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The Prevalence and the Determinants of Musculoskeletal Diseases in Emiratis Attending Primary Health Care Clinics in Dubai

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ABSTRACT

Objectives: To estimate the prevalence of rheumatic diseases in the Emiratis attending primary health care (PHC) clinics in Dubai. The secondary objective was to study the relationship between age, gender, and body mass index (BMI) and rheumatic diseases in the general population. ***Methods***: The Prevalence of Rheumatic Diseases and Osteoporosis (PRO) in Dubai study was a cross-sectional study, which randomly enrolled Emiratis' aged between 18–85 years old who attended one of 13 PHC clinics between 2 January 2009 and 31 December 2009. Demographic and health data for all participants was obtained via a questionnaire. Participants that indicated positive answers had their responses validated by a rheumatologist and underwent a thorough locomotor examination. ***Results:*** The study included 3,985 participants with a mean age of 42.1±15.8 years. The majority (77.4%) were female. Lower back pain was the most prevalent problem in our study population (32.9%). Knee osteoarthritis (OA) was the most common form of arthritis seen in our cohort (25.8%). Overall, the prevalence of inflammatory arthritis was 3.1%. Age and BMI were associated with increased risk of knee OA and lower back pain. ***Conclusions:*** Rheumatic diseases are quite common in Emirati patients attending PHC clinics. Lower back pain and knee OA were the most common musculoskeletal diseases seen in our cohort. There is a need for more population-based studies in the Middle East to have a better understanding of the epidemiology of rheumatic diseases in this region.

Musculoskeletal diseases are common disorders in the general population.[1,2] Lower back pain and other musculoskeletal diseases are among the leading causes of disability in the UAE.[3] Few studies in the Middle East have looked into the prevalence of the rheumatic diseases in the general population. Some of these studies have described the prevalence of different musculoskeletal disorders in the community.[4,5] Others have reported the prevalence of a specific disease in the general population.[6,7] Surprisingly, studies that have broadly looked at rheumatic disorders have reported wide-range prevalence for the same disease.[5,8] Even in studies that have used the same protocol, such as in the Community Orientated Program for the Control of Rheumatic Diseases (COPCORD) publications, investigators were allowed some flexibility using different sets of classification criteria to classify the same disease in different countries.[9]

Furthermore, few studies in this part of the world that have investigated the influence of gender, age, and body mass index (BMI) on the occurrence of rheumatic diseases.[6,7,10] So far, no study has looked broadly at the prevalence of rheumatic diseases in Emiratis in the UAE. Our study attempted to explore the prevalence and the determinants of musculoskeletal disorders in Emiratis attending primary health care (PHC) clinics in Dubai, and study the relationship between age, gender, and BMI.

METHODS

The Prevalence of Rheumatic Diseases and Osteoporosis in Dubai (PRO Dubai) study, was a cross-sectional study that took place between 2 January 2009 and 31 December 2009. We randomly invited Emiratis aged between 18 and 85 years old who attended any one of 13 PHC clinics (out of 16) in Dubai during the study period to participate

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in the study. Eleven clinics were located in urban areas, and two were in rural areas. We excluded three clinics as only a small group of Emiratis registered at those clinics. A randomization list for recruiting participants from their respective PHC clinic waiting areas was generated on a monthly basis.

In June 2008, the population of Emiratis aged between 18 to 85 years living in Dubai was 143,650. The majority (95.6%) of those subjects were registered with Dubai government PHC clinics in June 2008. The studied sample size of 4,667 subjects was predetermined based on the reported Emirati population living in Dubai on 1 June 2008 using a sample size calculator with a confidence level of 95%, confidence interval (CI) of 1.55, and possible 20% drop out.[11]

We included all Emirati's aged 18–85 years attending PHC clinics, and living in Dubai in our study and excluded Emirati nationals living outside Dubai but who were attending Dubai PHC clinics. Subjects younger than 18 years or older than 85 years old, and those with mental illness or mental handicap were excluded from the study.

