Effect of Colonoscopy on Prostate-Specific Antigen; New Words about an Old Subject

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Abstract

Background: The increasing in prostate specific antigen (PSA) level not only causes concern for the patiens, but also leads to unnecessary investigation of these patients. The age of these patients is generaly high and may require colonoscopy for various reasons. The results of a few recent studies on the effect of colonoscopy on PSA level were controversial.

Objectives: Therefore, we decided to study the effect of colonoscopy on PSA level in Iran and compare these results with the results of previous study in other countries. This was the first study in Iran to report such finding.

Methods: Forthy-two patients between 40 to 70 years included in a prospective study, before and after study in Imam Reza hospital in Tehran, Iran from 2016 to 2017. Colonoscopy was performed in all of patients and the PSA level was measured before and 72 hours after colonoscopy. The result was analyzed with paired t test and ANOVAs test and the level of significant was 0.05.

Results: The mean of total PSA before colonoscopy was 1.87 ng/mL with standard deviation (SD) 1.04 ng/mL and total PSA after colonoscopy was 2.02 ng/mL with standard deviation 1.13 ng/mL that was statistically significant (P = 0.01).

Conclusions: According to the finding of the present research, colonoscopy increases the PSA level. Another finding of the present study was that these changes are particularly significant in older than 50 years. In patients with high levels of PSA, before performing any other diagnostic procedure, it is necessary to question for a colonoscopy before measuring PSA. If this is done, the PSA should be repeated for 7 to 14 days after colonoscopy.

Keywords: Cancer, Colonoscopy, Prostate, Prostate Specific Antigen

1. Background

Benign prostatic enlargement (BPE) is one of the most common prevalent disorders found in prostate that is seen in 57/5% of men population, while nearly 30% of these patients are not aware of their disease (1). The symptoms such as urinary obstruction decrease quality of life of the patients and totally cause bothersome for person, family, and society (2, 3). Nocturia is known as a stimulating symptom of BPE; it is prevalent and different in quality and quantity in men and women (4). Nocturia causes sleeplessness or delay in start of sleep in adult, which has a negative effect on quality life and sleep (5). In addition, prostate evaluation is costly for people. Main laboratory diagnosis test in this field is prostatic specific antigen (PSA) (6-8); so, it is important to find out the factors, which affect PSA level. Studies showed that prostatitis increases the PSA level that usually treated by antibiotic. The maximum increase in PSA occurs on days 5 to 7 after prostatitis (9). In most cases, PSA

level becomes normal 8 weeks after prostatitis treatment. Increasing PSA level after prostatitis may cause mistakes in diagnosing prostate cancer (9, 10).

Studies have shown that cystoscopy has a very little effect on PSA changes. Rezakhaniha et al. reported that cystoscopy has no effect on PSA level (11). In another study, 69 patients were divided into 3 groups; the control group, those who were under Rigid cystoscopy and those who were under Flexible cystoscopy, were studied and PSA level was measured for them before and after cystoscopy. The result showed that cystoscopy has a little effect on PSA (0.05 - 0.1 ng/mL) (12).

According to the effect of transrectal ultrasonography on PSA level, one of these studies that was done on 44 people has shown that transrectal ultrasonography had no significant effect on PSA changes. It was also shown that age and prostate volume has no effect on PSA in this study (13); also, digital rectal examination had no effect on PSA level (14). For understanding the effect of biopsy on PSA changes,

many studies were carried out, whose results showed that prostate biopsy causes a remarkable increase in PSA and this increase is immediate and it takes about 3 weeks to return to the original level. In one of these studies, which was conducted on 32 persons, PSA level was measured before, 30 minutes, a week, and a month after biopsy. This study showed that the biopsy causes immediate increase in PSA and average of increase is 7.9 ng/mL and it takes about 3 weeks to return to the normal level. In some patients, PSA level was still high after 4 weeks, but it became normal in all of them after 6 weeks (12).

Barbatzas et al. in Greece reported the effect of colonoscopy on PSA on 30 men; they have shown that 47% of them had an increase in PSA level within 24 hours after colonoscopy. However, after a week, no significant increase was observed (15). In another study by Cetinkaya et al. in Turkey conducted on 44 men, it was shown that PSA level significantly increased in the first day and 1 week after colonoscopy (16). But, in a study carried out by Schwartz et al. on 24 men, 35% of them had an increase in PSA level after colonoscopy that was not significant (17).

