Cohort Study

Prevalence of rheumatoid arthritis among hospital workers in the north of Jordan: Preliminary report of a hospital-based cohort study

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ABSTRACT

Background: Rheumatoid arthritis (RA) is the most common autoimmune inflammatory arthritis in adults. Prevalence estimates of rheumatoid arthritis vary in the world. Occupational factors and geographical location might contribute to a higher risk of developing the disease, however the exact etiology remains unknown.
The aim of our study was to estimate the prevalence of RA among hospital workers in the North of Jordan and to compare this prevalence with that in the general population. In addition to describing the characteristics of RA patients.
Methods: The study was performed in two stages; during the first stage a specially designed questionnaire was conducted by trained residents with 2569 hospital workers from 6 government hospitals to identify individuals with RA. Suspected individuals of having RA identified in stage one were invited and examined further by two rheumatologists for confirmation of the diagnosis.
Results: A total of 2569 employees were interviewed; among them 1240 (48.5%) were males and 1318 (51.5%) were females. The mean (SD) age was $34\pm(8.4)$ years. In the second stage the diagnosis of RA according to ACR criteria 1987 was confirmed in 8 individuals (2 males and 6 females). Male: Female (M: F) ratio was 1:3 with mean (SD) age 43.38 (7.52) years. The estimated prevalence of RA among hospital workers in the North of Jordan was 8/2569 = 0.00311, 31.1:10.000, 0.31%, (95% confidence interval, 9.6–52.7:10.000).
Conclusion: The prevalence of RA among hospital workers in the North of Jordan is 0.31%, similar to that of other parts of Jordan and neighboring regions.

1. Introduction

Rheumatoid arthritis (RA) is the most common autoimmune inflammatory arthritis in adults. It runs a chronic progressive course and may lead to functional disabilities and deformities [1]. The worldwide prevalence of RA varies between 0.37 and 1.25% [2]. The prevalence is different between countries within the same continent. A higher prevalence was noticed in Northern European countries compared to southern countries [3]. In addition, RA prevalence was shown to vary within a country, for example the prevalence of RA in all of Turkey was reported to be 0.56%, while in the northern region the prevalence was 2.04% compared to 0% in the southern region [4].This was attributed to different levels of sun exposure [5]. Reports on the prevalence of RA in Arab countries which are located to the south of Europe around the

Mediterranean and whose ethnic origin is similar to Jordan showed a lower prevalence of RA compared to countries in the north like Saudi Arabia (0.22%) and Algeria (0.15) [6,7]. Studies regarding the prevalence of RA in Jordan are rare and there is only one report on this regard from South of Jordan that shows an estimated prevalence of 0.36% for a sample of 2220 adults aged between 16 and 75 years [8].

RA may occur at any age but mostly affects people between ages 40–60. The etiology remains unknown, but female gender, genetic susceptibility, cigarette smoking and infections play a role.

There is a relation between some occupations and the risk for developing RA, especially those related to potential noxious airborne agents and physically demanding tasks [9]. Among health care workers, female assistant nurses and attendants were found to be at increased risk of developing RA [10,11].

This study aimed to seek the prevalence of RA among hospital workers in the North of Jordan, compare the results with the prevalence in the country, and to describe the characteristics of identified RA patients.

2. Subjects and methods

This study was conducted at King Abdullah University Hospital (KAUH). Approval by The Institutional Review Board (IRB) of KAUH and the Jordanian Ministry of Health was obtained prior to initiation of study and data collection.

This study was conducted and in line with the STROCSS criteria [12]. It was also registered in Research Registry with the unique identification number researchregistry6132.

Our study was performed in two stages. In the first stage of our survey, 2569 hospital employees from 6 government hospitals in the North of Jordan including one university hospital were interviewed face to face by trained resident physicians using a screening questionnaire to identify individuals with musculoskeletal symptoms.

A three-part questionnaire was developed for this study. In the first part demographic data was recorded including sex, date of birth, level of education, marital status, smoking habits and ethnicity. In the second part, we asked; whether they had suffered from joints pain and swelling, if yes; which joints, symmetrical or not, number of joints, frequency, and what was the diagnosis?

Have you ever had rheumatoid arthritis; if yes, did you have positive RF, Anti CCP or ANA and If no have you ever had any other rheumatological diseases including SLE, AS, psoriatic arthropathy, gout, FMF, or Behcet's disease.

