Efficacy and Safety of Fish Oil in Treatment of Knee Osteoarthritis

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Objective: *To study efficacy and safety of fish oil in treatment of knee osteoarthritis.*
Material and Method: *75 participants had divided into three groups of 25 people to study efficacy results after taking fish oil 1,000 mg and 2,000 mg once a day for 8 weeks. 1,000 mg of fish oil have EPA 400 mg and DHA 200 mg. All participants had complete visual analog scale for measuring knee pain and knee function. They also had measured 100 meters walking velocity and three steps walking time before taking fish oil. Then they had re-measured all parameters again at 8-12 weeks after taking fish oil to compare the results.*
Results: *All parameters had statistically significant better differences in the group of participants who had taken fish oil when compared to the control group. The average score of patient's satisfaction was 9.06 of 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 1,000-2,000 mg daily supplementation had significant efficacy to improve knee performance and also are safe in mild to moderate stages of knee osteoarthritics patients. However higher dose 2,000 mg of fish oil had not significant higher efficacy than 1,000 mg of fish oil.*

Keywords: *Fish oil, Knee osteoarthritis*

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Fish oil supplements have been widely popular especially in the elderly and people who want to stay 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 eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). These are plentiful in fish and shellfish. However, algae often provides only DHA[1]. The other type of omega-3, short-chain omega-3 fatty acids are alpha-linolenic acid (ALA). 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 acids eicosapentaenoic 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. Because all of these diseases have a common genesis in inflammation that enough amounts omega-3 reduce the inflammatory process that leads to many chronic conditions. Researchers also found that fish oil helps relieve joint pain in rheumatoid arthritis[10,11]. Polyunsaturated fatty acids in fish oil have anti-inflammation effects. Reducing leukotriene, substances that cause inflammation help relieve pain so that 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). Nevertheless, we have little research on the effects of fish oil to reduce inflammation in patients with osteoarthritis. This is the reason for this research to study the efficacy and safety of fish oil in knee osteoarthritis. The results may be useful to prevent osteoarthritic pain and promote joint health. Fish oil may be another safety choice for knee osteoarthritis patients. From many review articles, research has shown benefits of fish oil supplementation that can alleviate the symptoms of rheumatoid arthritis, which mostly involves small joints of hands and feet. At least 13 published randomized, controlled clinical

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trials have reported significant benefits of fish oil supplementation in rheumatoid arthritis patients. However, there are few studies of fish oil in human knee osteoarthritis, the larger joint.

Material and Method

The study populations are patients with inactive primary knee osteoarthritis included males and females aged between 40-75 years with osteoarthritis criteria. The inclusion criteria are knee pain with one of abnormal x-ray finding (Joint space narrowing, subchondral sclerosis, subchondral cyst formation, osteophytes) and symptom of morning knee stiffness or knee crepitation or more than 50 years of age. The participants must not have taken anti-inflammatory drugs (NSAIDs) during the three months before the study, without any diseases that cause arthritis e.g. autoimmune disease, injury, septic arthritis, congenital joint deformity, hyperuricemia and history of bleeding disorder or bleeding risk e.g.: peptic ulcer.

Methods

This is Quasi-experimental research to study efficacy and safety of fish oil in the treatment of knee osteoarthritis. Seventy-five participants were divided into three groups of 25 people. Participants in group 1 had behavior modification to preserve knee function without fish oil supplement. The participants in group 2 had behavior modification to preserve knee function with taking fish oil 1,000 mg daily for 8 weeks continuously. Moreover, the participants group 3 had behavior modification to preserve knee function with fish oil 2,000 mg daily for 8 weeks continuously.

Then the efficacy results of subjective knee pain, knee function by walking velocity on flat ground, times to go up and down three steps and to determine knee function by visual analog scale, are compared before and after the study. Patient's satisfaction and safety after taking fish oil for 8 weeks are also considered. In addition the study compared the effectiveness among the three groups.

Statistical analysis

Descriptive statistics were reviewed to demonstrate demographic data of volunteers such as percentage, mean. Statistical analysis between the three groups performed by one way ANOVA, p-value ≤ 0.05 was considered significant.

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 are 4 males and 71 females participants. Their average age is 66.27 years old and average BMI is 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 receive anti-inflammatory drugs (NSAIDs) within 3 months. All participants finished the study; nobody dropped out.

At the beginning, there were no statistically significance in age, BMI difference, 100 meters walking times, knee stiffness scores and knee functional scores among the three groups. Nevertheless, up and down 3-steps walking time had statistically significant differences between group 1-2 and group 2-3 when measured before the study. Existing pain score by visual analog scale also had statistically significant differences between group 2-3.

