

Serum Concentration of Nine Hormones in Aging Male Population and Association with Potency and Libido Problems

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ABSTRACT

Aim was to determine if a serum levels of free testosterone and selected eight hormones are in correlation with potency and libido problems in aging male. Male population older than 45 years of two Slavonian villages was called for voluntary examination. Every patient filled a questionnaire concerning medical history, operations and potency and libido problems. Based on answers we formed six groups of patients, but only three were analyzed further. Population with potency and libido problems is on average older. In group of patients with normal potency and libido (PNLN group) average levels of free testosterone are 46.01 pmol/L, LH 4.62 IU/L and FSH 6.20 IU/L. In group of patients with mild-damaged potency and normal libido (PMLN group) average levels of free testosterone are 44.61 pmol/L, LH 6.19 IU/L and FSH 8.18 IU/L. In PALA group of patients with absent potency and libido (PALA group) average levels of free testosterone are 41.89 pmol/L, LH 8.07 IU/L and FSH 11.27 IU/L. Significant higher levels of FSH and LH were found compared with the control group (for FSH $p < 0.0001$ and $p < 0.003$, and for LH $p < 0.003$ and $p < 0.021$). No significant difference in serum levels of free or binned testosterone were found between three groups. Even if average serum levels of free testosterone is found lower in patients with libido and potency problems, this difference is not significant and testosterone deficiency itself can not explain potency and libido problems in aging male.

Key words: hormones, aging men, potency, libido

Introduction

Aging men is relatively new term which tries to describe a set of changes both biological and psychological in older male population. A term andropause was made in attempt to summarize hormonal changes that occur, with relation to same equivalent hormonal changes as they appear in women¹⁻⁵. Male potency and libido are complex issues, and still to this date a certain failure mechanism in libido loss and interaction of both was not observed. Serum levels of testosterone, both free and binned, and dehydroandrostendione are declining with age, while serum levels of LH, FSH, prolactine, sex hormone binding globulin (SHBG) and estradiol are raising as men get older⁵⁻¹¹. For some of these hormones is shown that a change in serum level is associated with potency or libido problems of aging men¹²⁻¹⁶. Aim of our study was to investigate whether there is statistical difference in serum levels of mentioned hormones in older men with normal potency and libido when compared to those with potency and libido problems.

Subject and Methods

A male population of two villages, mainly agricultural, in Eastern Slavonia: Josipovac and Čepin, older than 45 years was called to do a voluntary screening test as part of »Prostate Cancer Screening Project«.

Every men was asked to fill a semi-constructed questionnaire concerning a general health, previous medical history, family medical history, specific symptoms of lower urinary tract, potency and libido issues. Questions concerning libido and potency issues were set in such way to deal with subjective overlook of each patient. The questionnaire was constructed in a way that was clear and concise, so that it can be filled out after explanation without intervention from the side by our team of researchers. After completion of the questionnaire, a physical examination was performed which included rectal examination by the same physician. Blood samples, prior to examination, were taken for the analysis of PSA, colon tumor markers, FSH, LH, prolactine, T3, TSH, cortisol, androstendione, dehydroandrostendione, free and binned

testosterone, estrogene, progesterone, sex hormone binding globulin and vitamin D. Nine of those hormones were selected for further analysis. All blood samples were taken only once and at the same hour of the day (4–5 pm).

A total of 1000 men were included in this study. For the purpose of this study all men with previous medical history of severe metabolic disorders, previous operations that can alter hormonal balance (egg. orchidectomy), drugs intake with hormonal affect (egg. therapy for prostate cancer) were dropped from the study, and final number of 557 subjects was achieved.

Based on the answers concerning potency and libido problems all patients were divided in to six subgroups:

1. PNLN (Potency Normal Libido Normal) numbering 103 subjects.
2. PMNL (Potency Mild-damaged Libido Normal) with 288 subjects.
3. PALA (Potency Absent Libido Absent) with 138 subjects.
4. PALN (Potency Absent Libido Normal) with 21 subjects.
5. PMLA (Potency Mild-damaged Libido Absent) with 6 subjects
6. PNLA (Potency Normal Libido Absent) with 1 subject.

A PNLN group (normal potency and libido) was a control group, and since number of subjects in groups PALN, PMLA and PNLA were limited, we dropped those groups out from the further statistical analysis. All blood samples were analyzed at the same laboratory and calculated values expressed in standardized units. Since first statistical analysis indicated that distribution of calculated values was not normal or logarithmic we used Kolmogorov-Smirnov test to check out for statistical significance between three major groups.

