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FİZİKSEL TIP

ANTHROPOMETRIC MEASUREMENTS AND BODY COMPOSITION ANALYSIS IN PATIENTS WITH ANKYLOSING SPONDYLITIS

ANKİLOZAN SPONDİLİTLİ HASTALARIN ANTROPOMETRİK ÖLÇÜMLERİ VE VÜCUT KOMPOZİSYON ANALİZLERİ

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SUMMARY

Weight loss and loss of lean body mass in particular are powerful predictors of health both in disease states and general population. Inflammatory diseases may lead to weight loss and loss of fat-free mass.

The aim of this study was to evaluate anthropometric properties and body composition analysis of patients with Ankylosing Spondylitis (AS) and compare these values with those in healthy volunteers. 26 patients with a mean age of 44,08 ± 10,54 years and 23 age and body mass index matched controls were enrolled in this study. Waist, hip measurements, biceps, triceps, subscapular, suprailiac skinfold thickness measurements and body composition analysis by dual energy Xray absorpsiometer were performed.

AS patients had significantly reduced subscapular skin fold thickness, total fat mass, trunk lean mass and abdominal lean mass values (p=0,041, p=0,043, p=0,031, p=0,031 respectively). The lower trunk and abdomen lean mass of AS patients may be due to immobility and deformity of the spine as well as systemical inflammatory process. Thoracic and lumbar spine exercises may be beneficial for these patients to limit lean mass loss.

Key words: *Ankylosing spondylitis, skinfold thickness, fat mass, lean mass, body composition*

Running title: *Body composition in ankylosing spondylitis*

ÖZET

Kilo kaybı, özellikle kas kitlesi kaybı, hem hastalık durumlarında hem de genel populasyonda sağlığın önemli göstergeleridir.

Bu çalışmanın amacı, Ankilozan Spondilitli (AS) hastaların antropometrik özellikleri ile vücut kompozisyonu analizlerini değerlendirmek ve bu değerleri sağlıklı gönüllülerle karşılaştırmaktı. Çalışmaya ortalama yaşı 44,08 ± 10,54 olan 26 hasta ile yaş ve vücut kitle indeksi uyumlu 23 kontrol alındı. Hasta ve kontrollerin bel, kalça ölçümleri, biseps, triseps, subskapular ve suprailiak cilt katlantı ölçümleri ve dual enerji X-ray absorbsiyometre ile vücut kompozisyonları değerlendirildi.

AS'li hastaların subskapular cilt katlantı kalınlıkları, total yağ kitleleri, gövde kas kitleleri ve karın kas kitleleri anlamlı derecede düşüktü (sırasıyla p=0,041, p=0,043, p= 0,031).

AS'li hastaların azalmış subskapular cilt katlantısı, total yağ kitlesi, gövde kas kitlesi ve abdominal kas kitlesi omurganın immobilitesi, deformitesi ve sistemik inflamatuvar olaylara bağlı olabilir. Torakal ve lomber omurga egzersizleri bu hastalarda kas kitlesi kaybını önlemede faydalı olabilir.

Anahtar kelimeler: *Ankilozan spondilit, cilt katlantı ölçümü, yağ kitlesi, kas kitlesi, vücut kompozisyonu*

Introduction:

Ankylosing Spondylitis (AS) is an inflammatory disease of unknown aetiology characterised by prominent inflammation of spinal joints and adjacent structures, leading to progressive and ascending bony fusion of the spine (1). Weight loss and loss of lean body mass in particular are powerful predictors of health both in disease states and general population. Inflammatory diseases may lead to weight loss and loss of fat-free mass. There are probably multifactorial reasons and including mechanical and postural problems, muscle wasting, poor appetite, drug therapy and metabolic burden of the inflammatory response.

This study was designed to analyse the anthropometric properties, fat mass and fat-free mass of patients with AS and to

compare these values with age and body mass index (BMI) matched healthy controls.

Methods:

Twenty-six (21 female, 5 male) patients who fulfilled modified New York criteria, aged 28-68 with a mean age of 44.08±10.54 years were included in the study (1,2). Twenty-three healthy volunteer hospital staff aged 21-62 (41.13±10.53) (20 female, 3 male) formed the control group. Patients who were pregnant, non ambulant, taking oral corticostreoids, with history of diabetes mellitus, thyroid function disorders were excluded. Subjects who had bilateral shoulder operation or severe shoulder disease were also excluded as these may be interfered with upper arm anthropometry and fat-free mass measurements. None of the patients and control subjects were engaging a routine exercise programme.

The subjects were weighed on balance beam scales to the nearest 0.1kg. Standing height was measured on a wall in centimeters (cm).

BMI was calculated as weight in kilograms divided by height in meters squared. Skinfold thickness was measured using standard skin fold calliper. Triceps, biceps, subscapular and suprailiac skinfold thickness were measured using standardised procedures and locations.

Waist circumference was recorded at the midpoint between the superior iliac crest and lower costal margin. Hip circumference was measured at the symphisis pubis and projecting part of the buttocks.

