Social and psychological characteristics of health in women with metabolic syndrome

The article explores associations between the progress of metabolic syndrome (MS) and mental wellbeing among fertile women. The study demonstrates that MS patients with obesity have lower self-esteem and poorer assessment of self-fulfillment, which compromises their psycho-emotional status. The negative effects of MS manifestations on the life course have been approved by evidences of unsatisfactory family sexual relations and larger prevalence of tobacco smoking among them. Creating an adequate and evidence-based motivation for changing lifestyle to a healthier one and improving nutrition patterns could facilitate weight loss and normalize MS markers.

Key words: metabolic syndrome, obesity, mental wellbeing.

Preamble

Against the background of WHO’s introduction of the global action to combat the rapid spread of the obesity epidemic (Alberti K.G., Zimmet P.Z., 1998; Baltaku B., Charles M.A., 1999; World Health Organisation, 1999), as well as efforts to improve population awareness about the dangers of metabolic syndrome (MS) as a consequence of excessive body weight, the incidence of obesity worldwide continues to grow (Alberti K.G., Zimmet P.Z., 1998; World Health Organisation, 1999).

In fact, dysregulation of energy homeostasis is associated not only with a variety of genetic and economic factors, but also with a manifestation of contemporary global social processes: reduction of physical activity, prevalence of intellectual work, overreliance to readily available and, unfortunately, high-calorie foods (Avogaro P. et al., 1965; Alberti K.G., Zimmet P.Z., 1998; World Health Organisation, 1999).

The mechanisms that control energy metabolism and adipose tissue mass, are inextricably linked with the mechanisms of regulation of fertility and have evolutionary significance of survival in conditions of limited food supply (World Health Organization, 2000). Rapid increase in the incidence of obesity with related metabolic changes indicates imbalance and loss of control in homeostatic system of a human body, biology of which still remains unclear but, taking into account its reproductive value, needs very much in-depth study and understanding.

Obesity-related metabolic disorders significantly impair quality of life, causing health problems such as diabetes type 2, cardiovascular disease, dyslipidemia, and hypertension (Carnus J.P., 1966; Hanefeld M. et al., 1991). Much of the world's population with impaired fertility are obese or overweight (Hanefeld M. et al., 1991; Coviolio AD et al., 2009), accompanied by menstrual irregularities, anovulations (Vague J., 1966) and miscarriage (Manuhin I.B., Gevorkian M.A., 1999; Dubossarskaya Z.M., Dubossarskaya Y.A., 2009). MS is often associated with dysfunction of the female reproductive system, but scientists have yet to determine what is the main link between the state of metabolism and subfertility.

Clinical manifestations of metabolic syndrome in women of childbearing age are not only metabolic endocrine disorders of the reproductive system (Reaven G.M. Banting lecture 1988, 1988; Serov V.N. et al., 2004), but also a variety of psychiatric disorders (Korobka L.M., 2011). Thus, MS is an extremely important problem of modern society. According to basics tasks of preventive medicine, we need to create a clear system of both an adequate therapeutic management of gynecological pathology in this syndrome, and modification of social factors for its occurrence.

The purpose of this research is to study clinical and paraclinical characteristics of reproductive age women with MS and to analyse relationship between their health and lifestyle.

Object and methods of research

At the stage of group formation and selection of patients, we surveyed 750 women of reproductive age with MS. The criteria for inclusion in the main group of study were criteria of the International Diabetes Federation - IDF, 2005 (Alberti K.G., Zimmet P.Z., 1998; World Health Organisation, 1999, 2000) (Table 1).

The study formed three clinical groups of women (250 persons each). Group 1 included patients of early reproductive age, Group 2 - active reproductive age, the 3rd group consisted of 250 women of late reproductive age.

All women underwent ultrasound of reproductive organs (uterus, endometry, ovaries) at ATL 1600 ultrasound machine («Philips», USA) using vaginal (variable frequency 4-7,5 MHz) transducer. The survey was conducted dynamically in the follicular and lutein menstrual cycle phases or at any day of the cycle under conditions of oligo- / amenorrhea.

In addition, we carried out an assessment of endometry state, its thickness and compliance of echoscopy structure to menstrual cycle phase. We have studied the size and structure of ovarian, ovulatory signs.

With a specially designed questionnaire we conducted a thorough medical history collection, the results of computer processing of which we assess the clinical features of the disease.

