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ORIGINAL ARTICLE

Rheumatoid arthritis among autoimmune diagnosed patients: A pilot study at Africa's third largest hospital

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Abstract

Context: Rheumatoid arthritis (RA) is one of the leading causes of disability worldwide. Its etiology remains a generational challenge that keeps evolving with time. Epidemiological studies on this disease have been conducted in several countries around the globe. Unfortunately, little research has been done on RA in Africa. Due to this, RA is given low priority in medical research and often neglected in Africa. **Aims:** This pilot study aimed at estimating RA prevalence in a representative proportion of autoimmune diagnosed patients within Ghanaian population attending the rheumatology clinic of Korle Bu Teaching Hospital (KBTH). **Setting and Design:** This is a pilot and cross-sectional study conducted at the KBTH. **Methods:** Patients attending the rheumatology clinic of the KBTH were the subjects for this cross-sectional study. Data acquisition involved questionnaire usage and review of medical records. **Statistical Analysis Used:** Chi-square cross tabulation on SPSS 16 and frequency charts in Microsoft Excel were used to analyze outcomes. **Results:** Most patients (*n* = 153 out of 225) were diagnosed RA. These RA diagnosed patients (*n* = 133/87%) were often seropositive for RF. The female gender (*n* = 131/85.62%) was diagnosed mostly. The disease peaked among 51–60 years age group and economically active patients (*n* = 118/77%). Among all the ethnic groups, the Akans were the most RA diagnosed tribe (*n* = 78/153). **Conclusion:** RA is indeed a chronic disease that has its signs and symptoms not well known among patients. It exists at a high prevalence among the Ghanaian population attending the rheumatology clinic.

Keywords: Akans, Ga-Adangbe, immunopathy, rheumatoid factor, rheumatology, seronegative

Introduction

Rheumatoid arthritis (RA) is one of the leading causes of disability worldwide. It is a public health threat that imposes a huge burden on the economy. Although this immunopathy primarily affects the synovium of joints, it also causes other systemic comorbidities. RA etiology remains a generational challenge that keeps evolving with time. The interplay between genes and the environment is a plausible cause. The gender often affected by this condition are females.[1]

Incidence and prevalence of RA vary globally. Risk factors including climatic changes, genetic factors, behavioral factors, and several others such as hormonal factors contribute to these worldwide fluctuations. The establishment of RA prevalence is very significant in that; it helps in the estimation of the disease burden on the economy and in the formulation of policy for health and disability diseases. Moreover, inference drawn from the results might help illuminate the etiology of the disease

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and improve the effectiveness and efficiency of health care delivery systems, especially in developing countries where the cost of health care delivery is expensive and sometimes unavailable in most parts of the country.[2,3]

Over the decades, epidemiological studies on RA have been conducted in several countries around the globe. Unfortunately, little research has been done on RA in Africa. This could be attributed to inadequate public education about the disease and its existence as compared to acute life-threatening diseases which include Malaria. In conformity to this fact, RA is given low priority in medical research and neglected in Africa. In spite of this, observations from RA studies carried out in some African countries show an increasing prevalence and severity in urban populations of Africa.[2-5] However, this raised a question of whether this result could be extrapolated to other African countries like Ghana. This prompted the researchers to embark on a pilot study to estimate RA prevalence in a representative proportion of autoimmune diagnosed patients within the Ghanaian populace attending the rheumatology clinic of Korle Bu Teaching Hospital (KBTH). This will help in the establishment of a strong surveillance system for chronic diseases including autoimmune disease which have been neglected in the country, assist the legislature in the formulation of good, and effective health care policies by including the treatment of such diseases in the National Health Insurance Scheme. This will go a long way in helping to reduce the cost involved in treating autoimmune diseases.

Methods

Study site and area

The rheumatology clinic of the KBTH was the site under investigation. The KBTH is the third largest health facility in Africa and the leading national referral hospital in Ghana. Currently, it has a bed capacity over 2000 and provides health services to both Ghanaians and foreigners. The rheumatology clinic at the hospital is a physician specialist clinic that provides health care services to both in-and out-patients with rheumatologic diseases and autoimmune conditions. In addition, it carries out treatment procedures including arthrocentesis and operates once a week.

Study design

The cross-sectional study involved 225 patients with ages ranging from 1 to 90 years. A fraction of these patients (n = 45/225) were recruited randomly during this 3 months study period at the clinic. The selection criterion was conducted via a ballot system and patients voluntary acceptance to participate in the study. The folder numbers which corresponded to these patients' identity were randomly selected among those patients attending the clinic. The rest (n = 180) were obtained from archives of the rheumatology clinic.

