

Impact of nutrient intake and physical activity on the reduction of symptoms in females suffering from arthritis

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Sixty female patients suffering from arthritis in the age group of 40-60 years were selected from two hospitals of Ludhiana city and were divided into two groups viz., experimental (E) and controlled (C) group. General information, sign and symptoms, physical activity pattern and dietary pattern of the subjects was recorded by interview schedule. In group E nutrition counseling was imparted for three months at 15 days interval by individual and group contacts. The mean daily energy (67.3 to 83.3%) intake of the subjects increased significantly and intake of protein (92.32 to 81.07%) and total fat (207 to 185.30%) decreased significantly ($P=0.05$, $P=0.05$) in the subjects of group E. The mean daily intake of vitamins and minerals were increased significantly ($P=0.01$, $P=0.05$) by the subjects in group E. After nutrition counseling significant improvement was seen in food habits, physical exercise and dietary pattern of the subjects in group E. A significant reduction was seen in symptoms of disease like joint stiffness (90 to 33.3%), Swelling (83.3 to 30%), redness (33.3 to 16.7%) and rash or itch (13.3 to 6.7%) in group E after nutrition counseling. Other less experienced symptoms *i.e.* feeling unwell (10 to 3.3%) and fatigue (16.7 to 3.3%) were also decreased. Physical activity of the subjects was increased and subjects were started doing exercise after nutrition counseling in-group E. It was also seen that 20 per cent of the subjects were doing exercise for 10-30 minutes, 60 per cent were doing for 30-60 minutes and 20 per cent were doing exercise for more than 60 minutes in group E. Therefore, it can be reported from the results that nutrition counseling significantly improved the food intake and physical activity of the patients suffering from the arthritis.

Key Words : Arthritis, Nutrient intake, Nutrition counseling, Physical exercise, Symptoms

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INTRODUCTION

Arthritis is a term that includes a group of disorders that affect the joints and muscles. Its symptoms include joint pain, inflammation and limited movement of joints. When a joint is inflamed it may be swollen, tender, warm to the touch or red. Surrounding each joint is a protective capsule holding a lubricating fluid to aid in motion. Cartilage, a slippery smooth substance, covers most joints to assure an even fluid motion of the joint. With arthritis, the cartilage may be damaged, narrowed and lost by a degenerative process or by inflammation making movement painful (Mahan and Stump,

2000).

Typically a woman complains of pain, swelling and loss of mobility in the proximal joints of the fingers. There may be a previous history of 'muscle pain', tiredness, loss of weight and a general lack of well being. As time passes the symptoms 'spread' to other joints- the wrist, feet, knees and shoulders in order of frequency (Apley and Solomon, 1998). The first 5-10 years following the menopause, *e.g.*, from 50-60 years of age, women undergo a high rate of bone loss, *i.e.*, approximately 2 per cent per year. The loss of estrogens is so powerful that adding extra quantities of nutrients, such as calcium and vitamin D supplements, to the diet has little effect on the retention of calcium, as indicated by measurements of bone mass or density (Zacas and Wolinsky, 2003).

A patient of arthritis needs to bring changes in diet which is necessary for optimum health. It is important to maintain a low calcium to phosphorus ratio. If phosphorus content is high, then more calcium is lost from the body and will aggravate

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arthritis problems (Rajib, 2010). There are certain vitamins combat the swelling of arthritis and treated as the arthritis supplements vitamins. Such vitamins are vitamin B complex and vitamin C, E and K. vitamin B complex function like reducing swelling of the tissue, cell protection, generate myelin, dilates small arteries and increasing blood flow. Vitamin C works as the anti inflammatory and relieves the pain.

Antioxidants in brightly coloured fruits and vegetables offer substantial protection against arthritis. By eating more yellow and orange fruits and vegetables you will consume antioxidants called carotenoids, which can lower your chances of developing inflammatory arthritis. Focusing on vegetables instead of proteins will ease many other symptoms and help to reduce weight too (Whittaker, 2011).

Exercise is known to have benefits for people with arthritis. Many people with arthritis do not exercise, often because of joint or muscle pain, weakness, fatigue or joint swelling. This can lead to loss of joint motion, stiffness, and muscle weakness and tightness. These problems can worsen fatigue and cause joints to become unstable. Exercise can decrease pain and enhance quality of life. Exercise is most beneficial if it is done on a regular basis. Most people can find a way to exercise without increasing their symptoms. Exercise can reduce pain and improve joint function (Carol and Richard, 2009).

Keeping in view importance of nutrition counseling in the management of arthritis, the present study was designed to study impact of nutrient intake and physical activity on the reduction of symptoms in females suffering from arthritis.

METHODOLOGY

Selection of the subjects:

A statistically adequate sample of 60 females suffering from arthritis in the age group of 40-60 years were selected and divided into two groups *viz.*, Experimental (E) and Control (C). Nutrition counseling was imparted to group E, while group C was not be given any nutrition counseling.

