ORIGINAL ARTICLE

ASSOCIATION BETWEEN BIOCHEMICAL PARAMETERS AND ARTHRITIS AMONG MENOPAUSAL FEMALES: A POPULATION-BASED STUDY

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ABSTRACT

Objective: To determine the prevalence of arthritis and its correlation with biochemical markers in pre- and postmenopausal women.

Material & Methods: A cross-sectional observational questionnaire and laboratory-based study with 350 female participant was conducted. Using commercially available kits and laboratory tests, various biomarkers (BMI, uric acid, creatinine, cholesterol, triglyceride, HbA1c, erythrocyte sedimentation rate (ESR), rheumatoid factor (RF), and anticyclic Citrullinated protein) were measured among pre- and postmenopausal female population.

Results: Overall prevalence of osteoarthritis (32%) followed by rheumatoid arthritis (31.4%) was recorded among pre and post-menopausal females. 49% of patients were belonging to age group 51-60 years. The levels of biochemical parameters were found significantly important (P<0.0001) for menopausal arthritic female patients.

Conclusion: Biochemical parameters that show co-morbidities such as diabetes, cardiovascular and renal diseases, hypertension, obesity, and osteoporosis have borderline mean levels in women with different types of arthritis.

Key Words: Arthritis, Hypertension, Osteoporosis, Rheumatoid Factor.

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INTRODUCTION

A major health concern for women who are pre- or postmenopausal is arthritis. It is an autoimmune disorder that affects people who are over 45. There are various kinds of this condition, such as osteoarthritis, psoriatic arthritis, rheumatoid arthritis, and polyarthritis. Because women are either approaching or have reached menopause—the point at which their monthly cycles stop—this illness ratio is high in them. [1] Menopausal women in Asia, America, and Europe have seen a higher prevalence of this disease in the past ten years. According to a study, women 60 years of age or older had a 13% prevalence of osteoarthritis and a 17% prevalence of rheumatoid arthritis diagnoses.[2] In Karachi, 33% of women in Pakistan had an arthritis diagnosis. Obesity, knee joint discomfort, and muscle weakness in elderly women have also been identified as key arthritis symptoms. Recent estimates suggest that females with arthritis may experience joint pain in the hip, neck, shoulder, feet, and hands.[3] Factors that are closely linked to the beginning of arthritis include age, gender, obesity, bad lifestyle choices, poor nutrition, reduced physical activity, genetics, ignorance of illness, and low levels of education.[4]

Numerous biochemical profile alterations, such as those related to serum hemoglobin, cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), triglycerides, and sugar levels, have also been linked to arthritis in

females. The likelihood of anemia, cardiovascular illness, stroke, and renal comorbidity increases as this condition worsens in females.[5] Low levels of hemoglobin were measured in menopausal women who were diagnosed with different type of arthritis.[6] Female with arthritis have also been found diabetic in previous literature, in a study 47% of women who were diabetic have also been diagnosed with arthritis. Older age females who were diagnosed with arthritis were at higher risk of getting diabetes.[7] This shows that due to autoimmune and inflammation in arthritic patients, diabetes progression can also get induced. [8, 9]

Obesity and poor diet can cause elevated triglyceride, low HDL, and elevated LDL levels in the body, which can result in cardiovascular disease in people with arthritis. Patients with arthritis who had elevated blood levels of urea, creatinine, and uric acid have been found to have renal comorbidity.[10,11] In a study, renal impairment in patients with psoriatic and rheumatoid arthritis was strongly predicted by uric acid and creatinine.[12] In another study, those with osteoarthritis had elevated uric acid levels. [13] High levels of urea, uric acid, and creatinine in individuals with arthritis may be inflammatory indicators for the degree of joint inflammation and a symptom of renal impairment, according to many research. [14, 15] The aim of the present investigation was to assess the incidence of diverse types of arthritis and their correlation with biochemical parameters in women undergoing pre and post menopause.

MATERIAL AND METHODS

A cross sectional study was conducted in Faisalabad Punjab, Pakistan. Non-probability convenient sampling technique was applied for the study. Total 350, pre and post-menopausal women participated in study. The consent was already taken from participants. Participants in the survey had arthritis diagnoses of various types from licensed orthopedics. A standardized questionnaire was used to collect the demographic data and nutritional assessment of the female patients. Additionally, the subjects underwent assessments for a variety of biochemical parameters, including LDL, HDL, HBA1c, creatinine, erythrocyte sedimentation rate (ESR), urea, cholesterol, uric acid, hemoglobin, C-reactive protein (CRP), anti-cyclic Citrullinated protein and rheumatoid factor(RF). SPSS version 23 was used for data collection, recording, and analysis. For each variable, mean ± standard deviation, frequency, and percentage and independent sample T test were used in descriptive statistics.