Data collection

The method of data acquisition was via the review of medical records of all patients included in this study and the usage of questionnaires to interrogate RA diagnosed patients. This questionnaire was pretested with five study subjects, and its contents were validated by two rheumatologists to weed out all ambiguities and enhance clarity. Information enquired in this questionnaire included the health status of patients, knowledge about the disease they have been diagnosed, and the self-medications administered to them. In addition, patients' information including sociodemographic details, diagnosed rheumatologic disease, and comorbidities were sought. Sociodemographic details of the patients included age, gender, occupation, and tribes. The age of patients was categorized into eight age groups: Below 21 years, 21–30 years, 31–40 years, 41–50 years, 51–60 years, 61–70 years, 71–80 years, and 81–90 years. The gender of patients was indicated as either male or female. Furthermore, details of the tribe of patients visiting the hospital for health care services were documented. These were the Akan (which included the Guan ethnic group for the purpose of this study), Ga/Adangbe which comprised both the Ga and Adangbe ethnic group in Ghana, the Ewe, the Northerners which constitute all the ethnic groups at the three northern regions in Ghana except the Guan, and the non-Ghanaians. Patients' occupational statuses (students, employed, unemployed, retired, and vocational) were classified into two groups based on their significance to the economic gross domestic product of Ghana. These groups were denoted as economically active and economically inactive. RA diagnosis was based on physician established report and in conformity to 2010 ACR/EULAR criteria for RA diagnosis.

Serology investigation

All patients had their serum tested for rheumatoid factor autoantibodies. Rheumatoid Factor autoantibody was tested using Taytec Latex Kit manufactured in Canada by Taytec Enterprise Incorporation. The RF kit functions based on the principle of latex agglutination assay of Singer and Plotz, which involves an immunological reaction between human IgG bound to biologically inert latex particle and rheumatoid factors in the test specimen. A positive result indicating presence of rheumatoid factor is identified by agglutination formation in the serum – RF reagent mixture.

Statistical analysis

Data were entered into a computer and analyzed using Microsoft Excel 2010 and SPSS Inc. Released 2007. SPSS

for Windows, Version 16.0. Chicago, SPSS Inc. Chi-square was used to test for an association between RA and patients' demographic details. This was done under a confidence level of 95%.

Ethical considerations

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee of the Department of Biomedical and Forensic Science – University of Cape Coast and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. Patients' confidentiality and anonymity were assured.

Results

This pilot study at the rheumatology clinic of the KBTH involved 225 patients as study participants. Out of these 225 study participants, 20% (45 patients) were available RA diagnosed patients who were interrogated via questionnaire at the clinic.

As illustrated in Table 1, 68% (153) of the study population were positive for RA diagnosis. However, 32% (72) patients were diagnosed with other rheumatologic diseases. The establishment of this diagnosis was based on physicians' report and in accordance to 2010 ACR/EULAR diagnosis criteria for RA.

Table 1: Description of sample population included in the rheumatoid arthritis pilot study

Variables	Frequencies in the study *n* (%)	
	Rheumatoid arthritis (*n*=153)	Other rheumatologic diseases (*n*=72)
Gender		
Men	22 (14.38)	7 (9.72)
Women	131 (85.62)	65 (90.28)
Age group/years		
Below 21	11 (7.19)	11 (15.28)
21-30	18 (11.77)	12 (16.67)
31-40	27 (17.65)	23 (31.94)
41-50	30 (19.61)	14 (19.44)
51-60	40 (26.14)	4 (5.56)
61-70	23 (15.03)	8 (11.11)
71-80	4 (2.61)	0 (0.00)
81-90	0 (0.00)	0 (0.00)
Ethnicity/tribe		
Akans	78 (50.98)	34 (47.22)
Ga-Adangbe	36 (23.53)	18 (25.00)
Ewes	26 (16.99)	16 (22.22)
Northerners	10 (6.54)	4 (5.56)
Non-Ghanaian	3 (1.96)	0 (0.00)
Rheumatoid factor status		
Positive	133 (86.93)	53 (73.61)
Negative	20 (13.07)	19 (26.39)
Occupation		
Economically active	118 (77.12)	19 (26.39)
Economically inactive	35 (22.87)	53 (73.61)

The 51–60 years age group recorded the highest prevalence for RA diagnosis (n = 40/26.14%) while the 81–90 years age group were the least RA diagnosed patients (n = 0/0%) as shown in Figure 1.

Among the RA diagnosed patients (n = 153), the Akan tribe recorded 78 (n = 50.98%) cases of RA, followed by Ga/Adangbe (n = 36/23.53%). Similar trend was achieved among the population of RA diagnosed patients attending the autoimmune clinic. These were Akans, 78/(78 + 34) = 69.8%; Ga-Adangbes, 36/(36 + 18) = 66.7%; Northerners, 10/(10 + 4) = 71.43.

With respect to gender, RA was found to be high among the females (n = 131/85.62%) than the males (n = 22/14.38%) as shown in Table 1. Estimate of the female-to-male gender ratio was about 6.14:1.

