

**THE SIGNIFICANCE OF SEX HORMONE METABOLISM AND GENETIC  
FACTORS IN NON-ALCOHOLIC FATTY LIVER DISEASE**

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**Abstract.** Non-alcoholic fatty liver disease (NAFLD) is a group of liver disorders that begins with excessive fat accumulation in hepatocytes and may subsequently progress to steatohepatitis, fibrosis, cirrhosis, and hepatocellular carcinoma. In modern international clinical guidelines, this pathology is increasingly defined as metabolic dysfunction-associated steatotic liver disease (MASLD), characterized by hepatic steatosis together with the presence of cardiometabolic risk factors. This study examines the role of sex hormone metabolism and genetic factors in the development and progression of non-alcoholic fatty liver disease. Particular attention is given to the balance between estrogens and androgens, insulin resistance, sex hormone-binding globulin (SHBG), and genetic polymorphisms related to hormone metabolism. Understanding these mechanisms may contribute to improved diagnosis, risk assessment, and personalized therapeutic approaches for patients with NAFLD.

**Keywords:** non-alcoholic fatty liver disease (NAFLD), reproductive age, sex hormones, estrogen-androgen balance, insulin resistance, SHBG, CYP19A1, UGT2B15, UGT2B17.

**Noalkogol yog‘li jigar kasalligida jinsiy gormonlar metabolizmi va genetik  
omillarning ahamiyati**

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**Annotatsiya.** Noalkogol yog‘li jigar kasalligi jigar hujayralarida ortiqcha yog‘ to‘planishi bilan boshlanib, keyinchalik steatogepatit, fibroz, sirroz va gepatotsellyulyar karsinoma kabi og‘ir asoratlarga olib kelishi mumkin bo‘lgan kasalliklar majmuasidir. Zamonaviy xalqaro tavsiyalarda ushbu patologiya metabolik disfunksiya bilan bog‘liq steatotik jigar kasalligi sifatida baholanib, uning asosiy mezonlari jigar steatozi va kardiometabolik xavf omillari mavjudligi bilan izohlanadi [1; 492–542-b.].

**Kalit so‘zlar:** *noalkogol yog‘li jigar kasalligi, reproduktiv yosh, jinsiy gormonlar, estrogen-androgen muvozanati, insulinrezistentlik, SHBG, CYP19A1, UGT2B15, UGT2B17.*

Reproduktiv yoshdagi ayollarda jinsiy gormonlar jigar metabolizmini boshqaruvchi muhim biologik omillar qatoriga kiradi. Estrogenlar insulin sezgirligini qo‘llab-quvvatlash, visseral yog‘ to‘planishini kamaytirish va gepatotsitlarda lipid almashinuvini muvozanatda saqlashda ishtirok etadi. Biroq giperandrogenizm, abdominal semizlik va insulinrezistentlik mavjud bo‘lgan holatlarda estrogenlarning himoyalovchi ta’siri susayadi. Natijada jigarda lipidlar to‘planishi, oksidlovchi stress va yallig‘lanish jarayonlari kuchayadi [2; 1797–1835-b.].

Jinsiy gormonlarni bog‘lovchi globulin jigar tomonidan ishlab chiqariladigan oqsil bo‘lib, testosteron va estradiolning biologik faol erkin fraksiyasini boshqaradi. Uning pasayishi erkin androgenlar miqdorining ortishi, insulinrezistentlik va jigar steatozi xavfining kuchayishi bilan bog‘liq bo‘lishi mumkin. Shu bois SHBG reproduktiv yoshdagi ayollarda noalkogol yog‘li jigar kasalligini erta baholashda muhim gormonal-metabolik ko‘rsatkichlardan biri sifatida qaraladi [3].

CYP19A1 geni aromataza fermenti sintezini kodlaydi. Aromataza androgenlarning estrogenlarga aylanishida ishtirok etib, ayol organizmida jinsiy gormonlar nisbatini

saqlashda muhim rol o'ynaydi. Ushbu gen polimorfizmlari estrogen-androgen muvozanatiga ta'sir ko'rsatib, tuxumdonlar polikistoz sindromi, giperandrogenizm va metabolik buzilishlarga moyillikni oshirishi mumkin [4].

UGT2B15 va UGT2B17 genlari androgenlarning glyukuronidlanishi, ya'ni ularning biologik faolligini kamaytirish va organizmdan chiqarilish jarayonlarida ishtirok etadi. Ushbu genlardagi funksional o'zgarishlar steroid gormonlar almashinuvi, jigarining metabolik javobi va kasallikka individual moyillik shakllanishiga ta'sir qilishi mumkin [5].

Shu jihatdan, reproduktiv yoshdagi ayollarda noalkogol yog'li jigar kasalligini baholashda faqat antropometrik ko'rsatkichlar, transaminazalar darajasi yoki ultratovush tekshiruvi natijalariga tayanish yetarli emas. Klinik, biokimyoviy, gormonal va molekulyar-genetik ko'rsatkichlarni birgalikda o'rganish kasallikni erta aniqlash, xavf guruhlarini belgilash va shaxsiylashtirilgan profilaktik yondashuvlarni ishlab chiqish uchun muhim ilmiy asos yaratadi.

**Xulosa.** Reprodukativ yoshdagi ayollarda noalkogol yog'li jigar kasalligi metabolik, endokrin va genetik omillar o'zaro ta'sirida shakllanadigan murakkab patologik jarayondir. Estrogen-androgen nisbatining buzilishi, SHBG miqdorining kamayishi hamda CYP19A1, UGT2B15 va UGT2B17 genlarining funksional xususiyatlari kasallik rivojlanishi va klinik kechishiga ta'sir ko'rsatishi mumkin. Mazkur markerlarni kompleks o'rganish noalkogol yog'li jigar kasalligida gormonal-genetik xavfni baholash, erta tashxis qo'yish va individual profilaktika choralarini takomillashtirish uchun istiqbolli ilmiy yo'nalish hisoblanadi.

#### **Foydalanilgan adabiyotlar**

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