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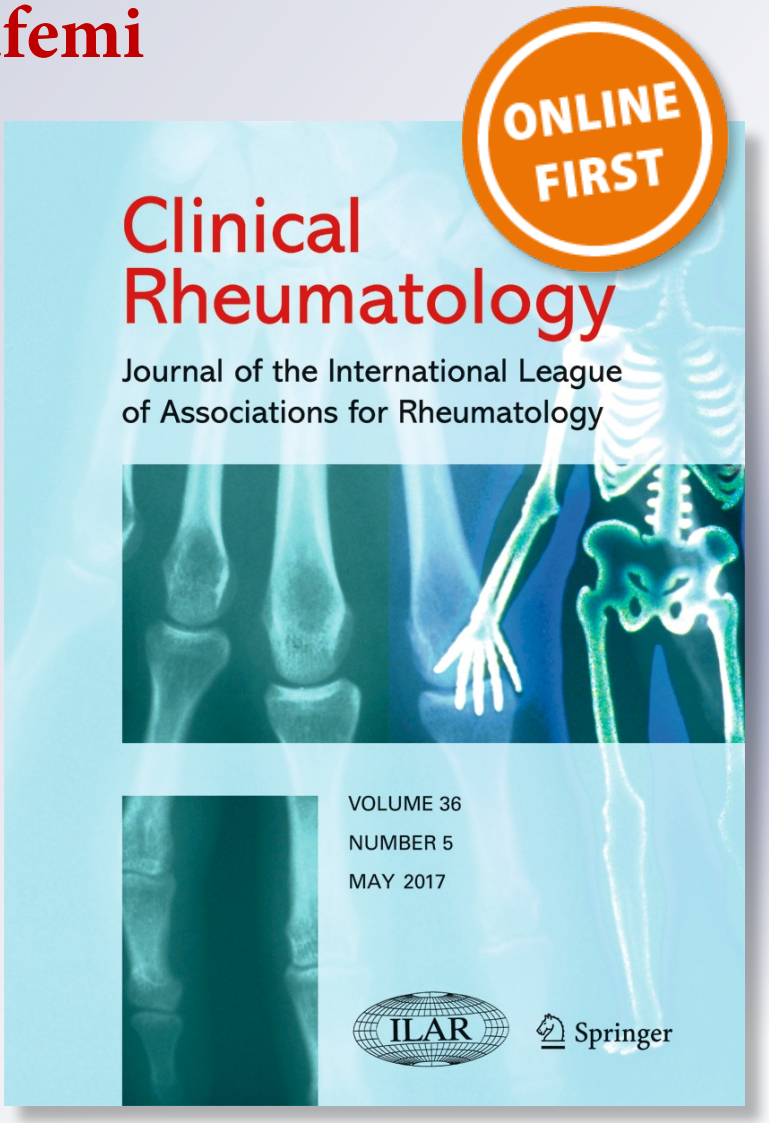
Clinical Rheumatology
Journal of the International League of Associations for Rheumatology

ISSN 0770-3198

Clin Rheumatol
DOI 10.1007/s10067-017-3648-z



Springer

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ORIGINAL ARTICLE

Prevalence of musculoskeletal diseases in a semi-urban Nigerian community: results of a cross-sectional survey using COPCORD methodology

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Received: 31 January 2017 / Revised: 14 April 2017 / Accepted: 19 April 2017

Abstract The International League of Associations for Rheumatology (ILAR) in collaboration with the World Health Organization (WHO) initiated the Community Oriented Program for the Control of Rheumatic diseases (COPCORD) to promote the growth of rheumatology in developing countries. This is the first COPCORD-type survey carried out in a West African community. The objective of this study was to determine the prevalence of musculoskeletal diseases in a semi-urban Nigerian community, using the COPCORD methodology. This is a cross-sectional total population survey, carried out in Katon Rikkos, Jos, Nigeria, from June 2015 to November 2016. All inhabitants of the community who are 15 years and older were included in the study, except those who were not available or refused to participate. Trained health workers from the community carried out a house-to-house survey, to administer the COPCORD questionnaire. People reporting musculoskeletal symptoms were examined and investigated at the teaching hospital, to determine the specific type of musculoskeletal diseases. Data was analyzed using Epi-info version 7.1.5 and *P* values of <0.05 were considered statistically significant. The median age of the study population was 33 (IQR 24–46) years, with a male to female ratio of 1:1.1. The prevalence of musculoskeletal disease was 33%. Females (57.0%) were more affected than males (43.0%); the most common form of musculoskeletal diseases diagnosed was osteoarthritis (22.0%). Male sex and a family history of musculoskeletal diseases were independent predictors of musculoskeletal diseases. A Health Assessment Questionnaire Disability Index (HAQ-DI) ≥1 was recorded in 14% of subjects with musculoskeletal diseases. The prevalence of musculoskeletal diseases in this community is high with significant disability; therefore, there is urgent need for increased access to rheumatology care in the community.