Collection of data:

Data pertaining to general information, physical activity pattern and dietary survey was carried out to collect the information regarding dietary pattern and dietary intake for 3 consecutive days by using 24 hour recall cum weighment method. Health profile related to arthritis of the subjects like duration of arthritis, sign and symptoms, type of medicine was recorded before and after nutrition counseling.

Dietary survey:

Information pertaining to food preferences, food avoidances was recorded. Dietary intake of subjects was recorded for three consecutive days by using 24 hour recall method using standardized containers before and after nutrition counseling. The average daily nutrient intake was

calculated using Michigan State University (MSU) Nutriguide Computer Programme (Song *et al.*, 1992). The average raw amounts in grams of each and every item of food consumed for three consecutive days for each subjects was fed in the software and nutritive value of the diets was recorded. The food intake was compared with RDA by ICMR (2003) and per cent adequacy of the various foods were calculated before and after nutrition counseling.

Nutrition counseling:

Nutrition counseling was imparted to the selected subjects for the period of 3 months at 15 days interval regarding arthritis, its types, physical exercise and dietary management. In dietary management knowledge regarding foods to be taken and avoided, importance of and physical exercise for the management of arthritis. Counseling was carried out through lectures and demonstrations. A booklet containing all the information regarding arthritis and its dietary management and a sample menu of 7 days were distributed to the subjects.

Statistical analysis:

The data were analyzed statistically by using appropriate

Table A. General information of the subjects		
Particulars	Group E (n=30)	Group C (n=30)
Age		
40-50	8 (26.7)	12(40)
50-60	22 (73.3)	18 (60)
Mean \pm S.E	53.37 \pm 6.38	50.90 \pm 7.40
If yes then		
Mother	6(20)	3(10)
Father	2(6.7)	1(3.3)
Siblings	-	-
Grand parents	-	-
Diagnose of disease		
< 1 yr	15(50)	14(46.7)
1- 3 yr	13(43.3)	12(40)
3 - 5 yr	2(6.7)	4(13.3)
Preference of diet		
Routine diet	30(100)	26(86.7)
Prescribed diet	-	4(13.3)
Medicines		
Yes	30(100)	30(100)
No	-	-
If yes then		
Allopathic	30(100)	29(96.6)
Ayurvedic	-	1(3.3)
Homeopathic	-	-
Restricted diet	-	-

Figures in parenthesis indicate percentages
n = number of subjects in each group

statistical tools such as mean, standard error and percentage. To test the significance student's t-test was applied on all the parameters (Cheema and Sidhu 2007).

OBSERVATIONS AND ASSESSMENT

The study was conducted on 60 females aged between 40-60 years suffering from osteoarthritis were selected randomly and divided equally into two groups *viz.*, Experimental (E) and Control (C). It was observed that 26.7 and 40 per cent of the subjects were in the age group of 40-50 years, while 73.3 and 60 per cent of the subjects were in the age group of 50-60 years in group E and C, respectively, majority of subjects belonged to

Sikh. Percentage of subjects who belonged to joint families was 46.6 and 16.7 per cent in group E and C, respectively. It was observed that majority of the subjects *i.e.* 43.4 and 53.4 per cent had per capita income more than Rs. 3500, 23.3 and 13.3 per cent of the subjects had per capita income of Rs. 1500 - 2500 and 33.3 per cent had per capita income of Rs. 2500-3500 in group E and C, respectively. It was reported that per capita income of Indians grew by 17.3 per cent to Rs. 54,527 in 2010-11 from Rs. 46,492 in the 2009-10, as per the revised data released by the Government of India. However, the increase in per capita income would be only 6.7 per cent in 2010-11 (Anonymous, 2011a). However, the per capita income of Punjab is estimated to Rs.70072 in 2010-11 showing an increase of 12.74 per cent (Anonymous, 2011b).

Table 1. Physical activity pattern of the subjects

Particulars	Group E (n=30)	Group C (n=30)
Occupation		
Working	4(13.3)	5(16.7)
House wife	26(86.6)	25(83.3)
Type of job		
Desk	1(3.3)	1(3.3)
Supervision	2(6.7)	1(3.3)
Touring	1(3.3)	3(10)
Working hour /day		
<1	4(13.3)	3(10)
1-4	5(16.7)	6(20)
4-8	18(60)	17(56.7)
>8	3(10)	4(13.3)
Sleeping hours		
<5	3(10)	2(6.7)
5-8	16(53.3)	10(33.3)
>8	11(36.7)	18(60)

Figures in parenthesis indicate percentages
n = number of subjects in each group

Physical activity pattern of the subjects:

The physical activity pattern of the subjects showed that 33.3 per cent of the subjects in group E were not doing any kind of exercise (Table 1 and 2). After nutrition counseling 100 per cent of the subjects started doing exercise while there was no change in group C. Majority of the subjects *i.e.* 40 and 23.3 per cent in both the groups spent 10-30 minutes on exercise, while 23.3 and 20 per cent of the subjects spent 30-60 minutes and only 3.3 and 10 per cent of the subject were spent more than 1 hour. After nutrition counseling the corresponding figures increased in group E while no change in group C was observed.

