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PREVALENCE AND RISK FACTORS FOR PROSTATITIS IN AFRICAN AMERICAN MEN: FINDINGS FROM THE FLINT MEN'S HEALTH STUDY

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Abstract

Introduction—Prostatitis is a common, yet ill-defined condition without clear diagnostic criteria and treatment strategies. Previous studies examining the prevalence and correlates of prostatitis are limited in their inclusion of primarily white populations. The objective of the current study was to identify prevalence of and risk factors for prostatitis in a population-based sample of African-American men.

Methods—In 1996, a probability sample of 703 African-American men, aged 40–79, residing in Genesee County, Michigan without a prior history of prostate cancer/surgery provided responses to a structured interview-administered questionnaire which elicited information regarding sociodemographics, current stress and health ratings, and past medical history, including history of physician diagnosed prostatitis, BPH and sexually transmitted diseases. Logistic regression was used to identify predictors of prostatitis after adjustment for age.

Results—47 (6.7%) of the 703 men reported a history of prostatitis. Increased frequency of sexual activity and physical activity were significantly associated with decreased odds of disease. Number of stressful life events, perceived stress, emotional and physical health ratings and social support scores were all significantly associated with prostatitis. Moderate to severe lower urinary tract symptoms and a history of BPH were significantly associated with prostatitis after adjustment for age.

Conclusion—Approximately 7% of men self-reported a history of prostatitis. Worsening lower urinary tract symptoms and history of BPH were associated with prostatitis, suggesting a role for BPH and prior infection and inflammation in disease etiology. Further studies are necessary to determine etiologic roles of suggested risk factors and potential for treatment and prevention.

Keywords

African-American; Prostatitis; Prevalence; Risk Factors

BACKGROUND

Prostatitis is a common, yet ill-defined condition without clear diagnostic criteria and treatment strategies.[1] To limit confusion regarding case identification, a prostatitis classification system was developed by the National Institutes of Health which includes 4 categories: I- acute bacterial prostatitis, II- chronic bacterial prostatitis, III- chronic

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prostatitis/chronic pelvic pain syndrome and IV- asymptomatic inflammatory prostatitis.[2] About 5% to 10% of prostatitis cases are known to be bacterial but etiology is unknown in more than 90% of cases. These cases are usually classified as type III prostatitis based on the classification scheme described above.

It has been estimated that a diagnosis of prostatitis accounts for 2 million physician office visits annually in the United States, including 8% of all urology visits and 1% of primary care visits.[3] In a review of 6 studies of prostatitis, 8.7% of men overall met various criteria for symptoms of the disease with prevalence estimates ranging from 2.2% to 9.7%.[4] Several population-based studies have recently identified age, race, and geographic region as significant risk factors for chronic prostatitis.[5–7] Previous studies have also identified an increased risk of prostatitis with various urologic characteristics such as lower urinary tract symptoms, history of benign prostatic hyperplasia (BPH) or urinary tract infection and decreased ejaculation frequency.[8, 9] Studies focusing on sociodemographic factors such as education, income and profession have yielded inconsistent results.[10, 11]

More recently, with the increasing interest in the role of infection and chronic inflammation in the development of prostate cancer, several studies have also examined the relationships between sexual behavior, sexually transmitted diseases (STDs), prostatitis and prostate cancer risk.[12–14] While these studies suggest that prior infections of the prostate are associated with prostate cancer, they are limited in their inclusion of clinically referred samples and primarily white populations.

The objective of the current study was to determine the prevalence of and risk factors for self-reported physician diagnosed prostatitis in African-American men using the resources of the Flint Men's Health Study, a population based sample of community dwelling African-American men aged 40–79 years.

MATERIALS AND METHODS

Study Subjects

In 1996, a probability sample of 943 African-American men was selected from households located in Genesee County, MI to participate in a study on risk factors for prostate cancer. Among the 817 men who agreed to participate (87% response rate), 730 subjects without a history of prostate cancer or a prior operation on the prostate gland were administered a detailed in home epidemiologic interview ascertaining information on potential risk factors for prostate cancer, general health and medical history, sexual activity and history of STDs, health care use and socio-demographic information.[15, 16]

At the conclusion of the interview 379 of the 730 subjects underwent a comprehensive urologic examination (uroflowmetry, digital rectal exam (DRE), transrectal ultrasound (TRUS), serum PSA measurement), anthropometric measurements and completion of the American Urological Association Symptom Index (AUASI). Prostate biopsy was recommended in individuals with an elevated PSA (4.0 ng/mL or greater) or suspicious DRE. Eleven men at baseline who were found to have positive biopsies for prostate cancer and an additional 16 men who developed prostate cancer during the study period were excluded. The final sample of 703 men from the interview-phase and 369 men from the clinic-phase were included in this analysis. The study was approved by the University of Michigan Institutional Review Board.

