ROLE OF SOLUBLE VASCULAR CELL ADHESION MOLECULE-1 IN KNEE OSTEOARTHRITIS AMONG POSTMENOPAUSAL WOMEN SUFFERING FROM TYPE II DIABETES MELLITUS

A

SUMMARY

SUBMITTED FOR THE AWARD OF THE DEGREE OF

Doctor of Philosophy

IN

MEDICAL BIOCHEMISTRY

(Faculty of Medicine)

At

JIWAJI UNIVERSITY, GWALIOR

UNDER THE SUPERVISION OF
Dr. (Mrs.) NEELIMA SINGH
PROFESSOR & HEAD
DEPARTMENT OF BIOCHEMISTRY
G.R. MEDICAL COLLEGE, GWALIOR

UNDER THE CO-SUPERVISION OF
Dr. R.K.S. Dhakad
PROFESSOR
DEPARTMENT OF ORTHOPAEDICS
G.R. MEDICAL COLLEGE, GWALIOR

By

REETIKA SHRIVASTAVA
(M.Sc. Medical Biochemistry)

DEPARTMENT OF BIOCHEMISTRY
GAJRA RAJA MEDICAL COLLEGE, GWALIOR (M.P.)
2018
SUMMARY

Osteoarthritis is the most common form of joint disorder and a leading cause of pain and functional disability among the elderly population. The knee is the most commonly affected joint. Osteoarthritis of the knee is generally occurring in women than men and it increases in prevalence and incidence just after menopause. This may be due to deficiency of estrogen hormone in postmenopausal women. Diabetes mellitus adversely affect the articular tissues and exacerbate the osteoarthritis process. Type 2 Diabetes mellitus is commonly co-occurring comorbidity in postmenopausal women with knee osteoarthritis. Firstly, it is considered as a non-inflammatory condition but now it becomes evident that synovitis occurs in an early and advanced phase of osteoarthritis. Adhesion molecules play an important role in the transmigration of leukocytes from vascular endothelium into the synovium at the site of inflammation. VCAM-1 is an inducible cell surface sialoglycoprotein expressed on chondrocytes and synovial fibroblasts and mediates the interaction of chondrocytes with immune cells and contribute to immune-mediated cartilage damage. Therefore, the study was aimed to know whether the release of soluble VCAM-1 in both diabetic and non-diabetic postmenopausal women helpful in early diagnosis of osteoarthritis.

The study was carried out in 400 postmenopausal women out of which 100 were normal healthy age-matched control subjects (Group I), 150 were non-diabetic subjects (Group II) and 150 were type 2 diabetic subjects (Group III) with clinical symptoms of knee osteoarthritis. Group II and Group III were further classified on the basis of presence or absence of radiological findings of knee osteoarthritis along with knee pain. These groups were further subdivided according to age group 45-60 years and 61-75 years. The blood sample was analyzed for routine biochemical parameters like blood sugar, glycated hemoglobin, lipid profile, uric acid, estrogen, inflammatory
parameter CRP and adhesion molecule sVCAM-1 in fasting state. Physiological parameters were also recorded. Data analysis were performed using Statistical Package for the Social Sciences, version 21.0 (SPSS, Chicago, Illinois, USA) and Excel (Microsoft Corp., Redmond, WA). The results were expressed as Mean ± Standard Deviation. Independent sample t-test and one-way ANOVA was done for evaluating the results. Pearson correlation coefficient was used to determine the correlation between the parameters. The p-value less than 0.05 were considered as significant. The outcomes of the study are as follows:

- High BMI and high blood pressure were observed in both non-diabetic and diabetic postmenopausal women with clinical symptoms of knee osteoarthritis as compared to age-matched control postmenopausal women.

- In non-diabetic postmenopausal women having knee pain only without radiological findings of knee osteoarthritis of age group 45-60 years, the mean level of CRP was significantly increased and estrogen was significantly decreased (p<0.05) as compared to control subjects.

- In diabetic postmenopausal women having knee pain only without radiological findings of knee osteoarthritis of age group 45-60 years, hyperglycemia and dyslipidemia were present along with the increased level of inflammatory marker CRP and decreased level of estrogen.

- No significant changes occur in the levels of uric acid and sVCAM-1 in both non-diabetic and diabetic postmenopausal women having knee pain only without radiological findings of knee osteoarthritis of age group 45-60 years as compared to control subjects.
Summary

- In non-diabetic and diabetic postmenopausal women having knee pain only without radiological findings of knee osteoarthritis of age group 61-75 years, no statistical analysis could be made due to less number of subjects.

- Dyslipidemia was observed in both middle-aged (45-60 years) and elderly aged (61-75 years) non-diabetic postmenopausal women with radiological finding of knee osteoarthritis while in diabetic postmenopausal women with radiological finding of knee osteoarthritis of both age group 45-60 years and 61-75 years along with dyslipidemia, hyperglycemia also occurred.

- The mean level of sVCAM-1, CRP and uric acid were found significantly increased and estrogen was found significantly decreased (p<0.001) in both middle-aged and elderly aged non-diabetic and diabetic postmenopausal women with radiological finding of knee osteoarthritis as compared to their respective control postmenopausal women.

- The mean value of sVCAM-1 was found more in diabetic postmenopausal women as compared to non-diabetic postmenopausal women with radiological findings of knee osteoarthritis of same age group which shows that severity of osteoarthritis is more in diabetic postmenopausal women as compared to non-diabetic postmenopausal women.

- On comparing the mean level of sVCAM-1 according to age wise distribution of subjects in both diabetic and non-diabetic group with radiological findings of knee osteoarthritis, the mean levels of sVCAM-1 were found highly significant (p<0.001) within and between the groups.

- The mean level of sVCAM-1 was also found increased as the age advances.
The correlative studies showed a significant positive correlation of sVCAM-1 with BMI, blood sugar, HbA1c, total cholesterol, LDL-C, CRP and negative correlation with HDL-C and estrogen in both diabetic and non-diabetic postmenopausal women with radiological findings of knee osteoarthritis.

On the basis of above findings, it is concluded from the study that obesity, hypertension, hyperglycemia, dyslipidemia and decreased estrogen level are associated with knee osteoarthritis in postmenopausal women. The increased level of sVCAM-1 shows the active cartilage damage in both diabetic and non-diabetic postmenopausal women. As the disease progresses the level of sVCAM-1 also increases. Therefore, estimation of sVCAM-1 is helpful for marking severity of disease in an early phase of osteoarthritis in non-diabetic/diabetic postmenopausal women. The change in lifestyle, weight reduction may be helpful in reducing the severity of osteoarthritis.