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ORIGINAL ARTICLE

Knowledge of cardiovascular disease risk in rheumatoid arthritis patients before and after educational intervention from a Southeast Asia country: Malaysia

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ABSTRACT

Objectives: This study aims to improve knowledge on cardiovascular disease (CVD) risk among rheumatoid arthritis (RA) patients using a multi-language leaflet tailored to our multi-ethnic patient population.

Patients and methods: This was a prospective study conducted in Hospital Pulau Pinang, Malaysia, between March 2015 and June 2015. Educational intervention was provided to 96 patients (11 males, 85 females; mean age: 52.4±12.9 years; range, 20 to 83 years) who fulfilled the inclusion/exclusion criteria. Questionnaires to assess knowledge of CVD risk were given to patients to be answered before reading the informative leaflet, after one hour of intervention, and during their next follow-up three months from the intervention. Both the informative leaflet and questionnaires were prepared in English and then translated into Malay and Chinese languages to suit the need of local patients.

Results: Our results showed that RA patients had good knowledge at baseline regarding risk of smoking, hypertension, and hyperlipidemia on increasing CVD risk and that exercise would not damage their joints. However, they had low knowledge at baseline regarding the amount of exercise needed for lower CVD risks and risk of CVD with use of anti-inflammatory drugs in RA. Total knowledge score increased significantly from baseline immediately after educational intervention. However, total knowledge score decreased after three months compared to immediate post-intervention phase while it was still significantly higher compared to baseline. The improvement was most obvious for knowledge regarding anti-inflammatory drugs and CVD risk and knowledge regarding the number of flares and CVD risk. Our study did not find any significant association between demographic characteristics and traditional cardiovascular risk factors with knowledge of CVD risk.

Conclusion: Rheumatoid arthritis patients have low knowledge regarding their CVD risk related to their disease. The intervention of providing an informative leaflet effectively improved the knowledge of this group of patients on CVD risk particularly in the field related to RA-specific risk.

Keywords: Cardiovascular disease risk, heart disease, knowledge of cardiovascular disease, rheumatoid arthritis.

Rheumatoid arthritis (RA), affecting approximately 1% of the general population, is characterized by polyarthritis, with often progressive joint damage and disability, immunological abnormalities, systemic inflammation, increased morbidity, and premature mortality.[1] Epidemiological studies showed that patients with RA are 30 to 60% more likely to suffer a cardiovascular (CV) event than the general population.[2,3] Therefore, education regarding CV disease (CVD) prevention among RA patients is needed[4] and it is recommended that patient education about CVD in RA should be provided as a standard practice to all patients with RA.[5] Many RA-specific programs have been developed, reviewed, and published.[6,7] However, the majority

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of these aimed to improve bio-clinical features of arthritis such as pain and disability, psychosocial status, and self-management skills, while other comorbidities of RA were largely neglected. Improved knowledge is fundamental for behavior change.[8] Clinical or behavioral outcomes are likely to be mediated through better knowledge[5,9] and providing information is recommended if the aim is to improve knowledge.[10] Printed patient educational materials can provide the basis for self-management and activate patient's engagement with self-care.[11] However, to our knowledge, there was currently no such educational intervention for RA patients in Malaysia. Thus, for the beginning, it would be rational to design an educational intervention focused on written information to improve knowledge of CVD risk among RA patients in local setting. Furthermore, it has been stated that starting with simple information and brochures as a precursor to implement a full education program is a step forward as comprehensive education programs will take much effort to be fully implemented into rheumatology clinics.[12] Therefore, in this study, we aimed to improve knowledge on CVD risk among RA patients using a multi-language leaflet tailored to our multi-ethnic patient population.