The PRO Dubai study consisted of three phases. All subjects who agreed to participate provided their written informed consent and attended the initial interview in phase one of the study. This was conducted by two trained research nurses. The interview process and answer reporting technique used was standardized in the pilot phase of the study (4–31 December 2008). The assessed Kappa coefficient between the two interviewers was 0.87 at the end of the pilot phase. The initial interview involved completing a questionnaire that included demographic data (date of birth, gender, level of education, marital status, weight, and height), GALS locomotor screening questions (to assess gait, arms, legs, and the spine),[12] a question regarding the quality of the night sleep, shading the corresponding area of pain in the last three months on a manikin, and the International Osteoporosis Foundation One-Minute Osteoporosis Risk Test. All subjects provided their medical history of chronic disease and underwent a quantitative ultrasound (QUS) of their right calcaneal bone using the Achilles InSight (GE Healthcare, Madison, WI, US).

Phase two was limited to those subjects with positive answers to GALS screening questions, or who had shaded an area of pain in the last three months on the manikin, or a T-score greater than −1.5 on QUS. Phase two involved validation of the positive answers by a rheumatologist who performed a thorough locomotor examination within one week of the initial interview. Phase three was limited to those with rheumatic disorders. These patients were referred and managed in a secondary care setting.

Rheumatic diseases were classified according to American College of Rheumatology (ACR) classification criteria for rheumatoid arthritis (1987), knee osteoarthritis (1986), systemic lupus erythematosus (1997 updated), gout (1977), and fibromyalgia (1990). Ankylosing spondylitis was classified using the modified New York criteria and spondyloarthropathies (SpA) were classified using the European Spondyloarthropathy Study Group criteria. Classification criteria for Benign Joint Hypermobility Syndrome (BJHS) were used to classify patients with BJHS. Lower back pain was defined as pain in the lumbar and/or gluteal region. Carpal tunnel syndrome was classified according to the May 2007 American Academy of Orthopedic Surgeons guidelines.

We categorized three variables (gender, age, and BMI) into subcategories. Gender was subcategorized into male and female. Age was subcategorized according to the participants age on 31 December 2009; 18–40 years, 41–60 years, and > 60.1 years. BMI was subcategorized into four subcategories: underweight (BMI < 18.5), normal weight (BMI = 18.51–25.00), overweight (BMI = 25.01–30.00), and obese (BMI > 30.01). Similarly, rheumatic diseases were categorized into category zero (patients without disease), and category one (patients with the rheumatic disease of interest). The data was captured on hard copy clinical research form. The validity of the data captured was checked by a third party with a target of less than one entry error per 1,000 entered variables.

We analyzed the data using SPSS Statistics (SPSS Inc., Chicago, US) version 15. We calculated the frequency of rheumatic diseases and the frequencies and the mean values of demographic data. All mean values are expressed as mean ± standard deviation (SD) of the mean. We used the Student's *t*-test to compare normally distributed independent variables and the Mann-Whitney U test to compare non-normally distributed independent variables. We used contingency table analysis to calculate the odds ratio (OR) and CI of various rheumatic diseases with respect to gender, age, and BMI. The chi-square test

Table 1: Demographic characteristics of the population studied according to gender.

Variables	Total, % n = 3985	Gender, %		Mann-Whitney U	
		Male, n = 901	Female, n = 3084	Z-value	Asymptomatic significance (2-tailed)
Age, years					
Mean±SD	42.1±15.8	47.3±16.9	40.5±15.1	–1.95	$p = 0.051$
Median	41.0	46.0	40.0		
Age group, years					
18–40	49.2	40.3	51.8		
41–60	36.3	33.3	37.2		
>60.1	14.5	26.3	11.0		
BMI, kg/m²					
Mean±SD	28.8±6.3	28.2±4.9	28.9±6.6	–10.52	$p < 0.001$
Median	28.1	27.8	28.3		
BMI, kg/m²					
<18.5	3.4	2.0	3.8		
18.51–25.00	25.4	22.7	26.1		
25.01–30.00	32.6	42.3	29.7		
≥ 30.01	38.7	33.0	40.4		

Table 2: The prevalence of rheumatic diseases in the general population and according to gender.