Measurements

WHAT ABOUT SEXUAL HISTORY ETC….In-person interviews gathered information regarding history and date of physician-diagnosed prostatitis and BPH. Urologic

examinations ascertained information on lower urinary tract symptom severity (LUTS) measured by the American Urologic Association Symptom Index (AUASI) (REF), prostate volume (cc), peak urinary flow rate (ml/sec), and prostate specific antigen (PSA) concentration (ng/mL).

Participants completed the 4-item version of the Perceived Stress Scale (PSS), a validated questionnaire designed to measure the degree to which respondents find their lives stressful.[17] In addition, supportive and negative social interactions with family and friends were assessed. Stressful life events were assessed by querying participants about the occurrence of seven of the most stressful live events identified in the literature.[18, 19] Finally, participants were asked to rate overall physical health and emotional health.(19) All individual stress related questions are listed in Appendix 1.

Statistical Analysis

Distributions of sociodemographic, sexual history and urinary characteristics were examined by prostatitis status and tested using Pearson's chi-square test for association and Cochran-Armitage test for trend. Logistic regression models estimated age-adjusted odds ratios and 95% confidence intervals. Two-tailed tests were used for all comparisons and p-values of < 0.05 were considered statistically significant. All analyses were performed using Statistical Analysis System 9.1 (SAS Institute, Inc., Cary, NC)

RESULTS

In this sample of 703 African American men, 47 (6.7%) overall reported a history of physician-diagnosed prostatitis. These men were significantly older compared to men with no history of prostatitis (P=0.025). (TABLE 1) Other sociodemographic and medical history factors, including income, education, marital status, family history of prostate cancer, or at least one DRE or PSA test in the past 5 years were not found to differ by prostatitis status. However, obese men (BMI≥30) and men who reported being very physically active (>4976 Kcal/day) were 67% and 70% less likely, respectively, to have a history of prostatitis after adjustment for age. (TABLE 1)

Men reporting poor physical health were 2.8 times more likely to have a history of prostatitis compared to men with excellent/good ratings of physical health after adjustment for age (OR= 2.80, 95% CI 1.09–7.22). (TABLE 1) This increased risk of prostatitis history was also observed among men who reported poor emotional health, (P=0.002) although this association was attenuated after adjustment for age. High perceived stress was also significantly associated with prostatitis (OR= 2.27, 95% CI 1.24–4.13). This association was supported by the finding that the number of stressful life events was significantly higher in men with prostatitis after adjustment for age (OR= 1.39, 95% CI 1.07–1.82). We also observed that men with prostatitis were approximately half as likely to report high social support compared to men without prostatitis (OR= 0.56, 95% CI: 0.31–1.04). (TABLE 1)

The distribution of sexual history characteristics in the sample is presented in Table 2. Specifically, decreased frequency of sexual activity was associated with increased risk of prostatitis, with only 21.1% of men with prostatitis history reporting sexual activity 2 or more times a week compared to 43.8% of men with no history of prostatitis (P=0.004). However, this relationship was no longer statistically significant after adjustment for age. (OR= 0.61, 95% CI 0.22–1.72). No other sexual history characteristics, including age at first intercourse, number of lifetime partners or previous STDS were found to significantly differ by prostatitis status. Althought increased frequency of gonorrhea and herpes infections were found to be slightly more common among men who reported a history of prostatitis, these findings were not statistically significant. (TABLE 2)

Table 3 presents the distribution of BPH measures by prostatitis status. A significantly greater number of men with a history of BPH reported a history of prostatitis (45.7%). After adjustment for age, this translated to an 11-fold increased risk of prostatitis history in men with a history of BPH compared to men without a history of BPH (OR=11.92, 95% CI 5.99–23.75). Additionally, 64% of men with a history of prostatitis reported moderate to severe LUTS compared to only 38.4% of men with no history of prostatitis (OR= 2.74, 95% CI 1.17–6.42). Although men with prostatitis were slightly more likely to have increased prostate volumes and PSA concentrations, these associations were not statistically significant after adjustment for age. No differences in peak urinary flow rates were observed by prostatitis status. (TABLE 3)

DISCUSSION

Among this population-based sample of African American men, 47 (6.7%) reported a previous history of prostatitis. This prostatitis prevalence estimate is consistent with previously published data from studies focusing primarily on white populations whose reported prevalence estimates ranged from 2–10%.[20] Overall, men reporting history of prostatitis in this sample were older. While it has been suggested that prostatitis is a younger man's disease, these findings are consistent with several other reports which demonstrate that prostatitis affects men of all ages. Specifically, Clemens et al. demonstrated that among a managed care population, 1 in 10 men ages 70 and above were diagnosed with prostatitis.[21] Mehik et al. found that prostatitis prevalence in a Finnish population increases with age.[10] However, The Olmsted County Study found no difference in age when comparing men by prostatitis status in those ages 66 years and older.[22] While age may not causally influence prostatitis risk, it is related to most factors speculated to be associated with the condition, including sexual behaviors, STDs, and other urologic symptoms and conditions.

