

# The Relation Between Nodal Osteoarthritis, Body Mass Index and Cholesterol Level

## NODAL OSTEOARTRİT, VÜCUT KİTLE İNDEKSİ VE KOLESTEROL SEVİYESİ ARASINDAKİ İLİŞKİ

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### Summary

In this prospective study we aimed to examine the possible relationship between the grade of nodal osteoarthritis (Heberden node), cholesterol level and body mass index. Cholesterol level was measured and body mass index was assessed in postmenopausal women with nodal osteoarthritis as risk factors.

One hundred nineteen female patients with nodal osteoarthritis were admitted to Mersin University hospital, department of Physical Medicine and Rehabilitation between June 1999-March 2000 were evaluated. Heberden nodes were assessed and graded on four (0-3) point scale according to the severity of swelling. The mean age of patients was 61.12±8.2 years. The mean body mass index was 28.44±5.05 kg/m<sup>2</sup> and the mean cholesterol level was 229.5±36 g/dl. Of the cases; 27 had grade 1 Heberden nodes, 37 had grade 2 Heberden nodes and 55 had grade 3 Heberden nodes. There was no statistically significant correlation between the grade of Heberden nodes, body mass index and cholesterol level (p= 0.211, p= 0.505, p> 0.01).

As a conclusion, We found that obesity and cholesterol level are not risk factors for nodal osteoarthritis but further studies with increased number of patients should corroborate this result.

**Key Words:** Nodal osteoarthritis, Body mass index, Cholesterol

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### Özet

Bu prospektif çalışmanın amacı, nodal osteoartrit derecesi ile kolesterol seviyesi ve vücut kitle indeksi arasındaki muhtemel ilişkiyi araştırmaktır. Risk faktörleri olarak, postmenopozal nodal osteoartritli kadınlarda kolesterol seviyesi ölçülüp, vücut kitle indeksi değerlendirildi.

Haziran 1999-Mart 2000 tarihleri arasında Mersin Üniversitesi Tıp Fakültesi Fiziksel Tıp ve Rehabilitasyon bölümüne başvuran 119 kadın hasta değerlendirildi. Heberden nodülü parmağındaki şişliğin derecesine göre 0-3 puan arasında derecelendirildi. Hastaların ortalama yaşı 61.12±8.2, ortalama kolesterol seviyesi 229.5±36 ve ortalama vücut kitle indeksi 28.44±5.05 idi. Vakaların 27 sinde grade 1 Heberden nodülü, 37 sinde grade 2 Heberden nodülü ve 55'inde ise grade 3 Heberden nodülü mevcuttu. Heberden nodülünün derecesi ile kolesterol seviyesi ve vücut kitle indeksi arasında istatistiksel olarak anlamlı korelasyon yoktu (p= 0.211, p= 0.505, p> 0.01).

Sonuç olarak, obezite ve kolesterol seviyesinin, nodal osteoartrit için risk faktörü olmadığı, fakat bunu destekleyecek, hasta sayısının daha fazla olduğu ileri çalışmalar gerektiği kanısına varıldı.

**Anahtar Kelimeler:** Nodal osteoartrit, Kolesterol, Vücut kitle indeksi

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Overweight people are at risk of developing osteoarthritis (OA) and being overweight accelerates the progression of the disease. Various studies

have shown that there is relation between obesity and osteoarthritis (1-5). It was debated whether obesity was a cause of OA or whether the resulting disability led to obesity and how obesity causes OA is less clear. Studies suggest that obesity is more common in patients with knee osteoarthritis especially (2,3). A few studies have shown an increased risk in non weight bearing joints such as hand involvement (1). However it is not complete-

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ly explained why obese persons have increased risk of osteoarthritis of the hand and why obese women have also increased risk of osteoarthritis than obese men. There are also insufficient data on weight loss as a treatment of osteoarthritis.

Hochberg et al found that hand osteoarthritis was associated with fat distribution but not with body mass index (3). Despite, Oliveria et al found that osteoarthritis at all joints (knee, hip, hand) was associated with body mass index (4).

In this prospective study, we determined the correlation between Heberden's nodes as a hallmark of hand OA, body mass index (BMI) and cholesterol level to understand whether obesity affects OA of the hand and also we investigated whether the grading of Heberden nodes were concordant with increased BMI and cholesterol level.

### Methods

One hundred nineteen female patients were enrolled in the study. Women were examined for bilateral joint swelling, tenderness and pain of distal phalangeal joints of the hand (pain elicited by pressure on examination and pain with use). Joint pain was reported if present for longer than one month. All female patients were in post menopausal period. The patients had no history of smoking, alcohol abuse, no trauma, and no use of hormone replacement therapy. Patients with systemic disease and infectious disease were excluded. There was no carpometacarpal (1.CMC) and proximal interphalangeal joint (PIP) involvement. Nodal OA was determined by the presence of HN on digits. Severity of the swelling of the HN was scored on a four point scale (0-3) (1). Heberden nodes were defined as present if HN of clinical grade  $\geq 1$  were present on one or more digits. The hand was also evaluated bilaterally. Anterior and posterior hand radiographs were taken and evaluated by a specialist. Distal interphalangeal osteophytes were defined as present if the grade of radiological osteophytes was  $\geq 1$  (1).

