

ORIGINAL RESEARCH

ASSOCIATION OF BLOOD GROUP IN PATIENTS WITH PRIMARY OSTEOARTHRITIS – AN OBSERVATIONAL STUDY

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ABSTRACT

Background Various diseases were suggested to be associated with the ABO blood group which is a crucial pathological process of primary knee arthritis. Recently, genome-wide studies revealed an association between the ABO gene and tumour necrosis factor α , as well as intercellular adhesion molecule 1 (ICAM-1), which are important pro-inflammatory cytokines and may have an impact on the systemic inflammatory response. Thus a disproportionate level of pro-inflammatory cytokines and inflammatory process play a vital role in the pathogenesis and progression of primary knee Osteoarthritis. This study aimed to determine whether ABO blood group may be associated with primary Osteoarthritis (OA). **Materials and Methods** This observational study is conducted in patients coming with known cases or newly diagnosed condition of primary osteoarthritis at the outpatient department in L. N. Medical College & Research Centre and associated J.K Hospital Bhopal (Madhya Pradesh). **Results:** Patients reported to the Department of medicine and orthopedics with the final diagnosis of primary knee osteoarthritis comprised of 450 patients with a prompt female predominance. The mean age of all the study participants observed from 67.4 ± 8.1 years (44 - 84 years). The control group consisted of 500 individuals with a slight female predominance and a observed mean age of 57.5 ± 10.42 years. These values showed that these parameters are statistically significant with the p – value of <0.001 . **Conclusion:** To conclude, the results of this showed that a strong relationship was observed between blood group A and primary knee osteoarthritis. Likewise this study showed that weak relationship was seemed to be observed between AB blood group and knee osteoarthritis.

Keywords: osteoarthritis, blood group, obesity

INTRODUCTION

Osteoarthritis (OA) is the degeneration of articular cartilage. When the chondrocytes fail to repair the injury of articular cartilage, the degeneration process of cartilage is triggered due to aging.¹ However, few recent studies suggest that inflammatory process plays a crucial part in the pathogenesis of Osteoarthritis (OA). Cytokines stimulate the interaction between the synovial membrane, synovial fluid, and cartilage and subchondral bone to increase the degeneration of articular cartilage, which denotes an association between inflammatory cytokines and knee OA.² The ABO blood group system was first put forward by *Karl Landersteiner* at the beginning of the 20th century³. It is based on hereditary features determined by the presence or absence of A and B antigens in red blood cells, tissue cells, saliva, and body fluids. ABO blood group antigens include A antigen, B antigen, and H antigen. H gene exists in each individual and encodes for the H antigen precursor, which eventually becomes H antigen with the help of fucosyltransferase.⁴ A

gene encodes for $\alpha 1 \rightarrow 3$ N-acetylgalactosaminyltransferase, which converts H antigen to A antigen. B gene encodes for $\alpha 1 \rightarrow 3$ -galactosaminyltransferase, which converts H antigen to B antigen. These antigens are not only present in erythrocytes but also exist in tissues and cells.⁵ Blood group A was identified as one of the risk factor for stomach cancer in 1953,³ Previous studies have reported an association between blood groups and orthopaedic diseases such as musculoskeletal injuries and hip fractures.⁶

Over the recent years few genome-wide studies revealed an association between the ABO gene and tumour necrosis factor α , as well as intercellular adhesion molecule 1 (ICAM-1), are the pro-inflammatory cytokines which have an impact on the systemic inflammatory response.⁷ Thus a disproportionate levels of pro-inflammatory cytokines and inflammatory process play a vital role in the pathogenesis and progression of primary knee Osteoarthritis.

Hence this study aimed to determine that the ABO blood group may be associated with primary knee OA.

MATERIALS AND METHODOLOGY

This observational study is conducted in patients coming with known cases or newly diagnosed condition of primary osteoarthritis at the outpatient department in L. N. Medical College & Research Centre and associated J.K Hospital Bhopal (Madhya Pradesh). All patients with primary osteoarthritis coming to medicine and orthopaedic department for a period of 6 months will be examined for blood group. Patients with known cases of inflammatory arthritis like RA, SLE, Sjogren, septic arthritis, gout with or without coexisting osteoarthritis, those who do not want to give consent, patients with recent medical infection in the preceding 12 weeks, current or previous joint infections, other inflammatory joint diseases, comorbid autoimmune diseases like IBD, and all cases of secondary OA (e.g. trauma induced arthritis) were excluded from the study.