During the general survey we defined anthropometric data: height, body weight and calculation of body mass index (BMI) - the ratio of weight in kilograms and body length in meters, squared. According to the WHO classification, BMI of 18.5 to 24.9 kg/m² characterize normal weight, 25 to 29.9 kg/m² - indicate overweight and obesity include BMI> 30 kg/m².

Table 1

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial hypertension</td>
<td>Anti-hypertension therapy or</td>
</tr>
<tr>
<td>For Europeans WM &gt;80 cm in women</td>
<td>C.A.P. &gt;130 mm HG, D.A.P. &gt;130 mm HG</td>
</tr>
<tr>
<td>Obesity</td>
<td>Carbohydrate metabolism disorder</td>
</tr>
<tr>
<td>Diabetes type</td>
<td>Fasting glucose &gt;5.6 mmol/l or</td>
</tr>
<tr>
<td>Diabetes type</td>
<td>Diabetes type 2</td>
</tr>
<tr>
<td>TG &gt;150 mg/dl (1,695 mmol/l) and/or</td>
<td></td>
</tr>
<tr>
<td>Ch HDL P &gt;50 mg/dl (1,295 mmol/l) or dyslipidemia therapy</td>
<td></td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>Abdominal obesity + 2 other factors</td>
</tr>
</tbody>
</table>

The study was conducted in accordance with the principles of the international Declaration of Helsinki, and was approved by the institutional ethics committee. All women signed the informed consent for the study.

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Determination of hormones content in blood plasma of women surveyed was conducted at immune-ferment analyzer-photometer produced by “Aveneex Technology”. Immune-ferment examination ELISA was performed using two specific antibodies. Measurement of optical density was held at photometer MSR-1000 (“Sytron”; U.S., 1995). Endocrinological studies were carried out in the endocrinology laboratory with a group of biochemistry of the State Institution “Institute of Pediatrics, Obstetrics and Gynecology, Academy of Medical Sciences of Ukraine.”

To determine emotional state of women of surveyed groups and their self-esteem, we used HAM-method (health - activity - mood). For this, patients were given a completed multi-stage scale consisting of indexes and located between 30 pairs of words of opposite meaning, reflecting mobility, speed and rate of functions flow (activity), strength, health, fatigue (health), and emotional characteristics (mood).

When processing data, patients’ responses were re-coded according to the scoring from 1 to 7 points (extreme degree of manifestation of the negative state is estimated at 1 point, and an extreme degree of manifestation of positive state - 7 points). The poles and scales are always changing, but positive states always get high scores, and negative - low ones. These points were grouped into three categories according to the key, and points in each of them were calculated. Average scale point is 4.

Normal state assessment is within 5.05 - 5 points, values <4 points indicate a diminished state of health, activity and mood of an examinee.

Processing the digital data obtained was carried out using modern methods of variation statistics using Excel Microsoft Office 2003 and “Bio-stat” software, using Student's test for absolute numbers; when comparing multiple groups – with Bonferroni amendment; and for relative values – using method of p- angular Fischer transformation. The difference between the values compared was considered reliable at p <0.05.

Results and Discussion

In the course of our investigation we studied the life history data. It was found that the women surveyed most often started to suffer excess weight in pubertal period 420 (56.0%). This means that appearance of excessive weight in girls during puberty is a risk factor to have excessive body weight, followed by endocrine-metabolic changes in the reproductive age (Table 2).

At puberty, normally we observe physiological insulin-resistance (IR) as a result of increased production of growth hormone during this period. However, adolescents with MS frequently have genetic predisposition to obesity as well (Reaven G.M., Banting lecture 1988, 1988; Kim S.H., Reaven G.M., 2004). Increased body weight further enhances IP and hyperinsulinemia (GI), worsening endocrine status and clinical manifestations of the disease (World Health Organization, 2000). The study also analyzes diseases which happened during formation of menarche in women with MS. It was found that 713 (95.1%) patients with MS had in the age of 11-16 (i.e. period of menstrual function formation) such infectious diseases as measles, scarlet fever, rubella, chickenpox, mumps.

These data indicate that at puberty these factors adversely affect functioning of the hypothalamic-pituitary system, which has negative consequences in the form of violations of proper oogenesis in later reproductive life of patients.

