Rheumatology Advance Access published March 29, 2008

 doi:10.1093/rheumatology/ken050

# Beliefs about medicines in patients with rheumatoid arthritis and systemic lupus erythematosus: a comparison between patients of South Asian and White British origin

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**Objective.** To assess whether patients with RA and SLE who are of South Asian origin have different beliefs about medicines in general, and about DMARDs in particular, compared with patients of White British/Irish origin.

**Methods.** One hundred patients of South Asian origin (50 RA; 50 SLE) and 100 patients of White British/Irish origin (50 RA; 50 SLE) were recruited. Demographic and disease-related details and responses to the Beliefs about Medicines Questionnaire (BMQ), the SF-36 and the HAQ were collected.

**Results.** Patients of South Asian origin had significantly higher General Overuse (GO), General Harm (GH) and Specific Concern (SC) scores compared with patients of White British/Irish origin. Forward stepwise multivariable regression analysis showed that ethnic origin was an independent predictor of the GO, GH and SC scores with patients of South Asian origin having higher scores in these three scales of the BMQ.

**Conclusion.** RA and SLE patients of South Asian origin have very high levels of concern about DMARDs and are generally worried about prescribed medicines. This may have an impact on adherence in this group of patients and further work is needed to understand the reasons underlying these beliefs.

**Key words:** RA, SLE, Beliefs, Culture, Ethnicity, Quality of life, Physical health, Medication, DMARD, Beliefs about Medicines Questionnaire.

## Introduction

DMARDs play a pivotal role in the management of inflammatory rheumatic diseases such as RA and SLE [1–3]. Persuasive data suggest that these drugs should be introduced early in the course of disease to reduce disease activity and consequent damage, and that the tight control of inflammation in established disease improves the outcome [4]. However, in order to attain these benefits, patients need to be able and willing to adhere to the treatment. It is estimated that over a third of all medicines prescribed for long-term conditions are not taken as recommended [5]. Non-adherence may be unintentional, when an intention to take the medicine is impeded by capacity or resource limitations (e.g. problems with comprehension, dexterity or recall) or the intentional result of a decision on the part of patient [6].

Research attempting to understand non-adherence from the patient's perspective has highlighted the importance of personal beliefs about medicines. Studies across a range of illnesses and countries have shown that non-adherence is often related to the way in which patients evaluate the necessity of their medication relative to their concerns about potential adverse effects [7, 8]. Moreover, an evaluation of prescribed medication is influenced by more general beliefs about pharmaceuticals as a class of treatment [6]. These beliefs may be influenced by cultural background [9].

Understanding the health beliefs of patients of Asian origin living in the UK is important for successful healthcare delivery. Approximately 2 million people in the UK reported that they were of Indian, Pakistani or Bangladeshi origin in the 2001 census, representing 3.6% of the UK population and making up the largest ethnic minority group. Patients of Asian origin are found in large numbers in particular conurbations. In Birmingham, UK, 18.5% of the population report themselves to be of Indian, Pakistani or Bangladeshi origin. The high prevalence of certain rheumatic diseases such as SLE amongst patients from this ethnic background [10] makes it particularly important for rheumatologists to understand their health beliefs. We sought to determine whether there were differences in beliefs about medicines in general and DMARDs in particular between patients with inflammatory rheumatic diseases of South Asian and White British/Irish origin (hereafter, referred to as White origin) living in the UK. Furthermore, in this pilot study, we studied patients with two different diseases (RA and SLE) to determine whether ethnic differences in beliefs were influenced by the underlying rheumatic disease.

## Methods

This study was conducted in the outpatient Rheumatology Departments of Sandwell and West Birmingham Hospitals NHS Trust and the University Hospital Birmingham NHS Foundation Trust from December 2005 to August 2006. Patients were recruited if they fulfilled classification criteria for RA or SLE [11, 12], were taking a DMARD and had done so for >3 months prior to the study. For the purposes of this study corticosteroid was not regarded as a DMARD. Consecutive patients who consented to participate in the study were allocated to one of the four groups according to their underlying disease and ethnic origin: RA patients of South Asian origin; RA patients of White origin; SLE patients of South Asian origin; and SLE patients of White origin. Recruitment to each of the groups continued until 50 patients had been allocated to that group. In total, three potentially eligible patients refused to participate. Patients were classified as being of South Asian origin if they had three or more grandparents who had been born in India or Pakistan and regarded themselves as being of South Asian origin. Patients were classified as being of White origin if they had three or more grandparents who had been born in the UK or Ireland and

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Submitted 8 November 2007; revised version accepted 21 January 2008.

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regarded themselves as being of White origin. This study was approved by the Dudley Local Research Ethics Committee and all patients gave written informed consent.

All patients completed three questionnaires, the Beliefs about Medicines Questionnaire (BMQ) [13], the SF-36 [14] and the HAQ [15]. In addition, the following data were collected: age, gender, place of birth, highest educational level achieved (primary, secondary or tertiary), current DMARD therapy, self-reported disease duration and employment status (the following categories were used: working at present; retired; never worked; unemployed due to disease; and unemployed for other reasons).