Results

The average age of patients in the control group was lower when compared to other two groups, while average age of subjects in PALA group is highest in all compared groups (Table 1). In the control group (PNLN) average serum level of free testosterone was highest and levels of FSH, LH, binned testosterone, estrogen and sex-hormone binding globulin were lower then in other groups

(Table 2). Serum levels of FSH, LH, estrogen and binned testosterone are highest in PALA group and level of free testosterone is the lowest. There is statistical significance in serum levels of FSH, LH and progesterone ($p < 0,05$) in groups PNLN and PMLN, also statistical significance was found ($p < 0,05$) in levels of FSH, LH, DHEAS and estrogen in groups PNLN and PALA. Since group PNLN, PMNL and PALA are statistically significantly different, a comparison of PMNL and PALA group was performed, and there was no difference between the groups, $p = 0,078$. But when we compared serum levels of selected hormones in group PMLN with group PALA we found a statistical difference ($p < 0,05$) in serum levels of DHEAS, binned testosterone, estrogen and progesterone (Table 3). Also we analyzed serum levels of free testosterone, FSH and LH through decades in all patients: level of free testosterone is declining with age at approximate 0,4 pmol/year while both levels of FSH and LH are rising in older men (Table 4 and Figure 1).

Discussion and Conclusion

Only few decades ago terms »aging male« or »andropause« were not in use, since average age expectancy of male population was under 70 years. Things have changed: better medical care, advances in medical sciences, growing economy and improved life conditions, all together have prolonged expected life of male population. Now days almost every developed country in the world is facing a growing need for treatment of erectile dysfunction or impotence in elderly men.

Clear mechanism in libido impairment is still not certain. Complex mechanism of hormonal regulation, with

TABLE 1
NUMBER OF SUBJECTS AND AVERAGE AGE IN THREE ANALYZED GROUPS

Group	Patients (No)	Average age	Max	Min	SD
PNLN	103	56.35	73	45	6.20
PMLN	288	61.21	84	50	6.23
PALA	138	68.62	95	50	9.09

PNLN – Potency Normal Libido Normal, PMNL – Potency Mild-damaged Libido Normal, PALA – Potency Absent Libido Absent

TABLE 2
AVERAGE SERUM LEVELS OF SELECTED HORMONES IN THREE MAJOR GROUPS

Group	FSH (IU/L)	LH (IU/L)	Prolactine (mIU/L)	DHEAS (nmol/L)	Free testosterone (pmol/L)	Binned testosterone (pmol/L)	Estrogene (pmol/L)	Progesterone (nmol/L)	SHBG (nmol/L)
PNLN	6.20	4.62	294.53	4.08	46.01	15.30	49.80	1.83	48.37
PMLN	8.18	6.19	278.85	3.31	44.61	15.77	54.50	1.94	54.89
PALA	11.27	8.07	312.47	7.15	41.89	16.75	68.65	1.73	56.49

PNLN – Potency Normal Libido Normal, PMNL – Potency Mild-damaged Libido Normal, PALA – Potency Absent Libido Absent

TABLE 3
STATISTICAL COMPARISON OF AVERAGE HORMONE SERUM LEVELS IN THREE GROUPS

Hormone	PNLN vs.	PNLN vs.	PMLN vs.
	PMLN	PALA	PALA
	<i>p value</i>		
FSH	0.0001*	0.003*	0.075
LH	0.003*	0.021*	0.214
Prolactine	0.740	0.724	0.341
DHEAS	0.135	0.002*	0.0001*
Free testosterone	0.928	0.289	0.446
Binned testosterone	0.221	0.561	0.034
Estrogene	0.798	0.042*	0.038*
Progesterone	0.0001*	0.933	0.0001*
SHBG	0.235	0.334	0.529

*p<0.05 is significant, Kolmogorov Smirnov test, PNLN – Potency Normal Libido Normal, PMLN – Potency Mild-damaged Libido Normal, PALA – Potency Absent Libido Absent

TABLE 4
AVERAGE SERUM LEVELS OF FREE TESTOSTERONE, FSH AND LH IN ALL PATIENTS THROUGH DECADES

Hormone	Decades				
	40-49	50-59	60-69	70-79	80-89
Free testosterone (pmol/l)	54.68	45.52	43.13	39.57	38.42
FSH (IU/l)	7.03	6.92	8.73	15.60	-
LH (IU/l)	6.26	5.51	6.84	7.64	-

extensive numbers of hormones, is now recognized and a fall in regulation or effect of any of this can lead to impotence or libido impairment. Changes in anatomy, neural network or metabolism can all contribute to the same problem.

Testosterone is main hormone involved in regulation of sexual function in men. All available data suggest that levels of free testosterone are declining with age¹⁻⁵. Lower levels of testosterone are found in men with sexual dysfunction, but level of free testosterone is not significant in determining a level of dysfunction¹⁶. It has been observed that even hypogonadal men can achieve some level of erection and presence of libido when exposed to erotic stimuli^{11,12}.

Levels of FSH, LH, SHBG and prolactine are expected to rise with age, if the hypothalamo-gonadal feedback is still active and uncorrupted¹⁻⁵. Estrogen is found, by some reports, in elevated levels in aging men and can lead to obesity, loss of libido and masculine body hair pattern¹¹. At the same time some reports suggest decline in levels of estrogen, but with relative rise when compared to decline of free testosterone⁵.