Keywords COPCORD · Jos · Musculoskeletal disease · Prevalence · Rheumatology

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Introduction

The International League of Associations for Rheumatology (ILAR) in collaboration with the World Health Organization (WHO) has been driving the need for the recognition of community rheumatology in developing countries, since the 1980s, with the initiation of the Community Oriented Program for the Control Of Rheumatic Diseases (COPCORD) and the declaration of the years 2000–2010 as the bone and joint decade [1–4]. Africa, unlike Asia and South America, has not responded adequately to this initiative. Tunisia and Egypt are the only African countries on the COPCORD map and recently Kenya carried out a stage 1 study [5, 6]. The mission of ILAR is to bridge the gap in knowledge and practice between the identification and care for musculoskeletal diseases in developing and developed countries. Therefore, the COPCORD methodology has

Published online: 26 April 2017

provided the avenue to train and engage local health workers in identifying and gathering data on musculoskeletal diseases, provide musculoskeletal health education to the population, as well as provide basic care to sufferers of musculoskeletal diseases while creating a referral path for further care in specialist centers [7, 8].

Rheumatologic services are scarce in Nigeria, with less than 10-trained rheumatologist serving a population of over 170 million people. There are no rheumatologists at the primary and secondary levels of care. There are no previously published COPCORD-type population surveys for musculoskeletal diseases in West Africa. We therefore undertook this project to lay the foundation for community rheumatology in Nigeria, by generating the data that will be useful in the planning and provision of rheumatologic services, training of community health workers in early recognition of common musculoskeletal diseases, and education of the general population on prevention and identification of musculoskeletal diseases, thereby contributing to bridging the existing gap in the identification and management of musculoskeletal disorders. Our aims were to use the COPCORD methods, to determine the prevalence of musculoskeletal diseases in a semi-urban population in Nigeria, and to determine the factors associated with musculoskeletal diseases in the community, as well as the degree of disability associated with musculoskeletal diseases in the affected population.

Materials and method

This is a cross-sectional total population survey carried out in Katon Rikkos, Jos, Nigeria from June 2015 to November 2016. All inhabitants of Katon Rikkos who are 15 years or older were included in the study based on previous COPCORD studies [9, 10], except those who were not available or refused to participate. The minimum sample size estimated for this study was 724, using appropriate sample size estimation formula for a cross-sectional study [11]. This was based on the prevalence of 36.2% from a previous COPCORD study with a statistical power of 80% (0.84), standard normal deviate at 95% confidence interval of 1.96, and precision of 0.05 [12].

Katon Rikkos is a semi-urban community located about 3.8 km from the Jos University Teaching Hospital (JUTH). The closest health care facility is the Primary Health Care (PHC) center in Laminga community, located about 2.9 km from Katon Rikkos. The indigenous ethnic group of the community is Afizere, which is one of the three major ethnic groups in Jos North LGA (others are Anaguta and Berom). The city of Jos is the administrative capital of both Jos North LGA and Plateau state (north central Nigeria). The state has an estimated population of 3.5 million people while the LGA has an estimated population of 429,300. Lamingo ward is one of the 6 administrative wards in Jos North LGA, the population of Lamingo Ward who are 15 years and above, from the 2006 national population survey, is put at 17,503, approximately 3000 of them live in Katon Rikkos [13].

Approval for this study was obtained from the ethical committee of JUTH and the community head of Katon Rikkos. Informed consent was obtained from every participant by signing or thumb printing on the consent form attached to the questionnaire.

