PECULIARITIES OF THE DIAGNOSIS OF LATE-ONSET HYPOGONADISM IN MEN IN THE CASE OF CHRONIC DISEASES: ARTERIAL HYPERTENSION, DYSLIPIDAEMIA, ADIPOSITY, METABOLIC SYNDROME, TYPE 2 DIABETES MELLITUS, CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Anatolijs Pozarskis, Rita Pozarska

Pozarskis A. , Pozarska R. 2018. Peculiarities of the Diagnosis of Late-Onset Hypogonadism in Men in the Case of Chronic Diseases: Arterial Hypertension, Dyslipidaemia, Adiposity, Metabolic Syndrome, Type 2 Diabetes Mellitus, Chronic Obstructive Pulmonary Disease. *Acta Biol. Univ. Daugavp., 18 (1): 81 – 93.*

Late-onset hypogonadism (LOH) is a clinical and biochemical syndrome associated with age, and featured by typical symptoms and reduced blood testosterone level. Among males aged over 30 years, the incidence of androgen deficiency is 7 to 30 %. The aim of this study was to investigate the incidence of hypogonadism in patients aged over 40 years with an underlying condition and/or a comorbidity, such as arterial hipertension, COPD, metabolic syndrome, Type 2 of diabetes mellitus, dyslipidemia, adiposity in various GP and physician-sexologists' offices in Latvia; to reveale age-induced androgen deficiency-associated peculiarities of clinical features in the case of various clinical entities and to develope of diagnostic criteria of androgen deficiency associated with the main somatic pathology. Materials and methods. Males aged 40 years and over who turned to family doctors at nine GP practices were offered to fill in Aging Male Study (AMS) questionnaires used for the diagnostics of late-onset hypogonadism. Males aged 40 years who visited the office of the physician sexologist Anatolijs Požarskis were offered to fill in the same questionnaires. After compiling the data from AMS questionnaires, a group of males exhibiting the signs of LOH were isolated (total 1222 person). In these patients, we tested blood testosterone and sex-hormone binding globulin (SHBG). Chronic diseases were found in these men after the data evaluation in patients' medical records, and after performing physical and laboratory examinations. Using single and multiple factor analysis, the relationship between each symptom in the AMS questionnaire and chronic diseases and age in hypogonadal patients has been studied. Results. For each disease – arterial hypertension, dyslipidaemia, adiposity, metabolic syndrome, Type 2 diabetes mellitus, and COPD – different AMS questionnaire symptoms were typical in hypogonadal patients. Conclusions. Diagnostics of age-induced androgen deficiency shall be based not just on determining the level of testosterone, but also on the analysis of clinical features. Clinical symptoms of age-induced androgen deficiency are specified by patients' comorbidities.

Key words: late – onset hypogonadism, testosterone, male aging, AMS questionnaire.

Anatolijs Poarskis. Private Practice, 46,Cietoksna Str., Daugavpils, Latvia, E-mail: drpozarskis@inbox.lv
Rita Pozarska. First year student, Riga Stradina University, 16 Dzirciema Str., Riga, Latvia

INTRODUCTION

In recent years, much attention has been paid to the reproductive health of males of different ages. An important aspect of male health is an expressed impact of somatic diseases on male gonadal function. The issue of male late-onset hypogonadism, or LOH, is moving forward. It has been shown that with age, testosterone level gradually decreases even in a body of a completely healthy male. Moreover, this issue has hardly been studied in the context of comorbidities.

Testosterone fraction dynamics shall be studied in detail in the context of rather prevalent diseases, such as arterial hypertension, diabetes mellitus, dyslipoproteinemia, and metabolic syndrome. These diseases are featured by rather unfavourable prognosis regarding high risk of local vascular pathology, reducing the quality of life, and premature death. A pressing issue is the dynamics of testosterone fractions in the case of chronic obstructive pulmonary disease (COPD).

Aging Males' Symptoms questionnaire, or AMS questionnaire (Table 1) is recommended to be used in LOH diagnostics by the International Society for the Study of the Aging Male (ISSAM) (Morales, Lunenfeld, 2002). It is important not only to study testosterone dynamics depending on the age, but also AMS questionnaires symptoms association with chronic diseases in LOH patients, the clinical peculiarities of the above diseases in LOH patients.