Diseases	Total, % n = 3985	Gender, %	
		Male (n = 901)	Female (n = 3084)
RA	0.9	0.1	1.1
Seronegative spondyloarthropathy	2.2	1.9	2.3
Psoriatic arthritis	0.3	0.6	0.2
Ankylosing Spondylitis	0.1	0.1	0.0
Enteropathic arthropathy	0.0	-	0.0
Undifferentiated seronegative	1.6	1.1	1.8
Reactive arthritis	0.1	-	0.2
Systemic lupus erythematosus	0.1	-	0.1
Knee OA	25.8	27.8	25.2
Fibromyalgia	1.36	0.6	1.6
STR	7.0	8.2	6.7
Bursitis	2.0	2.0	2.0
Tendonitis	5.0	6.2	4.7
BJHS	2.8	1.7	3.1
Carpal tunnel syndrome	0.9	0.3	1.1
Gout	0.1	0.3	0.0
Lower back pain*	32.3	30.7	32.75
Osteopenia	22.4	16.3	24.2
Osteoporosis	3.1	2.7	3.2

BJHS: Benign joint hypermobility syndrome; STR: soft tissue rheumatism.
**Defined as pain at the lumbar and/or gluteal region.*

was used to assess the statistical significance of the association between rows and columns; a two-sided p-value < 0.050 was considered significant.

The binary logistic regression analysis model was used to determine the effect of gender, age, and BMI on the presence or absence of a rheumatic disease after controlling for other factors. We used the 18–40 year old age group and the normal weight BMI group as reference categories for subsequent analysis of age and BMI, respectively. We assessed how an individual model performed using omnibus tests of model coefficients, and the "goodness of fit" using Cox & Snell R-square, Nagelkerke R Square, and Hosmer and Lemeshow tests. The results of variables of the equation were expressed as OR 95% CI and significant p-value.

PRO Dubai was approved by the ethical committee of Dubai Health Authority. Before participating in the study, we clearly educated the participants on the objectives of the study and the subsequent referral to secondary care, if needed. We highlighted their right not to participate in the study and to withdraw at any time. Data confidentiality was maintained throughout the study.

RESULTS

We randomly invited 5,000 subjects to take part in the study, 4,322 agreed. We excluded 305 subjects as they were living outside Dubai. Furthermore, we

Table 3: The individual association of different rheumatic diseases with gender, age, and body mass index (BMI).

Rheumatic diseases	Gender		Age compare to subjects aged 18–40 years				BMI compared to 18.5–25					
	Female/Male+		41–60 years		>60.1 years		<18.5		25.1–30.0		>30.1	
	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI
RA	7.5*	1.1– 55.1	2.4*	1.2–4.9	1.2	0.4-3.9	1	0.1–8.4	1	0.4–2.7	1.6	0.6–3.8
SpA	1.2	0.7–2.0	0.8	0.5–1.3	0.1***	0.01-0.4	0.3	0.0–2.0	0.8	0.5–1.4	0.8	0.5–1.4
Lupus	0.6	0.1–6.6	0.5	0.0–4.3	1.1	0.12	3.6	0.3–39.5	0.4	0.03–4.2	0.6	0.1–4.5
Knee OA	0.9	0.7– 1.0	7.5***	6.1–9.1	18.5***	14.6–23.3	0.4**	0.2–0.7	2.2***	1.8–2.7	3.0***	2.5–3.8
Fibromyalgia	2.9*	1.2–7.2	1.6	0.9–2. 7	0.8	0.3–1.9	1.4	0.4–4.3	0.7	0.4–1.4	0.6	0.3–1.1
Soft-tissue rheumatism	0.8	0.6–1.1	1.7***	1.3– 2.2	1.1	0.8–1.7	0.6	0.2–1.6	1.3	0.9–1.8	1.5*	1.1–2.0
Lower back pain	1.1	0.9–1.3	1.1	0.9–1.3	1.4**	1.1–1.7	1.4	0.9–2.0	1.1	0.9–1.3	1.25**	1.1–1.5
BJHS	1.9*	1.1–3.6	0.2***	0.1–0.3	0.0***	0.0–0.2	1	0.5–2.4	0.6*	0.3–0.8	0.3***	0.2–0.6
Gout	0.1	0.0–0.9	5.4	0.6–48.7	6.83	0.6–75.5	3.6	0.3–39.7	1.2	0.2–7.0	0.6	0.1–4.5
CTS	3.2	1.0–10.6	2.7**	1.3–5.6	0.9	0.2–3.3	0.7	0.1–5.6	0.8	0.3–1.9	1.2	0.6–2.6

**p-value < 0.050, ** p-value < 0.010, *** p-value < 0.001; +Males were used as a reference group and the female group was the comparable category. RA: rheumatoid arthritis; SpA: spondyloarthritis; OA: osteoarthritis; CTS: carpal tunnel syndrome; BJHS: benign joint hypermobility syndrome; OR: odds ratio; CI: confidence interval.*

Table 4: The observed significant association of the three variables and different rheumatic diseases in the logistic binary regression model.