The BMQ [13] is a validated questionnaire comprising two sections. The BMQ-Specific assesses beliefs about medication prescribed for a particular illness and the BMQ-General assesses more general beliefs about pharmaceuticals as a class of treatment. The BMQ-Specific (DMARD version in the present study) comprises two scales: the Specific Necessity scale and the Specific Concern scale. The Specific Necessity scale comprises five items assessing perceptions of the necessity of medication for controlling the illness and improving or maintaining health. Examples of items from the Specific Necessity scale are: 'My health, at present, depends on my medicines' and 'My medicines protect me from becoming worse'. The Specific Concern scale comprises six items assessing concerns about the potential adverse effects of medicines. Examples of items from the Specific Concerns scale are: 'I sometimes worry about the long term effects of my medicines' and 'I sometimes worry about becoming too dependent on my medicines.' The BMQ-General comprises two scales: the General Harm scale and the General Overuse scale. The General Harm scale comprises five items and assesses beliefs about the intrinsic nature of medicines and the degree to which they are perceived to be harmful and addictive. Examples of items include: 'Most medicines are addictive', 'Natural remedies are safer than medicines' and 'Medicines do more harm than good.' The General Overuse scale comprises three items and assesses beliefs about the way in which medicines are prescribed and the degree to which they are overused by clinicians. Examples of items include: 'Doctors place too much trust in medicines' and 'If doctors had more time with patients they would prescribe fewer medicines.' Respondents indicate their degree of agreement with each individual statement about medicines on a 5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree and 5 = strongly agree. Scores obtained for the individual items are summed to give a scale score. Total scores range from 5 to 25 for the Specific Necessity scale and from 6 to 30 for the Specific Concern scale. Total scores range from 5 to 25 for the General Harm scale and from 3 to 15 for the General Overuse scale. In all cases, higher scores indicate stronger beliefs in the concepts represented by the scale.

Responses to the SF-36 health survey were categorized to give individual scores in each of the eight domains as originally described: Physical Function (PF), Role Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Role Emotional (RE) and Mental Health (MH) [14]. Each item is scaled to range from 0 (extreme disability, etc.) to 100 (no disability, etc.). In addition, the HAQ, a widely used tool to measure functional ability, was completed [15].

The study was undertaken by a research nurse (K.K.) of South Asian origin who was fluent in Punjabi, Hindi and Urdu. The research nurse was not involved in the clinical care of the patients taking part in the study. Some of the Asian patients were unable to either read or speak English and for these patients it was necessary to read and translate the questionnaires. To reduce bias, the questionnaires were read to all patients irrespective of their ability to communicate in English. The questions were read out verbatim in the language that the patient was able to best understand. The questionnaires that were translated into Punjabi, Hindi and Urdu (for 61 patients) were always read to patients speaking that language with exactly the same wording but no back-translation studies were undertaken. All patients recorded their responses themselves and no prompts were given to any of the patients. Patients took ~20 min to complete all the questionnaires and provide demographic details. We had considered translating the questionnaire into Punjabi, Hindi and Urdu. However, in a previous study conducted in our rheumatology unit, one-third of the patients of South Asian origin who could not read English were also unable to read the script of the South Asian language that they spoke. The approach of reading all the questions to the patients (with translation where appropriate) in a standardized manner was chosen to avoid excluding such patients.

### *Statistical analysis*

Data were analysed using SPSS software version 14 (Chicago, Illinois). The $\chi^2$ tests and Dunn's test were used to compare the demographic data. The Mann–Whitney test was used to test the association of the following variables with each of the BMQ scores: gender, the underlying rheumatic disease (RA or SLE), ethnic origin, place of birth (South Asia or the UK/Ireland), level of education (tertiary *vs* primary/secondary), family history of RA or SLE and whether the patient was or was not taking each of the DMARDs. Spearman's test was used to assess the correlation between each of the BMQ scores and the following variables: age, disease duration, the HAQ score and individual SF-36 domain scores. Forward stepwise multivariable regression analysis was used to test for independent associations between each of the BMQ scores and the following explanatory variables: gender, the underlying rheumatic disease, ethnic origin, place of birth, level of education, family history of RA or SLE, whether the patient was or was not taking each of the DMARDs, age, HAQ score and individual SF-36 domain scores. Multiple regression analysis was used to assess the association of ethnic origin with BMQ scores having adjusted for values of the other explanatory variables.

## Results

### *Demographic details*

The demographic details of patients are shown in Table 1. There was no significant difference in gender distribution between South Asian and White patients, though there were fewer women in the RA group compared with the SLE group ($P = 0.03$). Patients of South Asian origin were significantly younger than patients of White origin ($P < 0.0001$) and patients with RA were significantly older than patients with SLE ($P < 0.0001$). Patients of South Asian origin had had their disease for significantly longer than patients of White origin ($P < 0.0001$) though there was no significant difference in disease duration between RA and SLE patients. Significantly more patients of South Asian origin had been born abroad than was the case for patients of White origin ($P < 0.0001$); furthermore, more RA patients had been born abroad compared with SLE patients ($P = 0.046$). There was no difference between patients of South Asian and White origin in terms of the number who had received formal education at a tertiary level; however, fewer RA patients had received tertiary-level education compared with SLE patients ($P = 0.006$). There were several significant differences in employment history between the groups. More patients of South Asian origin had never worked ($P = 0.0001$) and fewer were retired ($P = 0.0003$) compared with their White counterparts. In addition, fewer RA patients were currently working ($P = 0.0005$) and more were retired ($P < 0.0001$) compared with their SLE counterparts. There were no significant differences between patients of South Asian and White origin in terms of the current DMARDs they were being treated with though there were differences between patients with RA and SLE as would be expected (Table 1).

