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AN INVESTIGATION OF THE EFFECT OF DAIRY PRODUCTS ON CHRONIC KNEE OSTEOARTHRITIS PAIN IN PATIENTS REFERRED TO TEHRAN RHEUMATOLOGY CLINIC OF IMAM KHOMEINI HOSPITAL

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ABSTRACT

Objective: Knee osteoarthritis **(OA)** is a degenerative disorder. Severe pain due to this disease disrupts the normal functioning of the patient and costs a lot to the individual and society. Traditional medicine treatment strategies for patient's relief could improve quality of life and decrease morbidity and mortality of the disease. Accordingly, this study aims at investigating the effect of dairy products on chronic knee osteoarthritis **(OA)** pain.

Material and method: Ninety patients with knee osteoarthritis **(OA)** referred to Tehran Rheumatology Clinic of Imam Khomeini Hospital enrolled in this quasi-experimental study. Other including criteria were: 1-age group: 30-52 year old patients. 2- Daily consumption of one to five units of dairy products. 3- Body mass index between 20-30. 4- Disease onset five years and less. 5- No any other major disease. The cases were randomly assigned into two groups: continuing consumption of dairy products and cutting consumption of dairy products.

Cases both genders were assigned equally to both groups. Severity of pain was detected by *Visual Analog Scale (VAS*) at the baseline and weeks 3 and 6. The effects of this intervention on severity of pain were then determined.

Results: The cutting consumption of dairy products group showed a significant decrease (P Value 0.0005 and 0.0002 respectively at weeks 3and 6) in the score of *VAS* in follow up studies (i.e., weeks 3and 6); whereas, for the other group, compared to the baseline, changes of VAS score in follow up studies were not significant (P Value 0.888 and 0.089 respectively at weeks 3 and 6).

Conclusion: Cutting consumption of dairy products led to a significant decrease in severity of pain in osteoarthritis **(OA)**.

Keywords: Osteoarthritis, Dairy products, *Visual Analog Scale*, Temperament, Physical activity

INTRODUCTION

Osteoarthritis is a physiologic process of degeneration in joint cartilage that mostly occurs after the age of 45; however, any age group may be affected by such a disorder. Many risk factors can trigger disease onset before its physiologic process. [1] These factors include race, genetic factors, severe trauma of joint, morbid obesity, bone density, sexual hormones, malnutrition, congenital disorders, and inflammatory or infectious disease of the joints. [2]

The criteria for **OA** of the knee include the presence of knee pain plus at least three of the following characteristics: 1-Age more than 50 years 2-Morning stiffness lasting less than 30 minutes 3-Crackling or grating sensation (crepitus) 4-Bony tenderness of the knee 5-Bony enlargement of the knee 6-No detectable warmth of the joint to the touch [3].

Statistics from the Rheumatology Research Center of Tehran University of Medical Sciences indicate that 16 percent of Iranians with ages above 15 years are affected by different types of arthritis involving the knees, fingers, hips, and neck arthritis. If we consider the population of people above 15 years old about 56 millions in the country, at least about 9 millions of people suffer from **OA** [4].

The average annual cost of **OA** in the US is $ 4,400. In 2009, about 185 billion dollars were spent on arthritis. If the cost of **OA** in Iran is calculated at least 20 percent of expenditure in the US, any Iranian patient has to spend an of average amount of $ 600 per year (one million and eight hundred thousand Rials) to treat arthritis. The cost

includes a minimum of four visits per year, intermediate drug consumption (daily average of thirty thousand Rials), and physiotherapy. The above numbers are calculated excluding costs such as surgery, joint replacement, the number of days of hospitalization and home, the costs of complementary and alternative therapies (such as acupuncture and massage therapy, etc.) in the country [4].

A number of treatments and lifestyle changes have been showed to be effective in reducing the progression or preventing pain. However, a large number of such drugs relieve the pain only temporarily and with many medical complications the most common of which are gastrointestinal side effects caused by the consumption of Non Steroidal Anti-Inflammatory Drugs (*NSAIDs*). In the final stages, joint replacement or arthroplasty surgery can be done causing patients expense and many complications [1].

If we reduce the morbidity of the disease with traditional medical treatment strategies, possible adverse effects of painkillers or other drugs of conventional medicine and surgery in patients will be reduced. From the perspective of traditional medicine, one of the most important causes of pain in **OA** is slimy mucus production and pouring in joints and dairy products are one of important and common producers of the slimy mucus in the body [5].