Several studies have demonstrated a relationship between prostatitis and BPH, based on the notion that prostatic infections promote inflammation resulting in an increase in prostate size. Alternatively, an increase in prostate volume may promote recurrent infections due to incomplete emptying of the bladder. In the Healthcare Professionals without Prostate Cancer study, BPH was associated with a 7-fold increased risk of prostatitis [23] Consistent with these findings, we observed that men reporting a history of prostatitis were approximately 11 times more likely to have had a previous diagnosis of BPH after adjustment for age. However, it is plausible that this association may be due, in part, to misdiagnosis as there is often significant overlap between BPH and prostatitis symptoms. In fact, a review by Nickel et al. found that 5–20% of men diagnosed with BPH have prostatitis-like symptoms, with over a third of men with previous diagnoses of BPH also having prostatitis in the past.[24] It has been demonstrated that men with BPH have increased risk for urinary tract infections further supporting the notion that inflammation promotes recurrent infections, thus, perhaps, mediating prostatitis risk.[25] While these findings further highlight the need for more stringent diagnostic criteria for these conditions, they are suggest that additional studies are necessary to elucidate whether a biologic relationship between the two conditions exists.

Lower urinary tract symptoms have been demonstrated consistently to be associated with prostatic inflammation, with 19% of men reporting urinary symptoms as the primary motivation to care.seek physician care for prostatitis [26] In a study which evaluated the overlap of LUTS and pain symptoms, 57% of men with moderate or sever LUTS also reported pain symptoms.[27] Furthermore, men with young-onset prostatitis were found to be 1.5 times more likely to develop LUTS compared to men without prostatitis.[28] Our study findings confirm these findings, as report of moderate to severe LUTS was found to be

significantly associated with a greater than 2-fold increase in odds of prostatitis after adjustment for age.

Previous studies have documented conflicting evidence regarding the association between prostatitis and sexual frequency. The risk of prostatitis has been found to be lower in divorced and single men when compared to married men independent of age, suggesting a role of sexual frequency influenced by a man's exposure to pathogens in their wives genital tracts.[10] However, Collins et al found that men who ejaculate more frequently on a monthly basis have a greater odds of reporting a history of prostatitis.[29] While no increase in risk according to marital status was observed in our study, we did observe a crude inverse relationship between prostatitis risk and sexual frequency. It is arguable that frequent sexual activity prevents the congestion of the prostatic ducts which increases the risk of prostatic infection.

An association between prostatitis and sexually transmitted diseases has also been suggested. Collins et al reported an increase in risk of prostatitis associated with a history of sexually transmitted infections.[30] Other literature further supports the notion of prior infection influencing the risk of prostatitis, suggesting that bacterial prostatitis may be the result of ascending urethral and urinary infections.[31] Furthermore, previous literature illustrates a relationship between STDs, prostatitis and prostate cancer risk, suggesting the interplay of these three conditions in an inflammatory/infectious pathway of carcinogenesis.[32] Our results do not support a significant association between prostatitis risk and a history of gonorrhea, syphilis or herpes. Also, no significant association was observed between partner's history of cervical cancer and risk of prostatitis among the men in this study. Due to the small percentage of study subjects who reported ever having STDs, our statistical power was limited and prevents any inferences from being made about the true associations between STDs and prostatitis in our cohort.

Findings from our study also suggest that varying measures of stress are inversely related with prostatitis. Men with fair to poor self-evaluated emotional and physical health scores were more likely to have a history of prostatitis compared to men who rated their physical and emotional health to be good or excellent. Further supporting the idea that stress influences prostatitis risk, men with a higher number of stressful life events and men with lower social support scores were more likely to report having prostatitis in the past. Our findings are consistent with those of the Health Professionals Follow-up study which observed that men who reported stress at home or work had a 1.2–1.5 increased risk of prostatitis.[33] While it is well characterized that stress promotes infection ubiquitously, it is difficult to rule out reverse causation when characterizing stress as a risk factor for prostatitis, as stress could result in response to diagnosis of prostatitis.[34]