TABLE 1. Baseline demographic characteristics of patients of South Asian and White origin

| | Asian | | White | | Asian *vs* White *P* | RA *vs* SLE *P* |
|---|---|---|---|---|---|---|
| | RA | SLE | RA | SLE | | |
| Number | 50 | 50 | 50 | 50 | | |
| Female (%) | 84 | 94 | 76 | 88 | 0.16[a] | 0.03[a] |
| Age (yrs) | 53 (39–61) | 36 (28–46) | 62 (52–66) | 48 (39–58) | <0.0001[b] | <0.0001[b] |
| Disease duration (yrs) | 8 (5–11) | 7 (4–11) | 12 (6–19) | 10 (6–20) | <0.0001[b] | 0.93[b] |
| Born in UK/Ireland (%) | 26 | 52 | 100 | 100 | <0.0001[a] | 0.046[a] |
| Tertiary education (%) | 36 | 48 | 28 | 54 | 0.89[a] | 0.006[a] |
| Family history (%) | 4 | 12 | 8 | 8 | 1.0[a] | 0.30[a] |
| Employment | | | | | | |
| Working (%) | 38 | 50 | 18 | 54 | 0.25[a] | 0.0005[a] |
| Retired (%) | 20 | 2 | 50 | 14 | 0.0003[a] | <0.0001[a] |
| Never worked (%) | 24 | 28 | 6 | 6 | 0.0001[a] | 0.70[a] |
| Unemployed disease (%) | 14 | 12 | 20 | 24 | 0.09[a] | 0.85[a] |
| Unemployed other (%) | 4 | 8 | 6 | 2 | 0.52[a] | 1.0[a] |
| Current medications | | | | | | |
| MTX (%) | 70 | 8 | 68 | 10 | 1.0[a] | <0.0001[a] |
| SSZ (%) | 44 | 0 | 40 | 2 | 0.86[a] | <0.0001[a] |
| LEF (%) | 6 | 0 | 8 | 2 | 0.47[a] | 0.03[a] |
| Gold (%) | 4 | 0 | 0 | 0 | 0.16[a] | 0.16[a] |
| Azathioprine (%) | 2 | 38 | 0 | 40 | 1.0[a] | <0.0001[a] |
| Cyclosporin (%) | 0 | 2 | 4 | 6 | 0.10[a] | 0.41[a] |
| HCQ (%) | 16 | 66 | 12 | 48 | 0.10[a] | <0.0001[a] |
| Cyclophosphamide (%) | 0 | 6 | 0 | 6 | 1.0[a] | 0.01[a] |
| Mycophenolate (%) | 0 | 12 | 0 | 16 | 0.58[a] | 0.0001[a] |
| Anti-TNF-$\alpha$ therapy (%) | 22 | 0 | 30 | 0 | 0.40[a] | <0.0001[a] |

Data are shown as either numbers, percentages (%) or median (interquartile range). [a]$\chi^2$ test; [b]Mann–Whitney test.

### *BMQ scores: univariable analysis*

The BMQ scores for South Asian RA, White RA, South Asian SLE and White SLE patients are shown in Fig. 1. The Specific Concern, General Overuse and General Harm scores were significantly higher for both RA and SLE patients of South Asian origin compared with those of White origin (Fig. 1). The Specific Necessity score for SLE patients of South Asian origin was lower than that of SLE patients of White origin. However, there was no significant difference between the Specific Necessity score of South Asian and White RA patients (Fig. 1). Seven patients of South Asian origin recorded a General Harm score of 25 (the highest possible) whilst no White patients recorded this score. Furthermore, eight patients of South Asian origin recorded a General Overuse score of 15 (the highest possible) whilst only one White patient recorded this score.

Univariable analysis was performed to assess the relationship between the four BMQ scores and baseline demographic variables, the scores in the SF-36 domains and the HAQ score (Table 2). Patients of South Asian origin had Specific Concern, General Overuse and General Harm scores that were significantly higher than those of patients of White origin (Table 2). In contrast, patients of South Asian origin had a Specific Necessity score that was not significantly different from that of White patients (Table 2). Similarly, patients who were born in South Asia had significantly higher Specific Concern, General Overuse and General Harm scores compared with patients who had been born in the UK. Patients with RA had higher Specific Necessity, Specific Concern and General Harm scores compared with patients with SLE. There was a significant positive correlation between age and the Specific Necessity score ($\rho$ 0.16; $P = 0.03$); however, there were no significant correlations between age and the other BMQ scores. There was a significant negative correlation between the disease duration and the Specific Concern and General Harm scores ($\rho$ −0.16; $P = 0.03$ and $\rho$ −0.15; $P = 0.04$, respectively); however, there were no significant correlations between disease duration and the Specific Necessity and General Overuse scores. Patients who had been educated to a tertiary level had lower Specific Necessity, Specific Concern and General Harm scores than patients who had only received primary- or secondary-level education. Patients with a family history of RA or SLE had a lower General Harm score than patients without such a family history. There were significant differences in the Specific Concern scores and in the General Harm scores between patients in the different employment categories. Dunn's multiple comparisons test revealed that the Specific Concern score was significantly higher in patients who had never worked than in patients who were working. Similarly, the General Harm score was significantly higher in patients who had never worked than in either patients who were working or in patients who were not working as a result of their disease. There were significant correlations between scores in several of the SF-36 domains and the BMQ scores. The PF score correlated negatively with all the four BMQ scores. The RE score correlated negatively with Specific Concern, General Overuse and General Harm scores. The MH score correlated negatively with Specific Concern and General Harm scores. There was a positive correlation between the level of disability as measured with the HAQ and the Specific Necessity score.

### *BMQ scores: multivariable analysis*

Forward stepwise multivariable regression analysis was conducted with the following variables for the RA and SLE patients separately: age, gender, ethnic origin, place of birth (UK/Ireland *vs* South Asia), educational status (primary/secondary *vs* tertiary), family history of RA/SLE, scores in each of the eight SF-36 domains, the HAQ score, all DMARDs (taken *vs* not taken) (Tables 3–5). In addition, forward stepwise multivariable regression analysis was conducted for all the patients together with all the variables listed plus disease (RA *vs* SLE) as an additional variable (Tables 6 and 7).

### *BMQ scores: multivariable analysis for RA patients*

The only significant independent predictor of the Specific Necessity score was the level of disability (the higher the disability, the higher the score) (Table 3). However, this variable explained only 5.9% of the variability in the Specific Necessity score ($R^2 = 0.059$).