During each counseling session subjects were motivated to initiate the physical activity and were educated that how physical exercise improve physical fitness, reduce joint pain and stiffness, builds strong muscle around the joints and increase flexibility and endurance. It reduces inflammation from arthritis and reduced the risk of chronic diseases. Ghroubi *et al.* (2008) reported that exercise and weight loss are more effective either separately or in combination, in improving pain

Table 2. Physical exercise pattern of the subjects

Particulars	Group E (n=30)		Group C (n=30)	
	Before	After	Before	After
Physical exercise				
Yes	20(66.7)	30(100)	16(53.3)	16(53.3)
No	10(33.3)	-	14(46.7)	14(46.7)
Type of exercise				
Walking	2(6.7)	2(6.7)	3(10)	3(10)
Moving of the joint	18(60)	28(93.3)	11(36.7)	11(36.7)
Yoga	-	-	2(6.7)	2(6.7)
Frequency of exercise (min.)				
10-30	12(40)	6(20)	7(23.3)	7(23.3)
30-60	7(23.3)	18(60)	6(20)	6(20)
>60	1(3.3)	6(20)	3(10)	3(10)

Figures in parenthesis indicate percentages

n = number of subjects in each group

and physical function in obese adults with moderate knee osteoarthritis. Carol and Richard (2009) also reported that exercise can reduce pain and improve joint function if it is done on a regular basis.

Nutrient intake:

The mean daily intake of nutrient by the subjects of group E and C are presented in Table 3.

Energy:

The data revealed in the present investigation that the mean daily intake of energy was 1279 ± 153.35 and 1415.22 ± 266.13 kcal and 1583.41 ± 56.36 and 1470 ± 284.06 kcal before and after nutrition counseling in group E and C, respectively. The results showed that energy intake was less than recommended values given by ICMR (2010). There was a significant increase ($P=0.01$) in energy intake in group E but a non-significant increase in energy intake was observed in group C. Increase in consumption of cereals by the subjects of group E resulted in increase in intake of total energy. The per cent adequacy was 67.3 and 74.4 and 83.3 and 77.3 per cent in group E and C before and after nutrition counseling respectively. Deepti *et al.* (2006) reported a lower mean value of energy intake (1143 kcal) among Indian women.

Protein:

The mean daily intake of protein was 50.78 ± 2.73 and 52.73 ± 7.51 g and 44.59 ± 9.75 and 50.80 ± 8.80 g/day, respectively before and after nutrition counseling in group E and C, respectively. A significant decrease ($P=0.05$) was observed in

group E due to decreased consumption of pulses, while in case of group C, there was non-significant decrease in protein intake. The decrease in protein intake of the subjects in group E might be due to reduce intake of protein rich foods because it triggered inflammation as the subjects were taught during nutrition counseling. Though the intake of pulses was less than the ICMR (2010) recommendations.

Further, it was also seen that the per cent adequacy in group E and C was 92 and 94.5 per cent and 81.07 and 91 per cent before and after nutrition counseling, respectively. Goyal (2003) reported a deficient protein intake (46.5 g) among adult Punjabi women.

Total fat:

The results of the present study revealed that the mean daily intake of fat was 52.10 ± 19.90 and 52.60 ± 15.67 g and 37.05 ± 8.17 and 53.55 ± 20.44 g/day before and after nutrition counseling in group E and C, respectively. It was observed that the intake was much higher than recommendation of 20 g given by ICMR (2010). The per cent adequacy decreased from 260 to 185.30 per cent in group E, while in group C, adequacy increased from 260 to 267 per cent before and after nutrition counseling. The subjects of group E and C were ignorant about the ill effects of more fat intake but during counseling sessions, the subjects of group E reduced fat intake in their daily dietaries. Majority of the subjects in both the groups had craving for fried foods. Kapoor (2010) reported that intake of total fat was high in the subjects.

