplements in prevention of preeclampsia among pregnant women with high risk factors in Sulaymaniyah governorate**

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## **ABSTRACT**

Hypertensive disorders of pregnancy, including preeclampsia, complicate up to 10% of pregnancies worldwide, constituting one of the greatest causes of maternal and perinatal morbidity and mortality worldwide. The aim of the current study is to evaluate the efficacy of omega-3 supplements in prevention of preeclampsia among women with high risk. This study was carried out at Shanroy Hospital in al – Sulaimanya city from January 2016 till December 2016. In a single blind clinical trial, a total of 100 pregnant women were divided into two groups, one group had received omega-3 1000 mg and another group receive capsule prefilled with glucose as placebo.

Selection criteria include: primipara women, ages under than 20 and above 40 years, previous history of preeclampsia or positive family history, obesity, history of renal disease and hypertension. Demographic profile with pregnancy length and neonatal outcome were recorded. The result of this study showed there was significant difference in development of preeclampsia during current pregnancy between omega-3 and placebo groups and there was a significant relationship ( $p < 0.05$ ) between both groups when compare the preeclampsia in its all forms. In conclusion, omega-3 deems promising drug for prevention of preeclampsia in pregnant women with high risk.

**Keywords: Preeclampsia, omega-3, pregnant women with high risk.**

## Introduction

Hypertensive disorders of pregnancy, including preeclampsia, complicate up to 10% of pregnancies worldwide, constituting one of the greatest causes of maternal and perinatal morbidity and mortality worldwide [1]. Pathophysiology and aetiology of preeclampsia are not completely known and are still under investigation. The dominant hypothesis of preeclampsia is decreased placental uterine perfusion due to defective invasion of cytotrophoblast to uterine spiral arteries. Other hypotheses include intolerance of mother's immunity with fetal-placental tissues, incompatibility of mother with cardiovascular inflammatory changes during normal pregnancy, nutritional deficiencies and hereditary factors. Preeclampsia is known as the disease of theories and there is no cause, treatment, valid and cost-effective preventive and predictive methods for it yet [2].

It's widely believed that defective trophoblast invasion results in relative under-perfusion of the placenta and that this releases a factor (S) into the maternal circulation that targets the vascular endothelium. The nature of this factor has not been identified, although numerous candidates have been proposed including a variety of growth factors, cytokines and products of oxidative stress caused by hypoxic-reperfusion injury in the placenta. As the target cell of the disease process, the vascular endothelial cell, is so ubiquitous, preeclampsia is a truly multisystem disease, affecting multiple organ systems, often concurrently [3]. Omega-3 FA, found primarily in fatty fish with high oil content, consists of both eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) [4]. Both fatty acids and EPA in particular, have close homology with arachidonic acid (AA), with EPA and AA differing only in the presence or absence of the omega-3 (n-3) double bond respectively [5].

Research has shown increasing evidence for anti-inflammatory, antithrombotic, antiarrhythmic and antiatherogenic effects of fish oil. Fish oil is the most significant source of dietary omega-3 FA [4]. The anti-inflammatory activity of EPA and DHA are due to inhibition of the oxidation of arachidonic acid (AA) by the cyclooxygenase (COX) and lipoxygenase enzymes that are pivotal in the production of the C20 oxylipids, known as eicosanoids (eicosa means twenty in Greek). These mediators are important in regulating various homeostatic functions, including the gastric mucosal integrity, vascular patency, homeostasis and inflammation [6]. Sufficient supplementation of omega-3 fatty acids is vitally important during pregnancy as they are critical building blocks of fetal brain and retina. Omega-3 fatty acids are critical for fetal neurodevelopment and may be important for the timing of gestation and birth weight as well. Omega-3 fatty acids may also play a role in determining the length of gestation and in preventing

perinatal depression [7,8]. The aim of the current study is to assess the influence of omega-3 fatty acids (EPA,DHA) on prevention of development of preeclampsia in pregnant women with high risk.

## **Patients and Methods**

### **Study design**

This study was carried out at Shanroy Hospital in al –Sulaimanya city from January 2016 till December 2016. In a single-blind clinical trial 100 pregnant women with risk of preeclampsia and gestational age of (18) weeks were participate in this study after receive a literal agreement. The sample was randomly divided in to two groups, one group take omega-3 1000 mg capsule daily and the second group take capsule prefilled with glucose as placebo. Omega-3 capsule was supplied by Adrien Gagnon, Canada. Whereas glucose was supplied by SDI, Samarra, Iraq.

