

RHEUMATOID ARTHRITIS PREVALENCE ON MENOPAUSAL FEMALE PATIENTS ATTENDING UNIVERSITY OF PORT- HARCOURT TEACHING HOSPITAL

¹ Henrrietta Ogadimma Asuzu-Samuel, ² Karibo Amakiri Okari

¹ Biomedical Technology, School of Science Laboratory Technology, University of Port Harcourt

² Department of Medical Biochemistry, Faculty Basic Medical Science, College of Medical Science, Rivers State University, Nkpolo-Oroworukwo, Port Harcourt

DOI: <https://doi.org/10.5281/zenodo.10674272>

Published Date: 18-February-2024

Abstract: Rheumatoid arthritis (RA) is systemic inflammatory disease that can affect multiple joints of the body. The risk factors for rheumatoid arthritis include: family history (genetics), gender, age, environment and smoking. RA affects women more than men and people believe that it's sickness of elderly. The study was carried out on sixty (60) female patients of above child-bearing age and ethical approval was obtained from the Ethical Committee of the University of Port Harcourt Teaching Hospital. 4ml of blood samples were drawn from the antecubital fossa of the women with 5ml syringe and needle at 8am to 11am daily and the samples were taken to the laboratory for analysis. The kit used for the serological analysis contains both the positive and negative control. The result obtained was compared with positive and negative control. The result showed three positive for Rheumatoid Factor during the qualitative analysis and the remaining fifty- seven results tested negative. All positive result from the qualitative analysis tested positive when the test control was carried out, likewise the negative results which were all negative for the test control. The prevalence of rheumatoid arthritis in female patients of child bearing age for this study was calculated to be 5% which was 4% higher than the world prevalence estimated to be 1%. This study is relevant to ascertain the occurrence of rheumatoid arthritis in female patients above child-bearing age. This would serve as a useful tool of reference in other rheumatoid arthritis prevalence studies. This may be directed towards a better understanding of the flare of the disease amongst these sets of people and also serve a purpose in the development of a more effective preventive and curative therapy.

Keywords: Prevalence, Arthrits, Patients, Rheumatoid and inflammatory.

1. INTRODUCTION

The word arthritis means inflammation of the joint (“*arthro*” meaning joint and “*itis*” meaning inflammation). Inflammation is a medical term describing stiffness, pain, redness, and swelling. Rheumatoid arthritis is a common autoimmune disease that is associated with progressive disability, early death, socioeconomic costs and systemic complications (Firestein, 2003). Although its cause is still unknown, rheumatoid arthritis is believed to be the result of a malfunctioning immune system. Rheumatoid arthritis is characterized by synovial inflammation and hyperplasia, autoantibodies production (rheumatoid factor and anti-citrullinated protein antibodies [ACPA]), and cartilage and bone destruction. Huber *et al.*, (2006) noted numerous lines of evidence which support the potential contribution of fibroblast-like synoviocytes (FLSs) to the pathogenesis of chronic arthritis. The symptoms and progression of rheumatoid arthritis vary widely from person to person.

In many cases the disease starts in a few joints then spreads to other joints over few weeks to months. However, rheumatoid arthritis can also progress extremely rapidly; some patients complain that one morning they could just get out of bed. The risk factors of rheumatoid arthritis have been associated with the female sex, although sex differential is less prominent in older patients (Firestein and Kelly, 2009). Modern researches have shown that several factors may contribute to the development of rheumatoid arthritis such as: Family history: Most people who develop rheumatoid arthritis have genetic risk factors. However, having genetic risk factors for rheumatoid arthritis does not necessarily mean that one will develop the disease. Gender: Rheumatoid arthritis affects women two to three times more than men. Age: Anyone can get rheumatoid arthritis at any age, but the risk increases with age (commonly developing between ages 40 and 60). Environment: Infections can trigger rheumatoid arthritis in people who are genetically predisposed to it. However, it's important to note that rheumatoid arthritis is not an infectious disease, nor is it contagious. Smoking: Studies have shown that of all environmental factors contributing to rheumatoid arthritis, smoking is the most convincingly linked. To evaluate the prevalence of rheumatoid arthritis on female patients of child bearing age (from 18- 50), attending the University of Port Harcourt Teaching Hospital is the objective of this research. Rheumatoid arthritis has a worldwide prevalence of approximately 1% (prevalence is the number of cases occurring in a population at a given time) and is consistently observed in women 2-3 times more frequently than men (Jane *et al.*, 2006). The occurrence of RA is not, however, the same throughout, the world (Abdel *et al.*, 1997). Prevalence rates are low in the less developed rural parts of the world and it has been suggested that RA is a modern disease, its appearance seeming to coincide with industrialization or urbanization. A study in South Africa found a low frequency of RA among Bantu-speaking people in their traditional rural environment but higher rates in the same ethnic group living in the modern urban townships of Soweto, similar in fact to Caucasians living in nearby Johannesburg (Beighton *et al.*, 1997). Rheumatoid arthritis is a chronic, progressive, inflammatory autoimmune disease associated with articular, extra-articular and systemic effects. It has been reported that RA affects approximately 0.5 to 1% of the adult population of developed regions (Carbonell *et al.*, 2008). Although some patients have mild self-limited disease, many experience joint destruction, severe physical disability and multiple co-morbidities (Plenge, 2009).