In our experience average age of male patients with observed potency and libido problems is higher than in

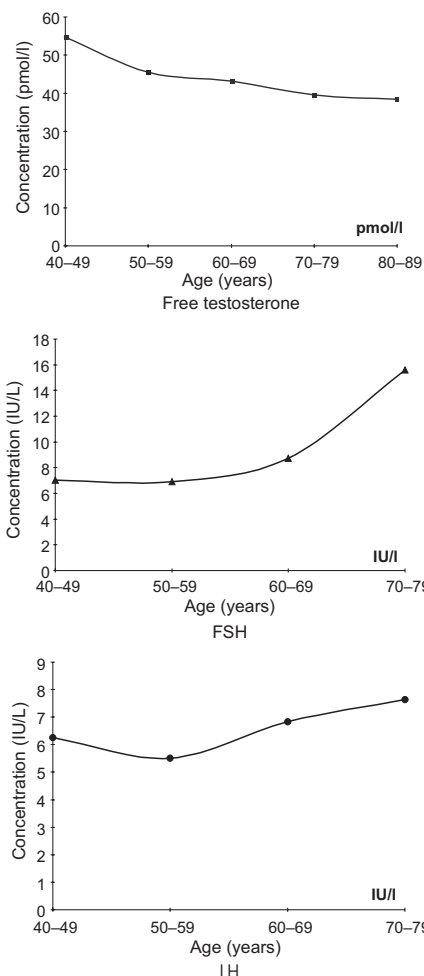


Fig. 1. Levels of free testosterone, FSH and LH in all patients through decades. FT- free testosterone.

normal subjects. Lower serum levels of free testosterone and higher levels of binned testosterone are expected and found in two groups of patients with potency/libido problems^{5,16}, and at the same time those groups are on average older than the control group, which correlates with so far known reports. Although lower values of free testosterone are observed, as mentioned, this observation is not statistically significant when compared to the control group. FSH and LH are lower in control group than in other two groups which is normal, since with age a deficiency in free testosterone occurs⁵, and still active gonado-pituitary regulation is as feedback increasing production of FSH and LH in order to match lower levels of free testosterone, and this difference is statistically significant in both PMLN and PALA group. Levels of estrogen and SHBG are higher in PMLN and PALA groups, but without significance in levels of SHBG. Elevated estrogen levels are found to be significant in PALA group when compared to the control group, and this observation is not as the one reported or expected^{5,11}.

Since all of the above mentioned data can be explained by the fact that patients in PMLN and PALA

groups are on average older than the control group, additional analysis of difference of serum hormone levels was performed between groups PALA and PMNL. Significant higher levels of DHEAS are found in group PALA, which was not expected^{2-5,11}, but can be explained by the higher FSH and LH as a final outcome resulting in the higher levels of DHEAS and estrogen.

In conclusion, a lower level of serum free testosterone is found in groups of patients with libido and potency problems, but this finding is not significant statistically.

However in average lower levels of free testosterone in coordination with other changes (circulatory deficiency, neural damage) could be responsible for overall effect of potency and libido impairment. Statistically higher values of serum FSH and LH are expected and are found in PMNL and PALA group, as contra measure of relative testosterone deficiency. We have found no evidence that serum levels of free testosterone alone are relevant and predictor to potency or libido problems in aging male.

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SERUMSKE RAZINE DEVET HORMONA U STARIJOJ MUŠKOJ POPULACIJI I POVEZANOST SA POREMEĆAJIMA LIBIDA I POTENCIJE

SAŽETAK

Cilj našeg istraživanja je bio utvrditi postoji li povezanost serumskih vrijednosti slobodnog testosterona i odabranih osam hormona sa poremećajima potencije i libida u muškaraca. Odabrana muška populacija starija od 45 godina u dva Slavonska sela je pozvana na dobrovoljni pregled. Svaki pristupnik je ispunio upitnik o prethodnim bolestima, operacijama i stanju potencije i libida. Na temelju odgovora formirano je šest skupina, ali zbog manjeg broja pristupnika, samo 3 skupine su uključene u studiju. Pristupnici sa poremećajima potencije i libida su u prosjeku stariji od ostalih grupa. U grupi pristupnika sa normalnom potencijom i libidom prosječna razina slobodnog testosterona je 46.01 pmol/L, LH 4.62 IU/L i FSH 6.20 IU/L. U grupi pristupnika sa umjerenim poremećajem potencije i normalnim libidom prosječna razina slobodnog testosterona je 44.61 pmol/L, LH 6.19 IU/L i FSH 8.18 IU/L. U grupi bolesnika sa težim poremećajima potencije i libida prosječna razina slobodnog testosterona je 41.89 pmol/L, LH 8.07 IU/L i FSH 11.27 IU/L. Statistički značajno više razine FSH i LH su nađene u tim grupama u odnosu na grupu pristupnika bez poremećaja (FSH $p < 0.0001$ i $p < 0.003$, a za LH $p < 0.003$ i $p < 0.021$). Nema statistički značajne razlike u vrijednostima slobodnog i vezanog testosterona za sve tri grupe. Iako je prosječna serumska razina slobodnog testosterona niža i potvrđena u pristupnika sa poremećajima potencije i libida, ta razlika nije statistički značajna i niže vrijednosti slobodnog testosterona same ne mogu objasniti poremećaje potencije i libida u starijih muškaraca.