The aim of this study was to investigate the incidence of hypogonadism in patients aged over 40 years with an underlying condition and/or a comorbidity, such as arterial hipertension, COPD, metabolic syndrome, Type 2 of diabetes mellitus, dyslipidemia, adiposity in various general practicioners (GP) and physician-sexologists' offices in Latvia; to reveale age-induced androgen deficiency-associated peculiarities of clinical features in the case of various clinical entities and to develope of diagnostic criteria of androgen deficiency associated with the main somatic pathology.

MATERIAL AND METHODS

The study design in time: cross-sectional study. It is based on a men's survey using Aging Males' Symptoms questionnaire, or AMS questionnaire, as well as on the assessment of the participants by means of clinical and laboratory methods. Males over 40 years of age who had referred to general practitioners at nine general practitioner's offices in Latvia due to acute illnesses, exacerbations of chronic disease, or for preventive examinations, and who had agreed to take part in the study, were offered to complete the AMS questionnaire.

Males over 40 years of age, who had referred to the physician-sexologist Anatolijs Požarskis' office, were offered to complete the same questionnaire. After the analysis of the AMS questionnaire data, a group of men with signs of LOH has been identified. These patients were offered to determine their blood testosterone and sex hormone building globuline (SHBG) levels. Men's medical records filled in by the general practitioners have also been assessed, and chronic diseases identified in anamnesis of these patients have been recorded. The presence of the following data in participants' medical records for the last 6 months has been assessed: blood glucose, as well as a total cholesterol, triglycerides, high-density lipoproteins (HDL), and low-density lipoproteins (LDL) levels, and spirometry. If the data were present in a medical record, they were used in our study; if the data were not available, blood glucose, total cholesterol, triglycerides, LDL, and HDL levels were determined in patients. Physical examination were performed, and the following indicators determined: arterial blood pressure on both arms; height and weight, body mass index was calculated; measurement of waist circumference was performed. The study group was comprised of patients in whom LOH had been established in accordance with the AMS questionnaire data, and the following diseases had been identified (n = 820): arterial hypertension, dyslipidaemia, adiposity, metabolic syndrome, Type 2 diabetes mellitus, COPD.

The control group was comprised of patients in whom LOH had been established in accordance

Table 1. AMS Questionnaire

Symptoms	Score
Decline in your feeling of general well-being	
Joint pain and muscular ache	
Excessive sweating	
Sleep problems	
Increased need for sleep, often feeling tired	
Irritability	
Nervousness	
Anxiety (feeling panicky)	
Physical exhaustion / lacking vitality	
Decrease in muscular strength	
Depressive mood	
Feeling that you have passed your peak	
Feeling burnt out, having hit rock-bottom	
Decrease in beard growth	
Decrease in ability/frequency to perform sexually	
Decrease in the number of morning erections	
Decrease in sexual desire/libido	

with the AMS questionnaire data, and in whom arterial hypertension, dyslipidaemia, adiposity, metabolic syndrome, Type 2 diabetes mellitus, and COPD had not been diagnosed (n = 402). Using single and multiple factor analysis, the relationship between each symptom in the AMS questionnaire and chronic diseases and age in hypogonadal patients has been studied.