2. MATERIALS AND METHODS

Sample Collection

The study was carried out in Port Harcourt, Rivers state, South-South Nigeria. Blood samples were collected at the Haematology Department of University of Port Harcourt Teaching Hospital. In this research, the prevalence of rheumatoid arthritis was investigated among sixty female patients above child bearing age, on clinical investigation in the hospital. After the blood samples were collected with plain sample bottles, the serum from the samples were then tested for serological biomarkers through the rheumatoid arthritis test procedure.

Rheumatoid Arthritis Test

Rheumatoid factors (RF) are antibodies directed against antigenic sites in the Fc fragment of human and animal IgG. Their frequent occurrence in rheumatoid arthritis makes them useful for diagnosis and monitoring of the disease (Taborn *et al.*, 1979).

One method used for rheumatoid factor detection is based on the ability of rheumatoid arthritis sera to agglutinate sensitized sheep red cells, as observed by Waaler and Rose. A more sensitive reagent consisting of biologically inert latex beads coated with human gamma globulin was later described by Singer and Plotz (Singer *et al.*, 1956). The RF kit is based on the principle of latex agglutination assay by Singer and Plotz. The major advantage of this method is rapid performance (3 minutes reaction time) and lack of heterophile interference.

Principle of the Test

The RF reagent is a suspension of polystyrene latex particles sensitized with specially prepared human IgG. The reagent is based on an immunological reaction between human IgG bound to biologically inert latex particles and rheumatoid factors in the test tube specimen. When serum containing rheumatoid factors is mixed with the latex reagent, visible agglutination occurs. The RF latex reagent sensitivity has been adjusted to detect a minimum of 8 IU/mL of rheumatoid factors according with the WHO Standard without previous sample dilution.

Rheumatoid Factor (RF) Reagent: A Latex Slide Test kit

The RF Reagent Test kit is manufactured by Teco Diagnostics; a firm involved in the production of in-vitro clinical diagnostic tests and instruments, and is based in Anaheim, California, USA. The Kit used in this serological test consists of:

RF Latex Reagent: A suspension of uniform polystyrene particles coated with IgG (human) in glycine buffer, PH 8.2; reagent sensitivity is standardized with the World Health Organization Standard.

RF Positive Control Serum: A stabilized, pre-diluted human serum containing at least 8IU/ mL of RF.

RF Negative Control Serum: A stabilized, pre-diluted human serum containing less than 8IU/ mL of RF.

Glycine-Saline Buffer (20×): PH 8.2 ± 0.1M glycine and 0.51M NaCl

Reaction Slide

Pipette/Stir Sticks

Serological EvaluationQualitative Test

The reagents and specimens were brought to room temperature before use

One drop of the RF Positive Control was placed on the field #1 of the reaction slide. One drop of the RF Negative Control was placed on field #2. The remaining fields were used for test specimens. The pipette provided was used to place one drop of the undiluted specimens on successive fields. The pipette/Stir Sticks were retained for the mixing steps.

The RF Latex Reagent was gently re-suspended and one drop added to each test field. The pipette/Stir Sticks were used to spread reaction mixture over the entire test field.

The slide was rotated manually or with a mechanical rotor at 80-100 rpm for 2 minutes and read immediately under direct light.

Presence of agglutination of the latex particle was taken a positive result. Agglutination indicates a RF concentration of equal or more than 8 IU/ ml. Sera with positive agglutination were evaluated again with the Quantitative Test.

Quantitative Test

The reagents and specimens were brought to room temperature before use.

The Glycine-Saline Buffer was used to dilute the specimens into a ratio of 1:2, 1:4, 1:8, 1:16, 1:32 or as needed.

One drop of both the negative and positive controls was placed on two slide rings. One drop of each dilution was placed on successive fields of the reaction slide.

The RF Latex Reagent was gently re-suspended and one added drop to the reaction slide.

The RF Latex Reagent was gently re-suspended and one added drop to each test field. The pipette/Stir Sticks were used to spread reaction mixture over the entire field.

The slide was rotated for 2 minutes and read immediately under direct light.

Quality Control

RF Positive and Negative Control were included in each test batch.

Acceptable performance was indicated when a uniform milky suspension with no agglutination was observed with the RF Negative Control and agglutination with large aggregates was observed with RF Positive Control.

