

**TOTAL TESTOSTERONE LEVEL IN THE BENIGN PROSTATE
HYPERPLASIA OF POLISH AVIATION PERSONEL – OWN RESEARCH**

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Abstract. Etiology and etio-pathogenesis of the benign prostate hyperplasia are not univocally determined. Several surveys conducted regarding this theme, especially in the last decade, broadened the knowledge considering BPH. The significance of carried out researches over the congeneric (social or professional) groups where psychological and physical factors are similar is quite relevant. Aviation personnel, taken under the examination in years 1997/2000, form such a congeneric group. The civil flying personnel aged from 50, and from 40 years old in cases where the positive prostate hyperplasia symptoms occurred, took part in the study during those years. The total testosterone concentration in the blood serum was determined. The prostate gland size was established as well (3 dimensions) through the abdominal USG (ultra-sonography). The total testosterone level was marked in 553 subjects. Almost 93.5% of them had the preferential amount of this enzyme (from 8.4 nmol·l⁻¹ to 32.27 nmol·l⁻¹). Around 5% (27 people) presented lowered testosterone level and almost 1.5% (9 individuals) higher than accepted upper border of its concentration. The prostate gland volume was specified in 614 subjects. The non overgrown gland was found in 18.4% (113 people) of examined personnel by the limit equalling 20 ml. Small degree prostate hyperplasia (21-40 ml) took place in 69.2%; mean degree (41-60 ml) in 10% and high degree (over 60 ml) in 2.5% of examined staff. The prostate hyperplasia in this profession group exceeded results of other population representatives. The total testosterone level in this class maintained within the preferred limits in crucial part of individuals taking part in this investigation.

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Key words: Prostate gland - Benign prostate hyperplasia (BPH) - Total testosterone - Aviation personnel

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Introduction

The multi-directive and multi-institutional researches over the etiological elements in the benign prostate hyperplasia (BPH) do not present the univocal theory considering this subject [1,4,5]. Searches for some hazardous agents influencing the occurrence of prostate and the dynamics of the hyperplasia process are still conducted. Effect of physical and sexual activity, specific diet, habits and addictions is the leading issue of many references [3,8,9,11,16]. The testosterone is the other etio-pathogenetic element of the BPH process although still very controversial one in the opinion of a number of urologists [2,6,7,12,13,14]. Studies applied to the group of the aviation personnel were to elicit the discussion over the mentioned subject. The aim of this work was the determination of the dependence between the total testosterone concentration in blood and the prostate hyperplasia degree.

Material and Methods

The Aviation Medicine Military Institute performed the annual prophylactic medical examinations of the aircraft personnel considering the benign prostate hyperplasia. Tests were conducted in 3 following periods: November 1977-98; 1998-99 and 1999-2000. Members of the civil aviation in number of 614 people were analysed (208, 206 and 200 in respective years). Research encompassed 50 men over 50 years old and over 40 men with the positive familial recognition of prostate. The average age equalled 52.3 years. The upper age border in the whole group amounted to 70.1 years. Subjects approved the research. Blood samples were taken unfed between 8-9 am. The total testosterone level in the blood serum was measured with the use of the Eliss's method and Elecsis 1010 apparatus (preferential values from 8.39 to 32.27 nmol·l⁻¹). The level of this hormone was specified in 553 subjects. The abdominal ultra-sonography (USG) was conducted as for the determination of the prostate gland size. The bladder content was measured (minimal urine value = 150 ml) before the USG. The basic linear dimensions of the gland were determined: width (W) measured in surface leaned (45°) in relation to the frontal surface and parallel to the inter-spinous line; height (H) measured in the same surface; length (L) recorded in the central body line square with the frontal surface. The prostate volume (Vgr.) was specified in millilitres and counted from the modified ellipsoid formula using Sonoline Elegra apparatus (Siemens) equipped with the counting programme. The cutting border was accepted at the level of 20 ml.



Results

The measuring of the prostate gland dimension was performed in 614 aviation personnel individuals. In the first examined group (208 people – November 1997/98) there were 95 subjects (46%) aged 50-54 years and 59 subjects (28%) aged 55-59 years. The percentage prostate values are presented in Fig. 1. In the second tested group (206 people – November 1998/99) were 104 subjects (50%) aged 50-54 years and 63 (30%) aged 55-59 years. This group percentage prostate values are showed in Fig. 2. The third group (200 people - November 1999/00) had 104 subjects (52%) aged 50-54 years and 53 (26%) aged 55-59 years. Results of this group are placed in Fig. 3.

