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## Health-Related Quality of Life for Patients With Vasculitis and Their Spouses

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### Abstract

**Objective**—Chronic disease affects both patients and spouses, yet the effect of vasculitis on the spouses of patients has not been systematically examined. We addressed this research gap by describing 8 dimensions of health-related quality of life (HRQOL) for antineutrophil cytoplasmic antibody–associated vasculitis (AAV) patients and their spouses and compared patients and spouses with norms for the general US population. We also determined whether the impact of AAV on HRQOL differs by sex for patients or their spouses.

**Methods**—Ninety-seven patients with AAV and their spouses completed a mailed questionnaire that included demographic information and a measure of HRQOL (Medical Outcomes Study Short Form 36.) Using the RAND method, we calculated 8 HRQOL dimensions: general health, physical functioning, emotional role limitations, physical role limitations, social functioning, mental health, bodily pain, and energy/vitality. Using norm-based scores, we compared the HRQOL of patients and spouses with the general US population. We then used multivariate analysis of covariance (MANCOVA) test for sex differences in HRQOL for patients and spouses.

**Results**—Patients with AAV scored lower than the US norm on all HRQOL subscales with the exception of bodily pain. In contrast, spouses scored similarly to national norms. When age, education, race, illness duration, and disease severity were controlled, there were no significant sex differences in HRQOL for patients or spouses.

**Conclusion**—AAV negatively impacts HRQOL for patients; whereas, spouses do not appear to be as negatively impacted. Long-term marriages may attenuate the effect of sex on HRQOL. Quality of life should be assessed throughout the disease course for both patients and spouses.

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#### AUTHOR CONTRIBUTIONS

Ms Carpenter had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Study design.** Thorpe, Lewis, DeVellis, Hogan.

**Acquisition of data.** Carpenter, Thorpe, Lewis, DeVellis, Hogan.

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## INTRODUCTION

The vasculitides are a family of rare autoimmune diseases that cause inflammation of blood vessels. Three types of vasculitis, Wegener's granulomatosis (WG), Churg-Strauss syndrome (CSS), and microscopic polyangiitis (MPA) primarily attack small blood vessels and are associated with antineutrophil cytoplasmic antibodies (ANCA) (1). Together, these types of vasculitis are known as ANCA-associated vasculitis (AAV). During the past 40 years, the advent of more effective drug regimens has transformed vasculitis from a frequently fatal, acute disease to a chronic condition with relapsing and remitting episodes and chronic sequelae that most patients live with for many years.

As with other chronic conditions, there is considerable evidence that vasculitis negatively impacts the health-related quality of life (HRQOL) of patients (2–9). However, to our knowledge no studies have investigated whether vasculitis differentially impacts quality of life in men and women, even though female patients with other rheumatic illnesses often fare worse than male patients on various dimensions of quality of life, including pain, psychological distress, and activity limitations (10). Furthermore, prior research suggests that vasculitis may affect men and women differently. For example, Reinhold-Keller and colleagues (4) found that among vasculitis patients age <40 years, women had a 2.6 times higher risk than men of becoming unemployed after receiving a diagnosis of WG. Identifying whether AAV impacts quality of life differently for men and women, and what those differences are, is important in order to determine if sex-specific interventions targeting HRQOL are warranted.

Similarly, no published studies have reported how vasculitis affects quality of life for spouses of vasculitis patients. This gap in the literature exists despite increasing recognition that chronic illness is a stressor for both patients and their spouses (11,12) and the management of chronic illness is a dyadic process that involves spouses (13). Furthermore, research suggests that other chronic rheumatic illnesses negatively influence spouses' quality of life. For example, das Chagas Medeiros et al (14) reported that spouses of rheumatoid arthritis patients experienced negative impacts on emotional and mental health. Moreover, in studies of married couples where one person has a chronic illness (e.g., dementia, Parkinson's disease, or cancer) sex differences in quality of life exist for spouses. For example, female spouses have consistently reported more psychiatric morbidity, including distress (15), than male spouses of chronic disease patients (16). Thus, characterizing spouses' HRQOL, and determining whether male and female spouses report similar HRQOL is important and could help inform future interventions for married couples facing the illness.