The increase in PSA level not only causes concern for the patiens, but also leads to the unnecessary investigation of these patients. The age of these patients is generally high and may require colonoscopy for various reasons. Therefore, the study of the effect of colonoscopy on the PSA level is important.

A few previous studies that carried out on the effects of colonoscopy on PSA level showed different results; some increased and in some others, no change in PSA level was observed. Therefore, we decided to study the effect of colonoscopy on PSA level in Iran and compare these results with the results previous study in other countries. This was the first study in Iran to report such finding.

2. Methods

2.1. Patients' Population

Forty-two patients between 40 and 70 years included in a prospective study, before and after study in Imam Reza hospital affiliated to AJA University of Medical Sciences, Tehran, Iran from 2016 to 2017. Sampling method was simple random sampling and the sample size was calculated, using Altman Nomogram method. Colonoscopy was performed in all of the patients and the PSA level was measured before and 72 hours after colonoscopy. Inclusion criteria were age between 40 and 70 years, absence of inflammation and infective symptom like fever, absence of ejaculation, and sexual relation 72 hours before and after colonoscopy. Exclusion criteria of study were surgery of digestive system and colonoscopy in last 2 months, positive urine culture, history of urinary retention, and any

surgery and manipulation in urogenital system in last 2 months. Colonoscopy of all patients was carried out just by a colonoscope made in OLYMPUS cv-170.

2.2. Sampling

Blood sampling was done right before and 72 hours after colonoscopy to measure PSA. Padtan elm kit (made in Iran) was used to measure PSA. This kit has been designed based on an Imunoenzymatic reaction on solid phase. In this system, 2 monoclonal anti-bodies of mouse was used, which recognized different antigenic index on PSA molecule. The sensitivity of kit was 0.1 ng/mL. Intra-assay and inter-assay tests for PSA kit was performed, using 4 sera with different concentrations (Tables 1 and 2).

Table 1. Inter-Assay PSA Kit Was Performed, Using 4 Sera with Different Concentrations

Sample	Number of Repetition	Mean ± Standard Division, ng/mL	CV%
1	10	1.9 ± 0.1	5.3
2	10	8.3 ± 0.3	3.5
3	10	22.2 ± 1.2	5.4
4	10	57.8 ± 3.3	5.7

Table 2. Intra-Assay PSA Kit Was Performed, Using 4 Sera with Different Concentrations

Sample	Number of Repetition	Mean ± Standard Division, ng/mL	CV%
1	24	2.2 ± 0.2	7.3
2	24	3.8 ± 0.1	3.4
3	24	6.1 ± 0.2	2.8
4	24	9.3 ± 0.4	4.5

2.3. Statistical Analysis

The analyses of data were done by SPSS version 24. For qualitative variables, frequency and frequency percent and for quantitative variables mean and standard deviations were calculated. The result was analyzed with paired t test and ANOVAs test, and the level of significant was 0.05.

2.4. Ethical Considerations

In all stages of the study, ethical issues of observation, the name and information of patients were kept confidential. The ethics committee of AJA University of Medical Sciences approved research project of this study (registry No: IR.AJAUMS.REC.1396.45).

Table 3. Comparison of PSA Levels Changes Before and After Colonoscopy Based on Age Ranges[a]

Age Ranges	PSA Level Before Colonoscopy				PSA Levels After Colonoscopy			
	PSA Level	Frequency, %	PSA Level	Frequency, %	PSA Level	Frequency %	PSA Level	Frequency, %
50 >	0 - 4	100	4 <	0	0 - 4	100	4 <	0
50 <	0 - 4	87	4 <	13	0 - 4	75	4 <	25

[a] The median PSA levels before and after colonoscopy was 1.87 (SD: 1.03) and 2.02 (SD: 1.13), respectively.

Table 4. PSA Value Before and After Colonoscopy

	Number	Min	Max	Mean ± Standard Deviation	P Value
PSA before colonoscopy	42	0.5	4.4	1.87 ± 1.03	
PSA after colonoscopy	42	0.6	4.65	2.02 ± 1.13	0.01
Free PSA before colonoscopy	42	0.1	0.75	0.48 ± 0.18	
Free PSA after colonoscopy	42	0.25	0.9	0.55 ± 0.21	

Table 5. PSA Value Before and After Colonoscopy Based on Age Ranges[a]