In our study, BMI was found to have a protective effect on prostatitis risk after adjustment for age. Obese men (BMI > 30) were at a 68% decreased odds of having a history of prostatitis when compared to men with a BMI of 25 or less. Although similar findings were reported by Collins et al.,[35] it is likely these findings are due to the influence of physical activity on this relationship. In this study, men who were vigorously physically active were at a 67% decreased odds of prostatitis after adjustment for age. Interestingly, a large percentage of the men characterized as obese in our sample were found to engage in vigorous exercise (57.8%). As physical activity is likely mediating the relationship between BMI and prostatitis in this cohort, we are unable to determine the direct effect of obesity on prostatitis independent of physical activity which has recently been found to be an effective treatment for men with prostatitis who did not respond to previous therapies. It is hypothesized that physical activity influences prostatic infection and resulting symptoms

through improvements in pain sensitivity and changes in immune and autonomic functioning.[36]

While the current study is one of the largest population-based studies of prostatitis in African-American men to date and the only to comprehensively characterize the relationship between various potential risk factors and prostatitis history, there are several limitations to consider. The primary limitation of this study is the susceptibility to recall bias as retrospective collection of exposures and outcome were based on self-reported physician diagnosis rather than serological or diagnostic confirmation. The definition of prostatitis includes a very heterogeneous group of diagnoses (NIH types I-IV). Our inability to distinguish between these types limits our ability to comprehensively study the predictors of prostatitis, as risk factors may differ by clinical manifestation. Additionally, because of the social stigma that surrounds STDs and sexual behavior, it is possible that participants under-reported exposures. However, it is unlikely this underreporting difffered by prostatitis status and most likely resulted in an underestimation of the associations observed.

Secondly, due to the symptomatic overlap between BPH and prostatitis, it is possible that men with symptoms indicative of either prostatitis or BPH could have been misdiagnosed. Furthermore, it is possible that men who sought treatment for BPH may be more likely to have been diagnosed with prostatitis and vice versa. However, we found no significant associations between report of DRE or PSA testing during the last five years and history of prostatitis and when adjusted for these variables, the association observed between BPH and prostatitis increased suggesting a relationship independent of diagnostic testing. Finally, the cross-sectional nature of the data does not permit causal inferences to be made as factors such as stress and sexual behaviors could have occurred as a result of having prostatitis. Therefore, results should be interpreted with caution. Despite these limitations, the current study is one of the few to comprehensively investigate the relationships between lifestyle factors, sexual history, indicators of stress, measures of BPH and prostatic infection in African-American men.

In summary, our findings suggest that prostatitis is comparably prevalent in African-American and Caucasian men described in previously published reports. After adjustment for age, lower urinary tract symptom severity and history of BPH were associated with increased odds of prostatitis while increased BMI, physical activity and sexual frequency were found to be associated with decreased odds of prostatitis. Finally, poor emotional and physical health, high perceived stress and low social support were associated with an increased risk of prostatitis history. Importantly, these findings suggest that the primary risk factors for this condition are largely modifiable and highlight potential targets for future prevention. Additional prospective research is needed to further characterize the etiology of prostatitis and elucidate the role of inflammation and infection in the natural history of prostatic disease in African-American men.

REFERENCES

1. Pontari MA, Joyce GF, Wise M, McNaughton-Collins M. Prostatitis. J Urol. 2007; 177:2050. [PubMed: 17509285]
2. Krieger JN, Nyberg L Jr, Nickel JC. NIH Consensus Definition and Classification of Prostatitis. JAMA. 1999; 282:236. [PubMed: 10422990]
3. Collins MM, Stafford RS, O'Leary MP, Barry MJ. HOW COMMON IS PROSTATITIS? A NATIONAL SURVEY OF PHYSICIAN VISITS. The Journal of Urology. 1998; 159:1224. [PubMed: 9507840]
4. Krieger JN, Riley DE, Cheah PY, Liong ML, Yuen KH. Epidemiology of prostatitis: new evidence for a world-wide problem. World Journal of Urology. 2003; 21(2):70–74. [Review] [17 refs]. [PubMed: 12712363]