It should be noted that in patients with metabolic syndrome there is a high incidence of abnormal development of reproductive function. Namely, in 482 (64.3%) patients with MS we revealed complaints of abnormal development of menstrual function compared with 36 (24.0%) women without MS (x² = 82.9, p<0.0001). At that, physiological development of menstrual function was found only in 268 (55.7%) women with MS compared with 114 (75.8%) patients of the control group (p<0.0001). Thus, probability of pathological development of menstrual function at MS is significantly higher than in healthy women: odds ratio is 5.7 (3.8-8.5).

It should be noted that patients with MS significantly more frequently have violations of menstrual cycle. Namely, amenorrhea was diagnosed in 28.3% of women with MS (4.1% in women of the control group, p <0.05), dysfunctional uterine bleeding - in 48.3% of patients with MS compared to 17.7% of women without violations of physical condition (p<0.05).

In studying the age of menstrual function establishment (Table 3), we revealed that in the majority of surveyed women menarche age was 12-15 years old. However, in women with MS of early and active reproductive age, we detected a trend to an earlier menarche (age <11 years) and the longer establishment time (1.5-3 years). We also more often observed late menarche in patients with MS (age> 15 years).

Consequently, late menarche was observed in 52 (20.8%) women of group 1, 45 (18.0%) women in group 2 and 47 (18.0%) women of the 3rd group, which is significantly higher than the corresponding figure in the control group of healthy women (p <0.05). These results may be an indication that both late and early onset of menstrual function may be applicable factor in MS genesis.

We have identified age-dependent nature of reproductive health disorders at MS. Thus, for young women of reproductive age, frequency (60%) of menstrual disorders of oligomenorrhea type and various forms of polycystic ovaries is more typical.

In the active reproductive age, in women with MS the states like infertility, hormonal breast disease, amenorrhea, uterine leiomyoma were dominating.

In patients of late childbearing age, such disorders of reproductive system as endometrial hyperplasia, uterine leiomyoma, menstrual disorders by type metrorrhagia were typical (Graph).

Modern preventive medicine, main provisions of which are aimed at slowing the aging process (anti-aging therapy), understands the term “health” as “health for...” that reveals opportunities that health provides for a person (Hanefeld M. et al., 1991).

Health in this approach is one of the most important resources needed for a person to fulfill his/her individual potential and capabilities in all areas of life (Korobka L.M., 2011). Thus, development and self-realization of a person in the modern world is one of the most important criteria for health.

<table>
<thead>
<tr>
<th>Age groups of obesity, years old</th>
<th>Absolute quantity, n</th>
<th>Share, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>52</td>
<td>6,9</td>
</tr>
<tr>
<td>11-12</td>
<td>17/3</td>
<td>23,1</td>
</tr>
<tr>
<td>13-14</td>
<td>135</td>
<td>18</td>
</tr>
<tr>
<td>15-16</td>
<td>112</td>
<td>14,9</td>
</tr>
<tr>
<td>17-19</td>
<td>14</td>
<td>17,1</td>
</tr>
<tr>
<td>19-20</td>
<td>97</td>
<td>12,9</td>
</tr>
<tr>
<td>&gt;20</td>
<td>53</td>
<td>7,1</td>
</tr>
</tbody>
</table>
The study analyzed clinical and paraclinical characteristics of women with MS of all groups based on social, environmental and biomedical factors in order to identify risk factors and make prediction of future MS occurrence.

Exploring the nature of employment and education in the studied individuals, primarily revealed a large proportion of work with high intellectual differentiation in the main group of women. Thus, mental type of work was typical for every second patient with MS (50.54%), and physical type of work was typical only for every fifth of the surveyed (20.36%) with MS symptoms. In contrast, in the control group, this distribution was exactly the opposite, and these figures were 18.7 and 54.6%, respectively (Table 4).

Important role of emotional and mental load in development of the disease under study is indicated by the presence of significantly bigger stress history, and also we identified the trend of increased prevalence of higher education of women in the main group (Table 5.6).

Thus, prevalence of stress history of patients of active and late reproductive age is significantly higher than in healthy women and women of Group 1, indicating important role of stress factors in MS development and its prevalence in older women (p < 0.01).

Given the modern definition of health as a harmonious combination of physiological, psychological, and social factors that provide internal welfare of the individual (Korobka L.M., 2011), one of the directions of our research is to determine subjective evaluation by women with MS their quality of life.