Participants in group 1 had only behavior modification to preserve knee function without fish oil supplement. After 8 weeks the participants in this group had increased knee pain scores and had impaired knee functional scores with statistically significant differences at p-value = 0.0001 and p-value = 0.0039, respectively. Moreover, 100 meters walking times, up and down three steps walking times and knee stiffness scores of group 1 had no significant difference, as illustrated in Table 1.

In group 2, participants had behavior modification to preserve knee function with fish oil taking 1,000 mg daily for 8 weeks continuously. All parameters of this group had statistically significant differences at p-value = 0.0001 when the differences between before and after the study were analyzed by paired t-test, as illustrated in Table 2.

In group 3, participants had behavior modification to preserve knee function with fish oil taking 2,000 mg daily for 8 weeks continuously, all parameters of this group also had statistically significant differences at p-value = 0.00 when the differences between before and after the study were analyzed by paired t-test, as illustrated in Table 3.

The statistical analysis for correlation among three groups was done by one way ANOVA, as illustrated in Table 4. Between group 2 and group 1, the results showed significant differences in all parameters. In addition between group 3 and group 1, the results also showed significant differences in all parameters except 3 steps walking time. The mean of difference of

Table 1. Comparative analysis before and after the study of Group 1 participants by paired t-test

Variable	Mean before	Mean after	Mean diff	SD	*p*-value
Walking time	1.2896	1.2840	-0.0056	0.1011	0.7843
3 steps walking time	6.1860	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	-0.3540	0.2127	0.1091
Functional score	2.5383	3.1171	0.5788	0.9055	0.0039

Table 2. Comparative analyses before and after the study of Group 2 participants by paired t-test

Variable	Mean before	Mean after	Mean diff	SD	*p*-value
Walking time	1.2620	1.1764	-0.0856	0.0797	0.0001
3 steps walking time	9.0639	7.0439	-2.0200	2.1867	0.0001
Pain score	2.0640	0.3120	-1.7520	0.7489	0.0001
Stiffness score	3.0200	0.6800	-2.3400	1.1965	0.0001
Functional score	2.8288	0.7444	-2.0844	0.8646	0.0001

Table 3. Comparative analysis before and after the study of Group 3 participants by paired t-test

Variable	Mean before	Mean after	Mean diff	SD	*p*-value
Walking time	1.3344	1.1764	-0.1580	0.0817	0.0001
3 steps walking time	6.0384	5.3744	-0.6640	0.7342	0.0001
Pain score	3.6560	1.7880	-1.8680	1.6090	0.0001
Stiffness score	3.5200	1.7880	-1.7320	1.2844	0.0001
Functional score	3.3780	1.9008	-1.4772	0.8488	0.0001

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

	Mean 100 m walking time difference	Mean 3 step walking time difference	Mean knee pain score difference	Mean knee stiffness score difference	Mean knee functional score difference
Group 2-1	-0.0800 *p* = 0.0060	-1.7344 *p* = 0.0001	-2.3688 *p* = 0.0001	-1.9860 *p* = 0.0001	-2.6632 *p* = 0.0001
Group 3-1	-0.1524 *p* = 0.0001	-0.3784 *p* = 1.0000	-2.4848 *p* = 0.0001	-1.3780 *p* = 0.0001	-2.0560 *p* = 0.0001
Group 3-2	-0.0724 *p* = 0.0150	+1.3560 *p* = 0.0040	-0.1160 *p* = 1.0000	+0.6080 *p* = 0.2220	+0.6072 *p* = 0.0490

3-step walking time of group 3 had improved more than group 1, but this was not significant.

The significant difference between participants group 2 and group 3 appeared in only one parameter, 100 meters walking time. Knee stiffness scores and knee functional scores showed better differences in group 2 than group 3, but they were not significant. However, there is significant difference of mean 3-steps walking time in group 2 more than group 3. Group 3 participants had more differences in knee

Table 5. Patients satisfaction after taking fish oil

Satisfaction	Mean	SD	Mean difference	t	*p*-value
Group 2	9.2000	0.6454	0.2800	1.2556	0.2154
Group 3	8.9200	0.9092			
Total	9.0600	0.7930			

pain parameters than group 2, but not significant, either. Patients satisfaction after taking fish oil for 8 weeks were also considered and recorded by subjective scoring from 1-10. The average of patient's satisfaction is 9.06. The differences between group 2 and group 3 were not significant. In addition, by verbal response, all 50 participants felt good and happy with fish oil. Six participants asked to buy fish oil from the researcher for themselves to continue and for their cousins.

