Assesment of Hand grip Strength in Patients with Pelvic Organ Prolapse

Pelvik Organ Prolapsusu Olan Hastalarda El Kavrama Gücünün Değerlendirilmesi

El Kas Gücü ve Pelvik Organ Prolapsusu / Hand grip Strength and Pelvic Organ Prolapse

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Özet

Amaç: Pelvik organ prolapsusu(POP) doğum yapmış kadınların %50'sinde gözlenen, sık bir patolojidir. Pelvik organ prolapsusunun önde gelen sebebi pelvic taban kaslarının zayıflığıdır. El kavrama gücü, total kas gücü ile ilişkilidir ve kişinin genel kas gücünü değerlendirmek için kullanılabilir. El kavrama gücünün ölçümü Jamar dinamometre adında taşınabilir bir dinamometre ile yapılır. POP olan hastalarda genel kas gücünün azalmış olabileceği hipotezini kurduk. Gereç ve Yöntem: Namık Kemal Üniversitesi Tıp Fakültesi Jinekoloji kliniğine başvuran hastalardan, POP tanısı alan 20 hasta ve kontrol grubuna alınan 21 hasta çalışmaya alındı. POP-Q klasifikasyonu prolapsusun şiddetini değerlendirmek için kullanıldı. Jamar hidrolik el dinamometresi ile el kavrama gücü ölçüldü. Bulgular: Prolapsus grubunda medyan POP skoru 3 (1-4) idi. İki grupta ortalama Jamar Skorları sağ el için, sol el için ve dominant el için benzerdi (p=0.774, p=0.575 and p=0.707). Prolapsus grubunda ortalama vücut yağ oranı %33.9 ± 5.7 iken kontrol grubunda %38.9 ± 7.4 idi(p=0.021). Tartışma: Çalışmamızda POP grubu ile sağlıklı kontroller arasında genel vücut kas gücü açısından fark bulmadık. Sonuçlarımız vücudun genel kas gücünü gösteren Jamar Skorlarının pelvik organ kas gücü ile ilişkili olmadığını göstermiştir.

Anahtar Kelimeler

Pelvik Organ Prolapsusu; El Kavrama Gücü; Kas Gücü

Abstract

Aim: Pelvic organ prolapse(POP) is a common condition that is observed in 50% of parous women. Weakness of pelvic floor muscles is an important factor that leads to POP. The hand grip strength is related to total muscle strength and it could be used to evaluate one's general muscle strength. The Jamar hand dynamometer is a portable dynamometer that uses a strain gauge to measure hand grip strength. We hypothesized that general muscle strength would be impaired in patients with POP. Material and Method: Twenty patients with pelvic organ prolapse and twenty-one controls were recruited from the gynecology clinic of Namik Kemal University School of Medicine. The POP-Q classification was used to quantify the clinical severity of the prolapse. Hand grip strength was measured using a JAMAR hydraulic hand dynamometer. Results: The median pelvic organ prolapse score was 3 (1-4) in prolapse group. The mean Jamar scores of both groups were similar for the right hand, the left hand and the dominant hand (p=0.774, p=0.575 and p=0.707, respectively).The mean body fat percentage was 33.9 ± 5.7 % in prolapses group and it was 38.9 ± 7.4% in control group (p=0.021). Discussion: We found no difference in terms of general muscle strength between POP group and healthy controls. Our results showed that Jamar scores, which represented general muscle strength of body, did not related to pelvic organ muscle strength.

Keywords

Pelvic Organ Prolapse; Hand Grip Strength; Muscle Strength

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Introduction

Pelvic organ prolapse (POP) is the prolapse of anterior (urethrocele, cystocele) and/or posterior (enterocele, rectocele) vaginal walls with or without apical segment of the vagina (cervix, cuff or uterine) [1]. Women with POP have symptoms such as pelvic heaviness, dragging sensation in the vagina, protrusion of vagina or uterus from the vulva and backache. Bladder and bowel symptoms, and sexual dysfunction are evident. POP is a common condition that is observed in 50% of parous women and 10% of these women undergo surgery for the management of POP or urinary incontinence [2, 3].

Pelvic floor is composed of muscles, bones and ligaments. The muscles of pelvic floor are innervated by peripheral and central nerves [4].Weakness of pelvic floor muscles is an important factor that leads to pelvic organ prolapse. Moreover, grip strength is related to total muscle strength and it could be used to evaluate one's general muscle strength [5]. The Jamar hand dynamometer is a portable dynamometer that uses a strain gauge to measure hand grip strength. We hypothesized that general muscle strength would be an indicator of pelvic floor muscle strength and we evaluated the association of hand grip strength and POP.