PATIENTS AND METHODS

This prospective study was conducted among RA patients followed-up at the rheumatology clinic in Hospital Pulau Pinang (HPP), Malaysia, between March 2015 and June 2015. HPP is a tertiary healthcare facility and state hospital which has served as the sole rheumatology center in the northern region of Peninsular Malaysia since the year 2006.[13] All RA patients who were being followed-up in March 2015 and fulfilled the inclusion/exclusion criteria were selected based on randomized sampling. Inclusion criteria were patients diagnosed with RA who fulfilled the American College of Rheumatology (ACR) 1987 revised criteria for the classification of RA or ACR/European League Against Rheumatism 2010 criteria. Patients aged lower than 18 years on the day of selection, unable to read in English, Chinese or Malay languages, with cognitive disorders (delirium and dementia), previously involved in validity and reliability test of the questionnaires, and who already had read the newly developed leaflet prior to study initiation were excluded. Patient selection was performed during March 2015. A total of 96 patients (11 males, 85 females; mean age: 52.4±12.9 years; range, 20 to 83 years) were selected based on paired t-test sample size calculation to have a power of 90% with estimated 20% drop off rate. Questionnaires to assess knowledge of CVD were given to patients to be answered before educational intervention, after one hour of educational intervention, and during their next follow-up at three months after the intervention. An informative leaflet was provided as educational intervention. Information on demographics and CVD risk factors was extracted from patients' medical records while education level was self-reported. The study protocol was approved by the Medical Research and Ethics Committee, Ministry of Health of Malaysia, with reference ID NMRR-14-1276-22875. A written informed consent was obtained from each patient. The study was conducted in accordance with the principles of the Declaration of Helsinki.

The informative leaflet targeting to deliver information regarding CVD risk among RA patients was developed by a group of experts consisting of one rheumatologist, one general practitioner, and two pharmacists. An initial content of the leaflet was generated through a literature review which focused on exploring the readily available educational material and the literature regarding general and RA related CVD risk. Input based on experts' day-to-day clinical practice and ability of patients to read and comprehend the content were taken into consideration during leaflet development. Information on CVD, CVD risk, and CVD risk factors was retrieved from the literature. After discussion among the group members, the content of the leaflet was finalized. The content of the leaflet included knowledge of CVD in general, explanation on CVD risk factors (both traditional risk factors and RA-related risk factors), and prevention with some lifestyle modification examples and RA treatment. We reviewed components of educational leaflets used for CVD prevention in the general population and then integrated with information specifically addressing CVD in RA. Five experts including three doctors and two pharmacists confirmed the content validation.

After the content validation was performed for the English version of the leaflet, forward-backward translation was made into Malay, Chinese, and Tamil languages, performed by two translators for each language version. Translators were from the School of Languages, Literacies and Translation, Universiti Sains Malaysia (USM). Three English, three Malay, and three Chinese language speaking patients from the rheumatology clinic of HPP were asked to read the leaflet for face validity, state if they could understand the leaflet easily, and asked to provide feedback in terms of clarity and length of information in the leaflet. A minor amendment was performed after feedback given by the patients. The Tamil version was not used during the study as we had difficulty to find the sufficient number of patients for validity and reliability tests for the questionnaires.

The Heart Disease Fact Questionnaire-RA (HDFQ-RA) to assess RA patients' knowledge on CVD was adopted and adapted from a study in the United Kingdom.[14] The original questionnaires were translated into Malay, Chinese, and Tamil versions and then back translated into English version by different translators in USM from the School of Languages, Literacies and Translation for each version. English version of the backward translation (for both leaflet and questionnaires) was approved by two doctors and one pharmacist after comparison with the original English version. Five healthcare professionals including doctors and pharmacists confirmed face and content validity.

To estimate the internal consistency of the HDFQ-RA questionnaires, each final version (English, Malay, and Chinese) was distributed to 50 RA patients who fulfilled the inclusion/exclusion criteria during their visit to the Unit of Rheumatology, HPP, in January 2015. Participants were asked to complete the questionnaires and return them to the registration counter at the end of the follow-up session. Cronbach's alpha coefficient calculated based on correct/incorrect response (the response of "do not know" was considered an incorrect response) was 0.688, 0.696, and 0.677 for the English, Malay, and Chinese versions, respectively.

