

# ASSESSMENT OF THE IMPACT OF SELECTED SUPPLEMENTS SUPPORTING THE REPRODUCTIVE SYSTEM FUNCTIONING ON BODY COMPOSITION, SELECTED BLOOD BIOCHEMICAL PARAMETERS AND MENTAL HEALTH AMONG WOMEN WITH POLYCYSTIC OVARY SYNDROME

Katarzyna Stańczyk<sup>1</sup>, Katarzyna Wielemborek-Musiał<sup>2</sup>, Anna Lipert<sup>3</sup>

<sup>1,3</sup>Department of Sports Medicine, Medical University of Lodz

<sup>2</sup>Department of Coordinated Care, Medical University of Lodz

**Introduction:** Polycystic ovary syndrome (PCOS) is the most frequently diagnosed endocrine disorder among women of reproductive age, with an estimated prevalence of 10–18%. Patients with PCOS are at increased risk of developing insulin resistance, dyslipidemia, depressive disorders, sleep and circadian rhythm disorders. *Withania somnifera* (Ashwagandha) is a medicinal plant from the nightshade family (*Solanaceae*), whose extract is classified as an adaptogenic substance. The therapeutic effect of *W. somnifera* is mostly attributed to the activity of withanolides. The extract improves cognitive functions, reduces the level of perceived stress, alleviates depressive symptoms and circadian rhythm disorders by affecting the hypothalamic-pituitary-adrenal axis. Studies conducted using animal models show that the extract can also stimulate insulin sensitivity, reduce the concentration of luteinizing hormone (LH) and increase the concentration of follicle-stimulating hormone (FSH).  $\Omega$ -3 fatty acids belong to the family of polyunsaturated fatty acids (PUFAs). Among them, we distinguish  $\alpha$ -linolenic acid (ALA), that has antioxidant properties and reduces blood lipids, especially total cholesterol and triglycerides. ALA can also normalize hyperglycemia, lower blood glycated hemoglobin (HbA1c) and alleviate oxidative stress.

**Methodology:** The study will be conducted among 60 patients (study group: 30; control group: 30) of the Endocrinology Outpatient Clinic of the Central Teaching Hospital of the Medical University of Lodz and the Clinical Research Center Salve Medica Lodz, who were diagnosed with PCOS, aged 18-45 years, not taking dietary supplements. The planned intervention assumes the administration of a dietary supplement of vitamin D<sub>3</sub> and folic acid (0.4 mg/day) to all study participants, and the study group additionally with standardized *Withania somnifera* extract and vegetable oil, which is a source of  $\Omega$ -3 fatty acids, for 3 months. All patients will receive access to nutrition education in the form of online lectures. Blood biochemical tests will be used to assess the impact of the intervention (complete blood count; total cholesterol, TG, HDL-CH, LDL-CH; fasting blood glucose and insulin levels; blood CRP levels; if financially possible: HbA1c, total testosterone, LH, FSH, PRL, SHBG, DHEA-S, ALT, AST in blood), same as bioelectrical impedance analysis (BIA) and survey research (Beck Depression Inventory; Perceived Stress Scale; Sleep Quality Questionnaire Pittsburgh; International Physical Activity Questionnaire; Food Consumption Frequency Questionnaire). The analysis of the obtained results will be carried out using the STATISTICA version 13.1 program.

**Aim of the study:** Assessment of the effect of supplementation with a standardized extract of *Withania somnifera* and an oil of plant origin, which is a source of  $\Omega$ -3 fatty acids, on body composition, selected blood biochemical parameters and mental health of women with PCOS.

**Preliminary research results:** The study involved 15 women aged 23-43 (mean: 29.60±5.04 years), among whom almost ¼ had normal body weight. 8 out of 10 participants of the study were in relationships, and more than half of them reported trying to conceive a child (f=0.67). PCOS was diagnosed between 2 and 144 months before participation in the study (average: 55.67±45.15 months), while insulin resistance was present in nearly 7 out of 10 patients – IR was diagnosed between 4 and 96 months before the initial examination (average: 36,80±27.39 months). More than half of the women declared the presence of comorbid disorders (f=0.67), most often depressive disorders (f=0.60), hypothyroidism (f=0.50) and anxiety disorders (f=0.40). Therefore, 5 out of 10 study participants were taking medications, mainly medicines containing levothyroxine (f=0.63), metformin (f=0.50) and selective serotonin reuptake inhibitors (SSRIs) (f=0.38). In addition, during the six months preceding the study, all patients took a vitamin D<sub>3</sub> supplement, more than half supplemented with folic acid and myo-inositol and/or D-chiro-inositol (f=0.60), nearly half took probiotics, peppermint and/or spearmint and omega-3 fatty acids, and only 1 in 5 study participants used *Withania somnifera* (Ashwagandha). The average level of perceived stress was characteristic of ¼ of the patients (stems 5-6), high level concerned ⅓ of women (stems 7-10), and very high was found among 4 out of 10 respondents, with the average result obtained in the PSS-10 questionnaire 21.13± 2.89 points. At the same time, the average score of the Beck Depression Scale was 17.47±7.18 points. Poor and very poor sleep quality affected over ¾ of women (f=0.87), but less than half of the patients subjectively assessed sleep quality as poor (f=0.40). The study participants spent an average of 7.2±1.50 hours/day sleeping, while falling asleep lasted an average of 32.73±41.73 minutes. In the month preceding the study, ⅓ of women used sleeping pills, and 6 out of 10 patients reported having disturbances of consciousness while driving, eating meals or engaging in social activities. Sufficient physical activity characterized more than half of the respondents (f=0.60), high physical activity concerned ⅓ patients, and insufficient physical activity 2 out of 10 women – the average MET-min/week value was 4369±3483.21. In the last 12 months, ¾ of the patients consumed nuts, grains and fatty fish, which are a source of omega-3 fatty acids, not more often than a few times a month.