Material and Method

Patients with pelvic organ prolapse and age matched healthy controls were recruited between October 2011 and December 2013 from the gynecology clinic of Namik Kemal University School of Medicine. The study was approved by the local research and ethics committee. Informed consent was obtained from each subject immediately before testing.

All women were postmenopausal and also they were not using hormone replacement therapy. In the pelvic organ prolapse (POP) group the women were patients who were scheduled for surgery or treated with pessary. The women in POP and control groups had not any history of surgery within one-year period and had no orthopedic or musculoskeletal disorders (such as upper extremity functional limitation, inflammatory arthritis, entrapment neuropathies, polyneuropathies, neurological disorders and patients with history of trauma) that would affect results. The age-matched patients were chosen for the control group to avoid disturbance in JAMAR scores by aging. Age, body mass index (BMI), body fat percentage (BFI), POP stage, hand grip strength were recorded for each patient. The POP-Q classification was used to quantify the clinical severity of the prolapse. There are three reference points anteriorly (Aa, Ba, and C) and three posteriorly (Ap, Bp, and D). The points Aa and Ap are 3 cm proximal to the hymenal ring anteriorly and posteriorly, respectively. Points Ba and Bp are defined as the lowest points of the prolapse between Aa anteriorly or Ap posteriorly and the vaginal apex. Anteriorly, the apex is point C (cervix), and posteriorly is point D (pouch of Douglas). The vaginal length, the genital hiatus from the middle of the urethral meatus to the posterior hymenal ring, and the perineal body from the posterior aspect of the genital hiatus to the midanal opening are also noted in POP-Q. Once the measurements are noted, corresponding POP-Q stage is calculated (Between 0 and 4) [1]. Hand grip strength was measured using a JAMAR hydraulic hand dynamometer [Figure 1(a-b)]. Both hands were tested three times and the average of results was used for each hand. The measurement was performed between 9 and 11 am to avoid muscle weakness in the sitting position with the arm held in a comfortable position as previously described by Spijkerman et al. [Figure 2(a-b)] [6].

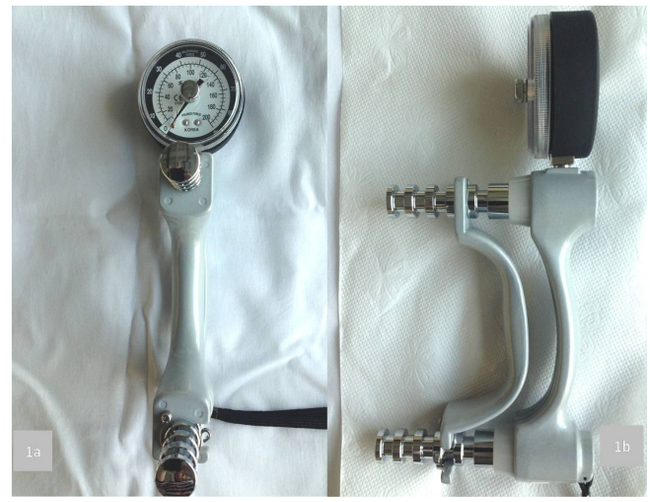


Figure 1. JAMAR hydraulic hand dynamometer (A,B)



Figure 2. JAMAR hydraulic hand dynamometer measurement in a suitable position (A,B)

Statistical analyses were conducted using the Statistical Package for the Social Sciences for Windows 20.0 software (SPSS, Chicago, IL, USA). Descriptive statistics were given as mean, standard deviation, median, min-max, frequency and percentage. The Kolmogorov Smirnov test was used to evaluate whether the continuous variables were normally distributed. For continuous variables the independent samples t-test or Mann Whitney U-test were used as appropriate. The chi-square or Fisher's exact test was used to compare nominal variables. A probability value < 0.05 was considered the minimum level of statistical significance. A two-sided p-value was considered for all comparisons.