We used the following diagnostic criteria of somatic pathologies. *Arterial hypertension.* We used the currently available hypertension classification system recommended by the European Society of Hypertension and the European Society of Cardiology (Mancia et al., 2013), where the optimal blood pressure (BP) level is considered < 120/80; normal BP: 120–129/80–84; high normal BP: 130–139/85–89; stage 1 hypertension: 140–159/90–99; stage 2 hypertension: 160–179/100–109; stage 3 hypertension: ≥ 180/≥ 110. Depending on blood pressure level, risk factors, asymptomatic organ impairment, and presence of concomitant clinical pathology, arterial hypertension has been divided into four risk groups of complications: low, moderate, high, and very high risk (Mancia et al. 2013). *Diabetes mellitus.* During the study, diabetes mellitus was diagnosed on the basis of the following criteria: repeated measurements of fasting blood glucose levels are > 7.0 mmol/l (120 mg %), or > 11.1 mmol/l (200 mg %) two hours after 75 g glucose load. *Obesity.* Obesity diagnosis was established in accordance with modern WHO classification principles depending on the body mass index. According to the body mass index, normal weight corresponds to 18.5–24.99 kg/m^2, overweight – to 25–29.99 kg/m^2, obesity – to 30–39.99 kg/m^2, severe obesity – ≥ 40 kg/m^2. *Dyslipidaemia* was established according to the following metabolic parameters: total cholesterol concentration > 5.0 mmol/l, triglyceride level > 1.7 mmol/l, high-density lipoprotein cholesterol concentration < 1.0 mmol/l, and low-density lipoprotein cholesterol concentration > 3.0 mmol/l. *Metabolic syndrome.* Metabolic syndrome was diagnosed if at least three of the following criteria had been established (Alberti et al. 2009): arterial hypertension (characteristic values of arterial blood pressure > 130/85 mm/Hg, or patients with

arterial hypertension taking antihypertensives); triglycerides > 1.7 mmol/l, or medical treatment of hypertriglyceridemia; fasting blood glucose level > 5.6 mmol/l, or medical treatment of hyperglycaemia; HDL level < 1.0 mmol/l; Men's waist circumference > 94 cm, which is a sign of abdominal obesity.*Chronic obstructive pulmonary disease.* Moderately severe COPD was diagnosed according to the following criteria. Anamnesis data (long-term smoking period, or long-term exposure to substances irritant to respiratory system), complaints (dyspnoea at physical exertion of moderate intensity, productive cough, periods with cough and high temperature), physical examination (vesiculotympanitic resonance to percussion, weakened respiration, dry noise to auscultation), instrumental examination - measurement of forced expiratory volume in one second (FEV1) 50 to 80 % of the normal at FEV1/FVC < 0.70, bronchodilation test – after the inhalation of salbutamol FEV1 increased on average by 7.6%, which is a sign of an irreversible bronchial obstruction).

Laboratory diagnosis of LOH was established by means of immunoenzymatic method using *Multiskan Plus* photometer test system at the wavelength 450 nm. During the diagnostics, total and free testosterone levels were established and divided into three categories: "normal value", "reduced to the threshold level", and "abnormally low". Following the recommendations of International Society of Andrology (ISA), International Society for The Study of The Aging Male (ISSAM) and European Urology Association (EAU) guidelines in 2006 (the year when our study was started), total and free testosterone level is considered normal > 3.46 ng/ml and > 72.00 pg/ml, reduced to the threshold level – 3.46–2.31 ng/ml and 65.00–72.00 pg/ml, and abnormally low < 2.31 ng/ml and < 65.00 pg/ml, respectively (Nieschlag et al., 2006).

Non-parametric (percentage and its 95 % confidence interval, cross-tabulation analysis) and parametric descriptive statistical methods (minimum, maximum, average, standard deviation, median) were used to describe the population. The Kolmogorov-Smirnov test was used to determine the normal distribution of parametric indicators. Binary logistic regression was used to search for different associations between AMS symptoms and hypogonadism. To evaluate the significance of the differences between two sets of data, the Student's t-criterion was used. The difference between the parameters is statistically significant, if t-value is ≥ 2 (in this case, $p < 0.05$). Student's t-criterion was used to identify significant differences in quantitative parameters of investigated processes. Statistical data processing was performed using the SPSS (Statistical Package for the Social Sciences) 20.0 software. MS Excel was used to create figures. The level of significance chosen for this work (p) is 0.05, that is, the results are considered statistically reliable if $p < 0.05$.