All the patients will be counselled for osteoarthritis manifestations. A detailed history of their present condition is noted after getting informed consent from the patients. The collected data are analysed statistically. Analysis will be done in the form of percentages, proportions wherever necessary.

RESULTS

Patients reported to the Department of medicine and orthopedics with the final diagnosis of primary knee osteoarthritis comprised of 450 patients with a prompt female predominance. The mean age of all the study participants observed from 67.4 ± 8.1 years (44 - 84 years). The control group consisted of 500 individuals with a slight female predominance and a observed mean age of 57.5 ± 10.42 years. These values showed that these parameters are statistically significant with the p – value of <0.001 .

Considering the primary osteoarthritis with the ABO group, Group A: 202 (44.8%), Group B: 75 (16.6%), Group O: 141 (31.3%) and Group AB: 32 (7.2%) whereas in control group the blood group distribution is as follows, Group A: 217 (43.2%), Group B: 86 (17%), Group O: 152 (30.4%) and Group AB: 45 (9%). The difference between these is observed to be statistically significant ($p=0.001$).

Table – 1: Demographic data of the patients

Parameters	Primary knee osteoarthritis	Control group	P - value
No. of patients	450	500	
Age (years)	67.4 ± 8.1	57.5 ± 10.42	<0.001
Gender (F/M)	310/140	390/110	<0.001

Table – 2: Distribution of ABO blood group in primary knee osteoarthritis

Blood Groups	Primary knee osteoarthritis	Control group	P – value
A	202 (44.8%)	217 (43.2%)	0.001
B	75 (16.6%)	86 (17%)	
O	141 (31.3%)	152 (30.4%)	
AB	32 (7.2%)	45 (9%)	
Total	450	500	

DISCUSSION

Generally, ABO blood group type has been frequently associated with various diseases linked with osteoarthritis and primarily with abdominal cancers and certain cardiovascular diseases.³ In the year 1975, *Lourie* et al assessed that the association between ABO blood group and primary hip OA in a retrospective case-control study wherein they compared with the control group, the proportion of patients with blood group O was observed to be minimised in the case group.⁵

Conditions like primary knee OA is considered to be a multifactorial disorder associated with the same factors such as age, female gender, obesity, osteoporosis, hypermobility and hyperuricemia.² There were only few studies available in the literature closely associated to primary knee OA and ABO blood groups was published in 2019 by *Li* et al. Moreover, a statistically significant difference was noted in knee OA in the AB blood group, it was also observed that there was no significant difference between the patient and control groups in respect of the frequency of AB blood group (patient group: 9.7% AB, control group:7.8% AB). In this current study, similar to *Li* et al.'s study, a strong relationship was found between ABO blood groups and primary knee OA. Additionally the most important parameter was that blood group A was associated with knee OA, it was also determined that blood group AB was observed to be minimised in the knee OA group (patient group: 44% group A, control group: 43.2% group A; patient group:7.2% group AB, control group: 9% AB). Based on this, it can be understood that the results of this study strengthen the relationship between OA and ABO blood groups.¹¹

Across the globe, the distribution of blood groups revealed variability between different countries. Group B is frequent in Asia, particularly in southern part of India. Group A is common across the world but the highest incidence is observed in Australian Aborigines and Semitic races. In a study of hip fractures, *Buckwalter* et al observed that the increased fracture incidence in the A blood group.¹³ Study by *Kuru* et al also evaluated the relationship between hip fractures and ABO blood groups and determined a relationship between extracapsular fractures and blood group A.¹² The other group of importance in the PKO group was the group with advanced OA determined at a young age. The early onset of PKO not only reduces the quality of life of the patient at a young age but also paves many ways to a severe treatment process. In the current study, while the distribution of ABO blood groups was similar in the younger patient group and those aged >65 years, the blood group was seen as a risk factor for the early onset of OA (p=0.664).

CONCLUSION

To conclude, the results of this showed that a strong relationship was observed between blood group A and primary knee osteoarthritis. Likewise this study showed that weak relationship was seemed to be observed between AB blood group and knee osteoarthritis.

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