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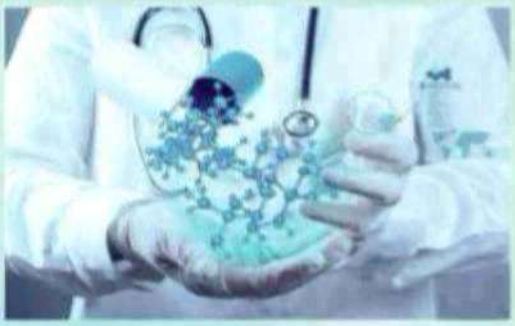

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THE IMPORTANCE OF CLINICAL AND LABORATORY MARKERS IN ASSESSING THE DEVELOPMENT OF OSTEOPOROSIS IN MIDDLE-AGED AND ELDERLY PATIENTS WITH NON-ALCOHOLIC FATTY LIVER DISEASE

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✓ ***Resume***

Nonalcoholic fatty liver disease is one of the most pressing problems in modern medicine, and its components, metabolic syndrome, insulin resistance, and chronic inflammation, negatively affect many systems, including bone metabolism. The study results revealed a reliable correlation between liver enzymes, vitamin D, parathyroid hormone, bone turnover biomarkers, and bone mineral density . Non-alcoholic fatty liver disease showed that individuals with nonalcoholic fatty liver disease are at high risk of developing osteoporosis. This study examined the prevalence of nonalcoholic fatty liver disease in middle-aged and elderly people . The risk of osteoporosis in patients with osteoporosis was comprehensively assessed using clinical, biochemical, and hormonal markers.

Keywords: NAFLD, osteoporosis, bone mineral density level, vitamin D

ЎРТА ВА ҚАРИ ЁШДАГИ ЖИГАР НОАЛКОГОЛ ЁҒ ХАСТАЛИГИ БИЛАН ХАСТАЛАНГАН БЕМОРЛАРДА ОСТЕОПОРОЗ РИВОЖЛАНИШИНИ БАҲОЛАШДА КЛИНИК-ЛАБОРАТОР МАРКЁРЛАРНИНГ АҲАМИЯТИ

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✓ ***Резюме***

Жигар ноалкогол ёғ хасталиги замонавий тиббиётда долзарб муаммолардан бири бўлиб, унинг таркибий қисми саналган метаболик синдром, инсулинрезистентлик ва сурункали яллиғланиш фонида кўплаб тизимларга, жумладан суяк тўқимаси метаболизмига ҳам салбий таъсир кўрсатади.Тадқиқот натижаларида жигар ферментлари, витамин D, паратгормон, суяк айланиши биомаркерлари ва суяк минерал зичлик даражаси ўртасида ишончли боғлиқлик мавжудлиги аниқланди. Жигар ноалкогол ёғ хасталиги билан хасталанган шахслар остеопороз ривожланишининг юқори хавф гуруҳига киришини кўрсатди. Мазкур тадқиқот ишида ўрта ва кекса ёшдаги жигар ноалкогол ёғ хасталиги билан хасталанган беморларда остеопорознинг ривожланиш хавфини клиник, биокимёвий ва гормонал маркерлар ёрдамида комплекс баҳоланган.

Калит сўзлар: ЖНАЁХ, остеопороз, суяк минерал зичлик даражаси, остеопороз, витамин D

ЗНАЧЕНИЕ КЛИНИКО-ЛАБОРАТОРНЫХ МАРКЕРОВ В ОЦЕНКЕ РАЗВИТИЯ ОСТЕОПОРОЗА У ПАЦИЕНТОВ СРЕДНЕГО И ПОЖИЛОГО ВОЗРАСТА С НЕАЛКОГОЛЬНОЙ ЖИРОВОЙ БОЛЕЗНЬЮ ПЕЧЕНИ

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✓ ***Резюме***

Неалкогольная жировая болезнь печени (НАЖБП) является одной из актуальных проблем современной медицины и на фоне метаболического синдрома, инсулинорезистентности и хронического воспаления, являющихся ее составляющими, негативно влияет на многие системы организма, включая метаболизм костной ткани. Результаты исследования выявили достоверную корреляцию между уровнями печеночных ферментов, витамином D, паратиреоидным гормоном, биомаркерами костного метаболизма и минеральной плотностью костной ткани. Показано, что лица с НАЖБП имеют высокий риск развития остеопороза. В данном исследовании проведена комплексная оценка риска развития остеопороза у пациентов среднего и пожилого возраста с неалкогольной жировой болезнью печени с использованием клинических, биохимических и гормональных маркеров.