Trained health workers went from house-to-house to administer the COPCORD questionnaire. The names and phone numbers of those not available at the time of the visit were obtained from families and neighbors and they were called to arrange convenient meeting time with the health workers.

The modified COPCORD questionnaire had five parts. Parts A and B were filled by all participants, to capture basic demographic data including family, social and medical history as well as the presence or absence of musculoskeletal symptoms, respectively, with the use of a human mannequin to precisely localize the site of pain, swelling, and/or stiffness. Musculoskeletal symptoms were categorized as either current (within the last 7 days) or past (more than 7 days ago). Those with negative musculoskeletal symptoms did not complete parts C, D, and E, which dealt with the impact of musculoskeletal symptoms on quality of life, activities of daily living (Health Assessment Questionnaire (HAQ); graded from 0, no disability, to 3, severe disability), and treatment measures already taken by the subject, respectively. People reporting positive musculoskeletal symptoms, were examined and investigated at the rheumatology unit of the teaching hospital, by a rheumatologist, to determine the specific type of musculoskeletal diseases within 4 weeks of the survey. Diagnoses were based on established criteria [14–19]. Soft tissue rheumatism (STR) in this study was assessed as any disorder affecting periarticular structures including muscles, tendons, ligament, and capsules.

Epi-Info version 7.1.5 (CDC Atlanta USA) software was used for data analysis. The prevalence of musculoskeletal diseases and their categories are provided as a percentage of the total population, while the distribution of musculoskeletal diseases across various strata is stated in absolute figures and percentages.

Chi-squared test was used to compare the occurrence of risk factors between those with musculoskeletal disease and those without, while multiple logistic regression was used to determine the predictors of musculoskeletal diseases.

The degree of disability associated with musculoskeletal diseases was calculated from the Health Assessment Questionnaire Disability Index (HAQ-DI), with a score of ≥1, considered as significant disability (ranging from moderately severe to very severe disability) [20].

Results

The target population was 3000, but 2454 participants completed the questionnaire giving a response rate of 81.8%, (50.3% females) with a median age of 33 (IQR 24–46) years; 26 subjects (0.9%) declined, 520 (17.3%) were not available. The median age for males was 33 (IQR 24–47) years while that of females was 32 (24–45) years. One thousand three hundred and eighty-six (56.4%) were married and 113 (4.6%) had a history of smoking as shown in Table 1.

A total of 811 subjects had a history of current or past musculoskeletal symptoms, giving a period prevalence of 33.0% (95% CI 31.2–35.0%). Majority (731) reported current symptoms giving a point prevalence of 29.7% (95% CI 27.9–31.6%), while 80 (3.3%) gave a history of past musculoskeletal symptoms, Table 2.

Females, 461 (57.0%), were more affected than males, 350 (43.0%). The median age of subjects reporting musculoskeletal symptoms was 40 (IQR 30–53) years vs. 30 (22–41) years for those without symptoms. All those with musculoskeletal symptoms were invited to the teaching hospital for further evaluation; only 328 (40.4%) responded to the invitation; 254 (77.4%) of them required radiographic and blood tests to classify their musculoskeletal disease appropriately.

The most common form of musculoskeletal diseases diagnosed was osteoarthritis (OA), 179 (22.0%; 95% CI = 19.3–25.1%), and STR, 126 (15.5%; 95% CI = 13.1–18.2%), as shown in Table 3. No case of SLE was seen.

The prevalence of musculoskeletal diseases increased with age, from 16.3% in the 15–24 years age group to 56.5% in subjects who are 65 years and older ($\chi^2 = 173.47$, $P = 0.001$). There were 1234 females vs. 1220 males in the study population; the prevalence of musculoskeletal diseases in the female population was 461 (37.3%) vs. 350 (28.6%) in the male population ($\chi^2 = 20.83$, $P = 0.001$).

The prevalence of musculoskeletal diseases, decreased from 49.8% in subjects with informal education, to 38.6% in those with postgraduate education, the lowest prevalence was seen in those with secondary education 26.2%, ($\chi^2 = 68.79$, $P = 0.001$). Increasing literacy was also inversely associated with the prevalence of musculoskeletal diseases, as prevalence decreased from 58.6% in subjects who could not read nor write, to 35.6% in those who could only read and 30.0% in those who could both read and write ($\chi^2 = 72.31$, $P = 0.001$). A history of smoking found in 113 (4.6%) subjects in the study population was associated with the prevalence of musculoskeletal disease; as 57 (50.4%) subjects with a history of smoking had musculoskeletal symptoms vs. 754 (32.2%) of the 2341 subjects who had never smoked ($\chi^2 = 16.19$, $P = 0.001$).