We addressed the research gaps described above using data collected from AAV patients and their spouses as part of the Partners Adjusting to Illness with Relationship Support (PAIRS) study. Our goals were to describe 8 domains of HRQOL for patients and their spouses and compare them with general US population norms; and to examine whether sex differences exist with regard to these 8 domains for patients and their spouses. We also sought to determine whether patient and spouse HRQOL were significantly correlated.

## SUBJECTS AND METHODS

### Subjects

All data were derived from the PAIRS study, a longitudinal, observational study of married couples in which one partner had AAV. In the PAIRS study, patients and their spouses were assessed at baseline and again 1 year later. At each time point, both the patient and spouse completed a mailed questionnaire at home and then traveled to the study office to complete a 2-hour tape-recorded interview. The PAIRS study was approved by the Institutional Review Board of the University of North Carolina.

Participants for the PAIRS study were recruited through 2 strategies. Recruitment letters were mailed to known AAV patients who had previously signed Glomerular Disease Collaborative Network (GDCN) registry consent forms to be contacted for future research (n = 235) or who were part of the GDCN but had not signed a consent form to be contacted about future studies (n = 152). In the latter case, patients' physicians were asked to address and forward a prestamped study recruitment letter to patients. All GDCN patients had a histopathologic finding compatible with AAV and/or surrogate markers for WG (1), with verification of a positive ANCA test determined by immunofluorescence microscopy and antigen-specific enzyme-linked immunosorbent assay (ELISA) (17). We recruited 79 couples using this first strategy.

The second recruitment strategy involved posting a variety of recruitment announcements in vasculitis patient newsletters, websites, and support group meetings. It is unknown how many AAV patients were exposed to these announcements; however, 111 were recruited using this method. An additional 7 couples were either recruited in person at the 2006 annual Vasculitis Foundation Conference or recruited from a previous study led by the principal investigator (CTT) of the Vasculitis Self-Management study. All patients recruited through the second strategy had a self-reported diagnosis of AAV.

All interested patients who contacted study staff in response to these recruitment efforts (n = 197) completed a telephone screening to determine eligibility. Couples were excluded (n = 5) if the patient did not have a self-reported diagnosis of AAV for at least 6 months; the couple was not currently legally married; either partner was younger than age 18 years; the patient was currently on dialysis; either partner could not read, speak, and write in English or; either partner had a significant uncorrected hearing problem. We limited our sample to legally-married couples in order to control for differences that may exist between married couples and other types of couples (e.g., cohabitating unmarried couples, same-sex couples). Lastly, couples who did not agree to travel to a study interview office to complete the interview (n = 42) or who were uninterested in participating after learning more about the study via telephone (n = 11) were excluded. All couples who were deemed eligible during the telephone screening (n = 139) were mailed study consent forms (one for each couple member) and a patient Health Insurance Portability and Accountability Act consent form asking permission to contact the patient's primary vasculitis physician about his or her condition.

Of the 139 eligible and interested couples who were mailed consent forms, 113 couples (81%) provided consent and 97 (70%) returned the completed baseline questionnaires. Reasons for noncompletion included inability to travel for the first interview session (n = 6), patient too sick to continue (n = 3), and no desire to continue in the study (n = 7).

## Measures

Variables were assessed using the PAIRS study baseline questionnaire, with the exception of patient disease activity (assessed by physician rating), and data on major medical conditions (assessed using the followup questionnaire). Scores for multiple-item scales (HRQOL) were not calculated for individuals if >25% of the scale items were missing; instead, these summary scores were treated as missing.

We used the RAND 36-item health survey, version 1.0, to assess HRQOL for both patients and their spouses (18). The 36-items contained in the RAND survey are identical to the Medical Outcomes Study Short Form 36 (SF-36) (19). The scoring methods for the 2 measures differ, but produce scores that are almost perfectly correlated with one another (18). The RAND 36-item health survey assesses 8 domains of HRQOL, including physical functioning (10 items;  $\alpha = 0.93$ ), bodily pain (2 items;  $\alpha = 0.87$ ), role limitations due to physical health (4 items;  $\alpha = 0.86$ ), role limitations due to emotional health (3 items;  $\alpha = 0.84$ ), mental health (5 items;  $\alpha =$

0.83), social functioning (2 items;  $\alpha = 0.80$ ), energy/vitality (4 items;  $\alpha = 0.82$ ), and general health perceptions (5 items;  $\alpha = 0.79$ ). This measure has demonstrated face validity and construct validity when used with rheumatoid arthritis and osteoarthritis patients (20); however, no validity studies have been conducted with AAV patients. For all subscales, higher scores correspond to higher HRQOL (e.g., higher scores on the bodily pain domain correspond to less pain).