Ключевые слова: НАЖБП, остеопороз, минеральная плотность костной ткани, витамин D

Relevance

Nonalcoholic fatty liver disease (NAFLD) is a metabolic disease that occurs in approximately 25-30% of the world's population. Insulin resistance, lipid metabolism disorder, inflammatory process and oxidative stress play a key role in its pathogenesis. In recent years, NAFLD has become a hot topic not only in hepatology, but also in endocrinology, cardiology, and osteology. Scientific research has shown that individuals with NAFLD are at increased risk of developing low bone mineral density, osteopenia, and osteoporosis. Osteoporosis is a chronic systemic disease characterized by deterioration of the microarchitectural structure of bone tissue and a decrease in bone mineral density, which leads to increased bone fragility and fracture [1,3,5]. This problem has a serious impact on the quality of life, especially in middle-aged and elderly people. Therefore, the use of clinical and laboratory markers for early detection and prognosis of bone changes associated with NAFLD is very important. The aim of the study is to identify non-alcoholic fatty liver disease in middle-aged and elderly patients [2,4].

Objective of the study: Comprehensive assessment of the risk of developing osteoporosis in patients with osteoporosis using clinical, biochemical and hormonal markers.

Material and methods

120 patients with nonalcoholic fatty liver disease were selected for the study, of which 46 (66 %) were women and 24 (34 %) were men, aged 45–75 years (mean age 59.2 ±4.2). All patients included in the study were divided into three groups. The first group of the study included patients with NAFLD + osteoporosis (40 patients); the second group included patients with group II – OA, but without osteoporosis (40 people); the third group of patients formed group III – healthy controls (40 people). The results of the study in all groups were evaluated by a clinical reference card (questionnaire). Consent was obtained from the members of the ethics committee established under the auspices of the Bukhara Medical Institute named after Abu Ali ibn Sina to carry out this research. In the study are as follows: with confirmed UTI; no alcohol consumption and no chronic hepatitis. Exclusion criteria: oncological diseases, steroid use, hormone therapy in menopause.

The study was conducted in 2 stages. In the first stage, all patients in the main group were selected through a special questionnaire. Then, in the second stage of the study, patients in the main and control groups underwent laboratory and biochemical examinations. Checked parameters . Biochemical markers: In order to study the functional status of jigap, its lipid metabolism was investigated. The general cholesterol level (UXD) was evaluated according to the classification of the European Atepoclepotic Society [11]: in this case, up to 5.2 mmol/l is the optimal level; 5.3-6.5 mmol/l — mild hypepxolectepinemia (GXC); 6.6-7.8 mmol/l — moderate, severe; Higher than 7.8 mmol/l — high. Expanded lipid lipoproteins were also studied: triglyceride (TG), cholecystokinin (XC) density pact lipopoteinlap (LDL) and XC density high lipoprotein lipopoteinlap (HDL). Cholectepin very density pact lipopoteinlap (LDL) invention was investigated. It is determined that TG is up to 1.7 mmol/l, cholectepin ZLPP is higher than 2.6 mmol/l, cholectepin LDH is higher than 1.15 mmol/l. NAFLD to assess the functional state of the liver in patients , parameters of pigment metabolism, cytolysis and cholestasis were studied. C -reactive protein, Omega-3/6 ratio, markers of cholesterol metabolism: 25-hydroxyvitamin D (25(OH)D), parathyroid hormone (PTH), osteocalcin, CTX-1 (C-terminal telopeptide), P1NP (procollagen

type 1 N-terminal propeptide) and instrumental testing methods**:** DEXA – lumbar spine and hip bone mineral density levels were assessed.

Results and discussion

Demographic and anthropometric indicators of patients were analyzed.Were found to be overweight (Ketley index up to 30).

Disruption of lipid metabolism in NAFLD is one of the leading indicators of the disease. In our study, hyperlipidemia (above 6 mmol/l) was observed. Dyslipidemia in NAFLD was characterized by TG above 1.8 mmol /l , and LDL -C <1 mmol/l. These disorders were more pronounced with deeper lipid metabolism disorders. From the data in Table 5, in the steatosis and hepatic steatohepatitis stage of NAFLD, a decrease in cholesterol (p = 0.005), LDL-C (p = 0.001), HDL-C (p = 0.001), TG (p = 0.001), HDL-C (p = 0.03) and LDL-C (p = 0.001) was observed. In our study, HDL-C was above 6 mmol/l. The atherogenic index was significantly increased in all examined patients compared to the established indicator. In NAFLD, the parameters of pigment metabolism, cytolysis and cholestasis were studied to evaluate the functional status of the liver in the stage of steatosis and steatohepatitis. Biochemical tests: a laninaminotransferase (ALT) and aspartate aminotransferase (AST), γ -glutamyltranspeptidase (GGTP), alkaline phosphatase (IF), the amount of total bilirubin and its fractions were studied.