Variables	Associated disease	odds ratio	95% CI	*p*-value
Gender	No disease was associated with gender	-	-	-
Age, years				
41–60	Knee OA	6.4	5.2–7.8	<0.001
	CTS	2.8	1.3–5.9	0.010
	RA	2.3	1.1–5.0	0.040
	Fibromyalgia	2	1.1–3.5	0.020
	BJHS	0.2	0.1–0.3	<0.001
>60.1 years	Knee OA	20.1	15.7–25.8	<0.001
	Lower back pain	1.4	1.1–1.7	0.002
	Seronegative SpA	0.1	0.0–0.4	0.060
BMI				
<18.5	Knee OA	0.4	0.2–0.9	0.03
25.1–30.0	Knee OA	1.6	1.3–2	<0.001
>30.1	Knee OA	2.2	1.8–2.8	<0.001

OR: odds ratio; CI: confedence interval.
OA: osteoarthritis; RA: rheumatoid arthritis; SpA: spondyloarthritis; CTS: carpal tunnel syndrome; BJHS: benign joint hypermobility syndrome.

excluded another 32 as they were either younger than 18 or older than 85 years old. The mean age of the 3,985 participants who satisfied the inclusion criteria was 42.1±15.8 years old. Most participants (77.4%) were female, and 33.8% were found to be healthy individuals (i.e. with no musculoskeletal complaints in the last three months and a normal QUS). Demographic data is given in Table 1.

Lower back pain was the most prevalent problem in our population (32.9%). Knee osteoarthritis (OA) was the most common type of arthritis seen in our cohort (25.8%). We detected soft tissue rheumatism (tendinitis and bursitis) in 7.0% of participants. Only 2.8% fulfilled BJHS classification criteria, and 1.2% met the ACR classification criteria for fibromyalgia. Overall, the prevalence of inflammatory arthritis was 3.1% in our cohort, and the prevalence of rheumatoid arthritis (RA) and seronegative spondyloarthritis were 0.9% and 2.2%, respectively [Table 2]. Using QUS, we found osteopenia and osteoporosis in 22.4% and 3.1% of our cohort, respectively. The determinants, confounders, and correlation with bone mineral density will be discussed in another publication.

Female gender was associated with RA, fibromyalgia, and BJHS on univariate analysis [Table 3], but not associated with any rheumatic disease on binary logistic regression [Table 4].

Age, in general, was associated with increased risk of knee OA. The 41–60 year age group was independently associated with an increased risk for knee OA, carpal tunnel syndrome, RA, and

Table 5: Prevalence of rheumatic diseases in different epidemiological studies.

Diseases	PRO Dubai	COPCORD publications					Other regional studies
		Lebanon[4]	Kuwait[5]	Egypt[8]	Iran[13]	Iran[14]	
Sample size	3985	3530	359	5120	10,291	1,565	
Region	Urban and rural	Urban	Urban	Rural	Urban	Rural	
RA	0.9%	1%	0.7%	0.29%	0.33%	0.19%	0.22%[15]
SpA	2.2%	0.3%	-	0.15%	0.23%	1.1%	-
PsA	0.3%	-	-	-	-	-	-
AS	0.1%	0.1%	0.7%	0.09%	0.12%	-	-
Enteropathic arthropathy	0.0%	-	-	-	-	-	-
Undif SpA	1.6%	0.2%	-	0.02	-	-	-
Reactive arthritis	0.1%	-	-	0.04%	-	-	-
Lupus	0.1%	-	-	0.05%	0.04%	-	-
Knee OA	25.8%	-	29%	8.5%	19.9%		13%[6]
Fibromyalgia	1.36%	1%	-	1.3%	0.69	0.06%	-
STR	7.0%	5.8%	45.6%	6.6%	4.76%	2.2%	-
BJHS	2.8%	-	-	-	-	-	-
CTS	0.9%	0.8%	-	-	1.27%	0.6%	-
Gout	0.1%	0.01%	0.7%	-	0.13%	-	-
Lower back pain	32.3%	3%	15%	30.3%	15.4%	23.4%	18.8%[7]

