The Effect of Ejaculation Frequency on Serum Prostate-Specific Antigen Level

Ejakülasyon Sıklığının Serum Prostat Spesifik Antijen Düzeyine Etkisi

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ABSTRACT

Objective: Serum prostate-specific antigen (PSA) levels are very important in the diagnosis of prostate cancer. Besides prostate cancer, PSA levels can also be increased by cystoscopy, prostate biopsy, prostatitis, and manipulation. There are also studies reporting that ejaculation affects serum PSA levels. In this study, we aimed to investigate the effects of ejaculation frequency on serum PSA level.

Methods: A total of 135 male patients aged in the range of 48–69 years who presented with lower urinary tract symptoms at the urology outpatient clinic between October 2009 and August 2012 were included in the study. Three groups divided according to ejaculation frequency (Group 1, Group 2, and Group 3) were compared by total and free PSA (t/f PSA) values, age, International Prostate Symptom Score (IPSS), prostate volumes, and PSA density (PSAD).

Results: There was no significant difference between t/f PSA values, age, IPSS, prostate volumes, and PSAD values of the groups.

Conclusion: In our study, ejaculation frequency was found to have no effect on serum PSA levels. *(JAREM 2015; 5: 56-9)*

Keywords: Ejaculation frequency, prostate specific antigen, ejaculation

ÖZET

Amaç: Serum prostat spesifik antijen (PSA) düzeyleri prostat kanserinin tanısında oldukça önemlidir. PSA düzeyini prostat kanseri haricinde sistoskopi, prostat biyopsisi, prostatit ve manüplasyon gibi sebepler de yükseltebilmektedir. Ayrıca ejakülasyonun serum PSA düzeyini etkilediğine yönelik çalışmalar mevcuttur. Biz bu çalışmada ejakülasyon sıklığının serum PSA düzeyi üzerine etkisini araştırmayı amaçladık

Yöntemler: Çalışmaya Ekim 2009 ile Ağustos 2012 tarihleri arasında üroloji polikliniğine alt üriner sistem semptomları (LUTS) ile başvuran 48-69 yaş aralığındaki toplam 135 erkek hasta dâhil edildi. Aylık ejakülasyon sayısı 0-5 olanlar Grup 1, 6-10 olanlar Grup 2 ve 11-20 arasında olan hastalar Grup 3 olarak gruplandırıldı. Ejakülasyon sıklığına göre ayrılan üç grup (Grup 1, Grup 2 ve Grup 3) total ve serbest PSA (t/s PSA) değerleri, yaş, uluslararası prostat semptom skoru (IPSS) ve prostat volümleri, uluslararası erektil fonksiyon değerlendirme skoru (IIEF), PSA dansitesi (PSAD) açısından karşılaştırıldı.

Bulgular: Gruplar arasında total ve serbest PSA düzeyleri, yaş, IPSS, prostat volümü ve PSA dansitesi açısından anlamlı fark saptanmadı.

Sonuç: Çalışmamızda ejakülasyon sıklığının serum PSA düzeyi üzerine etkisinin olmadığı görüldü. *(JAREM 2015; 5: 56-9)*