Demographic and obstetric data were recorded on special forms for each participant. Gestational age determination was based on precisely recalled menstrual dates as they were having regular menstrual cycles, and further confirmed by their first or early second trimester ultrasound. Selection criteria include:-primipara women, ages under than 20 and above 40 years, previous history f preeclampsia or a positive family history, twin pregnancy, obesity, history of renal disease and hypertension, history of diabetes mellitus. Pregnant women were visited monthly until the end of pregnancy and their health and possible side effects of drug and placebo were evaluated. Apgar score was assessed at 5 and 10 minutes at the time of delivery, delivery information and the presence of preeclampsia were investigated.

The collected data have been transferred to the computer on the SPSS manager system (the statistical package for social sciences) version no. 18,. Both descriptive and analytic statistics have been carried out and the relation between the variables by using Chi-square ( $\chi^2$ ), and ANOVA (Analysis of Variance) was used to compare between means of numerical variables when we have multiple observation at each level. The level of statistical significance of P value was 0.05

## Results

The study population consists of 100 pregnant women who having risk factors for development of preeclampsia. They divided in to two groups, group 1 consist of 50 pregnant women who received 1000 mg of omega-3capsule, and group 2 consist of 50 pregnant women who received placebo, from table (1) it was founded that mean age of omega-3 group  $\pm$  standard deviation was  $(28.7 \pm 7.28)$  yr. and for placebo group was  $(29.26 \pm 6.4)$  yr.

About parity it was found that primipara account 19 of omega-3 group (38%) and 12 (24%) from placebo group, while previous history of hypertension in its all form among omega-3 group were 47 (94%) and previous history of hypertension in its all form among placebo group were 44 (88%).

Only 2 cases with diabetes mellitus and 5 cases with history of renal diseases while 19 cases with obesity were found among omega-3 group, while in placebo group only 2 cases of renal disease and 11 case of obesity were found.

**Table (1) Descriptive of study variables among omega-3 and placebo groups.**

	Variable	Omega-3 n=50		Placebo n=50	
1-	Mean age in year $\pm$ SD	28.7000 $\pm$ 7.28221		29.2600 $\pm$ 6.40092	
2-	Parity:	No.	%	No.	%
	Primipara	19	38	12	24
	Multipara	31	62	38	76
	Total	50	100%	50	100%
3-	Hypertension:				
	No	3	6	6	12
	Family history	21	42	20	40
	Previous history of PET	17	34	9	18
	Essential hypertension	9	18	15	30
	Total	50	100%	50	100%
3-	Diabetes Mellitus				
	Yes	2	4	0	0
	No	48	96	50	100
	Total	50	100%	50	100%
4-	Renal disease :				
	Yes	5	10	2	4
	No	45	90	48	96
	Total	50	100%	50	100%
5-	Obesity:				
	Yes	19	38	11	22
	No	31	62	39	78

Regarding the development of risk factors during current pregnancy, it was found that 28 cases out of 50 (56%) delivered by normal vaginal delivery in omega-3 group and 42 women from 50 (84%) in placebo group were delivered by NVD. While 16 cases developed PE out of 50 cases (32%) in omega-3 group but among placebo group only 7 pregnant women developed sever PE out of 50 case (14%).In assessment of Apgar's scores measurement of newborn who delivered by study population it was found that 7/50 were having poor Apgar's scores among omega-3 group and 13/50 from placebo group, as demonstrated in table (2).

**Table (2) Risk development of current pregnancy among omega-3 and placebo groups**

<b>Risk factor</b>	<b>Omega-3 n=50</b>	<b>Placebo n=50</b>
Mode of delivery:		
NVD	28	42
C/S	22	8
PE during current pregnancy		
Mild	9	0
Moderate	2	0
severe	5	7
NO	34	43
Apgar's scores		
8-10	43	37
5-7	7	13

By applying ANOVA statistical test for study the age of both omega-3 and placebo groups , it was founded that there was no significant relation between mean age in years between omega-3 and placebo groups as in table (3).

**Table (3) ANOVA statistical test for relation between omega-3 and placebo groups in relation to age in years**

	Sum of Squares	df	Mean Square	F	Sig.	comment
Between Groups	6.630	21	.316	1.340	.177	Not sign.
Within Groups	18.370	78	.236			
Total	25.000	99				

From table (4) was shown the relationship between development of PE during current pregnancy among both omega-3 and placebo groups by using Chi-Square test ,there was a significant relationship( $p < 0.05$ ) between both groups when compare the PE in its all form while in comparing the severe form only it was no significant relationship ( $p > 0.05$ ) between both groups .

