

ABO Blood Group and Osteoarthritis: A Predominant Phenomenon

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Abstract: Human ABO blood type antigens exhibit alternative phenotypes and genetically derived glycoconjugate structures that used to be located on the red cell surface which play a vital role in the cells' physiology and pathology. In this context blood type and disease have been studied since the early 1900s when study determined that antibodies and antigens are inherited. However, due to lack of antigens of some blood groups, there have been some contentious issues with the association between the ABO blood group and vulnerability to certain infectious and non - infectious diseases, recent studies and researches have suggested association between the ABO blood group and inflammation which is the primary risk factor of osteoarthritis specially knee osteoarthritis. The aim of this study was to investigate the relationship between the ABO blood group and primary or secondary osteoarthritis and the severity of primary osteoarthritis as well as the histopathologic association in a subgroup of patients. This study has the data of female as well as male patients. In this study we had some questionnaire format by which the patients were asked about their heredity, blood grouping, and socioeconomic structure etc. related problems. The study has a review of patients with osteoarthritis that served as the case group and random sampling has been done. The study was performed to investigate the expression of blood group antigens in synovial tissue of the knee in both cases and controls. A total of 200 patients who were affected by osteoarthritis of rural as well as urban locality were involved. The proportion of A and B blood group was higher percentage in female patients (20.8% and 47.9% respectively). Male patients of the blood group A and O had a higher percentage (30% and 35% respectively). This study suggested that the blood group A and B was associated with primary knee osteoarthritis, as well as its radiological severity. This study revealed that blood group A, B, AB and O were associated with osteoarthritis disease, which shed new light on the nature of osteoarthritis, and the development of new methods of therapy of osteoarthritis disease.

Keywords: Osteoarthritis, Blood group, Inflammation, Histopathology, Socioeconomic structure, Synovial tissue, Radiology

1. Introduction

Human ABO blood type antigens exhibit alternative phenotypes and genetically derived glycoconjugate structures that are located on the red cell surface which play an active role in the cells' physiology and pathology [1, 2]. Furthermore, oligosaccharide structures specific to the antigens defined the blood type. Thus, blood group antigens are secondary gene products, whereas various glycosyltransferase enzymes that help attach the sugar molecules to the oligosaccharide chain are primary gene products. These carbohydrate components are perceived as extraneous by the immune system of others and produce antibodies to them [3]. Medically, the ABO blood group system has been of great importance in different disease studies [4]. However, due to lack of antigens of some blood groups, there have been some contentious issues with the association between the ABO blood group and vulnerability to certain infectious and non - infectious diseases. The presence and absence of antigens in some blood types result in blood membrane alterations in both morphology and function. The functions dependent on the structure of blood types can associate the blood groups with diseases as well as health [1, 5].

Osteoarthritis is also known as osteoarthritis or degenerative joint disease (DJD). It is a progressive disorder of the joints caused by gradual deterioration of cartilage and resulting in the development of bony spurs and cysts at the margins of the joints. The study may describe the whole research topic

in detail. Inflammation is a common and essential protective response to the harmful stimuli such as infectious agents, antigen - antibody reactions, thermal, chemical and physical agents. The main characteristics of inflammation are redness, warmth, swelling and pain. Inflammation cascades lead to the development of diseases such as arthritis, chronic asthma, multiple sclerosis, inflammatory bowel disease. Osteoarthritis is characterized by loss of joint cartilage, resulting in pain and loss of function primarily in the knees and hips, which mostly affects 9.6% of men and 18% of women aged more than 60 years. It is a well - known fact that the most common causes of osteoarthritis are joint pains, overweight, and movement deterioration. The pains generally occur in the knee surface, hip joint, joints of several parts of the body mainly hands, feet, spine etc. The women who have crossed 40 years of age generally suffer from osteoarthritis as well as males of age group of 50 - 80 years and above are also suffer from osteoarthritis disease.

2. Literature Review

In the past decade India has made substantial academic or literal progress but the result of such growth has failed to fix the arthritic problems among Indian population mostly in females. A considerable increase has been seen in the case of osteoarthritis specially knee osteoarthritis. To find out the actual prevalence of osteoarthritis different experiments were performed and several studies were conducted.

In a study at rural Jammu, India in 2020 osteoarthritis was the most frequent type of arthritis in both developed as well as developing countries. Researchers gave a conclusion in which they have observed that more than one third of the participants were marked down as they were suffering from knee osteoarthritis. In a community based study the prevalence of knee osteoarthritis has been observed as 19.5% - 56%. Mostly female sex has been affected compared to male by knee osteoarthritis due their high BMI rate. The study also endeavors to evaluate the true generality of knee osteoarthritis and has been observed that decreased physical activity, history of trauma of knee osteoarthritis can be risk factors for osteoarthritis.