Significant independent predictors of the Specific Concern score were ethnic origin (patients of South Asian origin had a higher score), the BP score (patients with a higher BP score had a lower Specific Concern score), age (older patients had a higher score) and use of leflunomide (patients taking this medication had

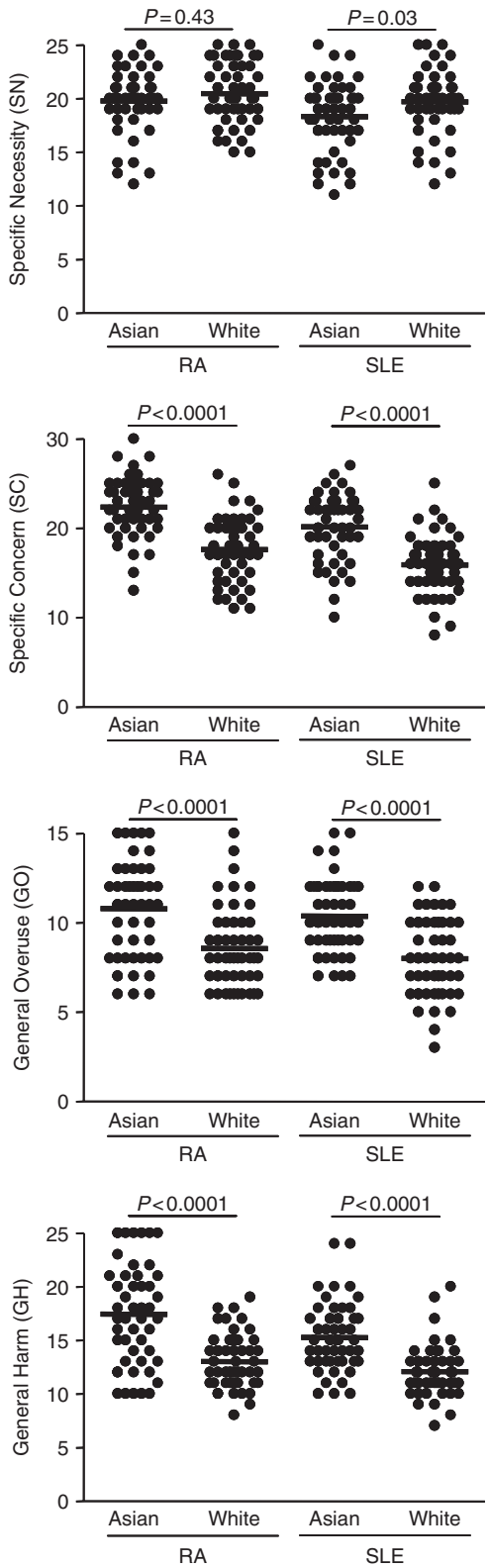


FIG. 1. Beliefs about medicine scores in patients with RA and SLE of South Asian and White origin. Horizontal lines represent median values. Patients of South Asian and White origin were compared using the Mann–Whitney test.

a higher score) (Table 3). A model incorporating these four variables explained 48.8% of the variability in the Specific Concern score ($R^2 = 0.488$).

Significant independent predictors of the General Overuse score were ethnic origin (patients of South Asian origin had a higher score), the RP score (patients with a higher RP score had a lower General Overuse score), age (older patients had a higher score) and family history of RA (patients with a positive family history had a lower score) (Table 4). A model incorporating these four variables explained 32.5% of the variability in the General Overuse score ($R^2 = 0.325$).

Significant independent predictors of the General Harm score were ethnic origin (patients of South Asian origin had a higher score), the educational status of patients (patients who had achieved tertiary education had a lower score), the RP score (patients with a higher RP score had a lower General Harm score) and age (older patients had a higher score) (Table 4). A model incorporating these four variables explained 39.0% of the variability in the General Harm score ($R^2 = 0.390$).

### *BMQ scores: multivariable analysis for SLE patients*

The only significant predictor of the Specific Concern, General Overuse and General Harm scores in patients with SLE was the ethnic origin with those of South Asian origin having higher scores. Furthermore, patients of South Asian origin had a lower Specific Necessity score. The educational status of patients was also an independent predictor of the Specific Necessity score (patients who had achieved tertiary education had a lower score). The $R^2$ values for models incorporating these variables are shown (Table 5).

### *BMQ scores: multivariable analysis for all patients*

Analysis of the data for all 200 patients, with disease (RA *vs* SLE) as a variable, showed that disease was an independent predictor of only the Specific Concern score (Tables 6 and 7).

Significant independent predictors of the Specific Necessity score were the level of disability (the higher the disability, the higher the score) and the use of HCQ (the use of this drug was associated with a lower score) (Table 6). However, a model incorporating these two variables explained only 7.6% of the variability in the Specific Necessity score ($R^2 = 0.076$).

Significant independent predictors of the Specific Concern score were ethnic origin (patients of South Asian origin had a higher score), disease (patients with RA had a higher score), the RE score (patients with a higher RE score had a lower Specific Concern score), current use of LEF and of anti-TNF-$\alpha$ therapy (patients taking these medications had a higher score) (Table 6). A model incorporating these five variables explained 39.3% of the variability in the Specific Concern score ($R^2 = 0.393$).

Significant independent predictors of the General Overuse score were ethnic origin (patients of South Asian origin had a higher score), the RE score (patients with a higher RE score had a lower General Overuse score) and family history of RA/SLE (patients with a positive family history had a lower score) (Table 7). A model incorporating these three variables explained 25.6% of the variability in the General Overuse score ($R^2 = 0.256$).