Parallel sociodemographic information was collected from patients and spouses. These data included date of birth, age in years, sex, race, and years of education (possible responses 1 to >17). Race was dichotomized into white versus nonwhite because the number of nonwhite participants ( $n = 3$ ) was small. Duration of the current marriage (in years) was assessed by patient report. Patients also self-reported the presence of a major medical condition (other than vasculitis) and spouses reported whether they had any major medical conditions.

Marital quality was assessed by one item from the Quality Marriage Index (21), which asks patients and spouses to rate how happy, everything considered, they are with their marriages. Responses range from 1 = very unhappy to 10 = perfectly happy.

During the phone screening, patients reported the number of months/years they had been diagnosed with vasculitis. Values of <1 year ( $n = 3$ ) were assigned a value of 0.75 years because this is the halfway point between 6 months (the minimum diagnosis time to be eligible for the study) and the nearest integer (1 year).

To assess the patient's level of disease activity, a form was faxed to the patients' physicians asking them to rate the patient's current vasculitis condition (based on their last visit) using a 10-point scale where 1 = remission and 10 = most active disease. Physicians received the form at approximately the same time patients received their questionnaires.

### Statistical analysis

Analyses were conducted using SAS software, version 9.1 (SAS Institute, Cary, NC). In order to compare the HRQOL of patients and spouses with the general 1998 US population, we converted the HRQOL subscale scores to norm-based scores using procedures previously described by Ware and Kosinski (22). Ware and Kosinski's estimates for the 1998 noninstitutionalized US population were derived from the National Survey of Functional Health Status and represent 1,982 households that match census data on geographic region, market size, age, income (socioeconomic status), and household size (22). The mean age for the 1998 sample was 50.7 years; 59.6% were female, and the majority (84.2%) were white. Most respondents (79.8%) had at least 12 years of education. Regarding interpretation, a norm-based score of 50 indicates that the population of interest scored exactly the same as the general 1998 US population (all ages). Similarly, norm-based scores >50 indicate that the population of interest scored higher than the general 1998 US population (all ages), whereas scores <50 indicate that the population scored lower than the 1998 general US population. For this study, norm-based HRQOL scores for patients and spouses were presented along with norm-based scores for the general US population ages 54 – 65 years (i.e., the age group corresponding to the mean age of our patient and spouse samples) for the sake of age-adjusted comparisons. Independent sample *t*-tests were then used to determine whether patients and spouses differed significantly ( $\alpha = 0.05$ ) from the general US population (ages 54 – 65 years) on the 8 HRQOL subscales. We used the norm-based scores in all subsequent analyses.

To investigate sex differences in HRQOL among patients and spouses, we used multivariate analysis of covariance (MANCOVA) with separate models constructed for patients and spouses. That is, in the first MANCOVA, the 8 patient HRQOL subscales were the dependent variables, patient sex was the primary independent variable, and patient age, education, disease

activity, and years since diagnosis were included as control variables. The second MANCOVA included the 8 spouse HRQOL subscales as the dependent variables, spouse sex as the primary independent variable, and spouse age, education, patient disease activity, and years since diagnosis as control variables. For all MANCOVAs, we first inspected Wilks'  $\lambda$ . If this statistic was significant, we then inspected individual analysis of covariance to determine where differences existed. Last, we calculated Pearson's correlation to determine whether patient and spouse HRQOL were related.