InterpretationQualitative Test

Negative Result: A negative reaction was indicated by a uniform milky suspension with no agglutination observed with the RF Negative Control.

Positive Result: A positive reaction was indicated by any observable agglutination in the reaction mixture. The specimen reaction was compared to the RF Negative and Positive Controls.

Semi-quantitative Test

The titer of the serum is the reciprocal of the highest dilution, which exhibits a positive reaction.

An estimate of the RF concentration in the specimen can be expressed in IU/ml by using the following equation:

$$\text{IU/ml of specimen} = \text{IU/ml of control} \times \text{specimen titer}$$

3. RESULTS AND DISCUSSION

Table 1: Results of Rheumatoid Arthritis Test

S/N	Positive Control	Negative Control	Test Result
1	+	-	-
2	+	-	-
3	+	-	-
4	+	-	-
5	+	-	-
6	+	-	-
7	+	-	-
8	+	-	-
9	+	-	-
10	+	-	-
11	+	-	-
12	+	-	-
13	+	-	-
14	+	-	-
15	+	-	-
16	+	-	-
17	+	-	-
18	+	-	-
19	+	-	-
20	+	-	-

Table 1 shows the first batch of twenty samples from the sample size with its positive control, negative control and test result. All the positive controls were positive and all the negative controls were negative. All result tested negative for the Rheumatoid Factor during the qualitative analysis.

Table 2: Results of Rheumatoid Arthritis Test

S/N	Positive Control	Negative Control	Test Result
21	+	-	-
22	+	-	-
23	+	-	-
24	+	-	-
25	+	-	-
26	+	-	-
27	+	-	-
28	+	-	-
29	+	-	-
30	+	-	-
31	+	-	+
32	+	-	-
33	+	-	-
34	+	-	-
35	+	-	-
36	+	-	+

37	+	-	-
38	+	-	-
39	+	-	-
40	+	-	-

Table 2 shows the second batch of twenty samples from the sample size with its positive control, negative control and test result. All the positive controls were positive and all the negative controls were negative. Only two samples with serial number 31 and 36 tested positive for the Rheumatoid Factor during the qualitative analysis.

Table 3: Results of Rheumatoid Arthritis Test

S/N	Positive Control	Negative Control	Test Result
41	+	-	-
42	+	-	-
43	+	-	-
44	+	-	-
45	+	-	-
46	+	-	+
47	+	-	-
48	+	-	-
49	+	-	-
50	+	-	-
51	+	-	-
52	+	-	-
53	+	-	-
54	+	-	-
55	+	-	-
56	+	-	-
57	+	-	-
58	+	-	-
059	+	-	-
60	+	-	-

The main purpose of this study was to determine the prevalence of rheumatoid arthritis on female patients of above child bearing age in University of Port-Harcourt Teaching Hospital. The sample size was 60. The study method adopted is the simple random sampling method (i.e. each female patient within the inclusive criteria had an equal chance to be chosen). After sample collection, the serological evaluation was carried out in a laboratory immediately. Three positive samples out of the 60 samples SN 31, 36 and 46. We observed positive test for the control test.

$$\frac{\text{Number of Sample that tested positive}}{\text{sample size}} \times \frac{100}{1}$$

i.e.

$$\frac{3.00}{60} \times \frac{100}{1} = 5.0\%$$

Jane *et al.*, (2006) in her study showed 4% greater than value of the world prevalence which was estimated to be 1%. This also is less than other previous researches such as the South African study that gave the prevalence of RA of Tswana of West Transvaal to be 0-1% (Beighton *et al.*, 1975), Henrietta Ogadimma Asuzu-Samuel (2021), in her study prevalence of rheumatoid arthritis on female patients of child-bearing age showed 5% ie 3 out of 60 samples. The possible reason for this greater prevalence could be as a result of the age of the subjects (above child-bearing) involved. For the higher prevalence of this study could also be due to environmental factors such as pollution. Hart *et al.* (2009), in a Study examined the distance between the place of residence in 2000 and the nearest road, which served as an indicator of exposure to pollution. Women living within 50 m of a road were found to have increased risk of RA, compared to women living 200 m or farther from a road. Thus, exposure to traffic pollution in adulthood may be a newly identified environmental risk factor

for RA. Using the same simply random method, exceptionally low prevalences were reported in Nigeria as whole and Hong Kong (Lau *et al.*, 1993). Some of the surveys on developing countries have flaw but there is now sufficient information to make the low frequencies credible even if it cannot be determined whether Third World levels are due to demographic variables such as early death of women with RA, under-reporting of mild diseases, absence of environmental causative factors or differences in genetic susceptibility.