Significant independent predictors of the General Harm score were ethnic origin (patients of South Asian origin had a higher score), the educational status of patients (patients who had achieved tertiary education had a lower score), the RP score (patients with a higher RP score had a lower General Harm score), the current use of LEF (patients taking LEF had a higher score) and family history of RA/SLE (patients with a positive family history had a lower score) (Table 7). A model incorporating these five variables explained 34.4% of the variability in the General Harm score ($R^2 = 0.344$).

Having adjusted for the values of the other explanatory variables, the association of ethnic origin with the BMQ score was not significant for the Specific Necessity score ($P = 0.078$) but was significant for the Specific Concern and the General Overuse and General Harm scores (all $P < 0.001$).

TABLE 2. Univariable analysis assessing the relationship between the scores in the four scales of the BMQ and other clinical variables

| | Specific Necessity | Specific Concern | General Overuse | General Harm |
|---|---|---|---|---|
| Ethnic origin; $P^a$ | 0.05 | <0.0001 | <0.0001 | <0.0001 |
| Born in UK/Ireland; $P^a$ | 0.84 | <0.0001 | <0.0001 | <0.0001 |
| Disease; $P^a$ | 0.02 | 0.001 | 0.35 | 0.02 |
| Gender; $P^a$ | 0.12 | 0.52 | 0.20 | 0.87 |
| Age; $\rho$ ($P$)[b] | 0.16 (0.03) | 0.02 (0.76) | −0.02 (0.77) | 0.02 (0.77) |
| Disease duration; $\rho$ ($P$)[b] | 0.05 (0.52) | −0.16 (0.03) | −0.01 (0.92) | −0.15 (0.04) |
| Education; $P^a$ | 0.04 | 0.03 | 0.09 | 0.0004 |
| Family history; $P^a$ | 0.62 | 0.58 | 0.08 | 0.02 |
| Employment status[c] | 0.09 | 0.003 | 0.13 | 0.001 |
| Current medications; $P^a$ | | | | |
| MTX | 0.73 | 0.04 | 0.78 | 0.15 |
| SSZ | 0.42 | 0.66 | 0.77 | 0.56 |
| LEF | 0.92 | 0.18 | 0.31 | 0.07 |
| Azathioprine | 0.46 | 0.77 | 0.75 | 0.89 |
| Cyclosporin | 0.96 | 0.28 | 0.43 | 0.29 |
| HCQ | 0.03 | 0.20 | 0.88 | 0.40 |
| Cyclophosphamide | 0.37 | 0.33 | 0.53 | 0.97 |
| Mycophenolate | 0.95 | 0.18 | 0.31 | 0.10 |
| Anti-TNF-$\alpha$ therapy | 0.15 | 0.056 | 0.65 | 0.79 |
| SF-36 domains; $\rho$ ($P$)[b] | | | | |
| PF | −0.21 (0.003) | −0.27 (<0.0001) | −0.18 (0.01) | −0.21 (0.003) |
| RP | −0.14 (0.06) | −0.11 (0.12) | −0.11 (0.12) | −0.09 (0.19) |
| BP | −0.07 (0.30) | 0.05 (0.46) | 0.09 (0.23) | 0.07 (0.29) |
| GH | −0.08 (0.27) | −0.09 (0.23) | −0.06 (0.42) | −0.01 (0.83) |
| VT | −0.03 (0.70) | 0.06 (0.43) | 0.06 (0.42) | 0.10 (0.15) |
| SF | −0.09 (0.18) | −0.02 (0.76) | −0.01 (0.84) | 0.0004 (0.99) |
| RE | −0.01 (0.90) | −0.23 (0.0009) | −0.22 (0.002) | −0.18 (0.01) |
| MH | −0.08 (0.24) | −0.16 (0.028) | −0.13 (0.07) | −0.14 (0.046) |
| HAQ; $\rho$ (p)[b] | 0.21 (0.003) | 0.10 (0.16) | 0.02 (0.82) | 0.03 (0.69) |

No analysis performed for patients on gold as only two patients were on this drug. [a]Mann–Whitney test; [b]Spearman's rank correlation coefficient ($\rho$); [c]Kruskal–Wallis test.

TABLE 3. Forward stepwise multivariable regression analysis testing for independent associations with the Specific Necessity and Specific Concern scores in RA patients

| | | | Unstandardized coefficients | | Standardized coefficients | Significance | | |
|---|---|---|---|---|---|---|---|---|
| BMQ domain | | Model | $B$ | S.E. | $\beta$ | $P$ | $R$ | $R^2$ |
| SN | 1 | Constant | 19.068 | 0.515 | | | | |
| | | HAQ score | 0.855 | 0.344 | 0.243 | 0.015 | 0.243 | 0.059 |
| SC | 1 | Constant | 17.660 | 0.488 | | | | |
| | | Ethnic origin | 4.720 | 0.691 | 0.568 | <0.0001 | 0.568 | 0.323 |
| | 2 | Constant | 19.967 | 0.689 | | | | |
| | | Ethnic origin | 6.526 | 0.754 | 0.785 | <0.0001 | | |
| | | BP | −0.066 | 0.015 | −0.401 | <0.0001 | 0.660 | 0.436 |
| | 3 | Constant | 16.683 | 1.594 | | | | |
| | | Ethnic origin | 7.067 | 0.776 | 0.850 | <0.0001 | | |
| | | BP | −0.069 | 0.015 | −0.415 | <0.0001 | | |
| | | Age | 0.058 | 0.025 | 0.179 | 0.025 | 0.682 | 0.465 |
| | 4 | Constant | 16.731 | 1.568 | | | | |
| | | Ethnic origin | 7.010 | 0.764 | 0.844 | <0.0001 | | |
| | | BP | −0.067 | 0.015 | −0.402 | <0.0001 | | |
| | | Age | 0.052 | 0.025 | 0.162 | 0.041 | | |
| | | LEF | 2.492 | 1.206 | 0.153 | 0.042 | 0.698 | 0.488 |

SN: Specific Necessity; SC: Specific Concern.