The prevalence of musculoskeletal diseases in subjects with a history of diabetes was 48.3 vs. 32.6% in non-diabetics ($\chi^2 = 6.76$, $P = 0.009$), while 63.8% of those with a history of trauma had musculoskeletal symptoms compared to 32.3% ($\chi^2 = 25.37$, $P = 0.001$) of those without such history. A family history of musculoskeletal disease was also associated with the prevalence of musculoskeletal disease in the study population as 51.1% of those with family history of musculoskeletal diseases also reported musculoskeletal symptoms ($\chi^2 = 63.72$, $P = 0.001$).

Table 1 Sociodemographic characteristics of the study population

Variable	Frequency (%) $n = 2454$
Age (years)	
15–24	648 (26.4)
25–34	682 (27.8)
35–44	454 (18.5)
45–54	320 (13.0)
55–64	205 (8.4)
≥65	145 (5.9)
Sex	
Female	1234 (50.3)
Male	1220 (49.7)
Marital status	
Single	943 (38.4)
Married	1386 (56.5)
Divorced	25 (1.0)
Widowed	100 (4.1)
Education	
Informal	263 (10.7)
Primary	292 (11.9)
Secondary	1157 (47.2)
Tertiary	654 (26.6)
Postgraduate	88 (3.6)
Literacy	
None	215 (8.7)
Read only	216 (8.8)
Read and write	2039 (82.4)
Occupation	
Unemployed	73 (3.0)
Unskilled	1122 (45.7)
Student	572 (23.3)
Semi-skilled	345 (14.1)
Skilled	194 (7.9)
Professional	99 (4.0)
Retired	49 (2.0)
Habits	
Ever drank alcohol	281 (11.5)
Currently drinking	170 (6.9)
Ever smoked	113 (4.6)
Currently smoking	52 (2.1)
Recreational drugs	28 (1.1)

Table 2 Prevalence and site of musculoskeletal symptoms

Variable	Frequency (%, 95% CI)	Frequency (%, 95% CI)
Musculoskeletal disease	811 (33.0, 31.2–35.0%)	
	Current	Past
	731 (90.1, 87.9–92.1%)	80 (9.9, 7.9–12.1%)
Site		
Multiple	428 (52.7, 49.3–56.3%)	31 (3.8, 2.6–5.4%)
Single	303 (37.4, 34.0–40.8%)	49 (6.0, 4.5–7.9%)
Single sites		
Low back	134 (44.2, 38.6–50.0%)	24 (49.0, 34.4–63.7%)
Knee	97 (32.0, 26.8–37.6%)	9 (18.4, 8.8–32.0%)
Feet	19 (6.3, 3.8–9.6%)	2 (4.1, 0.5–14.0)
Ankle	16 (5.3, 3.1–8.4%)	4 (8.2, 2.3–19.6%)
Shoulder	10 (3.3, 1.6–6.0%)	3 (6.1, 1.3–16.9%)
Hip	7 (2.3, 0.74–5.4%)	1 (2.0, 0.05–10.9%)
Wrist	6 (2.0, 0.73–4.3%)	1 (2.0, 0.05–10.9%)
Hands	6 (2.0, 0.73–4.3%)	0 (0.0, 0.0–7.3%)
Ribs	2 (0.7, 0.08–2.4%)	2 (4.1, 0.5–14.0%)
Neck	1 (0.3, 0.01–1.8%)	0 (0.0, 0.0–7.3%)

Multiple logistic regression was used to determine factors that were independent predictors of musculoskeletal diseases. Nine variables with P value <0.05 in bivariate analysis were included in the model because of their statistical and clinical association with the prevalence of musculoskeletal diseases. Only sex and a family history of musculoskeletal diseases were found to be predictors of musculoskeletal diseases as shown in Table 4.

