

Original Research

Erectile Function in Men during the COVID-19 PandemicLudek Fiala^{1, 2, *}

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Abstract

This research focused on two age groups of men (under 40 and over 40 years) and their sexual function during the COVID-19 pandemic. Somatic examinations, including the measurement of hormone levels, were conducted on all patients. The subjects also completed two questionnaires and provided personal history data. The first questionnaire covered the evaluation of erectile function, while the second assessed psychosocial trauma and stress. The results in the first group (men under 40 years of age) showed a correlation between prolactin values and erectile function score results ($R = 0.54$), between erectile function score results and trauma and psychosocial stress symptoms ($R = 0.49$) and also between prolactin values and trauma and psychosocial stress symptoms ($R = 0.53$). The results in the second group (men over the age of 40) showed a correlation between prolactin values and erectile function score results ($R = 0.42$), between erectile function score results and trauma and psychosocial stress symptoms ($R = 0.54$) and between free testosterone level and erectile function score results ($R = 0.32$). These findings support the hypothesis of a different impact of stress on the development of erectile dysfunction in men under 40 and over 40 years of age during COVID-19.



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Keywords

COVID-19; erectile dysfunction; free testosterone; psychosocial trauma and stress symptoms; prolactin

1. Introduction

Erectile dysfunction (ED) is a common sexual dysfunction in men. It usually affects men over the age of 40, but nowadays, many younger patients seek treatment for this disorder [1]. The cause of ED can be organic, psychogenic, or a combination of both [2]. The most common organic causes of ED include hypertension, diabetes mellitus, obesity, or hormonal disorders [3]. Urinary tract diseases, especially prostatic disorders, are also important [4]. Psychogenic roots are usually related to psychosocial stress. However, there are other reasons for ED, including several psychiatric illnesses such as depressive disorders or psychoses. These disorders are often treated with antidepressants or antipsychotics, which subsequently affect serotonin and dopamine levels and can, in some cases, lead to elevated prolactin (PRL) levels.

Erectile function is affected by several hormones, the most important of which are total testosterone (TT), free testosterone (free T), PRL, and thyroid stimulating hormone (TSH). However, many others could affect sexual functioning, such as luteinizing hormone (LH), which stimulates testosterone production in men in the testes. PRL is a peptide hormone produced and secreted by the anterior lobe of the pituitary gland. It affects sexual taste and testosterone levels, and its effects target tissues. Its level also increases with mental stress. Dopamine primarily inhibits PRL production [5]. Hyperprolactinemia, defined as an elevated level of PRL in the blood, can lead to the pathology of libido, erectile dysfunction (ED), and sometimes to ejaculation and fertility disorders [6].

Testosterone is the primary male sex hormone. It plays a vital role in the development of the testes and prostate and influences sexual behavior. There is evidence that testosterone plays an important role in erectile function, and a decrease in its level can damage penile tissue [7]. Roughly 50% of TT is bound to albumin and about 44% to sex hormone-binding globulin (SHBG). SHBG is a glycoprotein that binds mainly androgens and estrogens. It plays an essential role in the regulation of steroids. About 1 to 2% is unbound, so-called free T, which is biologically active and can activate its receptor in cells [8].

Glandular follicles produce TSH. Circulating TSH acts on the TSH receptor [9]. Thyroid hormones affect sexual function, fertility, and metabolic processes [10]. Prostate-specific antigen (PSA) is a protein formed in prostate cells, which affects sperm motility and helps liquefy ejaculate. Elevated PSA levels may indicate prostate cancer or inflammation.

2. Participants and Methods

A total of 80 men with experience of erectile dysfunction after 15 days of quarantine were examined. The research occurred during the COVID-19 pandemic from July 2020 to July 2021 at the Department of Sexology of the Psychiatric Clinic in Pilsen. These men have never experienced erectile dysfunction before. The first erection problems appeared within a few days of their isolation, and these problems worsened even after the end of isolation and persisted for several months. We divided these men into two groups. The optimal cut-off point was determined by age

(40 years) because erectile dysfunction increases after 40 years of age [11]. The participants were divided into two groups. The first group consisted of men under 40 (mean age 22.6, SD = 5.29; age range 20-40). The second group included 40 men over 40 (mean age 52.6, SD = 9.23; age range 41-65 years).