5. Collins MM, Meigs JB, Barry MJ, Walker CE, Giovannucci E, Kawachi I. Prevalence and correlates of prostatitis in the health professionals follow-up study cohort. Journal of Urology. 2002; 167(3): 1363–1366. [PubMed: 11832733]
6. McNaughton Collins M, Stafford RS, Leary MP, Barry MJ. Distinguishing chronic prostatitis and benign prostatic hyperplasia symptoms: results of a national survey of physician visits. Urology. 1999; 53:921. [PubMed: 10223484]
7. Cheah PY, Liong ML, Yuen KH, Teh CL, Khor T, Yang JR, et al. Chronic prostatitis: symptom survey with follow-up clinical evaluation. Urology. 2003; 61:60. [PubMed: 12559266]
8. Collins MM, Meigs JB, Barry MJ, Walker CE, Giovannucci E, Kawachi I. Prevalence and correlates of prostatitis in the health professionals follow-up study cohort. Journal of Urology. 2002; 167(3): 1363–1366. [PubMed: 11832733]
9. Rothman I, Stanford JL, Kuniyuki A, Berger RE. Self-report of prostatitis and its risk factors in a random sample of middle-aged men. Urology. 2004; 64(5):876–879. discussion 879-80. [PubMed: 15533468]
10. Mehik A, Hellstrom P, Lukkarinen O, Sarpola A, Jarvelin MR. Epidemiology of prostatitis in Finnish men: a population-based cross-sectional study. BJU International. 2000; 86:443. [PubMed: 10971269]
11. Ku JH, Kim ME, Lee NK, Park YH. Influence of environmental factors on chronic prostatitis-like symptoms in young men: results of a community-based survey. Urology. 2001; 58:853. [PubMed: 11744444]
12. Sutcliffe S, Giovannucci E, De Marzo AM, Leitzmann MF, Willett WC, Platz EA. Gonorrhea, Syphilis, Clinical Prostatitis, and the Risk of Prostate Cancer. Cancer Epidemiol Biomarkers Prev. 2006; 15:2160. [PubMed: 17119041]
13. Sarma AV, McLaughlin JC, Wallner LP, Dunn RL, Cooney KA, Schottenfeld D, et al. Sexual Behavior, Sexually Transmitted Diseases and Prostatitis: The Risk of Prostate Cancer in Black Men. The Journal of Urology. 2006; 176:1108. [PubMed: 16890703]
14. Roberts RO, Bergstralh EJ, Bass SE, Lieber MM, Jacobsen SJ. Prostatitis as a risk factor for prostate cancer. Epidemiology. 2004; 15:93. [PubMed: 14712152]
15. Sarma AV, McLaughlin JC, Wallner LP, Dunn RL, Cooney KA, Schottenfeld D, et al. Sexual Behavior, Sexually Transmitted Diseases and Prostatitis: The Risk of Prostate Cancer in Black Men. The Journal of Urology. 2006; 176:1108. [PubMed: 16890703]
16. Beebe-Dimmer JL, Dunn RL, Sarma AV, Montie JE, Cooney KA. Features of the metabolic syndrome and prostate cancer in African-American men. Cancer. 2007; 109:875. [PubMed: 17265528]
17. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983; 24:385. [PubMed: 6668417]
18. Dohrenwend BP. Inventorying stressful life events as risk factors for psychopathology: Toward resolution of the problem of intracategory variability. Psychol Bull. 2006; 132:477. [PubMed: 16719570]
19. Golden-Kreutz DM, Andersen BL. Depressive symptoms after breast cancer surgery: relationships with global, cancer-related, and life event stress. Psychooncology. 2004; 13:211. [PubMed: 15022156]
20. Collins MM, Meigs JB, Barry MJ, Walker CE, Giovannucci E, Kawachi I. Prevalence and correlates of prostatitis in the health professionals follow-up study cohort. Journal of Urology. 2002; 167(3):1363–1366. [PubMed: 11832733]
21. Clemens JQ, Meenan RT, O'Keeffe Rosetti MC, Kimes T, Calhoun EA. Prevalence of and risk factors for prostatitis: population based assessment using physician assigned diagnoses. J Urol. 2007; 178:1333. [PubMed: 17706722]
22. Roberts RO, Bergstralh EJ, Bass SE, Lieber MM, Jacobsen SJ. Prostatitis as a risk factor for prostate cancer. Epidemiology. 2004; 15:93. [PubMed: 14712152]
23. McNaughton Collins M, Stafford RS, Leary MP, Barry MJ. Distinguishing chronic prostatitis and benign prostatic hyperplasia symptoms: results of a national survey of physician visits. Urology. 1999; 53:921. [PubMed: 10223484]