Eighteen people changed work, only 2 (11.1%) was due to musculoskeletal disorders, while 176 subjects (apart from the 18 that changed work) had stopped working all together due to health-related reasons. Musculoskeletal disorder, 27 (15.3%) was the third most common reason for stopping work due to ill health, 34 (19.3%) stopped as a result of accident injuries, 24 (13.6%) stopped on account of non-accident injuries, while 91 (51.7%) stopped as a result of other illnesses. However, the occurrence of musculoskeletal diseases was significantly associated with stopping work, as 103 (58.5%) of the 176 subjects who had stopped working, reported musculoskeletal symptoms (OR = 3.12, 95% CI = 2.28–4.27, χ^2 = 55.60, P = 0.001). Sleep disturbance was recorded in 40.9% of subjects with musculoskeletal symptoms (OR = 1134.65, 95% CI = 158.93–8100.52, P = 0.001), while 18.3% reported that they were depressed by their musculoskeletal symptoms (χ^2 = 319.27, P = 0.001).

Table 3 Clinically diagnosed musculoskeletal diseases

Diagnosis	Frequency (%)	95% confidence interval
Osteoarthritis	179 (22.1)	19.3–25.1
Soft tissue rheumatism	126 (15.5)	13.1–18.2
Fibromyalgia	12 (1.5)	0.8–2.6
Rheumatoid arthritis	3 (0.4)	0.08–1.1
Costochondritis	3 (0.4)	0.08–1.1
Juvenile idiopathic arthritis	2 (0.3)	0.03–0.9
Gout	1 (0.1)	0.0–0.7

The median HAQ-DI, among subjects with musculoskeletal diseases was 0.5 (IQR 0.25–0.75). A significant disability index was found in 119 (14.7%) subjects. Subjects with osteoarthritis had more disability as HAQ-DI ≥1 was recorded in 39 (21.7%) of them compared to 11 (8.7%) subjects with STR and 2 (16.6%) of the subjects with fibromyalgia. Only 1 of the 3 subjects with rheumatoid arthritis had a disability index ≥1 and none of the subjects with juvenile idiopathic arthritis or gout had significant disability index.

Respondents attributed symptoms of musculoskeletal disease to various causes, such as occupation related 134 (16.5%) and exposure to cold, 131(16.2%), among others (Fig. 1).

Over the counter treatment, 497 (61.2%) was found to be the most common source of treatment used by subjects in the study population (Fig. 2).

Discussion

This is the first unselected musculoskeletal disease survey carried out in a Nigerian community using the COPCORD methodology.

Musculoskeletal disease was defined by past and present symptoms including pain, stiffness, and limitation of function.

Table 4 Predictors of musculoskeletal disease

Variable	Odds ratio	95% confidence interval	*P* value
Age groups (years)			
15–24	1	–	–
25–34	0.3	0.17–0.57	*<0.001*
35–44	0.5	0.29–0.82	*0.007*
45–54	0.6	0.35–0.96	*0.03*
55–64	0.8	0.48–1.29	0.35
≥65	0.9	0.57–1.53	0.81
Sex			
Female	1	–	–
Male	1.6	1.30–2.00	*<0.001*
Marital status			
Single	1	–	–
Married	0.5	0.20–1.28	0.15
Divorced	0.6	0.24–1.43	0.25
Widowed	0.7	0.27–1.94	0.53
Literacy			
None	1	–	–
Read only	2.1	1.34–3.40	*0.001*
Read and write	0.9	0.61–1.31	0.56
Occupation			
Unemployed	1	–	–
Unskilled	0.6	0.27–1.50	0.30
Semi-skilled	0.6	0.28–1.25	0.37
Skilled	1.0	0.51–2.03	0.96
Professionals	1.3	0.67–2.87	0.38
Retired	1.2	0.56–2.71	0.59
Smoking			
No	1	–	–
Yes	0.5	0.29–1.08	0.85
Alcohol			
No	1	–	–
Yes	0.5	0.33–0.87	0.12
Family history			
Absent	1	–	–
Present	2.1	1.33–3.40	*0.002*
Diabetes			
Absent	1	–	–
Present	1.3	0.74–2.43	0.340