## RESULTS

### Sample characteristic

Demographic and clinical characteristics for couples in the sample are shown in Table 1. The mean patient and spouse age was ~57 years. Men comprised 55% of the patient sample, and the majority of patients (97%) and spouses (93%) were white. On average, patients and spouses had ~15 years of formal education (i.e., some college). Patients had been diagnosed with AAV for an average of 4.4 years, and couples had been married an average of 30.1 years. Both patients and spouses reported a substantial degree of happiness in their marriage (mean  $\pm$  SD  $8.3 \pm 1.7$  and  $8.1 \pm 1.8$ , respectively on a 10-point scale.) The overall mean physician-rated disease activity level was 2.0 on a 10-point scale, and the mean  $\pm$  SD disease activity level for male and female patients was  $2.1 \pm 1.4$  and  $1.8 \pm 1.2$ , respectively. The majority of patients (55.3%) did not report a major medical condition other than vasculitis, and most spouses (69.7%) did not report a major medical condition. Additionally, the average disease duration (in years) for male and female patients was  $4.1 \pm 3.8$  and  $4.9 \pm 5.4$ , respectively.

No significant differences by sex in patient disease activity or disease duration by independent sample *t*-tests were seen ( $t[78] = 0.97$ ,  $P = 0.33$  and  $t[92] = -0.84$ ,  $P = 0.40$ , respectively); and no difference by chi-square test in the number of male and female spouses reporting a major medical condition ( $\chi^2 = 1.21$ ,  $P = 0.27$ ).

### Normed HRQOL comparisons

Figure 1 presents the SF-36 norm-based HRQOL scores for patients, spouses, and the 1998 general US population ages 55–64 years. Independent sample *t*-tests revealed that patients scored significantly worse than the US population ages 55–64 years on all HRQOL subscales with the exception of bodily pain ( $t[405] = 0.51$ ,  $P = 0.31$ ). In contrast, spouses scored similarly to the general US population with the exception of the physical functioning ( $t[405] = -2.54$ ,  $P = 0.006$ ) and bodily pain ( $t[405] = -2.77$ ,  $P = 0.003$ ) subscales, on which spouses reported better physical functioning and less bodily pain.

### Comparisons of HRQOL by sex

The unadjusted mean  $\pm$  SD HRQOL subscale scores for patients and spouses by sex are shown in Table 2. Additionally, the HRQOL means that have been adjusted for patient or spouse age, patient or spouse race, patient or spouse education, patient disease duration, and patient disease severity are shown. MANCOVA analyses revealed that there were no significant differences in HRQOL between male and female patients (Wilks'  $\lambda$  0.72,  $P = 0.67$ ). Moreover, there were no significant differences in HRQOL between male and female spouses ( $\lambda$  1.60;  $P = 0.15$ ).

### Relationship between patient and spouse HRQOL

The correlations between patient and spouse HRQOL are shown in Table 3. Significant correlations were seen in 7 of 8 HRQOL dimensions ( $\alpha = 0.05$ ); only physical functioning was not significant. Patients and spouses were most strongly correlated on social functioning ( $r = 0.39$ ,  $P < 0.001$ ) and role limitations due to emotional health ( $r = 0.27$ ,  $P < 0.01$ ).

## DISCUSSION

Similar to previous research findings (2–9), our results indicate that AAV negatively impacts patient physical and emotional quality of life. Patients with AAV scored significantly lower than the general 1998 noninstitutionalized US population (ages 55– 64 years) on 7 of the 8 HRQOL dimensions. Particularly negative impacts were seen for general health and role limitations due to physical health; however, AAV patients were not significantly different from the general 1998 US population on the dimension of bodily pain. The explanation for this finding may be that the patients in our sample were healthier than the average patient with AAV, as evidenced by their willingness to travel to our research offices to complete the interview portion of our study, and thus, experienced less bodily pain.

In contrast to patients, spouses did not report impaired HRQOL. In fact, spouses reported better physical functioning and less bodily pain when compared with the general US population. These findings were surprising given that spouses of chronic disease patients often experience additional stress from being in a caregiving role, which ultimately impacts spouses' physical and emotional health (16,23). A possible explanation for this finding may be that, in our sample, patients were self-managing their illness well and did not require a great deal of instrumental assistance from their spouses. Additionally, caregiving may not have taxed spouses' health as much as expected because many spouses (70%) did not report having major medical conditions, which is an indication that spouses may have possessed above-average health. Indeed, a previous study found that older adults with <4 health conditions were less reactive to stress than those with >4 health conditions (24). This type of effect may also exist at the couple level, whereby the HRQOL of both couple members is negatively impacted when the total number of conditions exceeds 4. Future research should investigate whether there is a dose-response relationship between total number of health conditions (patient and spouse) and spouse HRQOL.