Statistical analysis

Data were analyzed using the IBM SPSS Statistics version 22.0 software (IBM Corp., Armonk, NY, USA). All variables were presented as frequencies and percentages for categorical variables and as means with standard deviations (SDs) for continuous variables. Multiple paired t-test with Bonferroni correction was used for comparison of RA patients' knowledge before, immediately after, and three months after educational intervention. Repeated measures analysis of covariance (ANCOVA) was used for association of demographic variables and CVD risk factors with knowledge of CVD. The significance level was set at $p<0.05$.

RESULTS

Demographic characteristics of the RA patients who participated in the study were presented in Table 1. Our patients were mostly female

Table 1. Demographic characteristics of study participants (n=96)

Variables	n	%	Mean±SD
Age (year)			52.4±12.9
Age during onset of disease (year)			43.7±12.4
Duration of disease (year)			8.7±7.1
Race			
Malay	36	37.5	
Chinese	35	36.5	
Indian	25	26.0	
Sex			
Male	11	11.5	
Female	85	88.5	
Education level			
Secondary	85	88.5	
Tertiary	11	11.5	
Past cardiovascular event			
Yes	11	11.5	
No	85	88.5	
Hypertension			
Yes	34	35.4	
No	62	64.6	
Diabetes mellitus			
Yes	14	14.6	
No	82	85.4	
Hyperlipidemia			
Yes	38	39.6	
No	58	60.4	

SD: Standard deviation.

(88.5%) with mean age of 52.4±12.9 years. The mean age at disease onset was 43.7±12.4 years with mean disease duration of 8.7±7.1 years. Percentage of Malay patients was 37.5%, followed by Chinese (36.5%) and Indian (26.0%) patients. Of the patients, 11.5% had a history of CVD. Among the patients, 35.4% had hypertension, 14.6% had type 2 diabetes mellitus, and 39.6% had hyperlipidemia. The majority of the patients (88.5%) had secondary education level while 11.5% had tertiary education level.

Table 2 reports the number of patients who answered each item of the questionnaires correctly before, after, and three months after the educational intervention. At baseline (before educational intervention), more than 80% of the patients answered correctly questions 2, 3, 4, 7, and 11, which reflects that most of them understood the risk of smoking, hypertension, and hyperlipidemia in increasing chances to develop CVD and that exercise would not damage their joints. Between 50 to 80% of the patients answered correctly questions 1, 5, 8, 9, and 10, which were related to the knowledge about heart disease, good cholesterol, CVD risk with diabetes, weight control, and benefits of quitting smoking in RA patients. Less than half of the patients answered questions 6, 12, and 13 correctly. These questions were regarding the amount of exercise needed for lower CVD risks, risk of

Table 2. Participants who answered each item of questionnaires correctly before, after, and three months after educational intervention and their mean knowledge score