	Number	Min	Max	Mean ± Standard Deviation	P Value
PSA before colonoscopy < 50	13	0.5	2.3	1.06 ± 0.51	0.05
PSA after colonoscopy < 50	13	0.6	2.4	1.07 ± 0.56	
PSA before colonoscopy > 50	29	0.9	4.4	2.23 ± 0.99	0.01
PSA after colonoscopy > 50	29	1.25	4.65	2.45 ± 1.06	
Free PSA before colonoscopy < 50	13	0.1	0.6	0.34 ± 0.13	0.05
Free PSA after colonoscopy < 50	13	0.25	0.75	0.38 ± 0.15	
Free PSA before colonoscopy > 50	29	0.3	0.75	0.54 ± 0.17	0.01
Free PSA after colonoscopy > 50	29	0.35	0.9	0.63 ± 0.18	

[a] The increase in PSA in both groups was significant and this increase was higher in the group older than 50 years compared with the group younger than 50 years old.

3. Results

The mean age of patients was 56.3 ± 9.3. The number of patients younger than 50 years old was 13, with PSA before and after colonoscopy less than 4 ng/mL. The number of patients over the age of 50 was 29 persons, of whom 87% had PSA level less than 4, and 13% had PSA greater than 4 ng/mL. After colonoscopy, 75% had a PSA less than 4 and 25% had a PSA greater than 4 ng/mL (Table 3). The results showed that the mean of total PSA before colonoscopy was 1.87 with standard deviation (SD) 1.03 ng/mL and after colonoscopy was 2.02 with SD 1.13 that was the statistically significant (P = 0.01), indicating that after colonoscopy, PSA value increased. Also, the mean serum free PSA before and after colonoscopy was 0.48 with SD 0.18 and 0.55 with SD 0.21 ng/mL, respectively that was statistically significant (P = 0.01) (Table 4). Meanwhile, the increase in PSA in both groups was significant and this increase was higher in the group over 50 years than in the group under 50 years old

(Table 5). Finally, it can be concluded that colonoscopy has effect on PSA level in patients and raise its titer.

4. Discussion

The colon and prostate cancer are the most common cancers in the elderly men. Digital rectal examination and PSA are used to evaluate patients suspected to prostate cancer and colonoscopy is the choice diagnostic tool for people with suspected colon cancer. As the age increase, the risk of these cancers increases; so, PSA and colonoscopy in these patients can be done in close proximity (18). Therefore, the study of the effect of colonoscopy on the PSA level is important.

According to the findings of the present research, it was observed that colonoscopy increases the PSA level. Another finding of the present study proved that these changes are particularly significant in older than 50 years,

which may be due to the larger volume of prostate in theses individual and resulting in more manipulation and massaging of the prostate during colonoscopy.

Several studies have been conducted on the effect of biopsy on PSA, showing that biopsy causes a significant increase in PSA, which is immediate and lasts about 3 weeks to return to the original level (12). Studies have shown that cystoscopy has a negligible effect on PSA. In a study conducted by Rezakhaniha et al. on 102 patients, it was shown that cystoscopy does not have any effect on PSA level (11).

The results of a few recent studies on the effect of colonoscopy on PSA level were controversial. Barbatzas et al. in Greece reported the effect of colonoscopy on PSA on 30 men; they have shown that 47% of them had an increase in PSA level within 24 hours after colonoscopy. However, after a week, no significant increase was observed (15). The results of this study showed that 72 hours after colonoscopy, the level of PSA significantly increased, which was consistent with the results of this study in the first 24 hours. In another study carried out by Cetinkaya et al. in Turkey on 44 men, it was shown that PSA level significantly increased in the first day and 1 week after colonoscopy (16), which was consistent with the result of the present research. But, in a study carried out by Schwartz et al. on 24 men, 35% of them had an increase in PSA level after colonoscopy that was not significant (17).

Both colonoscopy and measurement of PSA as a diagnostic tool are frequently used in older men. Therefore, the study of the effect of colonoscopy on the PSA level is important. This study showed that the colonoscopy increases PSA level. Therefore, if PSA measurement is performed immediately after colonoscopy, its level is falsely higher, which not only causes concern to the patients and physicians, but also can lead to unnecessary procedure in these patients.

It should be considered that PSA may increase after colonoscopy. In patients with high levels of PSA, before performing any other diagnostic procedure, it is necessary to question for a colonoscopy before measuring PSA. If this is done, the PSA should be repeated for 7 to 14 days after colonoscopy.

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Footnotes

Authors' Contribution: RB carried out the design and coordinated the study, participated in most of the experiments and prepared the manuscript. SS provides assistance in the design of the study, coordinated and participated in manuscript preparation and contributed to writing up process.

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