It is possible that spouses experienced a negative impact on HRQOL closer to the time of diagnosis, when both the patient and the spouse were learning to adjust to and cope with AAV. Previous research has demonstrated that transitioning into a caregiving role leads to an increase in depressive symptoms for spouses (23). As time passes and patients become more proficient at managing their illness, they may depend less and less upon their spouse for tangible and emotional assistance, which could lead to a concomitant improvement in spousal HRQOL over time. Additionally, spouses may adapt to the caregiving role over time and become more skilled and confident in providing support to patients, resulting in an improvement in spouses' HRQOL over time. Other variables, like marital quality and length of marriage, may influence how well spouses adapt to the caregiving role and should be explored in future studies.

We did not find significant differences in HRQOL between male and female patients or male and female spouses. This finding contradicts a substantial body of research that has documented that women report worse emotional health when compared with men (25,26). Moreover, research of male and female caregivers has documented that female caregivers are more distressed by their partner's illness (12) and, consequently, report more psychiatric symptomatology than male caregivers (16). One reason why sex differences were not significant in our study could be that long-term marriages and a high degree of marital quality buffer the negative impact of chronic disease on female patients' mental health. As noted earlier, couples in our study have been married an average of 30 years and reported a high degree of marital quality. It is possible that sex differences in HRQOL exist for patients who have not been married as long or who are not happily married. Also, due to our sample size, we only had the statistical power to detect large significant differences between male and female patients and spouses (27). Meaningful sex differences in emotional role limitations for

spouses and emotional well-being for patients and spouses may exist and should be explored in larger samples.

Additionally, sex differences in quality of life issues not measured by the SF-36 may exist for our sample. For example, Herlyn et al (2) have shown that female vasculitis patients were more likely to become unemployed after receiving a vasculitis diagnosis. Because we only measured HRQOL, we did not capture sex differences that may exist in other aspects of quality of life, such as employment. The Hoffman Vasculitis questionnaire (3) asks about these additional quality of life issues and should be considered for future quality of life studies for vasculitis patients and their spouses.

Our results demonstrate that the HRQOL of patients and spouses are moderately positively correlated ( $r = 0.15-0.39$ ). Thus, if patients are experiencing impaired HRQOL, then spouses may also be experiencing impaired HRQOL. This finding suggests that couples in our study may have been coping dyadically with vasculitis, which is consistent with previous research that found that spouses share stressors and engage in coping efforts with patients (11). For this reason, health practitioners should engage patients and spouses in discussions of how to optimize disease management. Discussions of managing the illness as a couple may be particularly important for newly-diagnosed couples and those couples who do not possess a high degree of marital quality.

The generalizability of our results is limited by the unique characteristics of our sample. Because most of our couples were older, white, and possessed at least some college education, they may have been better able to cope with the stressors of chronic illness. Moreover, the negative impact of vasculitis on the HRQOL of patients and spouses may have been buffered by positive contextual factors, including a long length of marriage, a high degree of marital quality, and the health status of spouses. The fact that spouses in our sample reported an absence of major medical conditions may be particularly limiting because it is possible that spouses who do not have major medical conditions may be more likely to stay in a relationship with patients than spouses who have major medical conditions. Although, in the absence of data representing greater diversity along these dimensions, it is difficult to determine the impact of these limitations; it is possible that they may have attenuated relationships among our variables.

We grouped 3 types of vasculitis (WG, MPA and CSS) patients together under the umbrella term of AAV, even though it is unlikely that all of our patients were ANCA positive. In patients with WG and MPA, approximately 10% are found to be ANCA negative (28), their clinical symptoms are similar by ANCA status (29), and ANCA are likely pathogenic (30,31). On the other hand, in CSS there may be differences in symptoms, organ involvement, and prognosis between patients with and without ANCA positivity; with those who are ANCA positive having symptoms and pathology more similar to patients with WG and MPA (32). In our previous studies, CSS patients have accounted for <1% of the sample (33), therefore it is unlikely that patients with this diagnosis accounted for a large portion of the sample in this study. It is also possible that grouping different vasculitis patients together masked differences in quality of life that may be attributable to permanent disease damage, which can differ for WG and MPA patients. Future studies with larger samples should investigate whether HRQOL differs between patients with WG, MPA, and CSS. Furthermore, when immunofluorescence microscopy and antigen-specific ELISA are available, researchers should determine whether patients who are ANCA positive have poorer quality of life than patients who are ANCA negative.