		Before intervention (n=96)		After intervention (n=96)		3 months post-intervention (n=90)	
No	Question	n	%	n	%	n	%
1	A person always knows when they have heart disease	57	59.4	67	69.8	60	66.7
2	A person who smokes is more likely to develop heart disease	80	83.3	93	96.9	83	92.2
3	Keeping blood pressure under control will reduce a person's chance of developing heart disease	83	86.5	93	96.6	86	95.6
4	A person with high cholesterol is more likely to develop heart disease	90	93.8	96	100	90	100
5	If your 'good' cholesterol (HDL) is high you are more likely to develop heart disease	70	72.9	87	90.6	81	90.0
6	Only exercising in a gym or in an exercise class will lower a person's chance of developing heart disease	43	44.8	67	69.8	56	62.2
7	Eating fatty foods does not affect blood cholesterol levels	85	88.5	94	97.9	87	96.7
8	A person with diabetes is more likely to develop heart disease	73	76.0	91	94.8	83	92.2
9	A person with rheumatoid arthritis can reduce their chance of heart disease by keeping their weight under control	68	70.8	88	91.7	82	91.1
10	A person with rheumatoid arthritis can reduce their chance of heart disease by stopping smoking	75	78.1	96	100	82	91.1
11	People with rheumatoid arthritis should not exercise because it can damage their joints	85	88.5	93	96.9	83	92.2
12	Anti-inflammatory medications, such as diclofenac or ibuprofen, taken by patients with rheumatoid arthritis may increase the chance of heart disease	16	16.7	86	89.6	59	65.6
13	Having lots of inflammation ('flares') of rheumatoid arthritis adds to the increased chance of heart disease	31	32.3	94	97.9	68	75.6
	Overall knowledge score (0-13) (mean±SD)	8.9±2.0		11.9±1.1		10.4±3.0	

SD: Standard deviation.

Table 3. Mean difference of total knowledge score before, after, and three months after educational intervention

Comparison	Mean difference	95% CI	*p*
After-before	3.01	2.71, 3.31	<0.001
3 months after-after	-1.51	-2.07, -0.95	<0.001
3 months after-before	1.50	0.86, 2.14	<0.001

CI: Confidence interval; Pairwise comparison with Bonferroni correction.

CVD with use of anti-inflammatory drugs in RA patients, and the increased risk of CVD associated with number of flares in RA. Generally, our RA patients were well aware of the traditional CVD risk factors as the majority could identify smoking (83.3%), hypertension (86.5%), hyperlipidemia (93.8%), and diabetes (76.0%) as CVD risk factors before the educational intervention. In regard to knowledge on exercise, about 56% of our RA patients assumed that workout in gym or exercise class only would lower the CVD risk.

The overall mean score of CVD knowledge in our study at baseline was 8.92±2.01. After reading the leaflet, the mean knowledge score increased to 11.93±1.08. Three months after reading the leaflet, the mean knowledge score decreased to 10.42±2.98.

Our patients' CVD knowledge score increased significantly from baseline immediately after the educational intervention (mean difference score 3.01, [95% confidence interval (CI): 2.71, 3.30]) ($p<0.001$) and although the total knowledge score decreased after three months compared to post-intervention phase with mean difference score of -1.51, (95% CI: -2.07, -0.95) ($p<0.001$), the knowledge score after three months post-intervention was still significantly higher compared to baseline with mean difference score of 1.50, (95% CI: 0.86, 2.14) ($p<0.001$). Table 3 reports the mean difference of total knowledge score before, after, and three months after educational intervention. The improvement was obvious for knowledge regarding anti-inflammatory drugs and CVD risks (correct scores increased from 16.7 to 89.6% post-intervention and sustained at 65.6% at three months) and knowledge regarding the number of flares and CVD risks (correct scores increased from 32.3 to 97.9% post-intervention and sustained at 75.6%). Our study did not find any significant association between demographic characteristics and CVD risk factors with knowledge on CVD.

DISCUSSION

In comparison with the original HDFQ-RA, our internal consistency was 0.688 for English, 0.696 for Malay, and 0.677 for Chinese versions, which was similar but slightly higher compared to the original version (0.65). A study from France that translated the HDFQ-RA questionnaires into French showed a higher internal consistency with Cronbach's alpha of 0.71.[15] The internal consistency of both translated and English versions were adequate as a level of between 0.5 and 0.7 is considered the minimum acceptable level for internal consistency for questionnaires assessing knowledge.[16] We could not expect perfect internal consistency for factual knowledge questions since participants would tend to only know certain facts instead of knowing either all or none of them.[14] Patients recruited in our study were from one specialized unit in a tertiary hospital where an annual review of common comorbidities (hypertension, hyperlipidemia, and diabetes mellitus) was performed and referral would be made to the respective specialized unit in the same hospital if the patient's condition could not be controlled. Patients might have higher knowledge on certain risk factors due to exposure to various counseling or advice from healthcare providers.

