Quality of Life in American Indian Women With Arthritis or Diabetes

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OBJECTIVE. We investigated quality of life (QOL) in American Indian women with different chronic diseases.

METHOD. Sixty American Indian women with diabetes mellitus (DM), rheumatoid arthritis (RA), or both DM and RA (DM + RA), and healthy control women received evaluations of joint motion, hand strength dexterity, pain, activity and participation limitations and QOL.

RESULTS. The DM + RA and RA groups had significantly more pain, less joint motion, decreased hand strength, and more activity limitations. Participation was similar for all groups except the DM + RA group. Past and present QOL were similar; however, the DM + RA group reported significantly decreased future QOL.

CONCLUSION. Results suggest that the presence of more than one chronic disease affects activity and participation. Factors that related to QOL were different for each disease group, with the exception of pain. Identification of factors related to QOL can help occupational therapists identify areas for intervention.


Quality of life (QOL), an outcome of occupational therapy according to the Occupational Therapy Practice Framework: Domain and Process (American Occupational Therapy Association [AOTA], 2008), refers to a person’s appraisal of his or her life and includes health status, self-care abilities, role competence, and socioeconomic factors such as vocation and education (AOTA, 2008). The International Classification of Functioning, Disability and Health (ICF) provides a model from which QOL for people with chronic conditions can be conceptualized as a global outcome influenced by activity limitations and participation restrictions, which are affected by impairments in body structure and function (Trombly Latham, 2008; Verbrugge & Jette, 1994; World Health Organization, 2001). Rheumatoid arthritis (RA) is one such chronic disease that seems to follow a causal pathway from impairments in body structure and function (e.g., health status, pain, deformity, or loss of joint motion) to limitations and restrictions in activity and participation (e.g., difficulty with self-care and role competence). The co-occurrence of other chronic conditions may have an impact anywhere on the causal pathway and hasten decline, all eventually leading to poorer QOL. Indeed, studies that examined comorbidity and its impact on QOL reported that as the number of chronic conditions increase, limitations in activities rise rapidly (Goins, Spencer, Roubideaux, & Manson, 2005; John, Kerby, & Hennessy, 2003; Verbrugge, Lepkowski, & Konkol, 1991).

RA and diabetes mellitus (DM) are two chronic conditions that show increased prevalence rates in American Indian populations. In fact, some of the highest prevalence rates for RA occur in American Indian populations (Ferucci,
The prevalence of DM in the American Indian population has been estimated to be 2.8 times that of the U.S. rate (Valway et al., 1993). For the communities of the Rio Grande Pueblos in New Mexico, the prevalence of diagnosed DM for all age groups is 5.7% (2.3 times the general U.S. rate); for people ≥35 yr old, the prevalence was 21.3% (4 times the comparable U.S. rate; Carter et al., 1989). In the Navajo population, for people >45, the prevalence of diabetes is 40.1% (Will et al., 1997). Thus, in some American Indian populations, those with RA are also likely to have DM. Verbrugge et al. (1991) also showed that both RA and DM had a moderate to high impact on physical functioning, a moderate impact on activity limitation, and a low impact on participation.

Impact of Rheumatoid Arthritis on Quality of Life

Few investigators have explored factors in relation to QOL in rheumatic diseases. Burckhardt (1985) ascertained that positive self-esteem, internal control over health, perceived support, and low negative attitude toward the disease were directly correlated to higher QOL. Activity limitation has also been reported to be an important factor influencing QOL. Dissatisfaction with activity level in participants with RA was found to be related to pain, depression, opinions of disease activity, and expectations of future disability (Katz, 1998). In other studies, however, the decline in activities associated with depression was linked to the loss of valued activities rather than only a decrease in activity participation (Blalock, Orlando, Mutran, DeVellis, & DeVellis, 1998; Katz & Yelin, 1995). Social support has also been shown to be important for adjustment to RA in patients with greater activity limitations than in patients with fewer limitations (Affleck, Pfeiffer, Tennen, & Fifield, 1988; Doeglas et al., 1994; Katz, 1998; Zautra et al., 1998).

Impact of Diabetes on Quality of Life

DM is a complex metabolic disorder caused by inadequate insulin production, decreased peripheral effects of insulin, or a combination of the two. Complications of the disease include neuropathy, renal disease, and blindness (Diabetes Control and Complications Trial Research Group, 1993). Less is known about the effect of DM on QOL, although it is a potentially life-threatening and debilitating disease. The strict regimen that people with insulin-dependent DM must follow to control their disease can interfere with their participation in daily social and physical activities and affect QOL (Nerenz, Repasky, Whitehouse, & Kahkonen, 1992). Several studies have reported that poorer QOL and depression are associated with the number and type of diabetic complications in people who are insulin dependent (Lloyd, Matthews, Wing, & Orchard, 1992; Nerenz et al., 1992). Lloyd et al. (1992) reported that the areas of daily activities most affected by DM were work, sexual behaviors, and household responsibilities, and Jacobson, deGroot, and Samson (1994) reported that physical and social functioning, role functioning, and pain were related to QOL. Social support (Schlenk & Hart, 1984) and psychological function (Arnold et al., 2004) have also been reported to predict QOL in people with DM.