With regards to the high rate of arthritis, especially knee osteoarthritis **OA** and its association with high morbidity and mortality, prevention of this disease, especially in terms of improving mobility and proper physical activity, proper nutrition, joint protection, and regulation of body weight would be critical. The central role of nutrition in the prevention and even stopping the progression of the disease cannot be ignored.

Since dairy is one of the most common foods in the diet of people in our society and **OA** one of the most common diseases of our present society, particularly in the elderly, we decided to investigate the effects of dairy consumption on chronic pain in patients with **OA** of the knee who referred to the Rheumatology Clinic of the Imam Khomeini Hospital of Tehran University of Medical Sciences

METHOD

In this quasi-experimental study, 120 patients with knee **OA** who referred to the Tehran Rheumatology Clinic of the Imam Khomeini Hospital from March 2014 to March 2015 were assessed and finally according to the inclusion criteria, ninety patients enrolled in the study.

The protocol of the study was approved by Regional Ethics Committee of Tehran

University of Medical Sciences (Research Project Number: 1394.1858. and informed consent form was obtained from all participants.

Definite diagnosis of knee **OA** was established by Rheumatology specialist (according to diagnostic criteria) before enrolling in the study. Including criteria were: 1-Age: between 30-52 years 2- Non menopause age 3- Daily consumption of one to five units of dairy products (The equivalent of each unit in clinical nutrition science is one glass of milk or two bowls of yogurt, each of which is equivalent to about 200 grams or is equivalent to the size of a matchbox cheese and curd, about 40 grams.) 4- Body mass index: between 20-30 (In the range of normal weight and overweight but not obese weight range because overweightness is a risk factor for developing knee **OA**) 5-Disease onset five years and less. 6-No any other major disease: including diabetes mellitus, cardiovascular disease, high blood pressure, and types of cancer 7- Normal blood calcium levels (Serum levels of calcium in all participants were tested before entering the study and hypocalcemic cases due to any reason whom were treated with calcium were excluded from the study.) 8-Mild to moderate pain (score 0-5 on *Visual Analog Scare*) in the baseline.

The patients were assigned into 2 groups: continuing consumption of dairy products and cutting consumption of dairy product. Participants were assigned equally by gender into both case and control groups. The selection of the individuals for intervention or non-intervention group was performed through *random blocks of four (AABB).*

In the intervention group, participants were asked to stop the consumption of any dairy products for 6 weeks, but there were no other changes in their lifestyle during this period. In the control group, no intervention was done in dairy product consumption. Both groups were only allowed to use Acetaminophen to relieve pain and other medications were forbidden in both groups during the study period. Moreover, physiotherapy or other methods of reducing pain were cut in both intervention and control groups. The onset of the disease was determined by the time of the first signs of pain or limitation of motion in the knee which was determined after questioning the patients. Five years or less for disease onset was one of the inclusion criteria. At baseline, severity of pain was determined by a standard pain measurement scale called *Visual Analog Scale (VAS*) which has approved validity and reliability. [6] In the middle of the study (i.e., week3) and at the end of the

study (i.e., week 6), severity of pain was again identified by the same scale. Patients with mild to moderate pain (score 0-5 on VAS) at baseline were selected to participate the study and effects of this intervention were determined in the intervention group and were compared to another group.

The amount and type of dairy consumption in both case and control groups were monitored by a valid questionnaire called *Food Frequency Questionnaire (FFQ)* [7]. This questionnaire was completed at baseline, week 3, and week 6 of the study and participants with one to five units of dairy products consumption were selected.

The limitation of physical activity was determined by physical subscale of The *Western Ontario and McMaster Universities Arthritis Index (WOMAC)* whose reliability and validity have been proved. [8] This questionnaire was completed at the baseline. All participants had score 0-48 at baseline (Total score of physical subscale of *WOMAC osteoarthritis index* is 96).

The effect of cutting or continuing consumption of dairy products on knee pain was assessed by VAS in weeks 3 and 6 (i.e., in the middle and at the end of the study).

By using *SPSS* software, *t-test, paired t-test, unidirectional analysis of variance (ANOVA*), and *Pearson correlation coefficient* were conducted to analyze data.

RESULTS

In the control group (continuing consumption of dairy), severity of pain in the middle and at the end of the study (i.e., weeks 3 and 6) did not change significantly (P Value 0.888 and 0.089 respectively), but in the intervention group (cutting consumption of dairy), significant decrease was seen in the severity of pain in weeks 3 and 6 compared to the baseline (P Value 0.0005 and 0.002 respectively). Table 1 summarizes the results of the study.