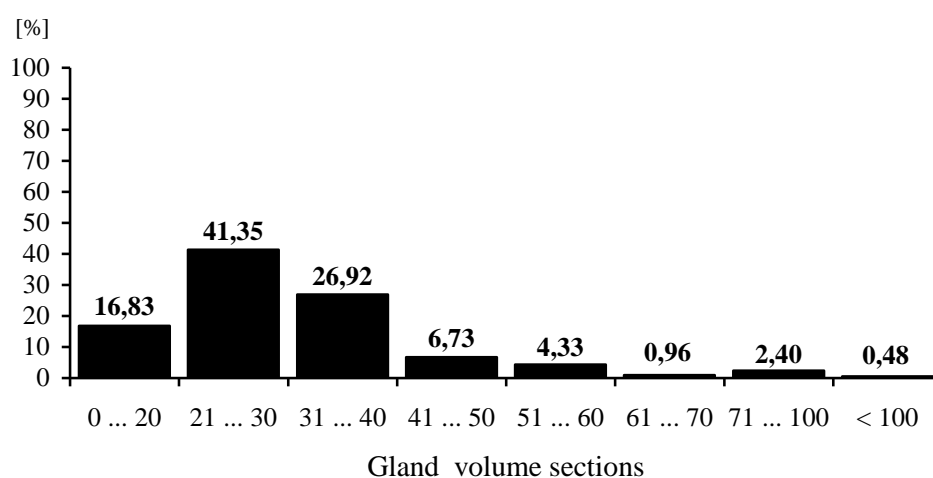
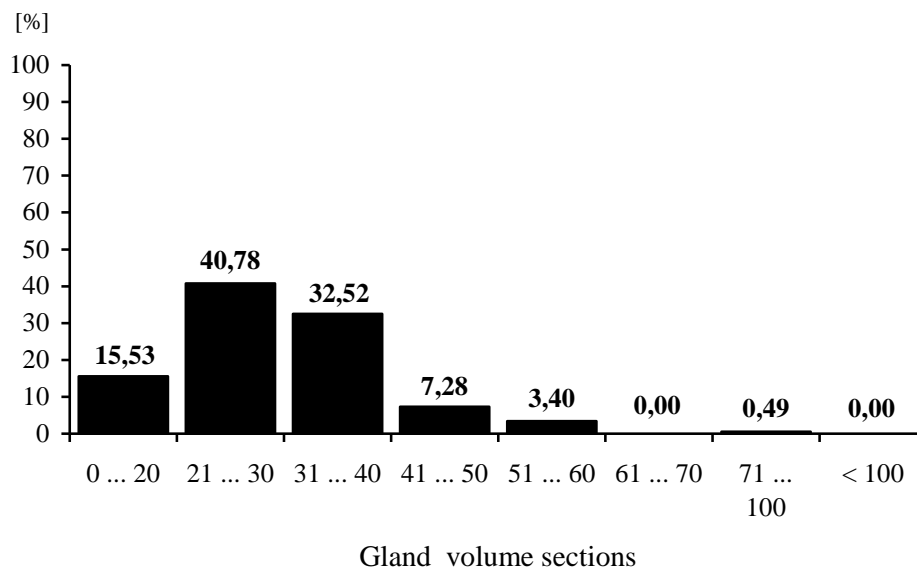


Fig. 1

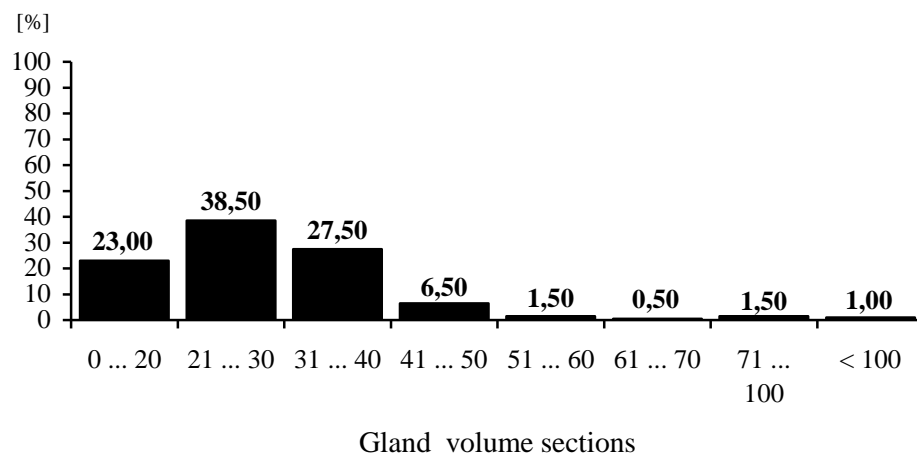
The prostate gland volume in the first examination phase 1997/98 in values sections of: 0-20; 21-70 ml/every 10 ml/; 71-100 ml and over 100 ml