Erectile dysfunction in all patients was diagnosed with the patient's medical history and physical examination. Patients also provided information on possible weight changes, increased alcohol consumption, sleep disorders, stress, and fear. The assessment of erectile function was conducted using the International Index of Erectile Function (IIEF-5) questionnaire. Exclusion criteria were based on other factors that may interfere with erectile function, such as diabetes mellitus and prostatic or thyroid disorders. All patients treated with antidepressants and antipsychotics before quarantine were excluded from this study. Prostate sonography and Doppler examination of the penis and scrotum were negative in all participants. No pituitary pathology was found on magnetic resonance imaging (MRI) in these men.

All participants in the study signed a written informed consent, and the University Hospital in Pilsen ethics committee approved this study. The Ethical Committee's (EC) decision No.189/20.

2.1 Erectile Function Questionnaire

The International Erectile Function Index (IIEF-5) questionnaire is a diagnostic tool for measuring erectile function. The questionnaire consists of 5 questions. The score of this questionnaire ranges between 1 and 30; a lower score determines a higher erectile dysfunction [12].

2.2 Psychometric Measurement of Stress Response: Trauma Symptom Checklist (TSC-40)

Trauma Symptom Checklist (TSC-40) questionnaire was used to measure possible symptoms of trauma and psychosocial stress. This method is employed to evaluate the stress levels of individual patients. It includes individual factors such as insomnia, depression, anxiety, sexual problems, dissociation, and traumatic index (SATI) [13]. The questionnaire comprises 40 questions, and participants record their answers on a Likert 4-point scale ranging from 0 ("never") to 3 ("often"). The assessment report includes a range of questions, each assigned a numerical value, with a total score ranging from 0 to 120. The questionnaire comprises inquiries about various aspects of sexual health, such as sexual problems (e.g., question no. 5), low sex drive (e.g., question no. 9), and sexual overactivity (e.g., question no. 11), among others.

2.3 Hormones and Markers

In order to assess the levels of hormones and markers, a regular collection of 2 ml of blood serum was carried out at 6:30 a.m. using standard procedures recommended by the Central Laboratory of the Institute of Medical Biochemistry and Laboratory Diagnostics of the Faculty of Medicine in Pilsen. Blood samples were refrigerated at 4°C and transported within 20 minutes for routine laboratory tests. Samples were assayed using an immunoassay method, except for free testosterone, which was analyzed using an immunosorbent assay [14]. Serum levels of PRL, LH, TT, free T, TSH, SHBG, and PSA were measured using standard analytical procedures. PRL and TSH levels were assessed by chemiluminescent immunoassay (CLIA) using an Advia 120 Hematology system analyzer (Centaur Bayer).

TT and free T: The normal reference for total testosterone values ranges from 6-27 nmol/l, and free testosterone in men from 30.2-190 pmol/l. [15].

SHBG: The normal reference for SHBG values ranges from 14-71 nmol/l in men.

TSH: The normal reference range for thyroid hormones is 0.3-4.9 mIU/l.

PRL: PRL in men is elevated above the maximum range of 2.1-17.7 µg/l (200-500 mIU/l). As PRL levels fluctuate significantly during the day, it is advisable to take a sample in the morning, preferably 2-3 hours after waking up.

LH: Levels were determined by an enzyme immunoassay (EIA). The reference range for men over 18 is 1.8-8.6 IU/l.

PSA: The values of this marker range from 0.0 to 1.4 µg/l.

3. Results

3.1 Study Group One (Men under 40 Years of Age)

The mean value of the IIEF-5 questionnaire was 13.54 (13 men scored under 10, 19 men under 20, and 8 men scored between 21-25). The mean value of TSC-40 was 32.83 (30 men scored under 40, 10 men over 40). The mean value of PRL was 13.47 µg/l (11 men had an elevated PRL value, and 29 men had a normal value of PRL). In this group, out of 13 men who had IIEF values below 10, 11 men had an elevated prolactin level. The mean value of TT was 14.52 nmol/l (SD = 7.92); for free T, it was 80.53 pmol/l (SD = 70.6); for SHBG, it was 35.65 nmol/l (SD = 20.43); for TSH it was 1.39 mIU/l (SD = 0.78). For LH, it was 1.95 mIU/l (SD = 0.69); for PSA, it was 0.89 µg/l (SD = 0.62).