The number of pregnant female patients in this study was thirty-five (35), this representing 58.3% of sample size. Only one of this category tested positive for RF factor (SN 46). The low incidence in this group (pregnant female patients) could be explained by other previous studies.

4. CONCLUSION

Rheumatoid arthritis in conclusion is characterized by autoantibodies production, synovial inflammation and hyperplasia associated with systemic disparity, progressive disability, early death, and socioeconomic costs. It's symptoms include stiffness in multiple joints and pain, decreased range of motion, fatigue, weight loss and fever. This study has shown that there was a high prevalence (5%), of rheumatoid arthritis in female patients of menopausal age in the University of Port Harcourt Teaching Hospital. It was suggested that environmental factors such pollution and age could contribute to this figure. *Christian mothers' disease as fondly called*, rheumatoid arthritis are mostly complained by women more than men and is associated with disability of lower limbs and joint pain around the knees. The relevance of this study was to ascertain the occurrence of rheumatoid arthritis in female patients of menopausal age which would serve as a useful tool in rheumatoid arthritis prevalence studies and study of the flare of the disease.

ACKNOLEGEMENTS

We acknowledge those menopausal subjects that participated in this study and University of Port Harcourt Teaching Hospital.

DISCLOSURE OF CONFLICT OF INTEREST

There is no conflict of interest between authors.

STATEMENT OF ETHICAL APPROVAL

This was sought and received from the University of Port Harcourt Teaching Hospital Ethical Committee and consent was received from each participated female subjects.

REFERENCES

- [1] Abdel-Nasser, A. M., Rasker, J. J., Valkenburg, H. A. (1997). Epidemiological and clinical aspects relating to the variability of rheumatoid arthritis. *Semin Arthritis Rheum* 27:123–140
- [2] Beighton, P., Solomon, L., Valkenburg, H. A. (1975). Rheumatoid arthritis in a rural South African Negro population. *Ann Rheum Dis* 34: 136–141
- [3] Carbonell, J., Cobo, T., Balsa, A., Descalzo, M. A., Carmona, L. (2008). The incidence of rheumatoid arthritis in Spain: results from a nationwide primary care registry. *Rheumatology*; 47:1088-92.
- [4] Darmawan, J., Muirden, K., Valkenburg, H., Wigley, R. (1993). The epidemiology of rheumatoid arthritis in Indonesia. *Br J Rheumatol*; 32:537-40
- [5] Firestein, G. S. (2003). Evolving concepts of rheumatoid arthritis. *Nature*; 423: 356-61.
- [6] Firestein, G. S., Kelly, W. N. (2009). Etiology and pathogenesis of rheumatoid arthritis: Kelly's textbook of Rheumatology. 8th edition. Philadelphia
- [7] Hart, J. E., Laden, F., Puett, R. C., Costenbader, K. H., Karlson, E. W. (2009). Exposure to traffic pollution and increased risk of rheumatoid arthritis. *Environ Health Perspective*; 117:1065–9.
- [8] Henrietta O. Asuzu-Samuel (2021). The Prevalence of Rheumatoid Arthritis on female patients of child-bearing age at University of Port Harcourt Teaching Hospital, Rivers State, Nigeria. *GSC Advanced Research and Reviews*, 08(02),001-007.

- [9] Huber L. C., Distler, O., Tarner, I., Gay, R. E. (2006). "Synovial fibroblasts: key players in of Family Physicians rheumatoid arthritis," *Rheumatology*, vol. 45, no.6, pp. 669-675.
- [10] Jane, W., Anne, B., Sally, L. (2006). The epidemiology of rheumatoid arthritis and the use linkage and association studies to identify disease genes.
- [11] Lau, E., Symmons, D., Bankhead, C., MacGregor, A., Donnan, S., Silman, A. (1993).Low prevalence of rheumatoid arthritis in the urbanized Chinese of Hong Kong.*J Rheumatol* 20: 1133–1137.
- [12] McGill P. (1991). Rheumatoid arthritis in sub-Saharan Africa.*Ann Rheum Dis* 1991.
- [13] Mendez- Bryan, R., Gonzales-Alcover, R., Roger, L. (1964).Rheumatoid arthritis in a tropical area.*Arthritis Rheum*;7:171-6
- [14] Moolenburg, J. D., Valkenburg, H. A., Fourie, P. B. (1986). A population study on rheumatoid arthritis in Lesotho, Southern Africa. *Ann Rheum Dis*; 45: 691-5.
- [15] Plenge, R.M. (2009). Rheumatoid arthritis genetics: 2009 update. *CurrRheumatol Rep* 2009; 11:351-6.
- [16] Singer, J., M., *et al.* (1956). *Proc Soc. Exp. Biol. Med* 68:1
- [17] Taborn, J.D., *et al.* (1979). Rheumatoid factor: 1 Review. *Lab Med*