## Discussion

This is the first study to examine the influence of ethnic background on beliefs about medicines in patients with rheumatic diseases.

The belief of patients with RA and SLE as to whether their specific DMARDs were necessary was not strongly influenced by their ethnic background. Although multivariable analysis showed that the Specific Necessity score was significantly lower in SLE patients of South Asian origin compared with patients of White origin, this was not seen in RA patients. Furthermore, in the total patient population, ethnic origin was not a significant independent predictor of the Specific Necessity score and in the SLE group, ethnic origin explained only a small proportion (4.3%) of the variability in this score. In the total patient population, multivariable analysis revealed that only the level of disability and the current use of HCQ were independently associated with the Specific Necessity score and most importantly that only a small proportion of the variability in this score could be explained by any of the parameters studied. Interpretation of the relationship between the current use of individual medicines and BMQ scores in the present study is difficult. The use of specific drugs may be markers of specific patterns or severities of disease that were not assessed in this study. Patients with RA and SLE had a Specific Necessity score that was similar to that of patients with asthma requiring hospital management, patients with cardiac disease requiring admission to hospital, patients undergoing renal dialysis and patients attending oncology clinics [16]. Furthermore, the Specific Necessity scores were similar to those recently reported for patients with RA in a cross-sectional study that did not look at the effects of ethnic background [16].

Our study shows that patients with RA and SLE of South Asian origin believed that drugs in general were more overused and more harmful than did their White counterparts. South Asian

TABLE 4. Forward stepwise multivariable regression analysis testing for independent associations with General Overuse and General Harm scores in RA patients

| BMQ domain | Model | | Unstandardized coefficients | | Standardized coefficients | Significance | | |
|---|---|---|---|---|---|---|---|---|
| | | | *B* | S.E. | $\beta$ | *P* | *R* | $R^2$ |
| GO | 1 | Constant | 8.580 | 0.352 | | | | |
| | | Ethnic origin | 2.220 | 0.497 | 0.411 | <0.0001 | 0.411 | 0.169 |
| | 2 | Constant | 8.908 | 0.352 | | | | |
| | | Ethnic origin | 2.612 | 0.492 | 0.484 | <0.0001 | | |
| | | RP | −0.018 | 0.006 | −0.288 | 0.002 | 0.496 | 0.246 |
| | 3 | Constant | 6.109 | 1.158 | | | | |
| | | Ethnic origin | 2.999 | 0.503 | 0.555 | <0.0001 | | |
| | | RP | −0.018 | 0.006 | −0.284 | 0.002 | | |
| | | Age | 0.048 | 0.019 | 0.229 | 0.013 | 0.542 | 0.294 |
| | 4 | Constant | 6.390 | 1.146 | | | | |
| | | Ethnic origin | 2.888 | 0.497 | 0.535 | <0.0001 | | |
| | | RP | −0.017 | 0.006 | −0.275 | 0.002 | | |
| | | Age | 0.046 | 0.019 | 0.218 | 0.016 | | |
| | | Family history | −2.018 | 0.965 | −0.177 | 0.039 | 0.570 | 0.325 |
| GH | 1 | Constant | 13.060 | 0.539 | | | | |
| | | Ethnic origin | 4.400 | 0.762 | 0.504 | <0.0001 | 0.504 | 0.254 |
| | 2 | Constant | 13.762 | 0.560 | | | | |
| | | Ethnic origin | 4.600 | 0.731 | 0.527 | <0.0001 | | |
| | | Education | −2.506 | 0.783 | −0.268 | 0.002 | 0.570 | 0.325 |
| | 3 | Constant | 14.096 | 0.564 | | | | |
| | | Ethnic origin | 5.034 | 0.736 | 0.577 | <0.0001 | | |
| | | Education | −2.375 | 0.767 | −0.254 | 0.003 | | |
| | | RP | −0.021 | 0.009 | −0.202 | 0.019 | 0.603 | 0.363 |
| | 4 | Constant | 10.232 | 1.951 | | | | |
| | | Ethnic origin | 5.508 | 0.760 | 0.631 | <0.0001 | | |
| | | Education | −1.764 | 0.810 | −0.189 | 0.032 | | |
| | | RP | −0.021 | 0.008 | −0.203 | 0.016 | | |
| | | Age | 0.063 | 0.031 | 0.187 | 0.042 | 0.625 | 0.390 |

GO: General Overuse; GH: General Harm.

TABLE 5. Forward stepwise multivariable regression analysis testing for independent associations with the Specific Necessity: Specific Concern: General Overuse and General Harm scores in SLE patients

| BMQ domain | Model | | Unstandardized coefficients | | Standardized coefficients | Significance | | |
|---|---|---|---|---|---|---|---|---|
| | | | *B* | S.E. | $\beta$ | *P* | *R* | $R^2$ |
| SN | 1 | Constant | 19.667 | 0.457 | | | | |
| | | Ethnic origin | −1.327 | 0.640 | −0.207 | 0.041 | 0.207 | 0.043 |
| | 2 | Constant | 20.366 | 0.564 | | | | |
| | | Ethnic origin | −1.406 | 0.630 | −0.220 | 0.028 | | |
| | | Education | −1.291 | 0.630 | −0.202 | 0.043 | 0.289 | 0.083 |
| SC | 1 | Constant | 16.063 | 0.508 | | | | |
| | | Ethnic origin | 4.118 | 0.711 | 0.509 | <0.0001 | 0.509 | 0.259 |
| GO | 1 | Constant | 8.104 | 0.306 | | | | |
| | | Ethnic origin | 2.276 | 0.428 | 0.477 | <0.0001 | 0.477 | 0.228 |
| GH | 1 | Constant | 12.104 | 0.411 | | | | |
| | | Ethnic origin | 3.176 | 0.575 | 0.491 | <0.0001 | 0.491 | 0.241 |