**Table (4) Assessment of omega 3 usage in relation to development of PE during current pregnancy between omega-3 and placebo groups.**

Risk factor	Omega-3	placebo	Statistical test	Level of significance
PE in its all form during current pregnancy	16	7	$X^2 = 4.574$	0.032 Sig.
Sever form of PE	5	7	$X^2 = 0.379$	0.538 Not Sign.

The study showed that there was significant relationship between both study groups and mode of delivery by applying Chi-Square statistical test p-value less than 0.05 level of significant as showed in table (5).

**Table (5) Assessment of omega 3 usage in relation to mode of delivery of current pregnancy between omega-3 and placebo groups.**

Risk factor	Omega-3	placebo	Statistical test	Level of significance
Mode of delivery				
NVD	28	42	$X^2 = 9.333$	0.002 Sig.
C/S	22	8		

It was found that there was no significant difference between omega-3 and placebo groups regarding pregnancy outcome by measuring Apgar's scores through applying Chi-square test from table (6) only 7 cases their newborn babies were Apgar's scores between 5-7 which was poor in omega-3 group and from placebo group 13 newborns born with poor Apgar's scores

**Table (6) Assessment of omega 3 usage in relation Apgar's scores assessment of newborn between omega-3 and placebo group.**

Apgar scores	Omega-3	placebo	Statistical test	Level of significance
8-10 5-7	43 7	37 13	$X^2=0.0749$	0.784 Not Sign.

## Discussion

Omega-3 is a polyunsaturated fatty acid that may reduce blood pressure and brain and heart attacks affecting the production of prostaglandins and reducing unwanted fat, vasodilatation and platelet adhesion. In a study by Schiff et al.[ 9], they expressed that thromboxane A2 levels and the risk of preeclampsia is reduced after the daily administration of 1.6 g of omega-3 in the third quarter of pregnancy. The effect of treatment with omega-3 on prevention of preeclampsia in pregnant women with risk was investigated in this study. The result of this study showed there was significant difference in development of preeclampsia during current pregnancy between omega-3 and placebo groups. This result was consistent with a single blind clinical trial performed by Lalooha F.*etal* which concluded that daily use of 1000mg of omega-3 supplements from the second trimester of pregnancy is effective in reducing the risk of preeclampsia and its severity[10]. Our study disagrees with study done by Shao J.*etal* which concluded that omega-3 supplementation in the second half of pregnancy has no effect on the risk of preeclampsia [11]). Our study revealed that there was no effect on reduction of severity of preeclampsia which was inconsistent with Innis SM and Makrides M,*et al* [12,13]. In our study it was found that there was no significant difference between omega-3 and placebo groups regarding pregnancy outcome by measuring Apgar's scores, which was disagree with the study done by Dirix *et al* which obtained a significant relationship between receiving omega-3 especially in early pregnancy and birth weight and Apgars scores at minute 5[14].



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فعالية أوميغا-3 في الوقاية من تسمم الحمل لدى النساء الحوامل اللواتي يعانين من عوامل الخطورة العالية في محافظة السلیمانیة

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## الخلاصة

ارتفاع ضغط الدم أثناء الحمل، بما في ذلك تسمم الحمل، له نسبة حدوث تصل إلى 10٪ من حالات الحمل في جميع أنحاء العالم، التي تشكل واحدة من أعظم أسباب امراضية الأمهات والوفاة في جميع أنحاء العالم. الهدف من الدراسة الحالية هو تقييم فعالية أوميغا 3 الدهنية في الوقاية من تسمم الحمل لدى النساء مع مخاطر عالية. هذه الدراسة اجريت في مستشفى شانروي في محافظة السلیمانیة للفترة من شهر كانون الثاني 2016 ولغاية شهر كانون الاول من نفس السنة. في تجربة سريرية عمياء واحدة، تم تقسيم (100 ) امرأة حامل إلى مجموعتين، المجموعة الاولى تتلقى أوميغا 3 (1000) ملغ كبسول والمجموعة الثانية تتلقى كبسول مملوء مسبقا بالجلوكوز كدواء وهمي. وتشمل معايير الاختيار: النساء اللاتي يحملن للمرة الاولى، نساء تكون أعمارهم تحت 20 و فوق 40 سنة، نساء لها تاريخ سابق من تسمم الحمل أو تاريخ عائلي إيجابي، والسمنة، وتاريخ من أمراض الكلى وارتفاع ضغط الدم . كان هناك علاقة ذات دلالة إحصائية ( $P < 0.05$ ) بين المجموعتين عند مقارنة حالة تسمم الحمل بكافة أشكاله. يستنتج من الدراسة ان دواء الأوميغا -3 له دور في الوقاية من تسمم الحمل في النساء الحوامل اللواتي يعانين من عوامل الخطورة العالية.