Actas Urol Esp. 2016;40(7):440–445

Actas Urológicas Españolas

www.elsevier.es/actasuro

ORIGINAL ARTICLE

Association between late-onset hypogonadism syndrome plus metabolic syndrome and prostate cancer and its aggressiveness☆

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Received 5 December 2015; accepted 8 February 2016
Available online 1 July 2016

KEYWORDS
Prostate cancer;
Late-onset hypogonadism syndrome;
Metabolic syndrome

Abstract

Objective: To assess the relationship between prostate cancer (PC) and the presence of metabolic syndrome and late-onset hypogonadism (LOH) syndrome.

Material and method: A retrospective study was conducted on 686 patients who underwent prostate biopsy. We analyzed the demographic variables, clinical data and biopsy results. To diagnose metabolic syndrome, we employed the criteria of the American Heart Association. For the diagnosis of LOH syndrome, we employed the Androgen Deficiency in the Aging Male questionnaire and testosterone levels (TT). We evaluated the relationship between free testosterone (FT) and bioavailable testosterone (BT) on one hand and PC and its aggressiveness on the other, as well as the usefulness of the TT to prostate specific antigen (TT/PSA) ratio in the PC diagnosis.

Results: The patient's median age was 65 years. Metabolic syndrome is not associated with PC (39.4% vs. 35%; $p = 0.1$) but is associated with a PC Gleason score > 7 (50.4% vs. 29.44%; $p = 0.002$). LOH, low FT and low BT are associated with an increased presence of PC (51% vs. 35%, $p = 0.02$; 44.86% vs. 33.33%, $p = 0.03$; and 46.46% vs. 33.08%, $p = 0.01$, respectively) and with an increased probability of a PC Gleason score > 7 (61.54% vs. 37.5%, $p = 0.02$; 54.17% vs. 34.12%, $p = 0.02$; 54.35% vs. 34.48%, $p = 0.02$, respectively). Additionally, the median TT/PSA ratio was significantly lower in patients with positive biopsies ($p = 0.022$).

☆ Please cite this article as: Fuentes-Pastor J, Pellejero P, Ortiz I, Ramírez-Backhaus M, de Gracia A, Marrugo C, et al. Asociación del síndrome de hipogonadismo tardío y síndrome metabólico con el cáncer de próstata y su agresividad. Actas Urol Esp. 2016;40:440–445.

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Conclusions: Metabolic syndrome was not associated with the probability of having PC but was associated with a PC Gleason score > 7. Moreover, LOH syndrome had a higher percentage of PC and a greater presence of PC Gleason score > 7, as did low levels of FT and low levels of BT.

PALABRAS CLAVE
Cáncer de próstata;
Síndrome de hipogonadismo tardío;
Síndrome metabólico

Asociación del síndrome de hipogonadismo tardío y síndrome metabólico con el cáncer de próstata y su agresividad

Resumen
Objetivo: Evaluar la relación entre el cáncer de próstata (CaP) y la presencia de síndrome metabólico (SM) y síndrome de hipogonadismo tardío (SHT).
Material y método: Estudio retrospectivo de 686 pacientes sometidos a biopsia prostática. Analizamos: variables demográficas, datos clínicos y resultados de la biopsia. Para diagnosticar el SM se utilizaron los criterios de la *American Heart Association*. Para el diagnóstico de SHT se utilizó el cuestionario ADAM y los niveles de testosterona (TT). Evaluamos la relación de la testosterona libre (TL) y testosterona biodisponible (TB) con el CaP y su agresividad y la utilidad de la ratio TT/PSA en el diagnóstico de CaP.
Resultados: Mediana de edad 65 años. El SM no se asoció al CaP (39,4% vs 35% p = 0,1) pero sí a un CaP Gleason > 7 (50,4% vs 29,44% p = 0,002). El SHT, TL baja y TB baja se asociaron a una mayor presencia de CaP (51% vs 35% p = 0,02; 44,86% vs 33,33%, p = 0,03; 46,46% vs 33,08%, p = 0,01 respectivamente) y a mayor probabilidad de CaP Gleason > 7 (61,54% vs 37,5% p = 0,02; 54,17% vs 34,12%, p = 0,02; 54,35% vs 34,48% p = 0,02 respectivamente). Además, la mediana de la ratio de TT/PSA fue significativamente menor en los pacientes con BxP positiva (p = 0.022).
Conclusiones: el SM no se asoció con la probabilidad de tener CaP, pero sí con el CaP Gleason > 7. Por otro lado, el SHT presentó un mayor porcentaje de CaP y una mayor presencia de CaP Gleason > 7, al igual que los niveles bajos de TL y los niveles bajos de TB.

Introduction

Prostate cancer is the most frequently diagnosed malignancy in men in industrialized countries.[1,2] Age, family history of prostate cancer (PCa) and race factors seem to be the most important risk factors. However, factors related to lifestyle, such as physical activity and diet, appear to play a role in the pathogenesis of PCa.[3]

Metabolic syndrome (MetS) is a major health problem which brings together the major cardiovascular risk factors.[4] Its incidence continues to rise and it is currently estimated that up to 25% of the adult population suffers from MetS. In recent years there has been interest in studying the association between MetS and PCa and the possibility of presenting a more aggressive PCa.

Late-onset hypogonadism (LOH) is a clinical and biochemical physiological syndrome due to decreased levels of testosterone (T) in aging.

The link between PCa and serum testosterone levels, LOH and MetS, has been studied extensively without reaching any firm conclusions. There are 3 main theories as to the relationship between testosterone and prostate carcinoma: androgenic hypothesis, non-linear behavior model and saturation model.[5]

The main objective of this work is to study the relationship between MetS and LOH with the presence of PCa and its aggressiveness. As a secondary objective we analyzed the relationship of free testosterone (FT) and bioavailable testosterone (BT) with PCa and its aggressiveness and usefulness of the T/PSA ratio for the diagnosis of PCa.

Material and method

We conducted a retrospective review of 686 patients who underwent consecutive ultrasound-guided transrectal prostate biopsy between 2008 and 2015. The data was collected prospectively in an assistance database from our center (FIVO SEREXTHO®).

Prostate biopsies were indicated by rising PSA, PCA3 and/or before a suspicious digital rectal examination.

Demographic variables, clinical data (diabetes mellitus [DM], LOH, dyslipidemia, coronary artery disease, and use of premedication) and biopsy results (presence or absence of cancer and Gleason score) were collected. Pretreatment with hormones and the use of inhibitors of 5-alpha reductase (5α-RD) were considered exclusion criteria.

A physical examination of each patient was performed on the first visit. In this visit patient's weight, height, body mass index (BMI) and waist circumference data was collected. Additionally, the administration and completion of IPSS, IIEF-5 and *Androgen Deficiency in Aging Males* (ADAM) questionnaires were conducted. The latter was completed for clinical diagnosis of late-onset hypogonadism (LOH). Analytical data of serum PSA, free PSA, PCA3, HDL cholesterol (HDL), triglycerides (TG), total testosterone (TT), free testosterone (FT), bioavailable testosterone (BT) and