24. Nickel JC. The overlapping lower urinary tract symptoms of benign prostatic hyperplasia and prostatitis. Curr Opin Urol. 2006; 16:5. [PubMed: 16385194]
25. Ku JH, Kim SW, Paick JS. Epidemiologic risk factors for chronic prostatitis. International Journal of Andrology. 2005; 28(6):317–27. [Review] [37 refs]. [PubMed: 16300663]
26. McNaughton Collins M, Stafford RS, Leary MP, Barry MJ. Distinguishing chronic prostatitis and benign prostatic hyperplasia symptoms: results of a national survey of physician visits. Urology. 1999; 53:921. [PubMed: 10223484]
27. Clemens JQ, Markossian TW, Meenan RT, O'Keeffe Rosetti MC, Calhoun EA. Overlap of voiding symptoms, storage symptoms and pain in men and women. J Urol. 2007; 178:1354. [PubMed: 17706719]
28. Sutcliffe S, Giovannucci E, De Marzo AM, Willett WC, Platz EA. Sexually transmitted infections, prostatitis, ejaculation frequency, and the odds of lower urinary tract symptoms. American Journal of Epidemiology. 2005; 162(9):898–906. [PubMed: 16177142]
29. Collins MM, Meigs JB, Barry MJ, Walker CE, Giovannucci E, Kawachi I. Prevalence and correlates of prostatitis in the health professionals follow-up study cohort. Journal of Urology. 2002; 167(3):1363–1366. [PubMed: 11832733]
30. Collins MM, Meigs JB, Barry MJ, Walker CE, Giovannucci E, Kawachi I. Prevalence and correlates of prostatitis in the health professionals follow-up study cohort. Journal of Urology. 2002; 167(3):1363–1366. [PubMed: 11832733]
31. Rothman I, Stanford JL, Kuniyuki A, Berger RE. Self-report of prostatitis and its risk factors in a random sample of middle-aged men. Urology. 2004; 64(5):876–879. discussion 879-80. [PubMed: 15533468]
32. Sarma AV, McLaughlin JC, Wallner LP, Dunn RL, Cooney KA, Schottenfeld D, et al. : Sexual Behavior, Sexually Transmitted Diseases and Prostatitis: The Risk of Prostate Cancer in Black Men. The Journal of Urology. 2006; 176:1108. [PubMed: 16890703]
33. Collins MM, Meigs JB, Barry MJ, Walker CE, Giovannucci E, Kawachi I. Prevalence and correlates of prostatitis in the health professionals follow-up study cohort. Journal of Urology. 2002; 167(3):1363–1366. [PubMed: 11832733]
34. Ku JH, Kim SW, Paick JS. Epidemiologic risk factors for chronic prostatitis. International Journal of Andrology. 2005; 28(6):317–327. [Review] [37 refs]. [PubMed: 16300663]
35. Collins MM, Meigs JB, Barry MJ, Walker CE, Giovannucci E, Kawachi I. Prevalence and correlates of prostatitis in the health professionals follow-up study cohort. Journal of Urology. 2002; 167(3):1363–1366. [PubMed: 11832733]
36. Giubilei G, Mondaini N, Minervini A, Saieva C, Lapini A, Serni S, et al. : Physical activity of men with chronic prostatitis/chronic pelvic pain syndrome not satisfied with conventional treatments--could it represent a valid option? The physical activity and male pelvic pain trial: a double-blind, randomized study. J Urol. 2007; 177:159. [PubMed: 17162029]
37. Schuster TL, Kessler RC, Aseltine RH Jr. Supportive interactions, negative interactions, and depressed mood. Am J Community Psychol. 1990; 18:423. [PubMed: 2264558]
38. Choi NG. Determinants of self-perceived changes in health status among pre- and early-retirement populations. Int J Aging Hum Dev. 2003; 56:197. [PubMed: 14661813]

APPENDIX 1. Psychosocial Stress Measures Individual Items

Perceived Stress Scale[1,2]
"In the last 30 days, about how often did you feel…
1) "unable to control the important things in your life?"*
2) "that difficulties were piling up so high that you could not overcome them?"*
3) "confident about your ability to handle personal problems?"
4) "that things were going your way?"

Social Support[3,4]
"How much do your family members make you feel loved and cared for?"
"How much do your friends make you feel loved and cared for?"
"How much do you feel your family members make too many demands on you?" *
"How much do you feel your friends make too many demands on you?"[37]*
Stressful Life Events
1 serious illness or injury that started or got worse **2** being the victim of serious injury or assault **3** retirement **4** being laid off from work **5** major financial difficulty **6** death of someone close **7** divorce or separation.
Physical Health[5]
"Would you say your health is excellent, very good, good, fair or poor?"
Emotional Health[5]
"What about your emotional health—how good you feel or how stressed, anxious or depressed you feel?"[38]

[1] 5-point scale varying from 0 (very often) to 4 (never).

[2] Individual scores were then summed to yield a summary score which ranged from 0–16 and dichotomized as ≥5 (high stress) vs. <5 (low stress) based on the median value for the sample.

[3] Responses were measured on a 5-point scaled from 0 (a great deal) to 4 (not at all).

[4] Individual questions were dichotomized as ≥3 (low support) vs. <3 (high support).

[5] 5-point scale varying from 0 (excellent) to 4 (poor).

* Negatively worded items were reverse-scored before analyzing.