RESULTS

Majority of patients (49%) belonged to the 51–60 age group. Rural areas were home to 68.5% of the female population. According to factors associated to the disease, the most common type of arthritis was osteoarthritis (32%) followed by rheumatoid arthritis (31.4%), Psoriatic arthritis (23.4%), and polyarthritis (13.1%). The majority of patients (52.5%) had been suffering from their illness for five to ten years. Patients who were female reported knee pain at a rate of 62.8% and 57.4%, respectively. (**Table 1)**

Statistical analysis by independent sample t test showed increased significance ($p<0.000$) of biochemical parameters among females with arthritis disease. The mean value of hemoglobin levels in this study was 10.98. In female patients with arthritis, the mean ESR and CRP levels were over the borderline, indicating swollen joints and inflammation. The HBA1c levels of the patients were also assessed; the majority of them had mean levels (6.71 ± 4.15) that were marginally higher than the borderline, suggesting that they may be pre-diabetic or diabetic. The means of low-density lipoproteins (110.58 ± 42.05) and triglycerides (158.32 ± 39.92) were borderline. Additionally, lower range high density lipoprotein means (29.22 ± 8.25) were discovered. Female patients likewise had high levels of urea (78.2 ± 22.73), uric acid (9.01± 1.49), and borderline creatinine (1.1 ± 0.55). A significant proportion of female patients (55.5%) and 47.7%, respectively, tested positive for anti-cyclic Citrullinated protein (Anti-CCP) and rheumatoid factor (RF), two important clinical indicators of arthritis. **(Table 2)**

Table 1: Demographic profile and disease related parameters of participants

Characteristics	Frequency (%)
Age	
40-50	100 (28)
51-60	172 (49)
61-70	78 (22.2)
Residential area	
Rural	240 (68.5)
Urban	110 (31.4)
Menopause	
Yes	220 (73.3)
no	80 (26.6)
Type of Arthritis	
Rheumatoid Arthritis	110 (31.4)
Osteoarthritis	112 (32)
Psoriatic Arthritis	82 (23.4)
Polyarthritis	46 (13.1)
Disease duration	
>1 year	11 (3.1)
1-2 years	45 (12.8)
3-5 years	110 (31.4)
5-10 years	184 (52.5)
Type of joint pain involved	
Shoulder	220 (62.8)
Spine	174 (49.7)
Knee	201 (57.4)
Neck	84 (24)
Hip	55 (15.7)
Hand	146 (41.7)
Wrist	110 (31.4)
Foot	81 (23.1)

Table 2: Biochemical clinical profiles of female patients

Characteristics	Frequency (%) Mean ± SD	P- value
Hemoglobin (g/dL)	10.98 ± 3.04	0.050*
Cholesterol (mg/dL)	210± 42.36	0.000*
Triglyceride (mg/dL)	158.32 ± 33.98	0.000*
LDL (mg/dL)	110.58 ± 42.05	0.000*
HDL (mg/dL)	29.22 ± 8.25	0.042*
HbA1c (%)	6.71 ± 4.15	0.001*
ESR (mm/h)	36.55 ± 1.92	0.000*
Creatinine (mg/dL)	1.1 ± 0.55	0.210
Uric Acid (mg/dL)	9.01± 1.49	0.001*
Urea (mg/dL)	78.2 ± 22.73	0.000*
CRP (mg/L)	29.23 ± 7.19	0.021*
RF	167 (47.7%)	0.060*
Anti-CCP	192 (54.8%)	0.000*
Body Mass Index (BMI Kg/m2)	201 (57.4)	0.040*

DISCUSSION

Women's health is seriously threatened by arthritis, particularly those who are pre- or post-menopausal. Among elderly female patients over 50, arthritic illness and related symptoms were highly prevalent. Numerous studies conducted globally have found that the incidence of arthritic disease is significantly higher in older adults (menopausal women aged 50-70) than in younger adults.[16] In pre- and postmenopausal women, biochemical markers can be an excellent diagnostic tool for predicting and identifying the many types of arthritis that can otherwise cause substantial health damage. [17] The most common types of arthritis were discovered to be osteoarthritis and arthritis. The outcomes align with earlier research. [18, 19] In one study, postmenopausal women with rheumatoid arthritis were found to have hormonal imbalances and obesity at the onset of menopause. [20] In a different study, the osteoarthritis ratio was higher in older females than in older males. Female arthritis may result from a lack of knowledge about menstrual cycle changes, an older, sedentary lifestyle, excess body weight, inactivity, and medication non-adherence. Our results showed that 57.4% of the female participants had a BMI of ≥ 25. Numerous patients in this study reported having knee pain, and multiple studies found a positive correlation between knee osteoarthritis and female age and BMI.

In females, low hemoglobin levels were found to be among the biochemical parameters. Studies on various types of arthritis have shown that obesity, stress, hypertension, and low hemoglobin levels are significantly linked to rheumatoid, polyarthritis, and osteoarthritis. [21] In general, there were high mean levels of cholesterol, borderline levels of triglycerides and low density lipoproteins (LDL), and low levels of high density lipoproteins (HDL). Previous research has shown that obesity-related increases in serum cholesterol and triglyceride levels were observed in patients with arthritis, particularly in females. [22]

Renal co-morbidity is frequent in older female arthritis patients, according to routine evaluations of renal function, urine, and serum parameters. [23] Elevated serum urea and uric acid levels in patients with psoriasis, rheumatoid arthritis, and osteoarthritis were significantly correlated with age, duration, and disease activity. This explains why our results had excessively high urea and uric acid levels. An additional indicator of severe joint inflammation and high disease activity in arthritis patients is C- reactive protein (CRP), which is further supported by an erythrocyte sedimentation rate (ESR). [24] Tests for RF factors and anti-CCP are thought to be crucial for the diagnosis of arthritis.[25] In our study, over 50% of the female participants tested positive for both RF and anti-CCP. These tests can aid in the early detection of arthritis, which can be beneficial in the management and treatment of arthritis in women who are not yet menopausal as well as those who are.

CONCLUSION

Females who have gone through menopause were found to have a high prevalence of various forms of arthritis. The borderline mean levels of biochemical parameters in women with various types of arthritis point to co-morbidities such as obesity, cardiovascular, diabetes, renal diseases, hypertension, and osteoporosis. Large-scale research is required in order to develop preventive measures that will stop this illness and its effects.

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