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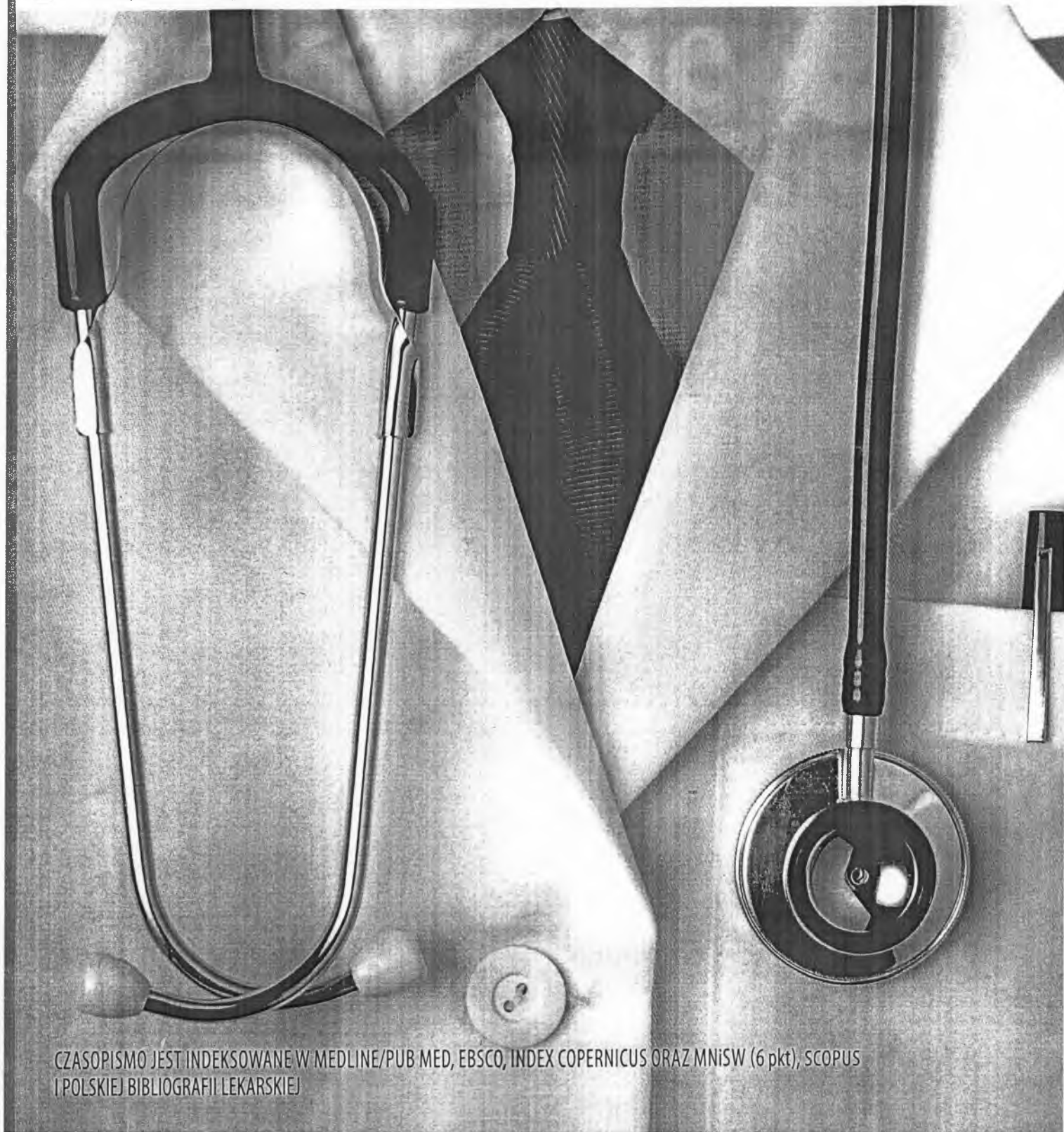
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Functional state of the thyroid gland in case of gestational diabetes mellitus

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ABSTRACT

We have investigated the functional state of the thyroid gland of 50 pregnant women with gestational diabetes and 50 healthy pregnant primigravida (control group) in the third trimester. The normal level of thyroid-stimulating hormone was accepted in the range of 0, 3–3, 0 mIU/L.

In 21 (42.0%) of the investigated pregnant with gestational diabetes the volume of the thyroid gland was increased, $p=0.0088$. At the same time, in 34 (68.0%) of the pregnant, dysfunctional disorders of the thyroid gland were absent, $p=0.0027$. The frequency of subclinical hypothyroidism was 22.0%, $p=0.0074$. Clinical hypothyroidism was diagnosed in 4 (8.0%) of the patients, $p=0.0412$. In 11 (22.0%) of the investigated the thyroperoxidase antibodies were found, $p=0.0074$. Only among the women with gestational diabetes 1 (2.0%) state of subclinical hyperthyroidism was diagnosed. The received data indicate the need of screening the state of the thyroid gland among women of reproductive age with the risk factors of gestational diabetes development.