SN: Specific Necessity; SC: Specific Concern; GO: General Overuse; GH: General Harm.

patients were also more concerned about their DMARDs. In multivariable analysis, ethnic origin was identified as the strongest independent predictor of higher General Overuse, General Harm and Specific Concern scores in the RA and SLE patients when analysed separately and in the total patient population. Amongst the other factors associated with the variation in these BMQ scores were the scores in several domains of the SF-36. Multivariable analysis revealed that the RP score was negatively associated with the General Harm score in the total patient population and negatively with the General Harm and General Overuse scores in the RA patients. In addition, the RE score was negatively associated with the Specific Concern and General Overuse scores in the total patient population. Thus, the more the patients perceived that they had problems with work or other daily activities as a result of their physical health, the more they believed that medicines in general were harmful. Furthermore, the more the patients perceived that they had problems with work or other daily activities as a result of emotional problems, the more they were concerned about using DMARDs and believed that medicines in general were overused. In addition, a family history of RA or SLE was associated with lower General Overuse and General Harm scores in the total patient population. This may reflect the fact that patients with a positive family history may have increased awareness of the disease and its potential complications and of therapies and their particular risks.

Our findings are consistent with those of other studies addressing beliefs about medicines in subjects of South Asian origin. In a study of 500 healthy UK undergraduates, those of South Asian origin had a higher General Harm score than those of European origin, although interestingly the General Overuse score was not significantly different between the two groups [9]. Furthermore, in a qualitative study of the perceptions of British Asian patients about oral hypoglycaemic agents, many themes relating to concerns about medications emerged [17]. Cultural background will have additional influences on how patients respond to illness and medication. In studies of patients with atrial fibrillation receiving warfarin and of patients with heart failure,

TABLE 6. Forward stepwise multivariable regression analysis testing for independent associations with the Specific Necessity and Specific Concern scores in all 200 patients

| BMQ domain | Model | | Unstandardized coefficients | | Standardized coefficients | Significance | | |
|---|---|---|---|---|---|---|---|---|
| | | | *B* | S.E. | $\beta$ | *P* | *R* | $R^2$ |
| SN | 1 | Constant | 18.701 | 0.342 | | | | |
| | | HAQ score | 0.893 | 0.273 | 0.228 | 0.001 | 0.228 | 0.052 |
| | 2 | Constant | 19.128 | 0.387 | | <0.0001 | | |
| | | HAQ score | 0.826 | 0.271 | 0.211 | 0.003 | | |
| | | HCQ | −1.023 | 0.448 | −0.158 | 0.024 | 0.277 | 0.076 |
| SC | 1 | Constant | 16.878 | 0.364 | | | | |
| | | Ethnic origin | 4.402 | 0.512 | 0.524 | <0.0001 | 0.524 | 0.274 |
| | 2 | Constant | 19.711 | 0.817 | | | | |
| | | Ethnic origin | 4.422 | 0.495 | 0.526 | <0.0001 | | |
| | | Disease | −1.902 | 0.495 | −0.226 | <0.0001 | 0.570 | 0.325 |
| | 3 | Constant | 20.225 | 0.812 | | | | |
| | | Ethnic origin | 4.356 | 0.483 | 0.518 | <0.0001 | | |
| | | Disease | −1.644 | 0.489 | −0.196 | 0.001 | | |
| | | RE | −0.017 | 0.005 | −0.192 | 0.001 | 0.601 | 0.361 |
| | 4 | Constant | 19.769 | 0.823 | | | | |
| | | Ethnic origin | 4.387 | 0.477 | 0.522 | <0.0001 | | |
| | | Disease | −1.411 | 0.492 | −0.168 | 0.005 | | |
| | | RE | −0.017 | 0.005 | −0.197 | 0.001 | | |
| | | LEF | 3.243 | 1.315 | 0.142 | 0.015 | 0.617 | 0.380 |
| | 5 | Constant | 18.874 | 0.934 | | | | |
| | | Ethnic origin | 4.454 | 0.475 | 0.530 | <0.0001 | | |
| | | Disease | −0.990 | 0.533 | −0.118 | 0.065 | | |
| | | RE | −0.017 | 0.005 | −0.193 | 0.001 | | |
| | | LEF | 3.671 | 1.323 | 0.161 | 0.006 | | |
| | | Anti-TNF-$\alpha$ therapy | 1.525 | 0.771 | 0.122 | 0.049 | 0.627 | 0.393 |

SN: Specific Necessity; SC: Specific Concern.

TABLE 7. Forward stepwise multivariable regression analysis testing for independent associations with General Overuse and General Harm scores in all 200 patients