Anahtar Sözcükler: Ejakülasyon sıklığı, prostat spesifik antijen, ejakülasyon

INTRODUCTION

Prostate cancer (PCa) is one of the most common types of cancer among men in the United States. In 2013, the American Cancer Society estimates that 238,590 U.S. men will develop PCa and 29,720 men will die from PCa. It occupies the second place among the causes of cancer-related deaths (1). For the detection of PCa at an early stage, regular prostate-specific antigen (PSA) measurements, digital rectal examination (DRE), PCa antigen 3 (PCA3 or DD3), prostate biopsies, taken if necessary, are of great importance, and Prostate Health Index (PHI) use is highly effective to benefit from early diagnosis and curative PCa treatment (2, 3). The introduction of PSA as a marker for PCa in the 1980s was a revolution in the diagnosis of PCa. However, though PSA is specific for the prostate organ, it is not specific for PCa. Elevated levels of serum PSA is caused by the entry of more PSA into circulation because of changes in the structure of prostate cells and defects formed in the basal layer. Besides PCa, PSA level may also be increased by cystoscopy, prostate biopsy, prostatitis, and benign prostatic hyperplasia (BPH) (4). There are studies in the literature that suggest that ejaculation increases, decreases or does not change serum PSA levels (5-7). In a study by Tchetgen et al. (5), PSA values before and after the ejaculation of 64 patients were taken into consideration. A statistically significant increase in PSA was observed in 87% of the patients, particularly within the first 24 h. An increase of 41%, 9%, and 8% was observed at 1 h, 6 h, and 24 h, respectively. In 95% of the same patients, increased PSA level was demonstrated to return to the baseline value within the first 48 h. In another study, by Simak et al. (6), serum PSA levels on day 1 and 7 before and after the ejaculation of 18 patients aged between 20 and 39 years were evaluated; as a result, a significant decline was identified in serum PSA levels after ejaculation. In that study, the decline in PSA values after ejaculation was associated with the depletion of PSA stocks in conjunction with ejaculation. Although the effect of ejaculation

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Received Date / Geliş Tarihi: 25.02.2015 **Accepted Date / Kabul Tarihi:** 18.03.2015

DOI: 10.5152/jarem.2015.685

on PSA levels was investigated in studies conducted so far, there is no report on the effect of ejaculation frequency on PSA in the literature.

In this study, we aimed to investigate the effects of ejaculation frequency on total and free PSA (t/f PSA).

METHODS

A total of 135 male patients aged in the range of 48–69 years who presented with lower urinary tract symptoms at the urology outpatient clinic between October 2009 and August 2012 were included in the study. Ejaculation number has been investigated by the survey method.

Patients taking the therapeutic 5-alpha reductase inhibitor and/or testosterone preparations or other hormonal effective drugs for BPH, patients with genitourinary tract malignancies who have a history of previous prostate surgery, cystectomy or other pelvic surgery, and those who had ejaculation in the last 48 h were excluded from the study.

Routine examinations of all patients as well as t/f PSA values, International Prostate Symptom Score (IPSS), number of ejaculations, PSA density (PSAD) value, and prostate volume were recorded.

The patients were divided into three groups by ejaculation frequency. Patients with 0–5 ejaculations per month were classified as Group 1, and those with 6–10 ejaculations and 11–20 ejaculations per month were classified as Group 2 and 3, respectively.

Prostate specific antigen (PSA) and free PSA measurements of the patients were performed by the radioimmunoassay method using a UniCel® DxI 800 Immunoassay System (Beckman Coulter, Inc., USA) device. PSAD was obtained by dividing total PSA level by prostate volume.

Transrectal ultrasound procedure was performed on patients in the left lateral knee, chest position, using a 6.5-MHz biplanar transrectal probe (Hitachi™ EUB-400, Tokyo, Japan).

Statistical Analysis

Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) Version 15.0 was used for statistical analysis. Groups were compared using one-way Anova test by age, t/f PSA values, IPSS, PSAD, and prostate volumes. A p value of <0.05 was accepted to be statistically significant.

In this study, the approval of the local ethics committee of the hospital was obtained. The patient gave an informed consent for the publishing of data.

RESULTS

Mean age of all patients was 58.23, and mean age for Group 1, 2, and 3 was 58.70±5.00, 58.20±5.46, and 55.38±5.56, respectively. No statistically significant difference was detected by mean age between the groups (p=0.106).

Mean tPSA values of the patients were found to be 1.29±0.89 ng/mL (0.21–3.98) for Group 1, 1.26±0.86 ng/mL (0.26–3.24) for Group 2, and 1.62±0.79 ng/mL (0.70–3.15) for Group 3. No significant difference was found between the groups by tPSA values (p=405).