In the whole, the lack of hyperplasia was found in 113 subjects (18.4%). Benign hyperplasia (21-40 ml) was noticed in 425 individuals (69.22%). Mean hyperplasia (41-60 ml) was recorded in 61 subjects (9.93%). Hyperplasia exceeding 60 ml /high degree illness was seen in 15 examined (2.45%). The comprehensive composition of percentage prostate values is presented in Fig. 4.



**Fig. 2**

The prostate gland volume in the second research period 1998/99 in values partitions of: 0-20; 21-70 ml/every 10 ml/; 71-100 ml and over 100 ml

**Fig. 3**

The prostate gland volume in the third study phase 1999/2000 in values sections of: 0-21; 21-70 ml/every 10 ml; 71-100 and over 100 ml



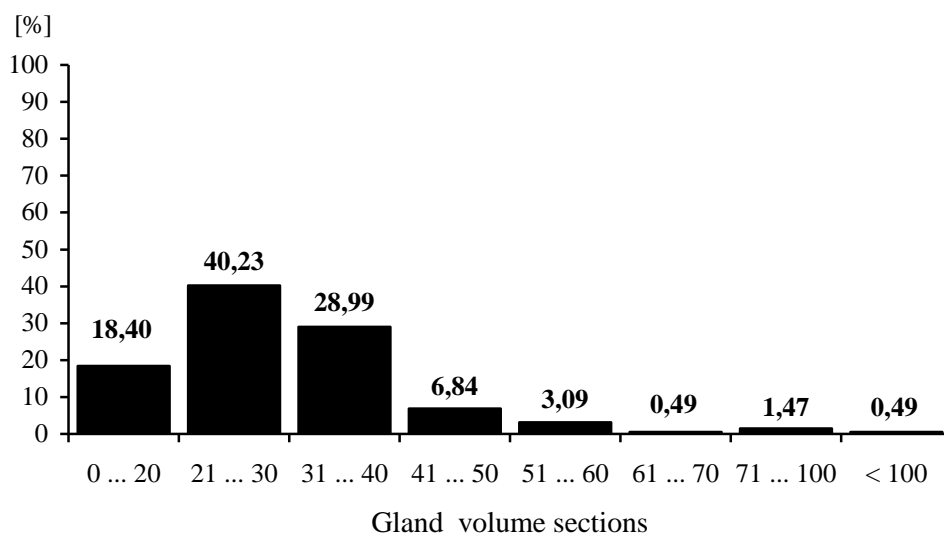


Fig. 4
The prostate gland volume in the whole examined group 1999/2000 in values partitions of: 0-20; 21-70 ml/every 10 ml; 71-100 and over 100 ml

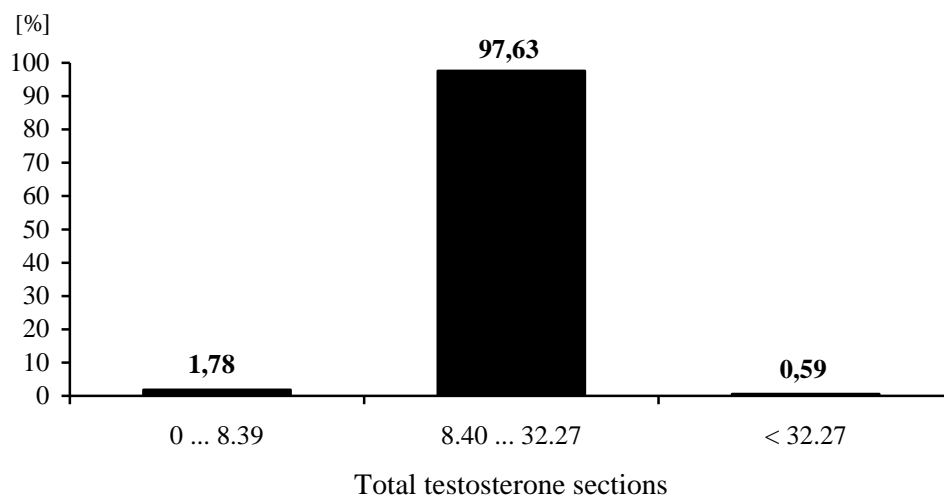


Fig. 5
The percentage total testosterone concentration in the first period of investigation 1997/98 within the preferred level borders, under and over it



Measurements of the total testosterone concentration in blood serum in the first period of examinations (1997/98) were performed in 169 subjects including 123 individuals (73%) aged 51-60 years. The bulk of them (165) displayed testosterone level within the accepted limits however, 3 subjects exceeded lower level ($8.4 \text{ nmol}\cdot\text{l}^{-1}$) and 1 person exceeded higher surface ($32.27 \text{ nmol}\cdot\text{l}^{-1}$). The percentage results obtained in the first examination period are presented in Fig. 5.