RESULTS

The study comprised 820 patients with chronic internal diseases. The following somatic pathologies were recorded in patients: arterial hypertension in 320 cases (39 %), obesity in 407 cases (49.6 %), Type 2 diabetes mellitus in 67 patients (8.2 %), dyslipidaemia in 681 patients (83 %), metabolic syndrome in 139 patients (17 %), COPD in 107 patients (13 %). The patients were in the age range of 40 to 70 years, and were distributed in the following age-defined patient groups: 40–45 years of age (81 patient, or 9.9 %), 46–50 years of age (93 patients, or 11.3 %), 51–55 years of age (372 patients, or 45.4 %), 56–60 years of age (157 patients, or 19.2 %), 61–65 years of age (85 patients, or 10.4 %), 66–70 years of age (32 patients, or 3.9 %) (Table 2).

402 men without any observed chronic concomitant disease were enrolled in the study. Male age characteristics were as follows: 40–45 years of age – 49 patients, 46–50 years of age – 51 patients, 50–55 years of age – 83 patients, 56–60 years of age – 68 patients, 61–65 years of age – 70 patients, 66–70 years of age – 81 patients.

Table 2.Age and clinical characteristics of patients enrolled in the study

Age (years)	AH	ADPS	DM	Dyslp.	COPD	MS	Total
40–45	30	45	2	54	12	33	176
46–50	52	65	14	97	10	25	263
51–55	40	48	9	102	24	39	262
56–60	44	76	15	147	16	31	329
61–65	58	79	14	140	21	5	317
66–70	96	94	13	141	24	6	374

Abbreviations:
AH – arterial hypertension
ADPS – adiposity
DM– diabetes mellitus
Dyslp. – dyslipidaemia
COPD – chronic obstructive pulmonary disease
MS – metabolic syndrome

According to clinical and laboratory data, hypogonadism was found in 669 patients (54.7 % of 1222 study participants). In patient groups with chronic comorbidities, hypogonadism was found in 650 patients (79 % of 820 study participants).

It was found in men without concomitant diseases in 19 cases (4.7 % of 402 participants in the group). The prevalence of hypogonadism is statistically significantly higher in the patient group with concomitant diseases ($p < 0.05$).

Using single and multiple factor analysis, the relationship between each symptom in the AMS questionnaire and chronic diseases and age in hypogonadal patients has been studied

Statistically significant association of the symptom "Decline in the overall well-being" with dyslipidaemia, metabolic syndrome, COPD and T2CD has been observed after the mapping with other diseases and the patient's age. Namely, dyslipidaemia statistically significantly ($p < 0.001$) increases the likelihood of occurrence of the symptom "Decline in feeling of general well-being" almost 10 times. Metabolic syndrome increases these odds more than 6 times ($p < 0.001$), COPD – more than 3 times ($p < 0.001$), and T2CD – 2.5 times ($p = 0.001$). Patient's age has also a statistically significant role; after mapping with an increase in age by one year, the odds for the above symptom increase by 5 % ($p < 0.001$)

After the mapping with other diseases and the patient's age, a statistically significant association of the symptom "Joint pain and muscular ache" has been observed with dyslipidaemia only, namely, dyslipidaemia statistically significantly ($p < 0.001$) decreases the likelihood of occurrence of the symptom "Joint pain and muscular ache" more than 12 times (OR = 0.08).

A statistically significant association of the symptom "Excessive sweating" with dyslipidaemia, arterial hypertension, metabolic syndrome, and T2CD has been observed after the mapping with other diseases and the patient's age. Namely, dyslipidaemia statistically significantly ($p < 0.001$) decreases the likelihood of occurrence of the symptom "Excessive sweating" about five times. Arterial hypertension increases these odds more than 33 times ($p < 0.001$), metabolic syndrome decreases the odds more than 250 times ($p < 0.001$), and T2CD decreases the odds more than 200 times ($p < 0.001$).

A statistically significant association of the symptom "Sleep problems" with dyslipidaemia, arterial hypertension, COPD, and T2CD has been

observed after the mapping with other diseases and the patient's age. Namely, dyslipidaemia statistically significantly ($p < 0.001$) decreases the likelihood of occurrence of the symptom "Sleep problems" about five times. COPD increases these odds more than 20 times ($p < 0.001$), and T2CD – more than 112 times ($p < 0.001$). The patient's age has no statistically significant association with this symptom.