Table 1. Demographic features and result of the groups

	Group 1 (n=81)	Group 2 (n=41)	Group 3 (n=13)	p value*
Age (years)	58.70±5.00	58.20±5.46	55.38±5.56	0.106
tPSA (ng/mL)	1.29±0.89	1.26±0.86	1.62±0.79	0.405
fPSA (ng/mL)	0.35±0.20	0.34±0.18	0.37±0.17	0.892
IPSS	13.93±6.70	13.39±6.85	10.00±4.16	0.139
Prostate volume (cm^3)	39.40±17.79	35.05±15.12	35.08±11.75	0.332
PSAD	0.35±0.25	0.38±0.025	0.51±0.026	0.129

*Used one-way Anova test
IPSS: International Prostate Symptom Score; PSAD: PSA density; tPSA: total PSA; sPSA: free PSA; PSA: prostate specific antigen

Mean fPSA values of the patients were 0.35±0.20 ng/mL (0.08–1.01) for Group 1, 0.34±0.18 ng/mL (0.7–0.8) for Group 2, and 0.37±0.17 ng/mL (0.18–0.74) for Group 3. There was no significant difference between fPSA values of the groups (p=0.892).

Mean IPSS values of the patients were 13.93±6.70 (0–32) for Group 1, 13.39±6.85 (3–29) for Group 2, and 10.00±4.16 (5–20) for Group 3. There was no significant difference between IPSS values of the groups (p=0.139).

Mean prostate volumes of the patients were 39.40±17.79 cm^3 (19–110) for Group 1, 35.05±15.12 cm^3 (20–92) for Group 2, and 35.08±11.75 cm^3 (19–58) for Group 3. There was no significant difference between prostate volumes of the groups (p=0.332).

Mean PSAD values of the patients were 0.35±0.25 (0.0042–0.14) for Group 1, 0.038±0.25 (0.007–0.10) for Group 2, and 0.51±0.26 (0.12–0.98) for Group 3. There was no statistically significant difference between PSAD values of the groups (p=0.129). Table 1 shows results and demographic features of the groups.

DISCUSSION

Nowadays, serum PSA testing is widely used in the diagnosis of PCa, and an annual check of serum PSA level after the age of 50 years is recommended for early diagnosis. However, the low specificity of the PSA test has resulted in a large number of unnecessary biopsies and overtreatment. PCA3 and PHI are among the most promising biomarkers that could complement PSA for early PCa diagnosis. A non-invasive, PCR-based method is able to detect PCA3 after prostate stimulation. Diagnostic urine test is more accurate than PSA, and it may reduce the likelihood of false-positive results (8). Different regions of the prostate contain varying proportions of fPSA isoforms, including proPSA that is associated with PCa. PHI, a mathematical formula that combines total PSA, free PSA, and [-2] proPSA, should be considered for biopsy decisions, risk stratification, and treatment selection (9).

PSA was reported to be non-specific for PCa, and it was suggested to increase based on conditions such as BPH and prostatitis as well as urological procedures, including cystoscopy, prostate biopsy, and DRE (10).

Thus, it is obvious that several factors may affect the serum levels of PSA. Several studies have addressed the effect of single ejaculation

on serum PSA levels (5-7). The results in such studies are variable, showing either increased or decreased PSA or the lack of effect. However, it is not known whether the ejaculation frequency is associated with PSA levels. We aimed to address this in the present study.

In a study by Oesterling et al. (11), it was observed that physiological membrane permeability and peri-prostatic PSA level increased as a result of weakening of the basal and epithelial cell membranes with advancing age. In that study, increasing permeability of barrier with ejaculation is thought to cause an increase in PSA levels. In a similar study by Herschman et al. (12), early stage PSA levels before and after the ejaculation of 20 patients was investigated. Total PSA values were found to be increased at 1h, 6 h, and 24 h after ejaculation, while free PSA value was reported to increase at 1 h and decrease at 6 h.