| BMQ domain | Model | | Unstandardized coefficients | | Standardized coefficients | Significance | | |
|---|---|---|---|---|---|---|---|---|
| | | | *B* | S.E. | $\beta$ | *P* | *R* | $R^2$ |
| GO | 1 | Constant | 8.347 | 0.233 | | | | |
| | | Ethnic origin | 2.243 | 0.328 | 0.438 | <0.0001 | 0.438 | 0.192 |
| | 2 | Constant | 8.969 | 0.289 | | | | |
| | | Ethnic origin | 2.199 | 0.320 | 0.430 | <0.0001 | | |
| | | RE | −0.012 | 0.003 | −0.218 | 0.001 | 0.490 | 0.240 |
| | 3 | Constant | 9.071 | 0.290 | | | | |
| | | Ethnic origin | 2.197 | 0.317 | 0.429 | <0.0001 | | |
| | | RE | −0.012 | 0.003 | −0.219 | 0.001 | | |
| | | Family history | −1.205 | 0.581 | −0.128 | 0.039 | 0.506 | 0.256 |
| GH | 1 | Constant | 12.592 | 0.349 | | | | |
| | | Ethnic origin | 3.778 | 0.491 | 0.482 | <0.0001 | 0.482 | 0.232 |
| | 2 | Constant | 13.307 | 0.392 | | | | |
| | | Ethnic origin | 3.799 | 0.477 | 0.484 | <0.0001 | | |
| | | Education | −1.753 | 0.484 | −0.220 | <0.0001 | 0.530 | 0.280 |
| | 3 | Constant | 13.624 | 0.402 | | | | |
| | | Ethnic origin | 4.099 | 0.481 | 0.523 | <0.0001 | | |
| | | Education | −1.586 | 0.480 | −0.199 | 0.001 | | |
| | | RP | −0.015 | 0.005 | −0.170 | 0.006 | 0.555 | 0.308 |
| | 4 | Constant | 13.492 | 0.401 | | | | |
| | | Ethnic origin | 4.142 | 0.476 | 0.528 | <0.0001 | | |
| | | Education | −1.525 | 0.475 | −0.192 | 0.002 | | |
| | | RP | −0.015 | 0.005 | −0.177 | 0.004 | | |
| | | LEF | 2.975 | 1.257 | 0.140 | 0.019 | 0.572 | 0.327 |
| | 5 | Constant | 13.612 | 0.401 | | | | |
| | | Ethnic origin | 4.135 | 0.471 | 0.527 | <0.0001 | | |
| | | Education | −1.436 | 0.472 | −0.180 | 0.003 | | |
| | | RP | −0.015 | 0.005 | −0.176 | 0.004 | | |
| | | LEF | 2.831 | 1.247 | 0.133 | 0.024 | | |
| | | Family history | −1.855 | 0.846 | −0.129 | 0.030 | 0.586 | 0.344 |

GO: General Overuse; GH: General Harm.

those of Asian origin were more likely to believe that their health was controlled by either God or fate than by themselves or the doctor [18, 19]. In addition, patients of Asian origin were significantly less aware of their underlying cardiovascular diagnosis or the reasons for taking their medication [18, 19].

Only two other studies have addressed beliefs about medicines in patients with RA [8, 20]. Neame and Hammond [20] reported a significant and positive correlation between the HAQ score and the Specific Necessity and Specific Concern scores. Furthermore, these authors identified significant positive correlations between the Specific Necessity and Specific Concern scores and pain and fatigue, as measured using a visual analogue scale. Neither of these variables was assessed in our study; doing so may have allowed us to develop a model that explained more of the variation in the Specific Necessity score. Treharne *et al.* [8] reported that holding strong beliefs about the necessity of medication, and believing that medications were generally not overused predicted higher reported adherence. Neither study

addressed the issue of ethnic origin and further research will be necessary to determine whether the high Specific Concern, General Overuse and General Harm scores found in patients of South Asian origin translate into poor adherence.

Some work has been done comparing clinical disease outcomes between patients of South Asian and White origin with either RA or SLE. Interestingly, RA patients of South Asian origin have higher disability and pain levels than White patients despite having fewer erosions and nodules [21]. South Asian patients with SLE may have a higher prevalence of renal disease compared with their White counterparts [22]. The reasons for such differences are unclear; they may relate to ethnic differences in the underlying disease process or in patient responses to having the disease and their approach to medication. Indeed, it has been shown that people of South Asian origin terminate DMARD therapy sooner than those of North European origin, and that concern about the drug was cited as a reason for stopping by significantly more people of South Asian origin [23].

This pilot study has several limitations. First, we included only those patients currently taking a DMARD. Consequently we have excluded patients who had refused to commence DMARDs or who had discontinued DMARDs for reasons including inefficacy and adverse events. It is likely that such patients would have negative views about DMARDs in particular and drugs in general [24]. Second, we did not capture data regarding previous drug-related adverse events or to what extent the DMARDs that the patient was taking had reduced their disease activity; having done so would have allowed us to assess the relationship between previous experiences with medication and current beliefs about medication. Third, we did not acquire data regarding the extent of damage accrued since the onset of disease or the current level of disease activity. We recognize that the terms South Asian and White British are very broad descriptors of ethnic origin, which do not reflect the diversity that exists within these two groups at religious, regional and other levels [25]. As data about religious background were not collected, we were unable to address whether this variable influenced beliefs about medicines. Furthermore, amongst patients classified as being of South Asian origin, there is likely to be considerable variation in the level of acculturation (a process through which members of one culture acquire the norms and values of another culture, for example, of the host). Levels of acculturation amongst British Asian patients influence reporting of pain [26] and may have influenced beliefs about medicines. However, data were not collected to address this. Finally, data on the socioeconomic status of the patients were not collected though this would have been helpful in interpreting our results.

We have shown for the first time that patients with RA and SLE of South Asian origin have very high levels of concern about medicines, worthy of further study. We are currently conducting in-depth interviews with subgroups of South Asian patients to explore the reasons for these beliefs. An improved understanding of the health beliefs of patients of South Asian origin will aid the development of a successful educational programme to address specific anxieties and concerns. Further work will be necessary to determine the effects of such a programme on adherence to medicines.

### Rheumatology key messages

- RA and SLE patients of South Asian origin living in the UK have very high levels of concern about medicines.
- This may have an impact on adherence in this group of patients and further work is needed to understand the reasons underlying these beliefs.

## Acknowledgements

*Funding*: This work was supported by an ICAC grant from the ARC (Grant ID 14374). V.T. is supported by Lupus UK. Funding to pay the Open Access publication charges for this article was provided by the ARC.

*Disclosure statement*: R.H. is the originator and copyright holder on the Beliefs about Medicines Questionnaire. All other authors have declared no conflicts of interest.

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