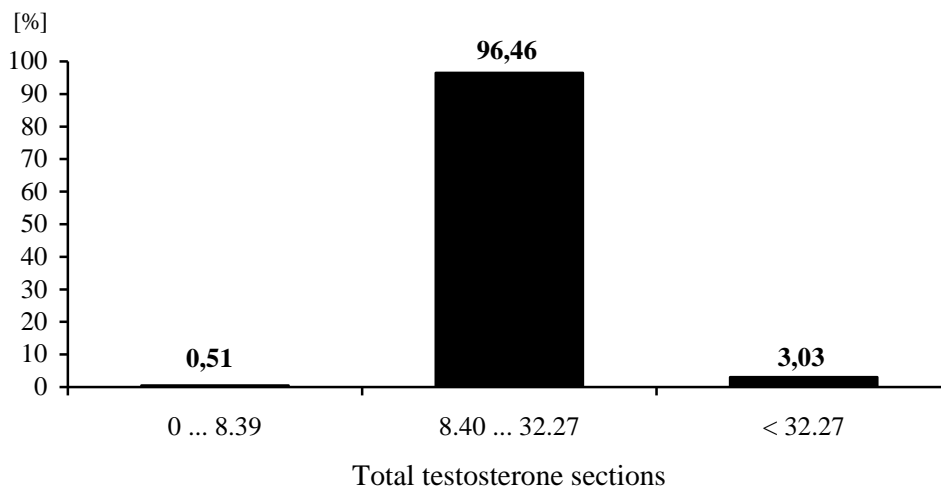


Fig. 6

The percentage total testosterone concentration in the second phase of research 1998/99 within the preferred level limits, under and over it

The second research period effected in examination of 198 subjects including 146 (74%) aged 51-60 years old. The testosterone level was within the preferred range ($8.4\text{-}32.27 \text{ nmol}\cdot\text{l}^{-1}$) in 191 people, 1 person presented lower value and 6 subjects higher ones. Percentage outcomes of this group are gathered in Fig. 6.

The total testosterone level in the third period (1999/00) was measured in 186 subjects among who were 164 individuals aged 51-60 years. The preferential level was found in 161 examined, 23 subjects displayed lower level than accepted and 2 people higher one. The percentage recording is introduced in Fig. 7.

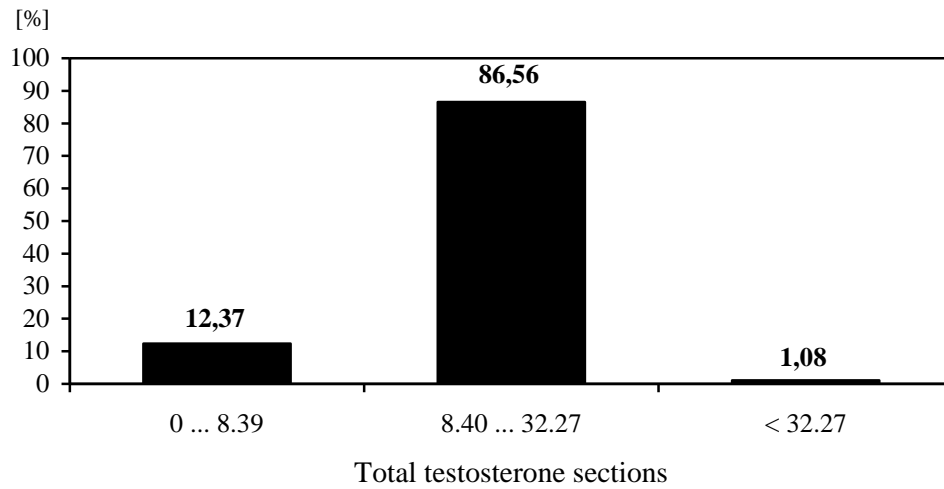


Fig. 7

The percentage total testosterone concentration in the third period of the study 1999/00 within the accepted level borders, under and over this range