A statistically significant association of the symptom "Increased need for sleep, often feeling tired" with dyslipidaemia, arterial hypertension, COPD, and T2CD has been observed after the mapping with other diseases and the patient's age. Namely, dyslipidaemia statistically significantly ($p < 0.001$) decreases the likelihood of occurrence of the symptom "Increased need for sleep, often feeling tired" about 7 times. COPD and T2CD increases the odds of occurrence of these symptoms: COPD increases them more than 111 times ($p < 0.001$), and T2CD – more than 83 times ($p < 0.001$). Patient's age has also a statistically significant role; after mapping with an increase in age by one year, the odds for the aforementioned symptoms increase by 5 % ($p = 0.03$).

A statistically significant association of the symptom "Irritability" with dyslipidaemia, arterial hypertension, metabolic syndrome, and T2CD has been observed after the mapping with other diseases and the patient's age. Dyslipidaemia statistically significantly ($p < 0.001$) decreases the likelihood of occurrence of this symptom about 2.5 times. Arterial hypertension and T2CD increases the odds of occurrence of this symptom more than 21 and 23 times, respectively ($p < 0.001$). Metabolic syndrome decreases the likelihood of occurrence of the symptom "Irritability" about 100 times ($p < 0.001$). The patient's age has no statistically significant association with this symptom.

Dyslipidaemia statistically significantly ($p < 0.001$) decreases the likelihood of occurrence of the symptom "Nervousness" about 6.5 times. Arterial hypertension increases the odds of occurrence of this symptom more than 20 times ($p < 0.001$). Metabolic syndrome decreases the likelihood of occurrence of the symptom "Nervousness" 250 times ($p < 0.001$). The patient's age has no statistically significant association with this symptom.

Dyslipidaemia statistically significantly ($p < 0.001$) decreases the likelihood of occurrence of the symptom "Anxiety (feeling panicky)" about 10 times. T2CD increases the odds of occurrence of this symptom more than 375 times ($p < 0.001$). The patient's age has also a statistically significant association with this symptom. Namely, with an increase in age by one year, the odds of a panic attack increase by 9 %, or 1.09 times ($p = 0.004$).

A statistically significant association of the symptom "Physical exhaustion/lacking vitality" with dyslipidaemia, adiposity, arterial hypertension, and metabolic syndrome has been observed after the mapping with other diseases and the patient's age. Namely, arterial hypertension statistically significantly ($p < 0.001$) decreases the likelihood of occurrence of the symptom "Physical exhaustion / lacking vitality" about 10 times. Metabolic syndrome increases these odds more than 15 times ($p < 0.001$), dyslipidaemia – more than 2 times ($p = 0.003$), and adiposity – 1.5 times ($p = 0.01$). The patient's age has no statistically significant association with this symptom.

Arterial hypertension statistically significantly decreases the likelihood of occurrence of the symptom "Decrease in muscular strength" about five times. Metabolic syndrome, COPD, and T2CD increase these odds more than 8.98, 6.55 and 19.97 times, respectively. Dyslipidaemia increases these odds more than 2 times ($p = 0.002$). The patient's age has no statistically significant association with this symptom.

Arterial hypertension statistically significantly decreases the likelihood of occurrence of depression about ten times ($p < 0.001$). Metabolic syndrome and COPD statistically significantly ($p < 0.001$) increase these odds 15.30 and 4.25 times, respectively. Dyslipidaemia – more than 2 times.

The patient's age also increases the probability of a symptom statistically significantly; with an increase in age by one year, the odds increase by 3 %.

A statistically significant association of the symptom "Feeling that you have passed your peak" with dyslipidaemia, adiposity, arterial hypertension, metabolic syndrome, and T2CD has been observed after the mapping with other diseases and the patient's age. Namely, adiposity statistically significantly ($p < 0.001$) increases the likelihood of occurrence of the symptom "Feeling that you have passed your peak" more than 2.5 times. Metabolic syndrome increases these odds more than 8 times ($p < 0.001$), T2CD – more than 51 time ($p = 0.001$), dyslipidaemia – more than two times ($p = 0.008$); arterial hypertension decreases these odds about five times ($p < 0.001$). The patient's age has no statistically significant influence on the development of this symptom.