Results

Twenty-one patients with POP and twenty-one controls were recruited for this study. A patient with POP refused to participate to the study and the study were conducted with twenty patients. Patients' mean ages were similar in both groups (p=0.457). The

mean value of BMI was 27.9 ± 4.5 kg/m2 in prolapses group while it was 32.9 ± 8 kg/m2 in control group (p=0. 019). The mean body fat percentage was 33.9 ± 5.7 % in prolapses group and it was 38.9 ± 7.4% in control group (0. 021). The mean Jamar scores of both groups were similar for the right hand, the left hand and the dominant hand (p=0.774, p=0.575 and p=0.707, respectively) (Table 1). The median pelvic organ prolapse score was 3 (1-4) in prolapse group. The mean hand floor distances were similar (p=0.728) (Table 1).

Table 1. Prolapsus and control groups demographic parameter and results.

	Prolapsus (20)	Control (n=21)	p
Age (years)	58.85 ± 10.41	56.33 ± 11.01	0.457
BMI (kg/m2)	27.9 ± 4.5	32.9 ± 8.0	0.019
Body fat percentage (%)	33.9 ± 5.7	38.9 ± 7.4	0.021
Jamar Right Hand (kg)	51.2 ± 11.8	49.9 ± 17.2	0.774
Jamar Left Hand (kg)	50.2 ± 9.9	47.6 ± 17.6	0.575
Jamar Dominant Hand (kg)	51.6 ± 11.5	49.9 ± 17.2	0.707
Hand to floor distance (cm)	2.65 ± 7.24	3.71 ± 8.56	0.728
POP Stage	3 (1-4)	-	

BMI: Body mass index, POP: pelvic organ prolapsed, kg: kilogram, cm: centimeter

Discussion

Pelvic floor muscles are the structural supports of the pelvic organs and pelvic apertures [7]. The weakness of pelvic floor muscles is one of the major risk factors of POP while the etiology is complex and multifactorial. The impaired general muscle strength would be related to weakness of pelvic floor muscles [8]. We hypothesized that hand grip strength would be an indirect indicator of pelvic floor muscle strength. Thus we compared the hand grip strength of patients with POP with healthy subjects, we could not find any difference of muscle strength between two groups. To the best of our knowledge it is the first study in the literature.

The decrease in estrogen levels in postmenopausal women distorts collagen configuration and decreases the body muscle mass. Thus it was reported that risk of POP increased in postmenopausal women [9]. Another study of Nicolay et. al. [10] showed that estrogen supplementation facilitated peripheral muscle strength. Moreover postmenopausal women who received hormone replacement therapy had lower incidence of POP [11]. In the light of these findings we chose postmenopausal women to avoid confounding effect of hormonal status of women and none of these women were using hormone replacement therapy.

The pelvic floor muscle training, which involves contraction of pelvic floor muscles to improve strength, endurance and timing of contractions, is the main conservative management option to treat or prevent POP. Electrical stimulation and biofeedback could be used during the pelvic floor exercises. It had been shown that the women with POP generated less vaginal closure force during a maximal voluntary contraction than healthy women [12]. All these findings proved that pelvic floor muscle strength is the most important etiologic factor of POP. Hand grip strength reflects physical health and muscle function and has been found to be related to functional limitations [13, 14].Impaired muscle strength, which is detected by hand grip strength, is a good marker of impaired physical performance and related to many diseases such as pulmonary diseases, neurologic diseases and fibromyalgia. Moreover the hand grip strength has a prognostic value for geriatric syndrome including urinary incontinence, losses in activity of daily living, pain, iatrogenic problems [8]. Thus we evaluated the hand grip strength in patients' with POP. Karabiber et al. [15] designed a study investigating general muscle strength in patients with nocturnal enuresis. They found that general muscle strength, which would be an indicator of striated muscles of pelvis, was lower in patients with nocturnal enuresis. Therefore we hypothesized that general muscle strength would be impaired in patients with POP.

Obesity is one of the risk factors of POP [16]. The obesity has adverse effects on muscle strength and it is thought to be related to deposition of triglyceride in myocytes [17]. All patients in both groups were obese in our study. Thus we eliminated the confounding effect of obesity in our study.

The limitations of our study are limited subject numbers and wide disturbance of patients' ages. We could not compare the subgroups that were stratified by age due to limited number of subjects.

In conclusion, we found no difference in terms of general muscle strength between POP group and healthy controls. Our results showed that Jamar scores, which represented general muscle strength of body, did not related to pelvic organ muscle strength. Our study could not show the association between general muscle strength of body and pelvic organ muscle strength. The situation may be related to the low number of cases. Further studies including a larger patient cohort will provide more clear results.

Competing interests

The authors declare that they have no competing interests.

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