Overall, our findings indicate that both male and female patients are negatively impacted across multiple domains by AAV. This negative impact exists despite the fact that the average patient disease activity score was 2.0 on a 10-point scale. Thus, health care providers should address

quality of life issues with patients, with a specific focus on how patients can cope individually and dyadically with the physical and emotional aspects of the illness. Based on our preliminary findings, we do not suggest creating sex-specific interventions at this time. Future quality of life investigations for vasculitis patients and their spouses should incorporate a life-course perspective to determine how HRQOL changes for patients and spouses over time and whether changes are related to improved self-management behaviors and social support. Also, future studies should compare the HRQOL between married and unmarried vasculitis patients to determine if marital status affects patient HRQOL.

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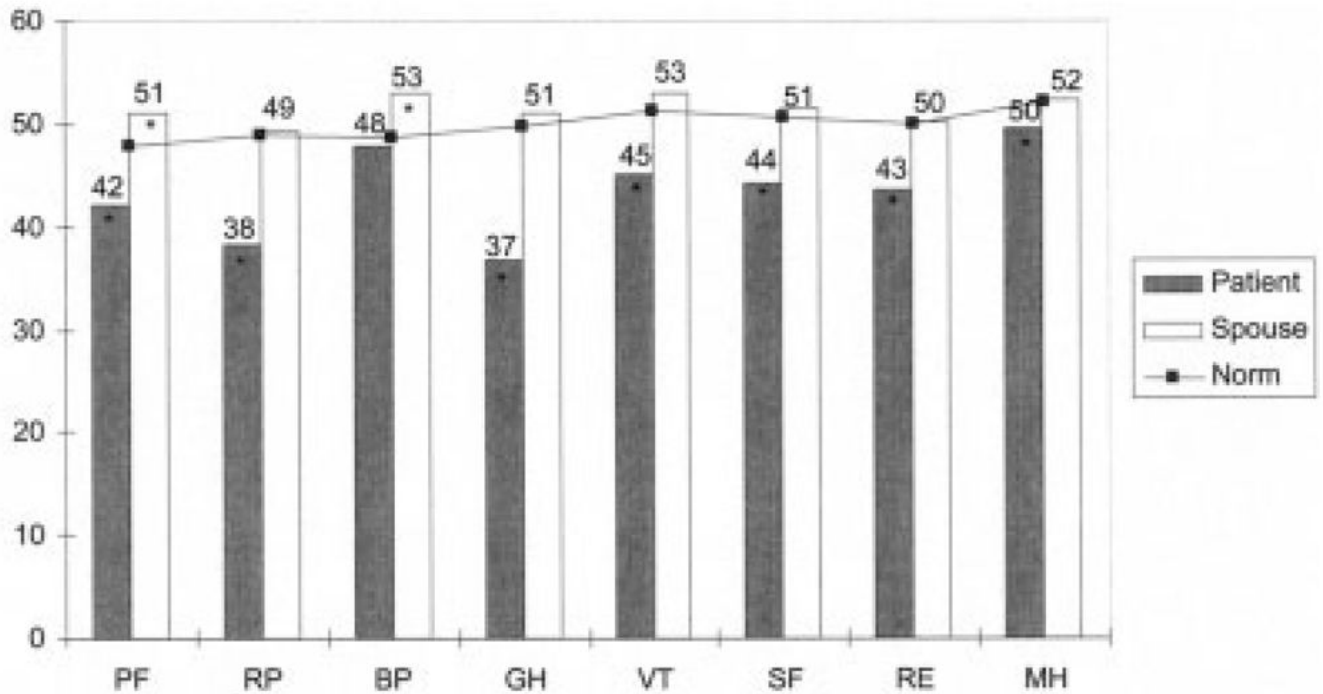
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**Figure 1.**

Norm-based health-related quality of life subscale scores for antineutrophil cytoplasmic antibody-associated vasculitis (AAV) patients, their spouses, and the 1998 general US population (ages 55–64 years) (ref. 22). PF = physical functioning; RP = physical role limitations; BP = bodily pain; GH = general health; VT = vitality/energy; SF = social functioning; RE = emotional role limitations; MH = mental health/emotional well-being. \* = significant by *t*-test ( $\alpha = 0.05$ ).