TABLE 1

Sociodemographic, Medical History and Lifestyle Chracteristics by Prostatitis Status among African-American Men (n=703).

	No History of Prostatitis (n=656)	History of Prostatitis (n=47)	p-value (based on chi-square)	Age-adjusted Odds Ratio (95% CI)
Sociodemographic Characteristics				
Age (years) *mean (SD)*	*57.4(10.78)*	*61.0(10.23)*	*.0250*	--
40–49	186(28.4)	6(12.7)	0.069	--
50–59	191(29.1)	16(34.4)		
60–69	157(24.0)	11(23.4)		
70–79	122(18.6)	14(29.8)		
Income ($)			0.240	
<15,000	108(23.7)	9(25.0)		--
15,000–29,999	117(25.7)	15(41.7)		1.50(0.63, 3.57)
30,000–49,999	89(19.5)	5(13.9)		0.70(0.23, 2.17)
50,000–73,999	77(16.9)	3(8.3)		0.55(0.14, 2.18)
≥74,000	65(14.3)	4(11.1)		0.84(0.24, 2.93)
Education			1.00	
Less than high school	263(40.1)	19(40.4)		--
High school or greater	393(59.9)	28(59.6)		1.33(0.69, 2.56)
Marital Status			0.861	
Married/living with partner	380(58.0)	25(53.2)		--
Divorced/separated/widowed	213(32.6)	19(40.4)		1.27(0.68, 2.37)
Never Married	62(9.5)	3(6.4)		0.86(0.25, 2.98)
Medical History				
Family History of Prostate Cancer			0.929	
No	520(79.3)	37(78.7)		--
Yes	136(20.7)	10(21.3)		1.04(0.50, 2.15)
DRE Test in Last 5 years			0.205	
No	210(32.3)	11(23.4)		--
Yes	440(67.7)	36(76.6)		1.34(0.66, 2.73)
PSA Test in Last 5 years			0.120	
No	335(55.1)	17(42.5)		--
Yes	274(44.9)	23(57.5)		1.49(0.76, 2.89)
Lifestyle Characteristics				
Body Mass Index (kg/m^2)			0.048	
Normal (<25)	228(35.2)	22(48.9)		--
Overweight (25–29)	248(38.3)	18(40.0)		0.76(0.49,1.46)
Obese (≥30)	171(26.4)	5(11.1)		0.32(0.12, 0.87)
Alcohol Use Status			0.460	
Never	106(16.2)	6(13.3)		--

	No History of Prostatitis (n=656)	History of Prostatitis (n=47)	p-value (based on chi-square)	Age-adjusted Odds Ratio (95% CI)
Former	236(36.0)	15(33.3)		1.03(0.40, 2.73)
Current	313(47.8)	24(53.3)		1.44(0.57, 3.64)
Cigarette Smoking Status			0.420	
Never	147(22.4)	9(19.2)		--
Former	245(37.4)	25(53.2)		1.49(0.67, 3.32)
Current	264(47.8)	13(27.7)		0.85 (0.35, 2.05)
Physical Activity (TEE)			0.002	
Less than 3274 kcal/day	154(23.6)	20(42.5)		--
3274–4027 kcal/day	166(25.5)	11(23.4)		0.53(0.25,1.15)
4027–4976 kcal/day	162(24.9)	10(21.3)		0.53(0.24, 1.19)
>4976 kcal/day	169(25.9)	6(12.8)		0.33(0.13, 0.88)
Physical Health Rating *(mean, sd)*	*3.11(1.12)*	*3.81(1.09)*	*<0.001**	
Excellent/ Good	173(26.4)	5(10.6)	0.016	--
Fair/Poor	482(73.6)	42(89.4)		2.80 (1.09, 7.22)
Emotional Health Rating *(mean, sd)*	*2.88(1.14)*	*3.43(1.21)*	*0.002**	
Excellent/ Good	225(34.4)	11(23.4)	0.125	--
Fair/Poor	430(65.6)	36(76.6)		1.68 (0.84, 3.37)
Perceived Stress Score *(mean, sd)*	*3.58(3.23)*	*4.49(3.71)*	*.114**	
Low Stress (<5)	219(33.4)	24(51.1)	0.014	--
High Stress (>=5)	436(66.6)	23(48.9)		2.27 (1.24, 4.13)
Number of stressful life events *(mean, sd)*	*1.04(1.02)*	*1.36(1.21)*	*0.081**	1.39 (1.07, 1.82)
Social Support Score *(mean, sd)*	*8.53(2.55)*	*7.70(2.47)*	*.044**	
Low Support (<8)	*193(29.5)*	*20(43.4)*	*0.046*	--
High Support (>=8)	*462(70.5)*	*26(56.5)*		0.56 (0.31, 1.04)