The results in the first group showed significant Spearman correlations between the IIEF-5 score and PRL values ($R = 0.54$ at $p < 0.05$). The correlations between the IIEF-5 score results and the TSC-40 values were significant ($R = 0.49$ at $p < 0.05$). Correlations between TSC-40 scores and PRL values were also significant ($R = 0.53$ at $p < 0.05$) (Figure 1).

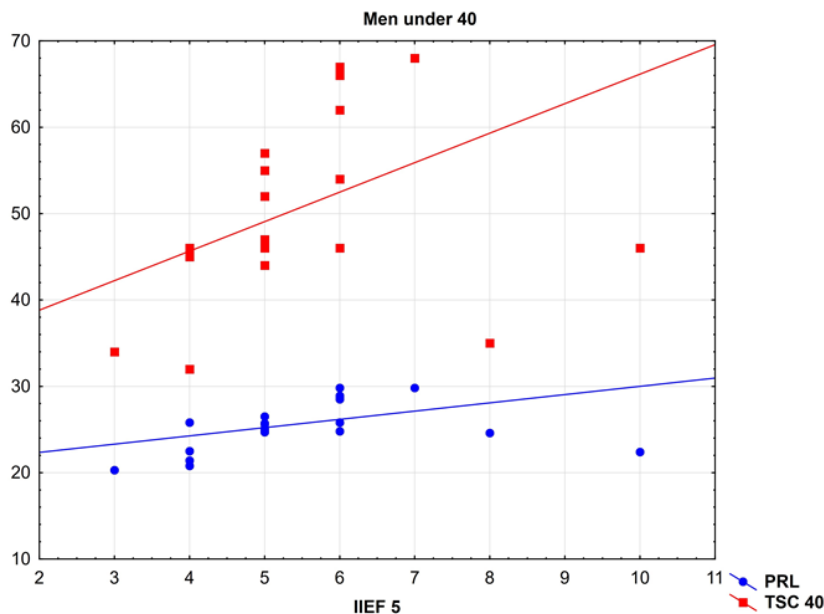


Figure 1 The Relationship between PRL and IIEF-5 and TSC-40.

The relationships regarding LH, TSH, SHBG, PSA, TT, and free T levels did not reach statistical significance.

We repeatedly diagnosed hyperprolactinemia in thirty-two men in the first group. One man reported a weight gain of more than 5 kilograms. Four men reported sleep disorders, and six men reported stress and fear of COVID-19.

Erectile dysfunction in this group of men required an average treatment period of 2 months.

3.2 Study Group Two (Men Over the Age of 40)

The mean value of the IIEF-5 questionnaire was 12.95 (18 men scored under 10, 15 men scored under 20, 15 men between 21-25). The mean value of TSC-40 was 33.84 (31 men achieved a score under 40, and 9 men scored above 40). The mean value of PRL was 13.6 $\mu\text{g/l}$ (12 men had an elevated PRL value, and 28 men had a normal value of PRL). Out of 18 men with IIEF values below 10, 12 men had an elevated prolactin level.

The mean value of free T was 31.4 nmol/l (2 men had an elevated value above 190 nmol/l, nine men under 30.2 nmol/l, and 29 men had values within the standard range). The mean value of TT was 15.67 nmol/l (SD = 5.67); for SHBG, it was 44.19 nmol/l (SD = 21.33); for TSH, it was 1.53 mIU/l (SD = 0.86); for LH it was 1.54 mIU/l (SD = 0.86) and for PSA it was 1.59 $\mu\text{g/l}$ (SD = 0.82).