The results analysis of self-estimation by women of the groups as for material security and living conditions revealed a significant difference between the data of main and control group (Table 7). So, poor self-esteem was present in every second surveyed woman of active reproductive age with MS (51.2%) in 2/3 of women of late reproductive age (68.8%) and only in 11.3% in volunteers (<0.01). It should be noted that the structure of self-estimation of patients of early reproductive age is not significantly different from the data of healthy women from the control group.

### Table 3

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Menarche age, years old (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Under 11</td>
</tr>
<tr>
<td>1-st</td>
<td>250</td>
<td>36 (14.4)</td>
</tr>
<tr>
<td>2-nd</td>
<td>250</td>
<td>40 (16.0)</td>
</tr>
<tr>
<td>3-nd</td>
<td>250</td>
<td>39 (15.6)</td>
</tr>
<tr>
<td>Control</td>
<td>150</td>
<td>3 (2.0)</td>
</tr>
</tbody>
</table>

**P<0.001**

### Table 4

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Physical</th>
<th>Mixed</th>
<th>Mental</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-st</td>
<td>250</td>
<td>82 (24.8)</td>
<td>66 (26.4)</td>
<td>appr. 122 (48.8)</td>
</tr>
<tr>
<td>2-nd</td>
<td>250</td>
<td>49 (19.6)</td>
<td>71 (28.4)</td>
<td>130 (52.0)</td>
</tr>
<tr>
<td>3-nd</td>
<td>250</td>
<td>50 (20.0)</td>
<td>66 (26.4)</td>
<td>134 (53.6)</td>
</tr>
<tr>
<td>Control</td>
<td>150</td>
<td>appr. 82 (54.6)</td>
<td>40 (26.7)</td>
<td>28 (18.7)</td>
</tr>
</tbody>
</table>

The difference between the groups as for type of work was not statistically significant (x² = 2.7, p = 0.59).
We should also note that with the age, frequency of non-satisfactory assessment of own achievements, quality of life and self-realization in women with MS grows (70.6%; p < 0.0001), which can evidence negative MS component influencing the quality of life of women with the mentioned MS.

The difference is statistically not significant between the 1st and control group, but it is statistically significant in older age groups (2nd and 3rd) due to significant reduction in good self-estimate frequency and increase of non-satisfactory self-estimate. General human’s health means feeling well, vitality, having energy, good performance, as well as harmony in sexual life.

When comparing the quality of sexual life in healthy women and women with metabolic syndrome, under condition of homogeneity of groups on marital status, we revealed significantly more frequent complaints of irregular sexual life and sexual disharmony among patients of active and late reproductive age with MS than in healthy women in the control group (x^2 = 26.8, p < 0.0001) (Table 8).

These data may indicate negative effects of chronic stress against obesity and its inherent dishormonal changes in the psychological sphere of family sex.

The analysis of smoking prevalence in study groups indicate the prevalence of female smokers among patients in active and late reproductive age, respectively 38.4 and 40% against 17.3% among women of the control group (Table 9).

**Conclusions**

Thus, summarizing a history and clinical characteristics of women with MS, we observed that the risk factors of the metabolic syndrome in women can be children's infectious diseases and excess body weight at puberty, abnormal menarche age (<11 years and >16 years), the presence of stressful situations and work with a high level of intellectual differentiation and low levels of physical activity.

Our results also indicate that MS and obesity presence in patients as a major component reduces a sense of satisfaction, self-realisation and thus affects their psycho-emotional status. MS negative impacting life also manifests in disharmony of sexual relations in marriage for women who suffer from this syndrome, smoking habits usual among them.

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Of course, the main goal of therapeutic MS management is to prevent development of diabetes, blood circulation diseases and their complications - stroke, heart attack. But it is equally important to maintain an adequate level of psycho-emotional health in women, which disorder against obesity was confirmed in studies.

Creating an adequate reasoned motivation for lifestyle changes (such as physical activity 150 min/week) and transfer to a healthy diet can help to reduce excess body weight and normalize MS indications. It is a way of life, not just welfare, working and living conditions determine the level of health the most.

Today it has been proved (World Health Organization, 2000; Hauner H., 2002), that of all the factors that affect human health, 50% belongs to lifestyle.

Given the urgent need to counter the rapid MS spread, particularly among women of reproductive age, the duty of gynaecologists is drawing attention of their patients to their personal responsibility not only for their own health but also for preservation of fertility of the entire population.

Literature


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