Table1: Results of Data Analyses

Pain	Dairy Consumption Status	Pain severity Average	T	P Value
Pain1(baseline)	+	**45.129**	**1.745**	**0.074**
Pain2(week3)	+	**40.145**	**2.859**	**0.888**
	-	**33.111**	**2.658**	**0.0005**
Pain3(week6)	+	**45.000**	**2.254**	**0.089**
	-	**31.478**	**2.120**	**0.0002**

DISCUSSION

According to our findings, cutting consumption of dairy products led to decrease in knee pain in patients with knee OA that was statistically significant, while continuing consumption of dairy did not change the severity of knee pain significantly in the control group. There are

many controversial ideas on this issue in modern medicine that makes this issue very complicated.

Many reports and studies about the benefits of dairy consumption in the health of skeletal system have been published so far. In a cross-sectional study by *Kacar* et al., 655 patients with knee **OA** over 50 years of age entered the study and the exact amount of consumption of dairy and other sources of calcium in their diet were determined. The results showed that the prevalence of knee **OA** was lower in people who had daily consumption of milk (P Value <0.05) [9].

In another study about the impact of milk consumption on **OA** progression, through measuring medial *Tibiofemoral* joint space, it was found that there is an inverse relationship between the consumption of milk and joint space loss in women while there was no such link in men. The gender differences in the relationship of milk consumption and osteoarthritis progression are not completely understood. Gender differences have been noted in the prevalence, incidence, and severity of arthritis for many years. Previous studies have shown that the thickness of cartilage at the end of the distal femur is already smaller in women compared to men [10].

Other evidence also suggests that estrogens from outside sources may protect cartilage and affect bone turnover. However, not all dairy was associated with benefits. Yogurt consumption appeared to have no effect on arthritis progression, and women who ate more cheese had greater deterioration in their joint space width. It's possible that the high levels of saturated fat in cheese may worsen arthritis progression or it could contribute to obesity, which would also worsen arthritis [10].

On the other hand, because of casein proteins in dairy, they may have a role in rheumatic pains. Milk is a common allergen food. According to Doctor *Neal Barnard*, casein in milk triggers inflammation and joint pain and people who avoid dairy products find pain relief.

Based on the conducted studies, in some patients, these proteins may irritate the tissue around the joints and cause inflammation of the joints. Some people with rheumatoid arthritis, who suffer from rheumatic pains, follow a diet that is free from animal and dairy products and gain most of the body's protein requirements from plant sources and vegetables such as spinach, nut butters, soy, beans, lentils, and quinoa [11].

A study on 30 thousand women in Iowa found that people who had received high amounts of vitamin D through dairy consumption developed a lower risk of rheumatoid arthritis. It seems that vitamin

D has some anti-inflammatory properties in the body; thus, milk acts like a double-edged sword in this regard [11].

In a study on 15 patients with sero-negative rheumatoid arthritis, eliminating of dairy from the diet caused seven of them to have full remission phase [12].

Contrary to popular belief, dairy intake does not reduce the risk of bone fractures. Societies with minimal consumption of dairy, like South Africa, have the lowest rate of fracture. About 50 percent of people worldwide have lactose intolerance and they are unable to digest and fully absorb milk that may indicate the possibility that these are not suitable for human. Among the various creatures, man is the only creature that continues milk consumption after breast milk period. [13]

Considering Iranian Traditional Medicine sources, for instance, according to *Muhammad ibn Zakariya al-Razi,* for recovery of *Neghres al-Bared* and joint pain, dairy products should be discontinued [14]. Other sources also mentioned that if milk (dairy) to be eaten a lot, will lead to development of *Neghres al-Bared* [5, 15, 16].

It should be noted that in Iranian Traditional Medicine sources, term *Neghres al-Bared* was used not in the meaning of Gout in modern medicine and it means any joint pain due to pouring of Soda (Melancholic) or Balgham (Phlegmatic) in joints [17].

According to the pathogenesis of *Balgham (Phlegmatic) i* and *Sodavi (Melancholic)* joint pain and their definition in *Exir E-Azam* (one of Persian medicine textbooks), it is concluded that chronic knee OA causes *Balghami (Phlegmatic)* and less *Sodavi (Melancholic)* joint pain.

It should be noted that milk has harmful effects on *Balghami (Phlegmatic)* and *Sodavi (Melancholic)* joint pain and has harmful effects in pain deterioration in these conditions [16, 17].

In conclusion, there is a doubtful connection between dairy consumption and OA.

This is affected by several factors such as gender, genetic factors, trauma, and etc. Low fat diet and non- animal foods with less stimulation of immune system can lead to the health of joint [13].

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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