The third part included data on comorbidities including; history of diabetes mellitus (DM), hypertension (HTN), bronchial asthma and malignancy.

Patients with relevant symptoms and previous diagnosis of RA were invited to be examined further for confirmation of diagnosis by two rheumatologists. Treating rheumatologists were also contacted for confirmation of diagnosis.

3. Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences, SPSS statistical package was used. The differences between groups were compared by means and proportions. P-values of ≤0.05 were considered to be statistically significant. The 95% CI was also calculated.

The study protocol was approved by ethical committees at Jordan University of Science and Technology, Irbid-Jordan, and the Jordanian ministry of health.

4. Results

A total of 2569 employees were interviewed representing 60% of the total number of hospital workers. All were Jordanian Arabs except for one individual of Sherkasian ethnicity.

Demographic data of interviewed Jordanian hospitals workers were as the following; mean (SD) age was 34 (8.4) years (ranging between age 18 to 73), 1240 (48.50%) were males and 1318 (51.50%) were females. Smoking was documented in 789 (30.90%). Level of education was as follows: 12 subjects (0.5%) were illiterate, 259 (10.1%) had less than high school education and 2287 (89.4%) had higher education more than high school (Table 1).

Twenty subjects had symptoms suggesting RA, the diagnosis of RA according to the ACR criteria 1987 was confirmed in 8 [13]. The rest had other rheumatological conditions including; Behcet's disease, familial Mediterranean fever, psoriatic arthropathy and systemic lupus erythematosus and one proved to have uncontrolled DM complicated by tendinitis.

Table 1
Demographic data of 2569 interviewed Jordanian hospital workers.

Variable	Absolute	%
Mean (SD) age in years	34.4 (8.4)	–
	(18–73)	
Males	1245	48.5
Females	1324	51.5
M:F	0.94:1	–
Level of education:		
Illiterate	12	0.5
High school or less	259	10.1
More than high school	2287	89.4
Smoking	793	30.9

Table 2 shows that the mean (SD) age of the 8 RA patients was 43.38 (7.52) years (range from 35 to 56 years old) compared to 34 (8.4) years in the whole group. Among them 6 were female and 2 were male with M:F ratio of 1:3 compared to 0.94:1 in the whole group. All RA patients had higher level of education compared to 88.9% in the whole group. Only one subject with RA was a smoker (12.5%) compared to 30.8% in the whole group, but without statistical significance in all parameters.

RA patients had several other comorbidities including; previous diagnosis of HTN and DM was documented in 3 patients each (37.5%) while the frequency in the whole group was 4.8% and 3.1% respectively (p value was 0.006 and 0.045 respectively). Bronchial asthma was observed in 1 (12.5%), no malignancy was observed in any individual. One female RA patient had undergone a total hip joint replacement.

The estimated prevalence of RA among hospital workers in the North of Jordan was 8/2569 = 0.00311, 31.1:10.000, 0.31%, with 95% confidence interval, 9.6–52.7:10.000.

The prevalence in males was 0.16% vs 0.45% in females. The highest prevalence was within the age group 40–49; 4(50%) patients were within this group followed by 3 (37.5%) in the age group 30–39, while only 1(12.5%) patient was >50 years.

5. Discussion

To our knowledge, this is the first survey showing the estimated prevalence of RA among hospital workers in the North of Jordan. Several studies pointed to the fact that RA prevalence is higher in northern countries and even within a same country the prevalence is higher in the north compared to southern regions [3,4]. The estimated prevalence of RA among hospital workers in the North of Jordan was similar to the reported prevalence in the South of Jordan and other neighboring Arab countries, Saudi Arabia (0.22%), Algeria (0.15%), and some parts of Turkey [6,7,14]. However, it is less than that reported from Europe (0.62%) and the USA (1.25%) [1].

Some studies have linked this phenomenon to the level of sun exposure, as ultraviolet radiation is the primary source of vitamin D which has a role in regulating the immune system and could suppress autoimmunity and decrease the risk for RA [5]. In this respect Jordan is

Table 2
Comparison of demographic data of cases diagnosed with RA and the whole group of interviewed individuals.

