Efficacy and Safety of Fish Oil in Treatment of Knee Osteoarthritis

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ABSTRACT

Objective: To study the efficacy and safety of fish oil in treatment of knee osteoarthritis

Material and Method: 75 participants were divided into 3 groups of 25 people to study efficacy results after taking fish oil 1000mg and 2000mg once a day for 8 weeks. In 1000 mg of fish oil contained EPA 400mg and DHA 200mg. All participants had completevisual analog scale for measure knee pain, WOMAC functional subscalefor assess knee function, measure 100 meters walking velocity and 3 steps walking time before take fish oil and re-measure all parameters at 8 -12 weeks after take fish oil to compare the result.

Results: All parameters had statistically significant better difference in the group of participants who had taken fish oil when compared to control group**.** The average score of patient's satisfaction was 9.06 from 10 and also by verbal response of 50 participants everyone felt good and happy with fish oil. One participant had hematuria from silent CA bladder at 10th week but the other 49 participants were safe without any complications from fish oil.

Conclusion: fish oil 1000-2000mg daily supplementation had significant efficacy to improve knee performance and also had safety in mild to moderate stage of knee osteoarthritis patients. But 2000mg of fish oil the higher dose had not significant higher efficacy than 1000mg of fish oil.

Keyword: fish oil, knee osteoarthritis

1. RESEARCH BACKGROUND

Fish oilsupplementshave beenwidely popular especially in theelderlyandpeople whowant tostay healthy. The essential ingredient in fish oil is Omega-3 fatty acids. There are two main types of omega-3 fatty acids. Long-chain omega-3 fatty acids are EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). These are plentiful in fish and shellfish. But Algae often provides only DHA[1], The other type of omega-3, Short-chain omega-3 fatty acids are ALA (alpha-linolenic acid). These are found in plants, such as flaxseed. Though beneficial, ALA omega-3 fatty acids have less potent health benefits than EPA and DHA.

The omega-3 fatty acidseicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), precursors of certain eicosanoids are known to reduce inflammation in the body[2,3], and have other health benefits. Hundreds of studies suggest that omega-3 may provide some benefits to a wide range of diseases e.g.; cardiovascular disease[4], asthma, depression[5,6], cancer[7,8], ADHD, and autoimmune diseases, such as SLE[9] and rheumatoid arthritis. BecauseAllof these diseases have a common genesis in inflammation that in large enough amounts omega-3 reduce the inflammatory process that leads to many chronic conditions. Researchers are also found that fish oil helps relieve joint pain in rheumatoid arthritis[10,11].Polyunsaturated fatty acidsin fish oil have anti-inflammation effects. Reducing leukotriene, substances that cause inflammation help relieve pain. So rheumatoid patients can reduce using of analgesic or NSAIDs[12]. These help reduce complications or adverse reactions from the use of anti-inflammatory drug (NSAIDs). But we have little research on the effects of fish oil to reduce inflammation in patients with osteoarthritis.

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This is the reason for this research to study the efficacy and safety of fish oil in knee osteoarthritis. The results may useful to prevent osteoarthritic pain and promote joint health. Fish oil may be another safety choice for knee osteoarthritis patients. Form review articles, many researches have shown benefits of fish oil supplementation that can alleviate the symptoms of rheumatoid arthritis which almost involve small joints of hands and feet. At least 13 published randomized, controlled clinical trials have reported significant benefits of fish oil supplementation in rheumatoid arthritis patients. But there are few studies of fish oil in human knee osteoarthritis, the larger joint.

2. **OBJECTIVE** To study the efficacy and safety of fish oil in treatment of knee osteoarthritis

3. **METHODOLOGY**
    The study populations were patients with inactive primary knee osteoarthritis include male and female who have aged between40-75years.

Inclusion criteria
- knee Pain with one of these abnormal x-ray finding
- Joint space narrowing
- Subchondral sclerosis (increased bone formation around the joint)
- subchondral cyst formation
- osteophytes
- with one of the 3 following criteria
    - age more than 50 years
    - morning joint stiffness
    - knee crepitation
- Aged40-75years
- Did not receive anti-inflammatory drugs(NSAIDs)within 3months
- Voluntarily consent to participate in the study and signed or fingerprinted by themselves
- Exclusion criteria
- the other diseases that cause arthritis e.g.: autoimmune disease, injury, septic arthritis, congenital joint deformity, hyperuricemiaๆ
- history of bleeding disorder or risk to bleeding e.g.: peptic ulcer

    This was Quasi-experimental research to study efficacy and safety of fish oil in treatment of knee osteoarthritis. 75 participants were divided into 3groups of 25 people.
- Participants group1 : Behavior modification for preserve knee function without fish oil supplement
- Participants group2: Behavior modification for preserve knee function with fish oil 1000mg daily for 8 weeks continuously.
- Participants group3: Behavior modification for preserve knee function with fish oil 2000mg daily for 8 weeks continuously.
    Knee pain score by visual analog scale, knee function by walking velocity on flat ground, times for go up and down 3steps stair and knee function by WOMAC functional subscale had measured and compared before and after the study. Patient's satisfaction and safety after taking fish oil for 8 weeks had also considered. And the study also compared the effectiveness between three groups. The parameters were:
- Knee pain scoring by visual analog scale
- Knee stiffness

- ▪ Knee function
- • Times for Walking 100 meters on flat ground
- • Times for go up and down 3steps
- • Determine subjective knee function by WOMAC functional subscale
- ▪ Patients Satisfaction
- ▪ Safety after taking fish oil for 8 weeks

Statistical analysis

     Descriptive statistic demonstrated demographic data of volunteers such as percentage, mean. Statistical analysis between 3 groups had performed by one way ANOVA, P-value ≤ 0.05 was considered significant.