Key words: pregnancy, gestational diabetes, dysfunction of the thyroid gland

РЕЗЮМЕ

Досліджено функціональний стан щитоподібної залози у третьому триместрі 50 вагітних із гестаційним діабетом та 50 здорових першовагітних жінок (контрольна група). Нормальним рівнем тиреотропного гормону приймали його значення у межах 0,3–3,0 мМОд/л.

У 21 (42,0%) обстежених вагітних із гестаційним діабетом об'єм щитоподібної залози був збільшений, $p=0,0088$. При цьому у 34 (68,0%) вагітних дисфункціональні розлади щитоподібної залози були відсутні, $p=0,0027$. Частота субклінічного гіпотиреозу складала 22,0%, $p=0,0074$. Клінічний гіпотиреоз діагностовано у 4 (8,0%) пацієнток, $p=0,0412$. У 11 (22,0%) обстежених було виявлено антитіла до тиреопероксидази, $p=0,0074$. Тільки серед жінок із гестаційним діабетом було діагностовано 1 (2,0%) випадок субклінічного гіпертиреозу. Отримані дані вказують на необхідність скринінгу стану щитоподібної залози у жінок репродуктивного віку із факторами ризику розвитку гестаційного діабету.

Ключові слова: вагітність, гестаційний діабет, дисфункція щитоподібної залози

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INTRODUCTION

Gestational diabetes mellitus (GD) and diseases of the thyroid gland (TG) are the most widespread endocrine disorders during pregnancy, that are closely connected with one another [10, 14, 15], as the hormones of the thyroid gland influence the secretion of the insulin and sensitivity of the organism to it [9].

Both of them lead to serious complications of the gestational process, negatively influence the health of the newborns and their adaptation possibilities [2, 3, 18] and cause a whole range of diseases among women after labor [14, 7, 17].

The data about the frequency and structure of the thyroid gland diseases in case of gestational diabetes mellitus in the literature significantly differ, probably because of the fact, that different criteria of the thyroid stimulating hormone (TSH) estimation are accepted, prevalently its content in the population level.

At the same time, taking into account the dynamics of the TSH increase during pregnancy (the decrease in the first trimester

with further increase), the American Thyroid Association (ATA, 2011) [13] and Endocrine society (ES, 2012) [9] recommend to use trimester-specific referent ranges for this hormone, that are for the first trimester 0.1–2.5 mIU/L, for the second trimester — 0.2–3.0 mIU/L, for the third — 0.3–3.0 mIU/L.

THE AIM OF THE STUDY

The analyses of the incidence and structure of the dysfunctional disorders of the thyroid gland in pregnant with gestational diabetes mellitus.

MATERIALS AND METHODS

We have conducted a complex clinical-paraclinical investigation of 100 pregnant women that were under the dispensary observation and gave birth in the maternity hospitals of the Transcarpathian region of Ukraine during 2011–the beginning of the 2015 years. 50 pregnant were with gestational diabetes mellitus (1 group) and 50 healthy pregnant primigravida (control group).

On the basis of the conducted oral glucose tolerance test (OGTT) at 24-28 weeks of gestation [8, 4], a group of pregnant with gestational diabetes was formed. The test was considered positive, if fasting plasma glucose and the level of two hour OGTT were more than normal (respectively > 5.5 mmol/L and ≥ 7.8 mmol/L).

The measurement of the venous plasma glucose was conducted by hexokinase method using the test systems Roche Diagnostics (Switzerland).

For the estimation of the state of the thyroid gland the ultrasonography was conducted using the apparatus Sono AC 8000 SE (South Korea) with the frequency of sensor 7.5 MHz.

The level of the serum TSH and free thyroxin (FT4) were measured in the third trimester by the immuno-chemiluminescent method using the test-systems «Roche» (Germany). The levels of thyroid peroxidase antibodies (anti-TPO) were also investigated.

Normal level of TSH for the third trimester was considered the range 0.3–3.0 mIU/L [13, 9].

Subclinical hypothyroidism was diagnosed if the level of TSH was elevated and FT4 was normal, clinical hypothyroidism – in case of decreased level of FT4 and elevated level of TSH, subclinical hypothyroidism – in case of low level of TSH and normal level of FT4, autoimmunity – in case the level of thyroid peroxidase antibodies (anti-TPO) > 30 IU/ml and the presence of hypoechogenic, heterogenic or other compaction of the thyroid gland tissue diagnosed by palpation.