Quality of Life in American Indians

Few studies have examined QOL in American Indians. Johnson et al. (1986, 1988) found that vision and hearing impairments, social support, and limitation in activities contributed to a decrease in QOL in American Indians. However, whether participants were healthy or had chronic diseases not made clear. A few studies have reported more activity limitations in American Indians compared with both White populations (Goins et al., 2005) and the entire U.S. population (Moss, Roubideaux, Jacobsen, Buchwald, & Manson, 2004). We found only a few studies that examined QOL in American Indians with a chronic disease (Johnson, Nowatzki, & Coons, 1996). In a study on Pima Indians with DM, older age was associated with poorer physical function, greater role limitations, more emotional problems, and lower levels of social functioning. Disease severity also affects QOL; participants on insulin had poorer physical function, greater role limitations, and lower social functioning resulting from physical problems. By contrast, participants receiving oral antidiabetic agents reported better physical function and fewer role limitations resulting from physical problems. Gilliland, Mahler, and Davis (1998) reported that rural New Mexican Americans had poorer QOL compared with all New Mexicans and all Americans. Yet, Poole, Chiappisi, Cordova, and Sibbitt (2007) reported that although QOL was similar for healthy American Indian and White women, QOL was poorer in American Indian and White women who had RA.

In summary, although the literature on QOL has been conducted with mostly White adult populations, findings have suggested that chronic diseases also affect QOL in American Indians; however, little is known about QOL in ethnic populations. Whether perceived QOL and...
determinants of QOL are similar for different chronic conditions or whether comorbidities affect QOL is also not known. In this research study, we aimed to begin to answer this question for American Indians with both RA and DM and with each chronic disease alone. Although occupational therapists consider participation in everyday occupations to result in improved QOL, the literature contains little to no information regarding participation and QOL in ethnic populations. The older American Indian/Alaskan Native population is estimated to increase to 3.5 times its current size between 2000 and 2050 (U.S. Census Bureau, 2000), with corresponding age-associated restrictions in activities and participation (Goins et al., 2005). Thus, an understanding of comorbidities, QOL, and factors related to QOL may help occupational therapists target areas to be addressed in intervention programs.

Method

Participants

Sixty American Indian women participated in this study in four groups: 15 women with DM but without RA (DM), 16 women with RA but without DM (RA), 13 women with both DM and RA (DM + RA), and 16 healthy control (HC) women without chronic conditions. Participants in the groups with disease must have been diagnosed for a minimum of 1 yr and be between ages 18 and 75. Participants were excluded if they had more than one rheumatic disease or if they had a disability attributable to another medical condition such as stroke or blindness. This study was approved by the Albuquerque Service Unit Health Board, the Albuquerque Area Combined Indian Health Services Institutional Board, and the University of New Mexico Human Research Review Committee.

Procedure

We used a cross-sectional design in which participants were tested at one point in time. The sample was one of convenience.

Instruments

The instruments used in this study covered the different levels of the ICF framework (World Health Organization, 2001). All participants received an evaluation of body function and structure (joint motion, hand function, and pain). They were also interviewed regarding activity and participation levels and quality of life. Sociodemographic data were also obtained. All instruments were reviewed for cultural appropriateness and approved by a focus group of American Indian women.

Impairment in body function and structure. Pain was assessed using the pain scale from the Dartmouth Primary Care Cooperative Information Project (COOP) Charts (Gilliland, Willmer, et al., 1998). Participants were asked to describe their pain during the past 2 wk on a scale ranging from 5 (no pain) to 1 (very severe pain). Illustrations corresponding to the level of pain were shown. Test–retest reliability intraclass correlation coefficients ranged from .88 to .93 (Nelson, Landgraf, Hays, Wasson & Kirk, 1990), and the COOP pain scales scores correlated with the pain scales on the Short Form 36 (r = .60; Nelson et al., 1987).

Joint motion was assessed using the Keital Functional Test (KFT; Eberl, Fasching, Rahlf, Schleyer, & Wolf, 1976; Kalla, Korze, Meyers, & Parkyn, 1988). The KFT consists of 24 performance tasks that evaluate functional patterns of joint range of motion in the upper and lower extremities. Scoring criteria for each task are well defined, and a total score is obtained by summing the scores on the 24 tasks, which yields a single score or an upper- or lower-extremity score. Having a single score can be easier to analyze statistically than a score for each joint motion. A higher score indicated more limitations in joint motion. Although no normative data are available, an extremity score $\geq$13 has been reported to be predictive of higher mortality (Söderlin, Nieminen, & Hakala, 1998). Interobserver agreement was reported to be .85; test–retest reliability, 0.96 (Kalla et al., 1988).