Note: Totals may not equal n=703 due to missing values

* Kruskall-Wallis Test

TABLE 2

Sexual History Characteristics by Prostatitis Status among African-American Men (n=703)

	No History of Prostatitis (n=656)	History of Prostatitis (n=47)	p-value (based on chi-square)	Age-adjusted Odds Ratio (95% CI)
Sexual History				
History of STDs			0.123	
Never	297(45.6)	16(34.1)		--
1 or More	354(51.4)	31(65.9)		1.57(0.84, 2.94)
Sexual Frequency in past 12 months				
None	84(13.2)	7(15.22)	0.004/0.004*	--
1–2 times	63(9.9)	12(26.1)		2.48(0.92, 6.73)
1–3 times/ month	75(11.8)	8(17.4)		1.44(0.49, 4.22)
1 time / week	135(21.3)	8(17.4)		0.84(0.29, 2.45)
2+ times / week	278(43.8)	11(23.9)		0.61(0.22, 1.72)
Number of Sexual Partners			0.424/0.428*	
1–5	117(24.7)	8(24.2)		--
6–11	114(24.1)	12(36.7)		1.51(0.59, 3.84)
12–24	121(25.6)	6(18.2)		0.74(0.25, 2.21)
≥ 25	122(25.7)	7(21.1)		0.89(0.31, 2.53)
History of Gonorrhea			0.213	
No	310(47.4)	18(38.3)		--
Yes	340(52.3)	29(61.7)		1.42(0.77, 2.62)
# of Times Had Gonorrhea			0.141/0.070*	
0	310(48.0)	18(38.3)		--
1	184(28.5)	12(25.5)		1.07(0.51, 2.29)
>1	152(23.5)	17(36.2)		1.90(0.95, 3.81)
History of Syphilis			0.566	
No	627(96.2)	45(97.8)		--
Yes	25(3.8)	1(2.2)		0.49(0.07, 3.75)
# of Times Had Syphilis			0.885/0.626*	
0	631(96.7)	46(97.9)		--
1	21(3.2)	1(2.0)		0.58(0.08, 4.44)
>1	1(0.15)	0(0.0)		n/a
Age at First Sexual Intercourse			0.882/0.487*	
< 14	147(23.1)	10(22.2)		--
14–15	163(25.6)	9(20.0)		0.70(0.27, 1.78)
16–17	105(16.5)	8(17.8)		1.01(0.38, 2.66)
>17	221(34.75)	18(40.0)		1.03(0.48, 2.33)
History of Herpes			0.596	
No	645(98.7)	46(97.9)		--
Yes	8(1.3)	1(2.1)		2.09(0.25, 17.3)

	No History of Prostatitis (n=656)	History of Prostatitis (n=47)	p-value (based on chi-square)	Age-adjusted Odds Ratio (95% CI)
# of Times Had Herpes			0.043/0.090*	
0	648(99.2)	46(97.8)		--
1	4(0.6)	0(0.0)		n/a
>1	1(0.2)	1(2.1)		19.5(1.14, 334.93)
Partner History of Cervical Cancer			0.369	
No	600(98.2)	44(100.0)		--
Yes	11(1.8)	0(0.0)		n/a

Note: Totals may not equal n=703 due to missing values

*Cochran-Armitage test for trend p-value

TABLE 3

Benign Prostatic Hyperplasia Measures by Prostatitis Status among African-American Men (n=703)

	No History of Prostatitis (n=656)	History of Prostatitis (n=47)	p-value (based on chi-square)	Age-adjusted OR (95%CI)
History of physician diagnosed BPH			<0.001	
No	614(93.7)	25(54.3)		--
Yes	41(6.3)	21(45.7)		11.93(5.98, 23.8)
AUASI Score*			0.018	
< 7 Mild/Moderate	202(61.5)	9(36.0)		--
≥ 7 Moderate/Severe	126(38.4)	16(64.0)		2.74(1.17, 6.42)
Prostate Volume (cc)*			0.266	
< 30cm3	210(66.5)	13(54.2)		--
≥ 30cm3	106(33.5)	11(45.8)		1.46(0.62, 3.46)
Peak Flow Rate (ml/sec)*			0.961	
≥ 12 ml/sec	209(65.7)	15(65.2)		--
< 12 ml/sec	109(34.3)	8(34.8)		0.86(0.34, 2.19)
PSA Level (ng/ml)*			0.230	
< 4 ng/ml	634(96.7)	44(93.6)		--
≥ 4 ng/ml	22(3.4)	3(6.4)		1.60(0.45, 5.63)

Note: Totals may not equal n=703 or n=369 due to missing values

* Based on information gathered during clinical exam phase (n=369)