Table 2

Comparative analysis of demographic and anthropometric parameters in the main and control group patients

Index	CG (n= 40)	I NAFLD+osteoporosis (n= 40) 1	II NAFLD+without osteoporosis (n= 40) 2	P 1-2
age	53.2±1.20	59.2±2.2	58.2±4.2	> 0.00 1
body weight, kg	62.0±1.03	83.0±3.2	81.0±3.22	0.001
Height, cm	172±3.2	165 ±3.33	166 ±4.25	> 0.005
BWI, kg/m 2 (25-30)	22.0±0.37	26.2±2.6	27.1±1.6	0.001
BWI , kg/m 2 (30-34.9)	23.2±0.19	32.2±1.8	31.9±1.1	0.001
BWI , kg/m 2 (35-39.9)	24.2±0.4	36.4±2.4	35.4±2.5	0.001
BWI, kg/m 2 40 <	24.0±0.5	40.2±1.4	38.2±2.8	0.001

Table 2

Indicators of lipid metabolism in the examined group of patients

Index	CG (n= 40)	I AFLD+osteoporosis (n= 40) 1	II NAFLD+without osteoporosis (n= 40) 2	P 1-2
Cholesterol (mmol/l)	4 , 93 ±0.0 6	7, 2 ±0.1 7	6.37 ± 0.23	>0.005
Cholesterol LDH (mmol/L)	0.36 ± 0.0 7	0.9 4 ±0.1 5	0.77 ± 0.1 1	0.001
Cholesterol LBP (mmol/l)	3, 22 ±0.0 8	4.68 ± 0.12	3.85 ± 0.41	0.005
Cholesterol LDH (mmol/L)	1.41 ± 0.04	0.79 ± 0.0 1	0.9 2 ±0.0 7	0.001
Triglycerides (g/l)	0.9 2 ±0.02	1.89 ± 0.1 9	1.78 ± 0.21	0.001
Atherogenic coefficient (AK)	2.7 3 ±0.04	7.67 ± 0.8 4	6.3 ± 0.72	0.03

Bilirubin levels were significantly higher than in the control group . Cytolysis levels were higher in patients with NAFLD + osteoporosis, with ALT 6 times higher and AST 3-4 times higher. Carbohydrate metabolism indicators: serum glucose levels in patients were significantly higher (p> 0.05). To determine the increased level of compensatory insulin in NAFLD patients, the HOMA-IR index was determined. The index was calculated according to the following formula: [insulin in the morning (mIU/ml) × glucose in the morning (mmol/l)] / 22.5. A normal index is considered to be less than 2 [8]. In our study, the HOMA-IR insulin resistance index in patients was significantly higher than in controls . Below is a distribution of bone mineral density (DXA-based, T-score) in 120 patients with NAFLD, ready for inclusion in a scientific article:

Table 3

Distribution by bone mineral density (BMD).

Assessment category (WHO criteria)	T-score value	Number of patients (n)	Share (%)
Norm	≥ –1.0	38 people	31.7 %
Osteopenia	From –1.0 to –2.5	54 people	45.0 %
Osteoporosis	≤ –2.5	28 people	23.3 %
Total	—	120 people	100%

Overall, 68.3% (n=82) of patients had decreased bone mass (osteopenia + osteoporosis). Osteoporosis was most common in patients over 55 years of age and in stages II–III of the NAFLD.

Vitamin D, ALT, AST and TVI with T-score (BMD) in 120 patients with CKD. Quoted (based on Pearson r):

Table 4

Correlation of selected clinical and laboratory parameters with T-score

Index	Correlation coefficient (r)	p-value
Vitamin D (25(OH)D)	+0.62	< 0.001
ALT (alanine aminotransferase)	–0.48	< 0.01
AST (aspartate aminotransferase)	–0.41	< 0.01
TVI (Body Mass Index)	–0.29	< 0.05

There is a strong positive correlation between Vitamin D and T-score ($r = +0.62$, $p<0.001$) — this confirms that vitamin D plays an important role in maintaining bone mineral density. As ALT and AST levels increase, T-score decreases —increasing levels of liver damage can lead to bone decalcification. A negative correlation with TVI indicated the presence of impaired bone metabolism in the context of obesity.

Conclusion

Based on this, it can be concluded that the risk of osteoporosis in patients with nonalcoholic fatty liver disease was mainly observed in patients over 55 years of age and in patients with stage II–III of NAFLD. Vitamin D is important in maintaining bone mineral density, and the risk is especially high in elderly patients. As body weight increases, bone metabolism disorders increase. In our subsequent studies, the role of molecular-genetic factors in the development of osteoporosis risk in patients with nonalcoholic fatty liver disease will be studied.

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