Our participants had lower prevalence of CVD risk factors (hypertension, hyperlipidemia, and diabetes) compared to a study assessing CVD knowledge among RA patients in the USA.[17] However, direct comparison could not be performed as in their study, the risk factors were based on patient's self-report while in our study, the risk factors were based on medical

documentation. A study from Korea assessing RA patients' knowledge of CVD risks with the same questionnaires showed that the prevalence of diabetes and hyperlipidemia was much lower in Korean RA patients compared to ours.[9] Their sample that only included RA patients free from CVD might have affected the results of CVD risk factors.[18]

Overall, our patients had good knowledge at baseline regarding the risk of smoking, hypertension, and hyperlipidemia on increasing the chances to develop CVD and that exercise would not damage their joints. The results were consistent with two other studies.[9,14] assessing RA patients' baseline CVD risk knowledge using the same questionnaire. Similar to this study, the two studies mentioned above were conducted at hospital rheumatology clinics where frequent reviews of common comorbidities were performed. Besides, doctors might have advised patients to do some exercise or referred patients to physiotherapy unit for counseling and education on exercise that are suitable for the patient's condition. In HPP, a physiotherapist is part of the team in RA management where they teach RA patients strengthening and range of motion exercises to strengthen the muscles and reduce joint pain. This may explain the reason for good baseline knowledge among RA patients that exercise would not damage their joints.

Patients in this study had weak knowledge regarding the risk of heart disease with use of nonsteroidal anti-inflammatory drugs (NSAIDs), which was consistent with other studies.[9,14] This might be due to doctors or pharmacists only focusing on the general side effects of NSAIDs like allergic reaction (rashes and shortness of breath) and gastrointestinal problems (bloating, stomach pain, nausea, and vomiting). Another reason might be that the RA patients in these rheumatology clinics were put on NSAIDs based on a needed basis only and the risk of CVD increased with prolonged use. As a result, counseling on the side effects of NSAIDs did not include CVD risk.

Poor awareness on RA-related CVD risk factors regarding the number of flares (32.3%) and use of NSAIDs (16.7%) as a possible risk factor for heart disease showed that this was the knowledge gap that needs to be focused for RA patients. The results were consistent with a systematic review which reported that a high proportion of RA patients were unaware of the association between RA and CVD risk.[19] Lack of awareness of healthcare providers regarding CVD prevention might result in RA patients' low level of knowledge about RA-related CVD risk.[9] One study reported that while 100% of rheumatologists were aware of RA-related CVD risk, half of the general physicians were unaware of the RA-CVD link and acted as a barrier to the translation of knowledge to patients.[20] Future research to evaluate general healthcare providers' knowledge of RA-CVD link and CVD prevention guidelines might be useful to assess the possible barrier in knowledge transmission to RA patients.

Moreover, approximately 56% of our RA patients assumed that only workout in gym or exercise class would lower CVD risk. Evidence to date supports the clinical usefulness of exercise (aerobic and strengthening exercise) in RA to improve both muscle function and fitness.[21] This wrong understanding regarding exercise needs to be corrected since regular or even low-intensity exercise has been shown to be important in reducing CVD risk in the long-term as well as improving the relief of RA symptoms.[9]

The overall mean score of CVD knowledge in our study at baseline was 8.92±2.01 which was lower than both the United Kingdom and Korean RA patients (both studies had mean score above 9). Difference in knowledge might be related to Korean patients' having higher education level (more than half of the patients had above college education level) compared to our participants although we included participants of similar age. Health literacy was correlated with education level.[22] RA patients from Korea and the United Kingdom might have had higher health literacy compared to our patients or more exposure to information in their population or hospital setting. In 2015, Malaysia National Health and Morbidity Survey reported that the overall prevalence of adequate health literacy among Malaysians aged 18 years and above was only 6.6%.[23] In England, 58% of working-age adults (aged 16 to 65 years) are able to understand or make use of everyday health information.[24] In Korea, health literacy level among those aged 20 to 64 years was 62.8 to 65.4%.[25]