RA: rheumatoid arthritis; SpA: spondyloarthritis; Undif SPA: undifferentiated spondyloarthritis; OA: osteoarthritis; CTS: carpal tunnel syndrome; BJHS: benign joint hypermobility syndrome; PsA: psoriatic arthritis; AS: ankylosing spondulitis; STR: soft tissue rheumatism.
COPCORD: Community Oriented Program for Control of Rheumatic Diseases.

fibromyalgia on binary logistic regression [Table 4]. On the other hand, the same age group was associated with a reduced risk for BJHS. Age greater than 60.1 years was associated with increased risk for knee OA and lower back pain. However, it seems that in this group of subjects age was a protective factor against developing SpA [Table 4].

BMI showed a positive correlation with the occurrence of knee OA in the underweight, overweight, and obese subgroups [Table 4]. There was no association between BMI and other rheumatic diseases in our cohort.

DISCUSSION

PRO Dubai is the first study that looked at the prevalence of rheumatic diseases and osteoporosis in the population of Emiratis attending PHC clinics in Dubai. Furthermore, it explored the association between gender, age, and BMI and the occurrence of rheumatic diseases in this group of subjects.

Lower back pain and knee OA were the most common rheumatic disorders in PRO Dubai. Our findings were similar to the prevalence of these disorders recorded in the Al-Qaseem community in Saudi Arabia.[3,4] Interestingly, the prevalence of the knee OA in the elderly in the Saudi study was identical to what we reported in the same age group [Table 5]. Overall, the prevalence of RA, carpal tunnel syndrome, soft-tissue rheumatism, knee OA, and fibromyalgia in PRO Dubai was similar to the reported prevalence in COPCORD studies done in the Middle East.

However, the prevalence of lower back pain in our study was higher than that reported in COPCORD studies conducted in the Middle East. This discrepancy can be attributed to the difference in the duration of lower back pain recorded. We included subjects with current lower back pain or who had it in the past three months when calculating the prevalence in our cohort. In contrast, the COPCORD studies included subjects with a shorter history of lower back pain (i.e. lower back pain present in last seven days) in the calculated prevalence. Hence, it is likely that PRO Dubai had a larger cumulative prevalence than the COPCORD studies.

We found a positive association between age and rheumatic diseases, namely knee OA, carpal tunnel

syndrome, RA, fibromyalgia, and lower back pain. Others have described a similar association between age and knee OA,[6] and lower back pain.[10] So far, there are no studies in the region that have looked at the association between age and carpal tunnel syndrome, RA, and fibromyalgia.

We also demonstrated a positive association between BMI and knee OA, which are similar to other findings.[16] Fascinatingly, a BMI less than 18.5 was associated with reduced risk of knee OA. This is in line with the findings from a population-based case-control study conducted in the UK.[17]

The association between lower back pain and obesity is well described in the literature.[10,18] We failed to demonstrate such an association in our study because the majority of subjects who participated were either overweight or obese (71%). Hence, subjects with and without lower back pain had a BMI > 25.

A potential limitation of the PRO Dubai is the inclusion of subjects who could only attend the PHC clinics in their catchment area; non-ambulatory patients were not well represented in this study. Furthermore, although 95.6% of this population was registered in PHC clinics in June 2008, we believe that the sample was representative of those that attend the PHC clinics and not of the Emirati population living in Dubai, hence the predominance of females in our sample. The expected percentage of females in the general population is 53%, and females made up 77.4% of the study population. Another limitation of PRO Dubai is not recording occupational history or physical activities in detail, which might be a possible confounding factor influencing the occurrence of musculoskeletal diseases in our cohort. Moreover, PRO Dubai has similar limitations as other cross-sectional studies. The study design was not ideal to study the prevalence of rare diseases or to evaluate risk factors for rheumatic diseases and osteoporosis.

CONCLUSION

Rheumatic diseases are quite common in Emaratis attending PHC clinics. Lower back pain and knee OA were the most common musculoskeletal diseases seen in our cohort. There is a need for more prospective population-based studies in the Middle East to have a better understanding of the epidemiology of rheumatic diseases in this region.

Disclosure

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