**Table 1**

## Characteristics of patients and spouses

Characteristic (no.)	Mean $\pm$ SD, (%)	Skewness	Kurtosis
Patient			
Age, years (n = 96)	57.0 $\pm$ 13.8	-0.40	-0.59
Male (n = 97)	(54.6)		
White (n = 97)	(96.9)		
Education, years (n = 97)	14.7 $\pm$ 2.2	-0.62	-0.63
Disease duration, years (n = 94)	4.4 $\pm$ 4.5	2.07	4.70
Years married (n = 97)	30.1 $\pm$ 15.7	-0.22	-1.06
Marital quality (n = 97)	8.3 $\pm$ 1.7	-1.33	1.66
Comorbidity, % yes (n = 76)*	(44.7)		
Disease activity (n = 80) <sup>†</sup>	2.0 $\pm$ 1.3	1.56	2.72
Spouse			
Age (n = 97)	56.6 $\pm$ 13.5	-0.50	-0.46
White (n = 96)	(92.7)		
Education, years (n = 96)	14.7 $\pm$ 2.1	-0.48	-0.97
Marital quality (n = 96)	8.1 $\pm$ 1.8	-1.48	2.48
Major medical condition, % yes (n = 76)*	(30.3)		

\* Measured on the followup questionnaire.

<sup>†</sup> Measured on a 10-point scale where 1 = remission and 10 = most active disease.

**Table 2**

Unadjusted and adjusted mean  $\pm$  SD health-related quality of life subscale scores for antineutrophil cytoplasmic antibody—associated vasculitis (AAV) patients and their spouses\*

Subscale	AAV patients		Spouses	
	Male	Female	Male	Female
Physical functioning	40.2 $\pm$ 12.1/42.5	44.2 $\pm$ 11.1/44.6	52.8 $\pm$ 5.4/51.7	49.7 $\pm$ 7.9/50.9
Physical role limitations	37.7 $\pm$ 11.1/46.7	38.6 $\pm$ 11.6/46.0	50.3 $\pm$ 10.0/48.8	48.4 $\pm$ 11.0/49.3
Emotional role limitation	42.4 $\pm$ 14.2/42.0	44.8 $\pm$ 12.4/44.2	52.5 $\pm$ 8.0/52.2	48.4 $\pm$ 10.5/47.7
Energy	44.6 $\pm$ 9.2/47.5	45.5 $\pm$ 9.0/48.5	54.2 $\pm$ 8.5/52.7	52.0 $\pm$ 10.1/52.8
Emotional well-being	48.7 $\pm$ 9.9/48.0	50.5 $\pm$ 10.0/52.1	54.2 $\pm$ 7.4/54.3	50.9 $\pm$ 8.5/50.4
Social functioning	43.5 $\pm$ 10.8/54.4	45.3 $\pm$ 9.2/53.9	52.8 $\pm$ 5.7/53.2	50.2 $\pm$ 9.0/50.0
Pain	47.2 $\pm$ 13.1/54.3	48.4 $\pm$ 11.8/55.7	54.0 $\pm$ 7.6/53.1	52.0 $\pm$ 10.1/53.0
General health	36.1 $\pm$ 10.4/38.7	37.5 $\pm$ 9.6/41.2	51.2 $\pm$ 7.8/49.7	50.8 $\pm$ 51.5/8.2

\* Values are the unadjusted mean  $\pm$  SD/adjusted mean. Mean adjusted for age, race, education, disease activity, and disease duration. AAV patients (male n = 51—52, female n = 43—44); spouses (male = 44, female n = 52—53).

**Table 3**

Correlations between patient and spouse health-related quality of life (HRQOL)

HRQOL dimension	r	P
Social functioning	0.39	< 0.001
Emotional role limitations	0.28	0.0075
Emotional well-being	0.25	0.01
Physical role limitations	0.25	0.01
Energy	0.25	0.01
Pain	0.23	0.02
General health	0.21	0.04
Physical functioning	0.15	0.15