The results in the second group showed a significant Spearman correlation between erectile dysfunction confirmed by IIEF-5 inquiry and elevated PRL values ($R = 0.42$ at $p < 0.05$). The correlations between the IIEF-5 score results and the TSC-40 values were also significant ($R = 0.54$ at $p < 0.05$). We found a new correlation in this second group; this correlation was between IIEF-5 and free T level ($R=0.32$ at $p < 0.05$) (Figure 2). The relationships regarding LH, TSH, SHBG, and TT levels did not reach statistical significance. We repeatedly diagnosed hyperprolactinemia in fourteen men in the second group. Twelve men reported a weight gain of more than 5 kilograms; twenty-one men reported sleep disorders, and twenty-six men reported stress and fear of COVID-19. Erectile dysfunction in this group of men required an average treatment period of 6 months.

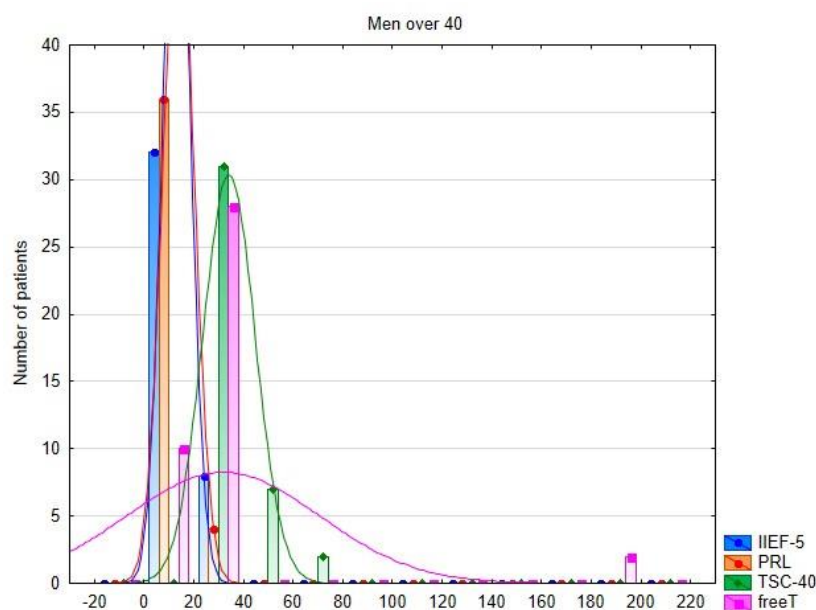


Figure 2 The Relationship between IIEF, PRL, TSC-40, and free T.

4. Discussion

We found a sizeable group of men under age 40 with ED of new-onset during isolation related to the pandemic. The results of our study confirm the relationship between erectile dysfunction, elevated blood PRL levels, and symptoms of trauma and psychosocial stress and represent important findings regarding these relationships. There is evidence that intimate relationships are very sensitive and respond to unsatisfactory and traumatic events that negatively affect the relationship and may subsequently cause sexual disorders [16], such as erectile dysfunction [17]. PRL is considered a hormone whose levels may increase under stress and subsequently lead to an increase in erectile dysfunction [18]. The relationship between PRL levels and IIEF-5 and TSC-40 questionnaire values was statistically significant in both groups employed in our study. We also found a relationship between IIEF-5 and free T levels in the older group. When we compared the two groups, we found that in the older group, there was a higher number of patients who gained weight, had sleep disorders, increased stress, or fear of the COVID-19 disease. These factors can affect the duration of treatment and can also lead to sexual dysfunction or various organic disorders.

Rastrelli reported a possible relationship between PRL levels, sexual dysfunction, and male fertility [19]. An association between anxiety and depressive symptoms in men with sexual dysfunction has also been found in the European population [17]. There are very few studies on the sexual health of elderly patients. In particular, sexual function in older men, especially those with sex hormone disorders, sexual dysfunction, or prostate diseases, has not been thoroughly studied. There is also a lack of information about sexual relationships in older men and their partners [20].

The COVID-19 pandemic provides further new information on the origin and effects of possible stress, psychosocial trauma, and fear of COVID-19 infection in the area of sexual function in healthy, quarantined men [21]. Fear and stress from COVID-19 can negatively affect sexual function, especially in older men, not only psychogenically but also organically [22].

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Author Contributions

The author did all the research work of this study.

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Author declares no financial assistance was received to support this study.

Competing Interests

Author declares no conflict of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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