Among all the patients (n = 153) diagnosed of RA, about 77% (n = 118) were identified to be economically active while the rest (n = 35/29%) were found to be economically inactive.

Regarding the serological investigations, most RA diagnosed patients were seropositive for rheumatoid factor autoantibody (n = 133/86.92%) with only 20 RA diagnosed patients (13.08%) being seronegative. Furthermore, a highly significant association existed between seronegativity and RA diagnosis (Pearson χ^2 = 6.060, P = 0.014).

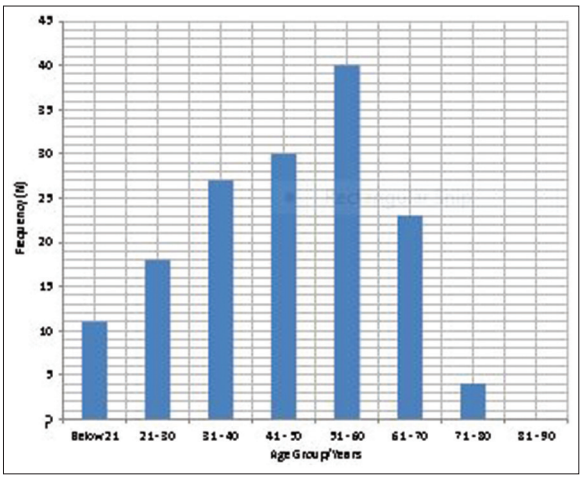

Figure 1: Indicates the trend of rheumatoid arthritis diagnosis among different age group at the rheumatology clinic of Africa's Third Largest Hospital

Data from the 45 patients who were further interrogated via questionnaire indicated that 43 (95.56%) patients were aware of the disease, 10 (22.22%) had knowledge of its existence, and 40 (88.89%) patients were taking some self-medication with the hope of relieving them of the symptoms of RA.

Discussion

The purpose of this cross-sectional study conducted at the rheumatology clinic of KBTH was to estimate RA prevalence in a representative proportion of autoimmune diagnosed patients within the Ghanaian population attending the rheumatology clinic of KBTH. Although results from this research are based on findings from the rheumatology clinic in KBTH (one of only two rheumatology clinics in the whole of Ghana), findings from this pilot study have established some important facts about RA in Ghana. The study shows that RA indeed exists among the Ghanaian population and its prevalence could be alarming if not investigated among the general population. In addition, its diagnosis is very high among females than men and knowledge on its signs and symptoms among RA diagnosed patients are poor.

From the prospective data acquired in this study, it is observed that most of these RA patients often fail to report their first experienced symptoms of RA immediately to physicians at the clinic. Rather, they resorted to misdiagnosis and self-medication (n = 40, 89%) with the aim of curing their misdiagnosed diseases as shown in Table 2. Misdiagnosis and self-medication are crucial matters of global interest in public health. These are interlinked with each other. In spite of their benefits in first aid practice, they have led to the development of drug resistance within the microbial community, a nightmare of the 21st century. Misdiagnosis and self-medication as have been reported among RA patients in this study occur when patients rely on their experience of signs and symptoms as a guide to aid them in the identification and usage of drugs to manage this condition. RA is inclusively characterized by joint pains as well. These symptoms, in the absence of a physician-certified diagnosis, mislead these RA patients to self-medicate to minimize the pains. This results in the increase of patient drug abuse cases since these self-medicated drugs are unable to either cure the disease or effectively minimize the disease burden. From the study, the high incidence rate of the misguided and self-diagnostic attempts recorded among RA diagnosed patients is attributed to patients' lack of knowledge about the disease. This factor could be a plausible cause of RA neglect in Africa.

Table 2: Awareness, knowledge and treatment behaviours of patients diagnosed of rheumatoid arthritis diseases

Patient response	Number of patients (%)		
	Yes	No	Total
Awareness of rheumatoid arthritis existence	43 (95.56)	2 (4.44)	45
Knowledge on disease signs and symptoms	10 (22.22)	35 (77.78)	45
Misdiagnosis and self-medication	40 (88.89)	5 (15.56)	45

RA was less frequent in men than in women as expected. Interestingly, the ratio of female-to-male RA diagnosis was 6.14:1. This ratio is higher than what is reported by Sakyi in Ghana.[6] Reasons for this result is often associated with sex hormones.[6,7] However in Ghana, additive effect of occupational exposure,[8] and sex hormones could likely be the cause of the increase in RA female gender ratio. The national statistical report indicates that the economy of Ghana is largely supported by women.[9,10] Although the nature of occupation of women may not be as strenuous as that of men often, the occupational risk ratio of women,[8] outweighs that of the men. This is because female makes up 51.2% of the national population structure.[9]