The figures in italic indicate statistical significance

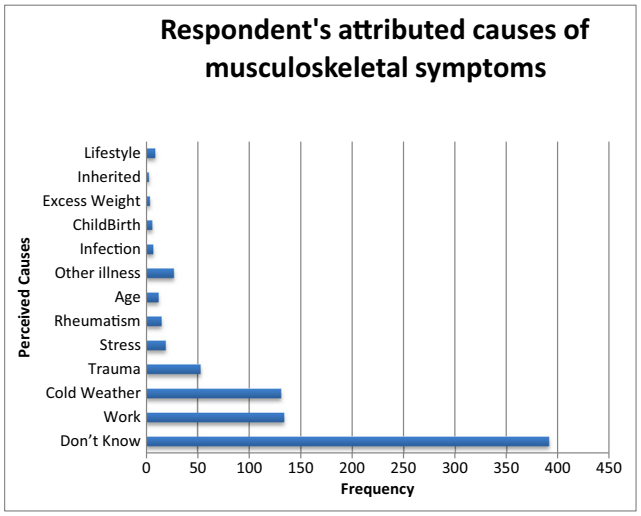

Fig. 1 Respondent's attributed causes of musculoskeletal symptoms

In our study population, about a third met the criteria for musculoskeletal disease; most of them had current symptoms.

The prevalence of musculoskeletal disease in this population is similar to other COPCORD studies [9, 10, 12, 21–24]. The prevalence of musculoskeletal diseases increased with increasing age on univariate analysis, but this association was not sustained on multiple logistic regression, probably because only a minority of the study population was in the elderly age group. As in most COPCORD surveys, there was a female preponderance to musculoskeletal diseases despite having an almost 1:1 population ratio; however, male sex and a family history of musculoskeletal diseases were factors that independently predicted the occurrence of musculoskeletal diseases on logistic regression. Educational attainment was excluded from logistic regression because it did not a follow a consistent trend in its association with the prevalence of musculoskeletal disease, while the effect of literacy in predicting musculoskeletal diseases appeared rather spurious. This may be supportive of the position that self-rated literacy level does not adequately explain educational differences in health and disease with suggestion of further studies to clarify this relationship [25].

Most patients with musculoskeletal symptoms reported multiple sites for their symptoms; however, the most frequent individual site of symptom was the back, similar to other COPCORD reports [26]. Out of the 158 subjects with back pain, 77 presented to the teaching hospital for further evaluation. Their final diagnosis was between lumbar spondylosis (OA), 59.7% and paraspinal muscle spasm (STR) 40.3%; based on X-ray finding of hypolordosis without the features of osteoarthritis. Osteoarthritis was the most common diagnosis made in this study, irrespective of the site, as was the case in many other COPCORD surveys [27]. However, it is noteworthy that osteoarthritis remained the most prevalent diagnosis in spite of the predominant young age of this population. This may be attributable to the highly physical nature of their occupation, mainly manual (skilled and unskilled) labors, but further studies may still be required to clarify this finding.

A high degree of disability was recorded in 14% of our study population. This is important in our setting where most functions are carried out manually. The personal and economic cost of disability may be reducing in the developed world, where trends toward artificial intelligence and automated machines are helping out in many everyday functions, but for a