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

Discussion

In this study, all of knee functions and knee pain parameters significantly improved after taking fish oil supplement with high patient satisfaction and safety. Noticeably, fish oil 1,000-2,000 mg as a daily supplement shows significant efficacy in improving knee performance and also safe in mild to moderate stages of osteoarthritic knee patients. However, the higher dose 2,000 mg of fish oil had not significant higher efficacy than 1,000 mg of fish oil.

The result showed useful of fish oil to prevent osteoarthritic knee pain, improve knee function and promote overall joint health. So fish oil may be another safety choice for knee osteoarthritis patients to reduce the consumption of NSAIDs. Furthermore, next research should be done on the effectiveness of fish oil in the treatment of the other diseases caused by inflammation in the body.

Potential conflicts of interest

None.

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ประสิทธิผลและความปลอดภัยของน้ำมันปลาในการรักษาผู้ป่วยโรคข้อเข่าเสื่อม

พรระวี เพียรผดุงรัชต์

วัตถุประสงค์: *เพื่อศึกษาประสิทธิผลและความปลอดภัยของน้ำมันปลาในการรักษาผู้ป่วยข้อเข่าเสื่อม*

วัสดุและวิธีการ: *อาสาสมัครกลุ่มทดลองเป็นผู้ป่วยโรคข้อเสื่อม (primary osteoarthritis) เพศชายและหญิงที่มีอายุระหว่าง 40-75 ปี จำนวน 75 คน แบ่งเป็น 3 กลุ่มๆ ละ 25 คน เพื่อรับประทานน้ำมันปลาขนาด 1,000 มิลลิกรัม, 2,000 มิลลิกรัม และกลุ่มควบคุมตามลำดับ โดยน้ำมันปลาขนาด 1,000 มิลลิกรัม ประกอบด้วย EPA 400 มิลลิกรัม และ DHA 200 มิลลิกรัม อาสาสมัครกลุ่มทดลองต้องรับประทานน้ำมันปลาวันละ 1 ครั้ง ติดต่อกันนาน 8 สัปดาห์ แล้วเปรียบเทียบประสิทธิผลในระยะเวลาก่อนและ 2 เดือนหลังรับประทานน้ำมันปลา โดยวัดจากอาการปวดข้อ ความสามารถในการใช้งานข้อเข่า และประเมินสมรรถภาพของข้อเข่าโดยวัดอัตราเร็วในการเดินบนพื้นราบระยะ 100 เมตร และเวลาที่ใช้ในการขึ้นลงบันได 3 ขั้น*

ผลการศึกษา: *เมื่อวัดประสิทธิผลในทุกพารามิเตอร์เปรียบเทียบก่อนและหลังการรับประทานน้ำมันปลาพบว่า กลุ่มทดลองมีสมรรถภาพของข้อเข่าดีขึ้น อาการปวดข้อน้อยลง เดินได้เร็วขึ้นบนพื้นราบ ใช้เวลาในการเดินขึ้นลงบันได 3 ขั้นน้อยลง ซึ่งแตกต่างอย่างมีนัยสำคัญทางสถิติ เมื่อเทียบกับกลุ่มควบคุม ความพึงพอใจของกลุ่มทดลอง พบว่ามีคะแนนเฉลี่ย 9.06 จาก 10 โดยทุกคนบอกเล่าความรู้สึกที่ดีต่อการรับประทานน้ำมันปลา แต่หนึ่งในผู้เข้าร่วมมีอาการเลือดออกในปัสสาวะในสัปดาห์ที่ 10 เมื่อตรวจวินิจฉัยเพิ่มเติมจึงพบว่าเป็นจากมะเร็งกระเพาะปัสสาวะที่เป็นอยู่แต่ผู้ป่วยไม่เคยรู้ตัวมาก่อน ส่วนผู้เข้าร่วมการวิจัยอีก 49 ราย มีความปลอดภัยโดยไม่มีภาวะแทรกซ้อนใดๆ จากน้ำมันปลา*

สรุป: *การรับประทานน้ำมันปลาขนาด 1,000-2,000 มิลลิกรัม มีผลทำให้ผู้ป่วยข้อเข่าเสื่อมในระดับที่ยังไม่มีการอักเสบ มีสมรรถภาพของข้อเข่าดีขึ้น และมีอาการปวดข้อน้อยลง และมีความปลอดภัยไม่ก่อให้เกิดภาวะแทรกซ้อนที่ไม่พึงประสงค์ แต่การรับประทานน้ำมันปลาขนาดในขนาดสูง 2,000 มิลลิกรัมต่อวัน ไม่ได้มีประสิทธิผลที่ดีกว่าการรับประทานน้ำมันปลาขนาด 1,000 มิลลิกรัมแต่อย่างใด*