In the same period, Heidenreich et al. (13) obtained results distinct from other studies. In their study, PSA values of 100 patients aged within the range of 25–35 years were examined at 1hr and 24 h before and after ejaculation, and no statistically significant change was found in PSA level.

In the studies by Netto et al. (14) and Kirkali et al. (7), no significant rate of change in PSA was observed after ejaculation. In our study, the number of ejaculations within the last 1 month was found to cause no significant change in PSA level between groups. Further evaluations of free and total PSA values as well as PSAD also revealed no significant difference between the groups.

Stenner et al. (15) assessed a total of 707 patients in their study, in which ejaculation time was considered. The first group of patients (n=618) were enquired about their last ejaculation time, and their PSA values were considered. The patients in the first group were divided into seven groups according to those with last ejaculation time of 0.5, 1, 2, 3, 7, 30, and more than 60 days. No significant difference was found in PSA when these groups were evaluated within themselves. PSA values before and after the ejaculation of the patients in the second group (n=89) were compared; however, no significant difference was found. In that study, a significant difference was found between PSA values of the patients in the group with last ejaculation time of 1 day and PSA values of the patients in the group with last ejaculation time of 60 days.

In a recent study by Rajaei et al. (16), a group with a mean age of 31.3 years and another group with a mean age of 56.9 years were compared. Significant increase in PSA was observed in both groups at 1 h after ejaculation; however, no significant increase in PSA was observed in both groups at 24 h after ejaculation. Contractions of the pelvic musculature and the peri-prostatic tissue during ejaculation are thought to cause a leakage of PSA into the blood stream, resulting in increased PSA.

CONCLUSION

In our study, unlike previous studies, the effects of ejaculation frequency on serum PSA levels were investigated, rather than the existence of ejaculation. No statistically significant difference was established between PSA levels of the patients with a higher number of ejaculation and those of the patients with a lower number of ejaculation. According to our study, ejaculation frequency does not increase serum PSA levels. In previous studies, increased serum PSA after ejaculation was observed, particularly, at 1 h (5,12). However, the patients who had an ejaculation within the last 48 h were excluded from the study, thereby having no significant change in PSA. It is unlikely that after this period, the timing of the last ejaculation affected the serum PSA levels. Future studies should be conducted, and what impact will ejaculation frequency have on other biomarkers such as PCA3 and PHI should be investigated.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Ankara Numune Training and Research Hospital.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - M.K., M.Ç.; Design - A.Ö.A., S.A.; Supervision - M.Ç., M.K.; Resource - Ö.G., M.K., C.S.G.; Materials - M.K., A.Ö.A.; Data Collection and/or Processing - Ö.G., C.S.G.; Analysis and/or Interpretation - M.K., M.Ç., Ç.V.Ö.; Literature Review - Ç.V.Ö., S.A.; Writer - M.K.; Critical Review - M.Ç., C.S.G., A.Ö.A., Ö.G.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

Etik Komite Onayı: Bu çalışma için etik komite onayı Ankara Numune Eğitim ve Araştırma Hastanesi'nden alınmıştır.

Hasta Onamı: Yazılı hasta onamı bu çalışmaya katılan hastalardan alınmıştır.

Hakem değerlendirmesi: Dış bağımsız.

Yazar Katkıları: Fikir - M.K., M.Ç.; Tasarım - A.Ö.A., S.A.; Denetleme - M.Ç., M.K.; Kaynaklar - Ö.G., M.K., C.S.G.; Malzemeler - M.K., A.Ö.A.; Veri toplanması ve/veya işlemesi - Ö.G., C.S.G.; Analiz ve/veya yorum - M.K., M.Ç., Ç.V.Ö.; Literatür taraması - Ç.V.Ö., S.A.; Yazıyı yazan - M.K.; Eleştirel İnceleme - M.Ç., C.S.G., A.Ö.A., Ö.G.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

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