Obesity was defined as body mass index which calculated as  $\text{kg/m}^2$ . (low $<23.4$ , mid 23.4-26.4, high $>26.4$ ).(2) The level of cholesterol was measured by enzymatic colorimetric method (CHOD-PAP) with cholesterol esterase, cholesterol oxidase and 4-aminoantipyrine (Cholesterol, art. 0763012;

Roche Diagnostics, Cobas Integra 700). Hypercholesterolemia was defined as  $\geq 230$  g/dl (118-230 g/dl) or use of antihyperlipidemic drugs. Patients had no history of using antihyperlipidemic drugs. All statistical test were performed using SPSS for windows 9.01 (chi-square and t test) and p value of less than 0.05 was accepted as significant. Pearson's r correlation coefficient and interclass correlation's were used to evaluate test reliability.

### Results

This prospective study included 119 female patients with the mean age of  $61.12 \pm 8.2$  (46-82) years. The mean BMI was  $28.44 \pm 5.05$   $\text{kg/m}^2$ , the mean cholesterol level was  $229.5 \pm 36$  g/dl, and the mean VAS (visual analog scale) score was  $4.2 \pm 5.3$ . The mean menopause duration was  $12.9 \pm 5.5$  years (Table 1). Of the cases, 27 had grade 1 HN, 37 had grade 2 HN and 55 had grade 3 HN. The mean BMI of the patients with grade 1 HN was  $29.2 \pm 3.2$ , The mean BMI of the patients with grade 2 HN was  $27.6 \pm 4.2$  and the last one was  $28.6 \pm 2.2$  respectively. The involvement of the HN of the hand was bilateral. There was no statistically significant correlation between grade of HN and BMI ( $P= 0.505$ ). The mean cholesterol levels of the patients with grade 1 HN, grade 2 HN and grade 3 HN were;  $240.25 \pm 40$  g/dl,  $224.78 \pm 30$  g/dl and  $227.4 \pm 15$  g/dl respectively. There was also no significant correlation between grade of HN and cholesterol level ( $p=0.211$ ) (Table 2).

### Discussion

Although it is controversial, hand osteoarthritis is characterized by Heberden nodes in women especially at postmenopausal period and also rare in men. The etiopathogenesis of OA is unknown and

**Table 1.** Characteristics of 119 female patients with HN

	Mean	SD
Age (year)	61.12	8.2
BMI ( $\text{kg/m}^2$ )	28.44	5.05
Cholesterol (g/dl)	229.5	36
Menopause duration (year)	12.9	5.5
VAS (cm)	4.2	5.3<

**Table 2.** Relation between HN , BMI and cholesterol level

	Grade 1 (n=27)	Grade2 (n=37)	Grade3 (n=55)	P value
BMI(kg/m <sup>2</sup> )	29.2±3.2	27.6±4.2	28.6±2.2	0.505
Cholesterol (g/dl)	240.2±40	224.78±30	227.4±15	0.211

many risk factors are accused (1,2). In terms of risk factors, obesity is the main factor that may be cause of OA. However it is still in doubt whether obesity is a cause of OA or whether disability leads to obesity. Kellegren and Lawrence found that knee OA was more common in obese individuals, especially in women (2). In addition, a few studies have shown that DIP joint was associated with obesity (3,4).

The purpose of the present study is to determine the relationship between hand OA and obesity for understanding the etiology and role of risk factors. Although Kellegren and Lawrence found that there was relation between knee OA and obesity they also found that DIP involvement was associated with obesity in men but not in women (6,7). All studies suggest that OA of the knee is more consistent with obesity but there is weaker association for nodal OA.

Cicutini et al (8) found that obesity was related with tibiofemoral OA and DIP joint OA but some studies suggested that there was weak association between obesity and DIP joint OA but strong association between obesity and CMC joint involvement. Carmon et al found that there was no evidence that development of hand OA subsequently led to increased incidence of obesity (9). Hochberg et al studied the association of obesity and body fat distribution with hand OA and failed to support that obesity was associated with hand OA in women (10). In the present study we found no association between nodal OA , BMI and cholesterol level and also we evaluated the efficacy of severity of HN on BMI and cholesterol level but no significant correlation was found. Obesity leads to hormonal changes and maybe these changes may affect OA and its progression (11-14). So, further studies with hormones and OA must be performed. Data from some studies suggested that certain metabolic factors were associated with obesity,

such as hyperuricemia, diabetes and hypercholesterolemia (2,15). Sturmer et al (16) found that high serum cholesterol levels were indepently associated with generalized OA. Davis et al (17) suggested that patients with OA had had greater BMI, higher blood pressure and lower mean high density lipoprotein cholesterol level.

In the study we did not find any significant correlation between nodal OA, BMI and cholesterol level and there was also no any association between the grade of HN and cholesterol level and BMI. Perhaps, further studies with increased number of patients which analyze the subgroup of cholesterol may be necessary to determine the relation between nodal OA and obesity . In conclusion, it is suggested that unlike knee OA, obesity is not an important risk factor for hand OA and different factors and different mechanism may play a role for etiopathogenesis.

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