The statistical analyses of the data was conducted by the program Statistica 6.1 for Windows taking into account the calculation methods used in biology and medicine. The critical level of significance when testing statistical hypotheses in this study was accepted equal 0.05. The numerous quantitative features are $M \pm \sigma$, where M – the average value, σ – standard deviation.

Women with diabetes 1 and 2 types, smoking, and those who used the pills, that may influence the metabolism of glucose or the ones who refused take part in the study were not included into the study.

RESEARCH RESULTS AND DISCUSSION

The average age of the women of the 1 group was significantly higher and was 27.32 ± 4.98 , in the control group – 22.60 ± 3.79 , $p < 0.0001$. The fraction of the primigravida among the women with gestational diabetes mellitus was 28.0%.

In 27 (54.0%) of the pregnant gestational diabetes was compensated only by diet, in 23 (46.0%) the insulin therapy was prescribed because of non effective diet therapy during 1-2 weeks to achieve target levels of blood glucose.

The analyses of the incidence and structure of the thyroid gland diseases in women with gestational diabetes (table 1) shows, that the increased volume of the thyroid gland was diagnosed in 21 (42.0%), $p = 0.0088$ of the investigated patients, that is a little higher than in the study conducted by Nazarova, where the rate was 32.1% [5]. Herewith, in 34 (68.0%) of the pregnant of the 1 group no disturbances of the thyroid function were found, $p = 0.0027$. In 14 (28.0%) of the pregnant of the 1 group the diseases of the thyroid gland in relatives of the first line were marked, in the control group this factor was absent, $p = 0.0001$.

The incidence of subclinical hypothyroidism was 22.0% in the first group and 4.0% – in the control group, $p = 0.0074$. The average levels of FT4 and TTT in these groups were, respectively 11.61 ± 0.36 ng/L and 13.56 ± 0.51 ng/L, 3.65 ± 0.098 mIU/L and 3.17 ± 0.03 mIU/L. In 7 (14.0%) of the patients of the 1 group with subclinical hypothyroidism anti-TPO were elevated: 48.56 ± 3.66 IU/ml. In 2 (4.0%) of the women from control group anti-TPO were elevated in case of normal levels of FT4 and TSH, average meaning – 41.26 ± 7.05 IU/ml.

Clinical hypothyroidism was diagnosed in 4 (8.0%) of the patients of the 1 group, $p = 0.0412$. Average meaning of FT4 was 8.66 ± 0.20 ng/L, TSH – 4.08 ± 0.11 mIU/L. In 4 (8.0%) of the pregnant with hypothyroidism anti-TPO were found with the average meaning 42.25 ± 6.42 IU/ml. Herewith, the level of FT4 was significantly lower, than in the subclinical hypothyroidism (8.66 ± 0.20 ng/L, $p < 0.05$).

Only among women with gestational diabetes 1 (2.0%) state of subclinical hypothyroidism was diagnosed with the levels of TSH < 0.005 mIU/L, FT4 – 14.07 ng/L, anti-TPO – 12.25 IU/ml.

The most attention in the literature is paid to the incidence of detection of anti-TPO in case of gestational diabetes. According to different authors it is from 13.9% [1] to 27% [12].

The collected data in our study indicate that in 11 (22.0%) of the women with gestational diabetes mellitus anti-TPO were diagnosed, $p = 0.0074$, that is close to the findings of Timokhina et al. [6]. Among women, positive for thyroid peroxidase presence, the level of TSH was higher (3.94 ± 0.06 and 3.35 ± 0.07 , $p = 0.0048$), that corresponds to the data, collected by Nakova et al. [16].

CONCLUSIONS

The findings indicate the need for thyroid state screening among the women of reproductive age with risk factors for gestational diabetes mellitus development.

PROSPECTS FOR FURTHER DEVELOPMENT

To investigate the state of feto-placental complex in women with gestational diabetes mellitus and diseases of the thyroid gland.

Table 1. Structure and incidence of dysfunctional disturbances of the thyroid gland in case of gestational diabetes mellitus, abs. (%)

State of the thyroid gland	1 group	Control group	p
Increase volume of the thyroid gland	21 (42.0%)	9 (18.0%)	0.0088
Dysfunctional disturbances of the thyroid gland	16 (32.0%)	4 (8.0%)	0.0027
Hypothyroidism	4 (8.0%)	0	0.0412
Subclinical hypothyroidism	11 (22.0%)	2 (4.0%)	0.0074
Hyperthyroidism	1 (2.0%)	0	0.3152
Thyroid peroxidase antibodies	11 (22.0%)	2 (4.0%)	0.0074

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