Variable	RA	Whole group	p-value
Age			
mean(SD)	43.38 (7.52)	34(8.4)	
Range	(35:56)	(18:73)	
Gender: n (%)			
Male	2 (25.0%)	1243 (48.5%)	0.29
Female	6 (75.0%)	1318 (51.5%)	0.29
Level of education n(%)			
Illiterate	0.0 (0.0%)	12 (0.46%)	
Less than high school	0.0 (0.0%)	259 (10.1%)	
More than high school	8.0 (100%)	2279 (88.9%)	0.329
Smoking	1 (12.5%)	789 (30.8%)	0.448

blessed with an abundance of solar energy which is one of the highest in the world, with the average sunshine duration more than 300 days per year [15].

Female predominance was noted in our study with M: F ratio of 1:3, in agreement with reported data from other countries and support earlier studies that health related occupations might contribute to a higher risk of developing RA in health-related occupations especially among females [11].

Our results confirm earlier reports that RA may be associated with multiple comorbidities [16]. Previous diagnosis of DM and HTN were statistically higher in RA patients than the whole group.

Smoking has been considered to be associated with increased risk of developing RA. Although In some countries a decline in smoking among health-related professionals was noticed [17], the percentage of smoking among hospital workers was high, 30.8% of the whole interviewed subjects were smokers compared to only 12.5% (1 female) in the RA group. This might indicate fewer female smokers in the country probably due to social or cultural factors or to a better understanding of the negative effect of smoking on disease activity and increased awareness among RA patients.

Our study has some limitations, although the sample size of interviewed individuals was 2569, it represented only 60% of hospital employees who agreed to participate in the study. Another aspect which needed detailed information was the smoking habits, our questioner included information on current smoking with only one yes or no question. A larger study with more detailed analysis is needed to confirm our results.

Accurate estimates of disease prevalence are important; they are helpful in diagnosis, raising awareness and helping health care decision makers in the distribution of health resources. Large epidemiological studies are difficult to perform especially in countries with limited resources like our country. One can speculate that the method used in our study can be used for prevalence studies in countries with limited resources. Further large population-based studies will confirm our approach.

6. Conclusion

This is the first epidemiological survey among health care workers in Jordan. The prevalence of RA among hospital workers in the North of Jordan is 0.31% with a female predominance. This is almost equal to that in the South of Jordan and similar to reports from neighboring Arab countries, suggesting influence of genetic and environmental factors in the development of autoimmune diseases. Careful follow up and monitoring of patients with RA is necessary as they are at increased risk of having multiple comorbidities.

All authors have approved of manuscript. Materials have not been published or submitted to another journal.

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All data collection and work done was carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki). Informed consent was obtained from all human subjects and their privacy remained observed. No information which could identify subject or breech their privacy was included.

All authors have approved the final version of manuscript that has been submitted.

Provenance and peer review

Non commissioned, externally peer reviewed.

Ethical Approval

Approval by The Institutional Review Board (IRB) of King Abdullah

University Hospital (KAUH) and the Jordanian Ministry of Health was obtained prior to initiation of study and data collection.

Author contribution

Conception and design of study was done by KA, WM, DA, and MS. Acquisition of data done by KA and WM. Analysis of data and interpretation done by KA, WM, DA and MS. Manuscript drafting and revising done by KA, WM, DA and MS.

Declaration of competing interest

All authors have no conflict of interest to declare.

Registration of Research Studies

1 Name of the registry: The Research Registry
2 Unique Identifying number or registration ID: researchregistry6132
3 Hyperlink to your specific registration (must be publicly accessible and will be checked): https://eur04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.researchregistry.com%2Fbrowse-the-registry%23home%2F&data=04%7C01%7C%7Cb5bb2c60070c40f95cb708d873a26d2e%7C84df9e7fe9f640afb435aaaaaaaaaaaa%7C1%7C0%7C637386488735159681%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=d7G9jnCHOOhhq67Wm81QrwzW0jx3cIzMseNHzcNGf4E%3D&reserved=0

Guarantor

All authors including KA, WM, DA and MS take full responsibility.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2020.11.043.

Registry number

Research was registered on Research Registry. Unique Identifying number: researchresgistry6132 Hyperlink: https://www.researchregistry.com/browse-the-registry#home/registrationdetails/5f8ca226d720800015f7c597/

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