Arterial hypertension decreases the likelihood of occurrence of the symptom "Feeling burnt out, having hit rock-bottom" about five times ($p < 0.001$). Metabolic syndrome increases these odds almost 12 times ($p < 0.001$). With an increase in patient's age by one year, the odds of developing this symptom increases by 3 % ($p = 0.01$).

After the mapping with other diseases and the patient's age, a statistically significant association of the symptom "Decrease in beard growth" has been observed with arterial hypertension and adiposity only. Namely, arterial hypertension decreases the likelihood of occurrence of this symptom ten times ($p < 0.001$), and adiposity – about by half ($p = 0.02$). With an increase in patient's age by one year, the odds of developing this symptom increases by 4 % ($p = 0.002$).

A statistically significant association of the symptom "Decrease in ability/frequency to perform sexually" with dyslipidaemia, adiposity, arterial hypertension, metabolic syndrome, COPD, and T2CD has been observed after the mapping with other diseases and the patient's age. Namely, dyslipidaemia increases the likelihood of occurrence of this symptom more than 5.5 times ($p < 0.001$), adiposity – more than six times ($p < 0.001$), arterial hypertension – almost three times ($p < 0.001$), COPD – almost 2.5 times. Metabolic syndrome and T2CD increase the odds of developing this symptom the most, about 33.5 and 25.5 times, respectively. With an increase in patient's age by one year, the odds of developing this symptom increases by 2 % ($p = 0.03$).

A statistically significant association of the symptom "Decrease in the number of morning erections" with dyslipidaemia, arterial hypertension, metabolic syndrome, COPD, and T2CD has been observed after the mapping with chronic diseases and the patient's age. Namely, dyslipidaemia increases the likelihood of occurrence of this symptom more than 5 times ($p < 0.001$), arterial hypertension – more than three times ($p < 0.001$), COPD – more than four times. Metabolic syndrome and T2CD increase the odds of developing this symptom the most, about 7 and 16.6 times, respectively. With an increase in patient's age by one year, the odds of developing this symptom increases by 2 % ($p = 0.004$).

A statistically significant association of the symptom "Decrease in sexual desire / libido" with dyslipidaemia, adiposity, arterial hypertension, metabolic syndrome, COPD, and T2CD has been observed after the mapping with other diseases and the patient's age. Namely, dyslipidaemia increases the likelihood of occurrence of this symptom more than 7 times ($p < 0.001$), adiposity – more than 2 times ($p < 0.001$), arterial hypertension – almost 2 times ($p < 0.001$), COPD – almost 50 times ($p < 0.001$), metabolic syndrome – almost 12.5 times ($p < 0.001$), and T2CD – almost 16.5 times ($p < 0.001$). The patient's age has no statistically significant influence on the development of this symptom.

DISCUSSION

With the age, men's body is undergoing changes that lead to the decrease in concentration of testosterone: decrease in the number of

testosterone-synthesising Leydig cells in testes, decrease in the density of luteinising hormone receptors, impairments in the controlling communication of the hypothalamic-pituitary system, the enzyme that ensures testosterone metabolic synthesis pathway, and decrease in concentration and activity. With the reduction of testosterone level, chronic diseases start to develop in men's body (Lester & Mason 2015, Isidori et al. 2005, Scweiger et al. 1999, Jockenhovel 2004). On the other hand, chronic diseases can cause testosterone deficiency, or speed up its development. For example, in patients with visceral adiposity, fat cells synthesise biologically active substances, which, being involved in metabolic processes, reduce testosterone synthesis as a result (Butrova 1999, Požarskis & Ērenpreiss 2010). In men with reduced libido or erectile dysfunction, the frequency of sexual intercourses is reduced, which, in turn, increases the testosterone deficiency even more. It forms a vicious circle: testosterone deficiency causes chronic concomitant diseases, and concomitant diseases increase the testosterone deficiency even more.