Body composition was determined by dual energy X-ray absorpsiometry (DXA) (Norland XR 46) which is accepted as a valid estimation of fat and fat-free mass (3,4,5). Total bone mineral content (TBMC), total lean mass (g), total fat mass (g), percentage of total fat mass, Siri's fat percentage, Brozek's fat percentage, percentage of soft tissue mass, TBMC/fat free mass (FFM) (%), trunk lean mass, trunk fat mass, abdomen lean mass, abdomen fat mass measurements were recorded.

The data were analysed on a personal computer using SPSS software. An independent sample t-test was used for intergroup comparisons. Correlation analysis was performed using Spearman correlation analysis.

Results:

The characteristics of the two groups are demonstrated in Table 1. Body composition parameters of patients and controls analysed by DXA are shown in Table 2.

Table 1: The characteristics of patients and controls.

Parameters	*Patient (n=26)*	*Control (n=23)*	*p*
Age	44,08±10,5	41,13±10,5	n.s
B.M.I.	24,9±3,1	26,3±4,1	n.s
Waist (cm)	90,7±8,4	93,6±10,2	n.s
Hip (cm)	100,6±5,9	102,9±6,8	n.s
Biceps	8,8±3,6	10,2±3,9	n.s
Triceps	12,6±5,9	14,1±5,8	n.s
Subscapular skinfold	18,3±6,2	22,5±7,1	p = 0,041
Suprailiac skinfold	19,4±7,7	20,5±7,8	n.s

n.s; not significant

Table 2: Body composition parameters of patients and controls.

Parameters	*Patient (n=26)*	*Control (n=23)*	*p*
Total Lean Mass (g)	47818±9615	51023±9975	n.s.
Total Fat Mass (g)	22577±8216	27791±8926	p = 0,043
Total Fat %	31,5±11	32,8±10,9	n.s.
Soft Tissue Fat %	32,7±11,3	33,9±11,3	n.s.
Trunk Lean Mass (g)	20709±3617	23257±4307	p = 0,031
Trunk Fat Mass (g)	10586±4086	12455±5553	n.s.
Abdomen Lean Mass (g)	9413±1522	10510±1935	p = 0,031
Abdomen Fat Mass (g)	5022±1785	5589±2507	n.s.
Arm Lean Mass (g)	7090±1523	7446±1676	n.s.
Arm Fat Mass (g)	3983±1726	4475±1658	n.s.

n.s; not significant

There was no significant difference between two groups regarding age and BMI. Patients with AS did not have any statistical significance in waist and hip circumference measurements. Skinfold thickness parameters did not reveal statistically significant difference in biceps, triceps or suprailiac measurements. However, subscapular skinfold thickness values were reduced in AS group comparing to the controls (p=0,041).

When the values of body composition by DXA were compared, total fat mass, trunk lean mass, and abdomen lean mass of patients with AS were statistically significantly lower than healthy controls (p=0,043, p=0,031, p=0,031). Other body composition values did not reveal any significant difference.

Subscapular skinfold thickness was correlated with trunk fat mass and abdominal fat mass (r=0,597, r=0,573).

Discussion:

The body composition in inflammatory diseases has been previously studied in some aspects. Munro et al examined BMI,

upper arm fat and muscle areas recorded with fat free mass calculated from the waist measurement. They observed increased prevalence of low body mass, greatest for lean tissue (6). In another study it is determined that, patients with cystic fibrosis have lower mean fat-free mass (7). Capristo et al. showed decreased fat mass and enhanced utilisation of lipids in patients with Crohn's disease (8).

In this study we compared AS patients with age and BMI matched healthy subjects. This provided us to assess the regional fat and fat-free mass differences between these two groups. Patients' trunk and abdomen lean mass were significantly reduced as well as subscapular skinfold measurements although their BMI were similar. This result may suggest that, patients have regional lean mass difference compared with controls. Mechanical and postural problems leading to muscle wasting may be an important factor in explanation of this result. Because AS leads to immobility of the spine, particularly thoracic and lomber region (9). This immobility may be one of the causes of reduced trunk and abdominal lean mass in our study. However, active inflammation periods may also be one of the reasons of trunk and abdomen lean mass loss.

Toussirot et al. evaluated the changes in body composition in patients with AS and similar to our results determined that, fat and lean mass did not differ between patients and controls (10).

Systemically inflammatory reasons can also play a role in body composition change. Systemically increased Interleukin 1_ and Interleukin 6 and serum tumour necrosis factor may cause increased protein degradation and a reduction in lean body mass (1).

Decreased serum levels of biochemical markers of muscle origin (creatine kinase, aldolase, creatinine, alanin aminotransferase and aspartate aminotransferase) may lead increased protein degradation, predominantly in skeletal muscle (4).

As subscapular skinfold thickness values were correlated with trunk and abdominal lean mass, this measurement can be a guide for trunk and abdominal lean mass. It may reflect fat free mass when DXA or other body composition evaluation methods are not available.

In conclusion, we can suggest that AS patients have reduced trunk and abdominal lean mass and thoracic and lumbar spine exercises can be beneficial for lean mass preservation in patients with AS.

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