According to a study in Bhubaneswar, Odissa, eastern India 5000 individuals have been taken which was a population study, one individual has been taken from a household. It has been seen that 31.6% females were suffering from knee osteoarthritis. The manifestation was very high, right and left knee were approx 59%. Similar to this study, it was noticed that women in higher age group above 50 years who have attained menopause were suffering from OA. women, manifesting increased vulnerability to OA, may need quick and worthwhile therapy options. There were some differences in women between rural and urban background. It has been noticed that women in urban area were more effected than the women in rural area.

3. Methodology

The study has performed with the help of a questionnaire format and asking the patients who were suffering from osteoarthritis disease for many years about their hereditary diseases and about their blood groups. And the percentages has been calculated of male and female patients individually, after that pie chart and and table have been included on the basis of the collected data.

4. Result

A total of 200 patients who were affected by osteoarthritis of rural as well as urban locality were involved. The proportion of A and B blood group was higher percentage in female patients (20.8% and 47.9% respectively). Male patients of the blood group A and O had a higher percentage (30% and 35% respectively).

Blood group frequency among the studied population

RURAL

Table 1

Blood group	Male	Percentage (%)	Female	Percentage (%)
A	12	30	10	20.8
B	10	25	23	47.9
AB	4	10	6	12.5
o	14	35	9	18.7
Total (200)	40	20	48	24

In the above table the study has been shown the blood group frequency among the studied population in rural area. Here it has been shown that for blood group A male has the percentage of 30% whereas for female it is 20.8%. In blood

group B male is of 25% and female is of 47.9%. For AB blood group male is having 10% and female is of 12.5%. IN the case of blood group O male is of 35% and female is of 18.7%.

Hence, the blood group frequency among the studied population, male has higher ratio compared to female for blood group A, where as for B blood group male has lower ratio than female. For AB blood group male has the lower ratio than female And at the end for blood group O male has the higher percentage than female in blood group frequency counting among 200 total samples.

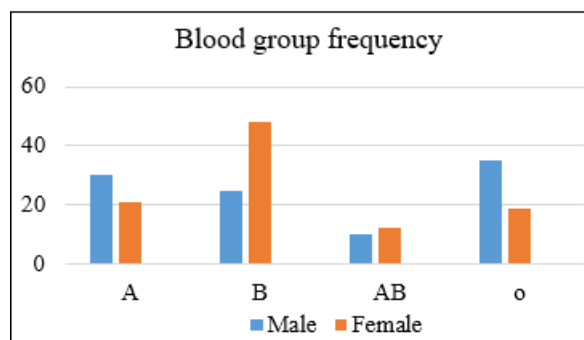


Chart 1

The above chart is showing blood group frequency among the studied population male and female of age group 40 - 80 and above in rural area. Here it has been shown that blood group AB has lower frequency compared to other blood grouped people male as well as female. In A blood grouping males are comparatively more affected than females. where as, in B blood grouping females are more affected than males. In the case of O blood grouping male is more effected than female.

URBAN

Table 2

Blood group	Male	Percentage (%)	Female	Percentage (%)
A	8	16	12	19.3
B	24	48	26	41.9
AB	7	14	9	14.5
o	11	22	15	24.1
Total (200)	50	25	62	31

In the above table the study has been shown the blood group frequency among the studied population in urban area. Here it has been shown that for blood group A male has the percentage of 16% whereas for female it is 19.3%. In blood group B male is of 48% and female is of 41.9%. For AB blood group male is having 14% and female is of 14.5%. In the case of blood group O male is of 22% and female is of 24.1%.

Hence, the blood group frequency among the studied population, male has lower ratio compared to female for blood group A, whereas for B blood group male has higher ratio than female. For AB blood group male has the lower ratio than female and at the end for blood group O male has the lower percentage than female in blood group frequency counting among 200 total samples.

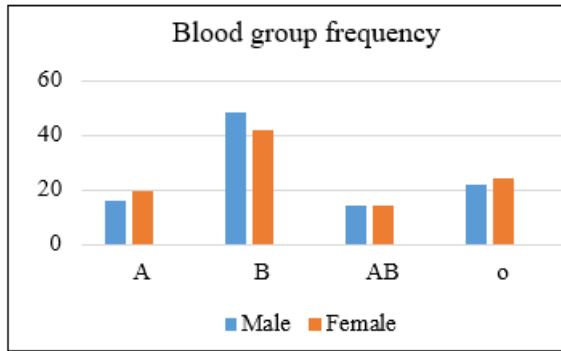


Chart 2

The above chart is showing blood group frequency among the studied population male and female of age group 40 - 80 and above in urban area. Here it has been shown that blood group AB has lower frequency compared to other blood grouped people male as well as female. In B blood grouping males are comparatively more affected than females. where as, in A blood grouping females are more affected than males. In the case of O blood grouping female is more effected than female.

5. Conclusions

This study suggested that the blood group A and B was associated with primary knee osteoarthritis, as well as its radiological severity. This study suggested that the blood group B was a risk factor for primary knee OA, independent of age and sex. Despite our rigorous methodology, the inherent limitations of the retrospective study were inevitable. Prospective cohort studies are expected to confirm the findings of this study.

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