4. RESULTS

     Seventy-five Thai participants with mild to moderate stage of knee osteoarthritis were recruited from the Thammasat university hospital elderly club and Wat Suwannaram Ayutthaya elderly club. There were 4 males and 71 females participants. Their average age was 66.27 years old and average BMI was 24.20. The diagnosis of knee osteoarthritis was done by knee Pain with one of abnormal x-ray finding criteria and one of symptomatic criteria. The participants must not received anti-inflammatory drugs(NSAIDs) within 3months. All participants had finished the study, nobody dropped out.

     At the beginning, there were no statistically significant of age, BMI difference, 100 meters walking times, knee stiffness score and knee functional score between the three groups. But up and down 3steps walking time was statistically significant difference between group1-group2 and group2-group3 when measured before the study. Existing pain score by visual analog scale also was statistically significant difference between group2-group3

     Participants group1 had only behavior modification for preserve knee function without fish oil supplement. After 8 weeks the participants in this group had increased knee pain score and had impaired knee functional score with statistically significant difference at P-value = 0.0001 and P-value = 0.0039, respectively. 100 meters walking times, up and down 3 steps walking times and knee stiffness score of group1 were not significant difference, as illustrated in table 1.

Table1 comparative analysis before and after the study of Group1 participants by paired T-test

Variable	Mean Before	Mean After	Mean diff	SD	p-value
Walking time	1.2896	1.284	-0.0056	0.1011	0.7843
3steps walking time	6.186	5.9004	-0.2856	0.9300	0.1378
Pain score	2.6285	3.2453	0.6168	0.6470	0.0001
Stiffness score	3.0277	2.6737	-0.354	0.2127	0.1091
Functional score	2.5383	3.1171	0.5788	0.9055	0.0039

     In group2, participants had behavior modification for preserve knee function with fish oil 1000mg daily for 8 weeks continuously, all parameters of this group were statistically significant difference at P-value = 0.0001 when the difference between before and after the study had analyzed by paired T-test, as illustrated in table2.

Table 2 comparative analyses before and after the study of Group2 participants by paired T-test

Variable	Mean Before	Mean After	Mean diff	SD	p-value
Walking time	1.262	1.1764	-0.0856	0.0797	0.0001
3steps walking time	9.0639	7.0439	-2.02	2.1867	0.0001
Pain score	2.064	0.312	-1.752	0.7489	0.0001
Stiffness score	3.02	0.68	-2.34	1.1965	0.0001
Functional score	2.8288	0.7444	-2.0844	0.8646	0.0001

In group3, participants had behavior modification for preserve knee function with fish oil 2000mg daily for 8 weeks continuously, all parameters of this group were statistically significant difference at P-value < 0.0001 when the difference between before and after the study had analyzed by paired T-test, as illustrated in table 3.

Table3 comparative analysis before and after the study of Group3 participants by paired T-test

Variable	Mean Before	Mean After	Mean diff	SD	p-value
Walking time	1.3344	1.1764	-0.158	0.0817	0.0001
3steps walking time	6.0384	5.3744	-0.664	0.7342	0.0001
Pain score	3.656	1.788	-1.868	1.6090	0.0001
Stiffness score	3.52	1.788	-1.732	1.2844	0.0001
Functional score	3.378	1.9008	-1.4772	0.8488	0.0001

The statistical analysis for correlation between three groups had done by one way ANOVA, as illustrated in table4. Between group2 and group1, the result showed significant difference in all parameters. And between group3 and group1, the result also showed significant difference in all parameters except 3steps walking time. The mean of difference of 3steps walking time of group 3 had improved more than group1 but there was not significant.

The significant difference between participant's group2 and group3 had shown in only one parameter, 100 meters walking time. Knee stiffness score and knee functional score showed more better difference in group2 than group3 but there was not significant. There was significant difference of mean 3steps walking time in group2 more than group3. Group3 Participants had more difference in Knee pain parameter than group2 but there was not significant, too.

Table 4 summary of comparative analysis between three groups by one way ANOVA

	mean 100m walking time difference	mean 3step walking time difference	mean knee pain score difference	mean knee stiffness score difference	mean knee functional score difference
Group2-1	-0.08	-1.7344	-2.3688	-1.986	-2.6632
	P=0.006	P=0.0001	P=0.0001	P=0.0001	P=0.0001
Group3-1	-0.1524	-0.3784	-2.4848	-1.378	-2.056
	P=0.0001	P=1.00	P=0.0001	P=0.0001	P=0.0001
Group3-2	-0.0724	+1.356	-0.116	+0.608	+0.6072
	P=0.015	P=0.004	P=1.00	P=0.222	P=0.049

Patient's satisfaction after taking fish oil for 8 weeks also considered and recorded by subjective scoring from 1-10. The average of patient's satisfaction was 9.06. The difference between group 2 and group 3 was not significant. And also by verbal response, all of 50

participants felt good and happy with fish oil. 6 participants asked to buy fish oil from the researcher for themselves to continue and for their cousins.

Table 5 Patients satisfaction after taking fish oil

Satisfaction	Mean	SD	Mean difference	t	P-value
Group2	9.2	0.6454	0.28	1.2556	*0.2154*
Group3	8.92	0.9092			
Total	9.06	0.7930			

One participant had hematuria from silent CA bladder at 10th week but the other 49 participants were safe without any complications from fish oil.

5. CONCLUSION AND DISCUSSION

In this study, all of knee functions and knee pain parameters had significant improved after taking fish oil supplement with highly patient's satisfaction and safety. Noticeably, fish oil 1000-2000mg daily supplementation had significant efficacy to improve knee performance and it was safe in mild to moderate stage of knee osteoarthritic patients. But 2000mg of fish oil the higher dose had not significant higher efficacy than 1000mg of fish oil.

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