**Conclusions:** The obtained results confirm the coexistence of insulin resistance, hypothyroidism and neuropsychiatric disorders among women suffering from PCOS. The results obtained by the patients in the questionnaires of the initial screening interview indicate the need to implement methods supporting mental health and modulating cognitive functioning. It can therefore be concluded that the use of a standardized *Withania somnifera* extract is justified.

**Keywords:** polycystic ovary syndrome, *Withania somnifera*, depression, mental health, reproductive system

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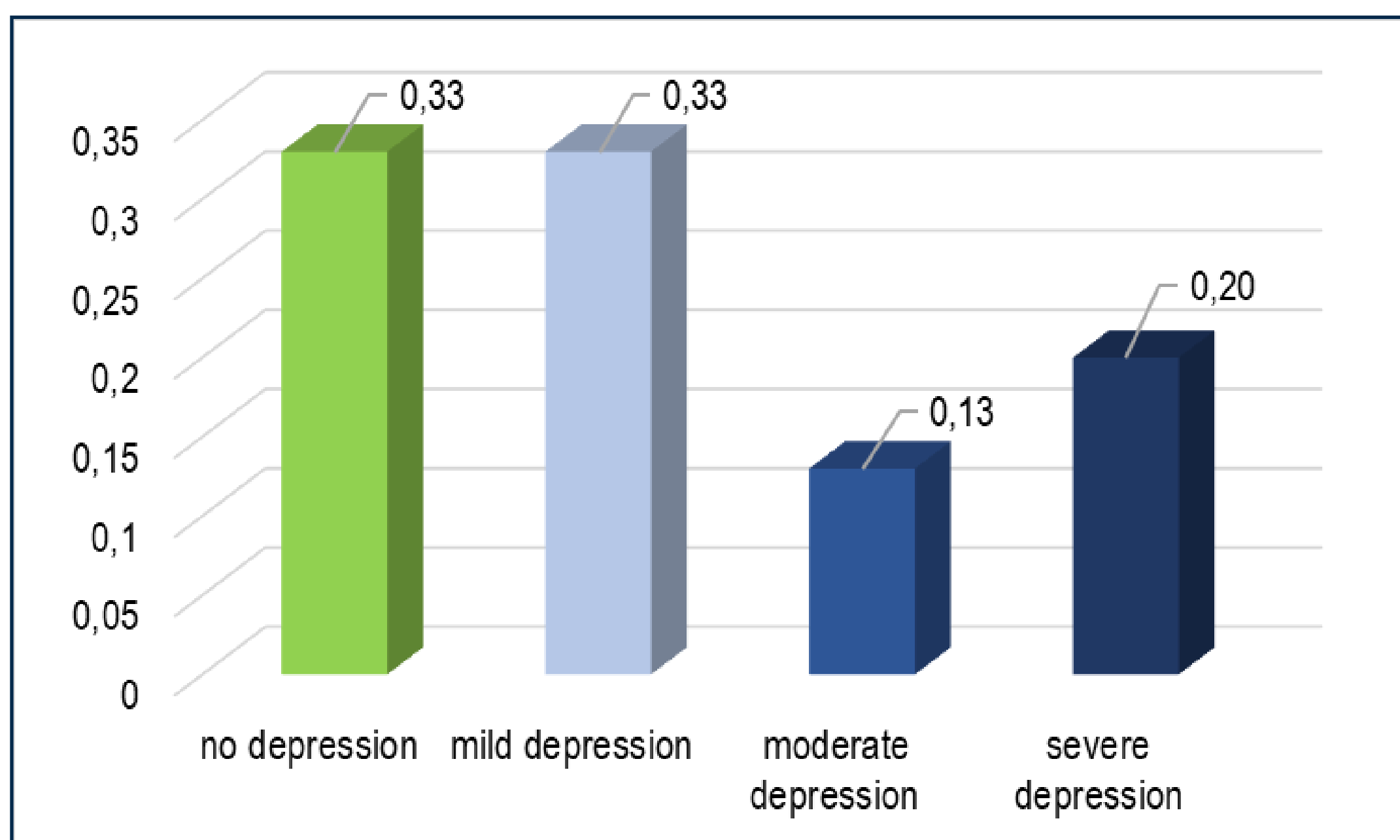


Figure 1. Interpretation of the Beck Depression Inventory results in fractions