In this study, we focus directly on the question of which the clinical peculiarities are observed in the case of a combination of hypogonadism with arterial hypertension, adiposity, dyslipidaemia, metabolic syndrome, Type 2 diabetes mellitus and COPD. We established hypogonadism in 79 % of these men. Until now, there were very little data on the prevalence of hypogonadism in men with each of these diseases. What is more, in men without aforementioned diseases, hypogonadism was found only in 4.7 % of all cases. Out of 1222 subjects (both with and without aforementioned diseases) we established hypogonadism in 54.7 % of these men. In the European Male Ageing Study (EMAS), LOH has been diagnosed only in 17 % of men aged 40 to 70 years. This difference may be linked to the fact that our study comprised men who referred to physicians mostly due to various diseases, but the EMAS study has investigated a general male population.

Based on the results of our research, there is an opportunity to offer an algorithm for early and timely detection of LOH in man with comorbidities. If a patient has low testosterone level, clinical manifestation of LOH is developing along with the studied somatic diseases. LOH symptoms significantly affected by the patient's comorbidities. If a patient has arterial hypertension characterised by target organ damage, LOH has the following cardinal symptoms: sweating, irritability, anxiety, decreased libido, decrease of the frequency of sexual intercourses, decrease of the frequency of morning erection. In the case of obesity, cardinal symptoms of LOH are decreased libido, decrease of the frequency of sexual intercourses, decrease of the frequency of morning erection, increased feeling that "you have passed your peak", increased physical exhaustion/lacking vitality. In a patient with Type 2 diabetes mellitus, cardinal symptoms of LOH are worsening of general well-being, difficulties falling asleep and daytime somnolence, irritability, panic attacks, feeling that "you have passed your peak", decreased libido, decrease in the frequency of morning erection, and decrease in the frequency of sexual intercourses. In patients with dyslipidaemia the cardinal symptoms of LOH are decreased libido, decrease of the frequency of sexual intercourses, decrease of the frequency of morning erection, worsening of general health condition, increased physical exhaustion/lacking vitality, muscle weakness, depression, feeling that "you have passed your peak". With metabolic syndrome as comorbidity, LOH is characterised by the following symptoms: worsening of general well-being, physical exhaustion/ lacking vitality, decrease in muscular strength, depression, feeling that "you have passed your peak", feeling burnt out, having hit rock-bottom, decreased libido, decrease in the frequency of morning erection, and decrease in the frequency of sexual intercourses.

In patients with COPD, cardinal symptoms of LOH are worsening of general health condition, insomnia, increased need for sleep, often feeling tired, muscle weakness, depression, decrease in

the frequency of morning erection, decrease in the frequency of sexual intercourses, decreased libido.

In the world literature up to now there has been no data about AMS questionaries symptoms association with chronic internal diseases in hipogonadal males. It is our study novelty.

CONCLUSIONS

Late-onset hypogonadism was laboratory-diagnosed in 79 % of patients with signs of late-onset hypogonadism in accordance with the "Male Aging Questionnaire" and with concomitant diseases (arterial hypertension, adiposity, dyslipidaemia, metabolic syndrome, Type 2 diabetes mellitus, COPD) and in 4.7 % of patients with signs of late-onset hypogonadism in accordance with the "Male Aging Questionnaire" and without the aforementioned concomitant diseases. For each disease – arterial hypertension, dyslipidaemia, adiposity, metabolic syndrome, Type 2 diabetes mellitus, and COPD – different AMS questionnaire symptoms were typical; yet, the common symptoms of all clinical entity studied were connected with sexual dysfunction ($p < 0.001$). Patients aged 40 years or over, having arterial hypertension, or adiposity, or dyslipidaemia, or metabolic syndrome, or Type 2 diabetes mellitus, or COPD, shall perform the screening of gonadal function condition and of its worsening, in order to prescribe a corrective testosterone replacement therapy, if necessary. Diagnostics of age-induced androgen deficiency shall be based not just on determining the level of testosterone, but also on the analysis of clinical features. Clinical symptoms of age-induced androgen deficiency are specified by patients' comorbidities.

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Received: 22.07.2018.
Accepted: 01.09.2018.