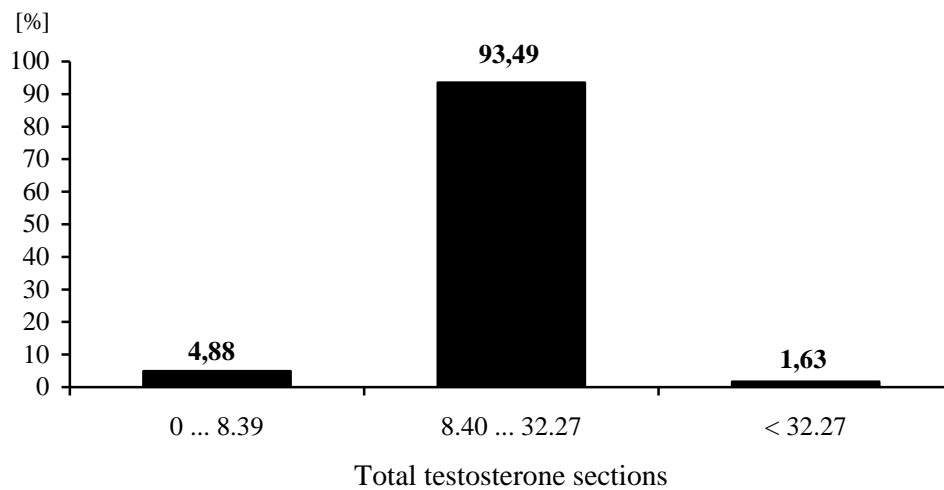


Fig. 8

The percentage total testosterone concentration in the whole examined group 1997/2000 within the preferred limitations, under and over it



The testosterone investigation was performed in 553 aviation personnel individuals. The number of 430 subjects (78%) were aged from 51 to 60 years. The accepted level of this enzyme was stated in 517 of them. The diminished level was noted in 27 individuals and increased in 9 (over $32.27 \text{ nmol}\cdot\text{l}^{-1}$). Values less than $8.40 \text{ nmol}\cdot\text{l}^{-1}$ were stated in: 2 people (around 0.04%) in group aged 40-50 years, 20 subjects (around 4%) in group aged 51-60 and 5 examined (around 0.9%) in group over 60 years old. The above data are comprehended in Fig. 8.

Discussion

Presented research results consider the congeneric professional group where so called "flying stress" factors have a specific influence and the protracted character [10]. This group was also similar in age: around 78% - 50-60 years. The cutting border, following the Polish Committee for Prostate Diseases counsel, was accepted at the level of 20 ml [11]. The medical check regarding the prostate gland volume revealed the benign prostate hyperplasia in nearly 80% of examined subjects. It proves much more higher dynamics of the overgrowing process in this profession in relation to the population of alike aged men in our country [9,11]. The etiologic influence of the "flying stress" indices may have the specific meaning in this field. Studied groups were the subject of prophylactic benign hyperplasia examination for the negative psychological and physical elements connected with practiced by them profession [15]. The fact that the prostate gland increase was between 21-40 ml (small degree hyperplasia) seems to be important. In the first period it was stated in 66% of subjects, in the second – 73% and in the third – 68% of examined personnel. On the other hand, quite interesting becomes the fact that comparatively small number of subjects displayed over 60 ml increased gland (high degree hyperplasia). This kind of overgrowth was noticed in 4% of individuals in the first period (1997/98); in 0.5% in the second one (1998/99) and in 3% in the last period (1999/00).

The total testosterone measurement in the blood serum showed that in the examined group aged less than 50 years old only 2 people had its level lower than accepted norms (around 9%). None of this group individuals presented higher, than preferred, lever of this enzyme. In group aged from 51 to 60 years the testosterone level was within the accepted boundaries in 73% (402 people) and formed 93% of all examined subjects (3 periods). Among individuals over 60 years old the testosterone level stayed within preferred limits in 102 people (94% of this age group). Analysed material points out the proper testosterone level retention however, simultaneously the higher tendency of the prostate hyperplasia in this



professional group. The known and approved role in the benign prostate hyperplasia plays a de-hydro-testosterone (DHT) [2]. Thus, following questions arise: does the proper testosterone quota influences the BPH dynamics? Do the psychological and physical elements of performed profession and described as so called "flying stress" elements [10] have the crucial meaning?

Answers for these questions may be obtained during further researches conducted in this field.

Conclusions

1/ The prostate gland increase (overgrow) as one of the clinic BPH elements has higher dynamics in this specific professional group in comparison to the male Polish population in similar age.

2/ The total testosterone concentrations maintain in the preferred borders.

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