Furthermore, women have greater chances of developing RA than men.[11] Research shows that women respond with increased titers of antibodies as compared to men during experiences such as infection, trauma, and vaccination.[11] On the contrary, men respond to the above-mentioned stimuli with increased T helper (TH) 1 production and inflammation, unlike women who produce more TH 2-predominant immune response.[11]

According to Kavanaugh and Lipsky,[12] RA is diagnosed often in the 35–50 years age group in all populations. However, other studies have also reported a high prevalence of RA in patients 70 years and over.[1] In this study, RA was found to be mostly prevalent in the 51–60 years age group (26.14%). Little is known of this in literature. The fluctuating nature of the peak age for RA could be as a result of the varying geographical location of research, high infection and comorbidity rate at that location, regional variation in behavioral factors, climates, RA diagnosis, and varying genetic make-up of participants in the location. This conforms to the notion that the prevalence and incidence of RA vary from country to country and in different population within the same country.[13,14]

The study indicated varying the prevalence of RA among patients of different tribes attending the clinic. As has been indicated in Table 1, the Akan tribe which also includes the Guans has the highest RA prevalence

of 50.98% within the population of the RA diagnosed patients. However among all autoimmune patients at the clinic, the non-Ghanaian had highest RA prevalence of 100%, followed by the Northerners, 71.43%, the Akans, 69.64% and the Ewes, 61.90%. According to Carmona *et al*.,[13] factors that are responsible for such trends may be behavioral, climatic, environmental, RA diagnosis, and genetic factors. Nevertheless, in Ghana, the factors that are more likely to have caused such RA prevailing trend may be environmental, geographical, and variation in the population of the various ethnic group. Silicon in the environment proves to be a predisposing factor that prime significant biological alteration such as immune hyper-activation, production of reactive oxidation species, and tissue damage as experienced in RA.[15,16] Most patients who access the hospital and for that matter the rheumatology clinic for health service, often live close to the coastal sectors of the country. Rural-Urban migration is a major cause of this population drift.[17] Geographically a huge population of the Akan tribe is located close to the coastal sector of Ghana.[18] These coastal sectors are sandy areas which contain silicon as a major constituent of the sand particles. This chemical element can cause a series of pathological events which can cause and exacerbate autoimmune responses that enhance the development of RA.[16]

However, there may be the influence of some confounding factors on the ethnicity findings from this research. These factors which were not investigated in this study are related to issues of hospital accessibility among different ethnic groups in Ghana. Moreover, knowledge about this is not readily available in literature. Constraints such as financial inadequacy, the delirium that hospital is a transit place to the grave, demotivation as a result of absence of an escort to the hospital for assistive purposes, previous encountered trauma of hostile reception expressed by hospital staffs, and the higher preference for alternative medicine over orthodox medicine[19] can be a justifiable confounding factors to have affected the variation in the RA prevalence.

Formerly, RF testing used to be a major serological examination to establish RA diagnosis. However, in the 21st century, several research have indicated that RF production is not a pathognomonic sign of RA only,[20] but is also produced in many rheumatologic diseases such as systemic lupus erythematosus, connective tissue disease, and several disease including Hepatitis C virus, Malaria, and Rubella.[21,22] Recently, the screening of anti-cyclic citrullinated peptide (anti-CCP) autoantibody in serum has been identified to be a precise serological biomarker for RA diagnosis.[21,22] In spite of the high specificity of anti-CCP to RA diagnosis, the 2010 ACR/EULAR criteria for RA diagnosis recommends either RF or anti-CCP for the serological diagnosis of RA.[23] In this cross-sectional study, RF autoantibody was investigated due to the availability of the RF serological diagnostic kit during the study period unlike that of anti-CCP.

The RA study at KBTH showed 13.08% seronegative results for RF among patients. Seronegativity in RF in a population often ranges between 15% and 20%.[22,24] Its importance in RA diagnostic is not clearly understood. However, this study showed a significant association between rheumatoid factor and the diagnosis ($P = 0.01$). This may mean seronegativity in RA can be a useful tool in RA diagnosis if properly investigated.

Conclusion

RA should not be considered a neglected condition in Ghana, as has been the case for some time now. Its prevalence among patients attending the rheumatology clinic under the Department of Medicine of the KBTH in Accra was 68%. The tribe with the peak prevalence of RA within the RA diagnosed patients is the Akan. The middle age group of the population was mostly affected by this disease. It also appears to be more prevalent among females than men, at a ratio of 6.14:1. All these results could be suggestive of the fact that the economy might be affected since females and the middle age group of the population in general play a major role in the nation's productivity. The findings provide substantive evidence for future research on a larger study population in Ghana. Also, there is the need to conduct a public awareness forum to educate people about this discomforting disease and its signs and symptom.

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Conflicts of interest
There are no conflicts of interest.

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