Our patients' CVD knowledge increased significantly from baseline immediately after educational intervention and although the total knowledge score decreased after three months compared to post-intervention phase, the knowledge level was still significantly higher compared to baseline. This was consistent with the results from the USA study where their RA patients also had significant improvement in CVD knowledge after reading the handout with their knowledge sustaining at two months.[26] Our study did not find any significant association between the demographic characteristics and CVD risk factors with the knowledge of CVD. This finding was in line with the other two studies which showed that having any risk factor for CVD did not predict knowledge[27] and education was the only predictor of CVD risk awareness.[17]

Since the data suggested that the leaflet could effectively improve RA patients' understanding of CVD risks, the use of such leaflet may assist healthcare professionals in providing CVD knowledge to RA patients. This was particularly useful in a rheumatology unit with limited consultation time for each patient due to high patient load during follow-up. Healthcare professionals may focus on controlling RA disease activity since the common desire is to control the symptoms of RA first before tackling other health issues,[20] while the leaflet can be used to create awareness on CVD risks among RA patients without taking up extra time for patient consultation and medication counseling.

We should first understand the knowledge level among RA patients regarding CVD before empowering them to become active participants in CVD prevention strategies.[19] The findings of this study reflect that patients generally had good knowledge on traditional CV risk factors while they had poor knowledge on RA-related CVD risk factors and a wrong understanding regarding the level of exercise needed to reduce CVD risk. Therefore, this knowledge gap needs to be addressed to encourage behavioral changes to reduce CV risks among RA patients. Furthermore, patients should be equipped with knowledge about CVD risk factors and their increased vulnerability with RA to CVD.[9] The educational intervention that consisted of providing an informative leaflet effectively improved knowledge of RA patients in CVD risks, particularly in the field related to RA-specific risks. Thus, our findings may be helpful in designing more focused, informative, and appropriate educational materials for RA patients to improve their knowledge in CVD risks.

There were some limitations in this study. First, we did not include any control group as this was a prospective cohort study that aimed to collect data on baseline knowledge of CVD risk among RA patients, identify the gap of knowledge, and follow-up patients in their naturalistic setting to evaluate the sustainability of the knowledge provided. Besides, we used repeated measured ANCOVA to check any association of demographic variables and CVD risk factors with the knowledge of CVD. Another limitation was that the patients were recruited from one regional expert unit where annual review was performed on common comorbidities. As such, the level of knowledge on heart disease might be higher in our participants compared to that in the general population of RA patients. However, our leaflet and questionnaires were translated and validated in three languages and they were cultural friendly to our local setting. In the future, larger national surveys of RA patients' CVD knowledge that increase the geographical spread of respondents can be carried out using the same questionnaires. Besides, to our knowledge, this was the first study to evaluate the knowledge of CVD among RA patients in Malaysia with validated and local-friendly questionnaires in English, Malay, and Chinese languages. We were also the first to develop and validate an educational leaflet on CVD specifically for RA patients in three different languages.

In conclusion, the multi-language leaflet we developed can assist healthcare professionals in providing and improving the knowledge of RA patients in CVD risks particularly in the field related to RA-specific risk factors. Future CVD education programs in RA patients should focus on filling in the knowledge gap in this field among RA patients. Besides, it is also important to consider how patients may be encouraged to behavioral changes based on their newly gained knowledge. Special education programs should be developed to help RA patients in implementing lifestyle modifications while providing the appropriate resources to support the changes. Addressing these concerns may have implications in reducing

the morbidity and mortality risk of CVD within the RA population.

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