The nutrient intake of thiamin (113%), riboflavin (70%), niacin (69.5%), pyridoxine (19.5%), vitamin B₁₂ (100%), β -

Table 3. Mean daily nutrient intake of the subjects before and after nutrition counseling (Mean \pm SE)

Vitamins	Group E (n=30)			Group C (n=30)			Suggested intake (g)
	Before	After	Paired t-value	Before	After	Paired t-value	
Thiamin (mg)	1.13 \pm 0.13	1.51 \pm 0.25	1.87**	1.12 \pm 0.11	1.14 \pm 0.11	0.03 ^{NS}	1.0
Riboflavin (mg)	0.77 \pm 0.26	1.48 \pm 0.49	2.85*	0.81 \pm 0.22	0.79 \pm 0.23	0.045 ^{NS}	1.1
Niacin (mg)	8.34 \pm 1.21	10.96 \pm 0.26	3.98*	8.14 \pm 0.94	8.45 \pm 0.98	0.12 ^{NS}	12
Pyridoxine (mg)	0.39 \pm 0.24	1.52 \pm 0.75	4.48*	0.37 \pm 0.25	0.37 \pm 0.25	-	2.0
Vitamin B ₁₂ (μ g)	1.09 \pm 1.36	1.45 \pm 1.57	1.72**	1.00 \pm 1.30	1.01 \pm 1.29	-	1.0
β - carotene (μ g)	2650.66 \pm 1869.70	4389.75 \pm 1519.07	3.76*	2561.45 \pm 1782.46	2571.45 \pm 1770.94	0.45 ^{NS}	4800
Vitamin E (mg)	2.19 \pm 0.84	2.89 \pm 0.68	2.49*	2.12 \pm 0.82	2.12 \pm 0.82	-	-
Folic acid (μ g)	130.91 \pm 29.27	131.91 \pm 28.57	1.00 ^{NS}	127.16 \pm 26.51	127.49 \pm 24.82	-	200
Ascorbic acid (mg)	22.42 \pm 14.24	61 \pm 3.03	5.65*	27.11 \pm 13.53	26.82 \pm 15.08	0.02 ^{NS}	40
Calcium (mg)	426.03 \pm 313.75	775.03 \pm 166.43	5.13*	563.90 \pm 190.57	563.47 \pm 190.51	-	600
Phosphorous (mg)	465.88 \pm 148.84	610.01 \pm 326.81	3.78*	586.46 \pm 276.57	586.80 \pm 276.60	0.01 ^{NS}	600
Magnesium (mg)	228.20 \pm 35.86	234.08 \pm 13.10	0.92 ^{NS}	222.02 \pm 33.31	222.02 \pm 33.03	-	310
Iron (mg)	11.06 \pm 1.48	17.94 \pm 2.10	5.26*	11.05 \pm 1.38	11.24 \pm 1.22	0.04 ^{NS}	21
Zinc (mg)	4.16 \pm 0.71	4.81 \pm 1.12	2.40**	4.07 \pm 0.77	4.12 \pm 0.68	0.21 ^{NS}	10

#: ICMR (2010)

NS= Non-significant

* and ** indicate significance of values at $P=0.01$ and $P=0.05$, respectively

Table 4. Sign and symptoms of the subjects before and after nutrition counseling

Particulars	Group E (n=30)		Group C (n=30)	
	Before	After	Before	After
Joint stiffness	27(90)	10(33.3)	22(73.3)	22(73.3)
Swelling	25(83.3)	9(30)	14(46.7)	17(56.7)
Redness	10(33.3)	5(16.7)	8(26.7)	10(33.3)
Rash or itch	4(13.3)	2(6.7)	5(16.7)	5(16.7)
Feeling unwell	3(10)	1(3.3)	8(26.7)	8(26.7)
Fatigue	5(16.7)	1(3.3)	4(13.3)	4(13.3)

Figures in parenthesis indicate percentages

n = number of subjects in each group

carotene (55.2%), folic acid (65%) and ascorbic acid (56%) before nutrition counseling by the subjects in group E. Which increased significantly ($P=0.01$, $P=0.05$) after three months of nutrition counseling by the subjects in group E, while no change was observed in group C. However, increase in intake of calcium and iron was highly significant ($P=0.01$) in group E, the corresponding values being 129.1 and 81 per cent after nutrition counseling, respectively. The intake of phosphorous, magnesium and zinc by the subjects increased significantly ($P=0.01$) after nutrition counseling.

Sign and symptoms of the subjects:

Regarding signs and symptoms of disease, majority of the subjects in both the groups suffered from joint stiffness *i.e.* 90 and 73.3, respectively followed by swelling (83.3 and 46.7%), redness (33.3 and 26.7%). Other less experienced symptoms were rash or itch (13.3 and 16.7%), feeling unwell (10 and 26.7%) and fatigue (16.7 and 13.3%), respectively. After the study, there was decrease in the symptoms experienced by the subjects in group E (Table 4).

Conclusion:

The investigations of present study revealed that mean daily intake of energy by the subject was increased significantly and average intake of protein by the subjects decreased significantly in group E as compared to group C but still it was less than the recommendations. The intake of fat reduced significantly after nutrition counseling in group E. After nutrition counseling all the subjects started doing exercise while there was no change in group C. It was also observed that after nutrition counseling there was decrease in the symptoms experienced by the subjects in group E.

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