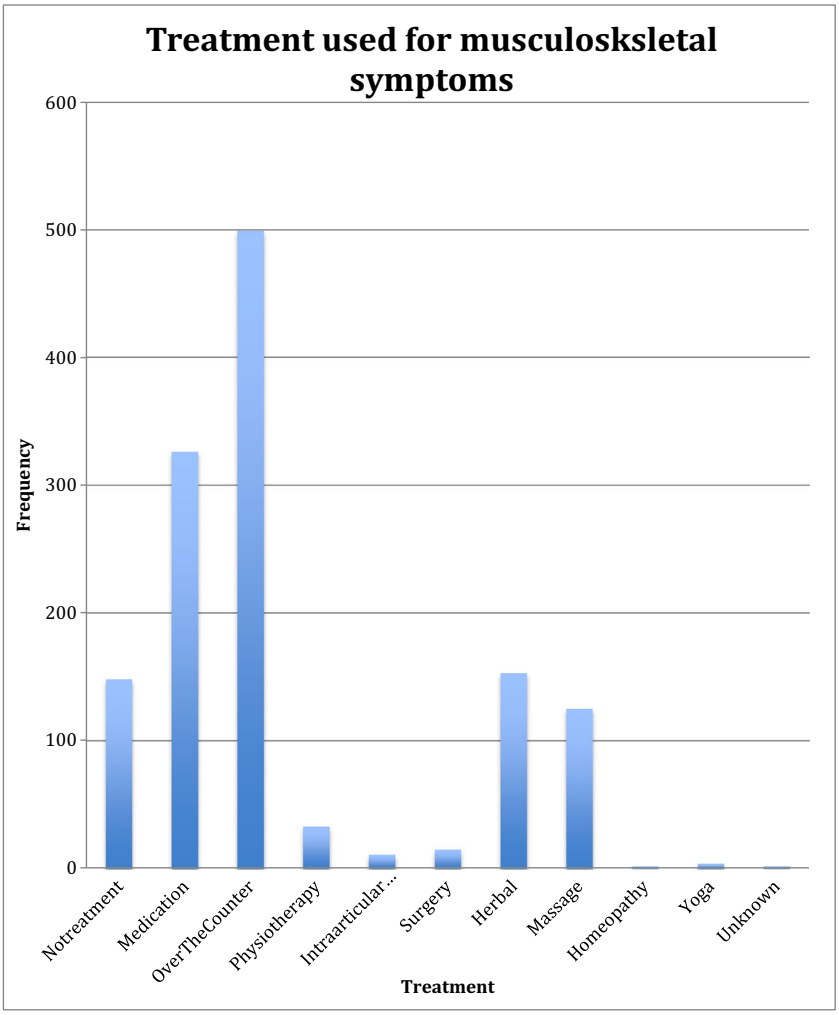

Fig. 2 Treatment used for musculoskeletal symptoms

person with musculoskeletal-related disability in the developing world, the cost of daily living from domestic to office-related activities may be enormous and difficult to quantify. This has been shown to further limit access to health care in low- and medium-income countries [28]. The self-reported functional disability was much higher than recorded in Australia, Canada, Cuba, and the Philippines but much lower than reported in India [21].

Subjects in this population preferred over-the-counter treatment to seeking the help of a physician. This poor attitude toward hospital-based care may be responsible for the very high HAQ-DI recorded in this population and the low response to the second phase of this study, despite the closeness of the teaching hospital to the community and the assurance of free investigations and treatment. Nigerians have been shown to have very poor health seeking attitude [29], probably as a result of the more traditional reliance on alternative medical practitioners. Therefore, the need for health education in our population is still very great.

Health care policy makers in Nigeria need to pay attention to the very high prevalence of musculoskeletal diseases and the associated disabilities in the communities, by providing quality education, more primary health care facilities, as well as training of community health workers to identify and refer subjects with musculoskeletal diseases. The rheumatology work force in the country needs to increase significantly, to make rheumatology care available at the community level. There is need for more and larger COPCORD-type population surveys in sub-Saharan Africa, to clarify some of the findings in this study, including the very low prevalence of inflammatory arthritides, despite increasing prevalence reported in hospital-based studies with subjects from very wide geographical coverage and highlight the enormous burden of musculoskeletal diseases in the continent [30].

Limitations to this study include the lack of information about those who did not participate; therefore, no comparison can be made with those that participated. However, this is unlikely to significantly affect the outcome of the study as more than 80% of the population participated. Also, the low response to the invitation for further evaluation in the teaching hospital may have affected the diagnoses of specific musculoskeletal diseases but not the prevalence and predictors of

musculoskeletal diseases (except for body mass index which could not be reported in this study because of the low turnout for physical examination), as these were based on history collected at the community level. The predominantly young age of the study population may have eroded the effect of age as a predictor of musculoskeletal disease in this study. Therefore, it will be imperative to further study the prevalence of osteoarthritis among younger population.

Acknowledgements The International League of Associations for Rheumatology project 2015 funded this work.

We also received additional support from the Medical Education Partnership Initiative in Nigeria (MEPIN) project funded by Fogarty International Center, the Office of AIDS Research, and the National Human Genome Research Institute of the National Institute of Health, the Health Resources and Services Administration (HRSA), and the Office of the U.S. Global AIDS Coordinator under Award Number R24TW008878.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding organizations.

Compliance with ethical standards

Disclosures None.

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