The Arthritis Hand Function Test (AHFT) is an 11-item test that measures hand strength and dexterity in adults with arthritis (Backman & Mackie, 1997; Backman, Mackie, & Harris, 1991). The hand strength items measure grip and pinch. The mean of three trials is recorded as the score for each item. Grip, two-point pinch, and three-point pinch items were converted to pounds and summed to create a strength total score for each hand. Normative data and standardized instructions can be found in the AHFT manual (Backman & Mackie, 1997). Interrater reliability ranged from .45 to .99 (Backman & Mackie, 1995; Backman et al., 1991), and test–retest reliability coefficients ranged from .53 to .95 (Backman et al., 1991). Scores on the AHFT correlated with scores on the Jebsen Hand Function Test ($r = .63$) and the dexterity items from the Arthritis Impact Measurement Scales ($r = .71$; Backman et al., 1991).

The AHFT’s dexterity section consists of a pegboard test. Scores are calculated on the basis of the time required to place and remove nine pegs from a pegboard. The applied dexterity section consists of five timed bilateral functional items: fastening and unfastening four buttons, lacing a shoe and tying a bow, pinning two...
safety into a slot, and cutting safety pins to a cloth and unpinning them. Participants also had to pick up and manipulating four coins into a slot, and cutting a piece of putty into four pieces with a knife and fork. The scores for each applied dexterity item were summed to yield a total score in seconds. The applied strength section of the AHFT consists of two items: lifting a tray filled with cans of soup and pouring a glass of water from a pitcher with a measured volume of water.

Activity and participation measures. Activity limitation was measured by the Disability scale of the Health Assessment Questionnaire (HAQ). The HAQ Disability scale (Fries, Spitz, Kraines, & Holman, 1980) is routinely used to measure outcomes in activity limitations in people with rheumatic diseases. It consists of eight categories of daily living (dressing and grooming, arising, eating, walking, hygiene, reach, grip, and outside activity). Each question is scored on a 4-point scale ranging from 0 to 3 (0 = without difficulty, 1 = with difficulty, 2 = with help from another person or with a device, and 3 = unable to do). The highest score for any component question in each category determines the score for that category. A disability index is calculated by adding the scores for each of the categories and dividing by the number of categories answered. Test–retest reliability for the total Disability scale was reported to be .98 (Fries et al., 1980). Fries et al. (1980) also established validity by comparing self-report scores with observer scores (r = .97).

Participation restriction was assessed with the 15-item Community Integration Questionnaire (CIQ; Willer, Ottenbacher, & Coad, 1994). The CIQ has three subscales: Home Integration, Social Integration, and Productive Activity. The total score, which represents a summation of the scores from the 15 items, can range from 0 to 29 (Sander et al., 1999). A higher score indicates greater integration, and a lower score reflects less integration. The instrument can be administered as an interview or a self-report. The test–retest reliability coefficient was reported to be .91 (Willer et al., 1994). Validity was established by comparing total and subscale CIQ scores with total and subscale scores on the Craig Handicap Assessment and Reporting Technique (rs = .19–.68; Zhang et al., 2002).

Quality-of-life measures. Global QOL was measured using Cantril’s (1965) Self-Anchoraging Ladder. This scale requires a person to imagine and identify the best possible life and the worst possible life. He or she is then shown a drawing of a 10-rung ladder and instructed that Rung 10 represents the best possible life and Rung 0 the worst possible life. The person indicates where on the ladder he or she would have been placed 5 years ago and where he or she would be placed at present and 5 years in the future. Cantril reported intrarater reliability to be .95. Cantril’s scale has been used to evaluate QOL in people with RA, DM, and other chronic diseases such as renal disease and heart disease (Arnold et al., 2004). Because future outlook must be considered with potentially disabling diseases such as RA and DM, we selected this scale for use in the current study. Moreover, Campos and Johnson (1990) recommended this scale as the most capable to assess QOL without imposing culture-specific standards. In addition, we used the adaptation of the COOP chart system for American Indians to measure domain-specific QOL (Gilliland, Willmer, et al., 1998; Nelson et al., 1987). The COOP chart has six items related to physical fitness, feelings, daily activities, social activities, pain, overall health, and social support. Items are rated on a 5-point scale ranging from 1 (great difficulty) to 5 (no difficulty).

We also obtained the following sociodemographic data: age, sex, marital status, income (optional), educational level, employment status, occupational status, type of disease, and duration of illness.

Data Collection
After we obtained informed consent, participants were administered the instruments just described. Data collection required approximately 1 hr, and participants were compensated $30 for their time.

Data Analysis
We analyzed the data using the SAS software version 9.1 for Windows (SAS Institute Inc., Cary, NC). Means and standard deviations were calculated for age, disease duration, body function and structure, and activity and participation measures. To compare the two groups on all measures, we calculated one-way analyses of variance with appropriate post hoc analyses. Spearman correlation coefficients were calculated to determine relationships between (1) the sociodemographic and impairment measures and (2) the activity limitations and participation restrictions measures.

Results
Table 1 shows the participants’ demographic information. An analysis of variance (ANOVA) showed a main effect for age (F[3, 39] = 3.39, p < .05). Women in the group with DM + RA were significantly older than women in the other three groups, which is not surprising given that the likelihood of having more than one chronic condition increases with age (Stang et al., 2006). Chi-square analysis showed a significant difference in education level; the
groups with DM and DM + RA had a lower level of education than the other two groups. However, there was no significant difference in disease duration for either DM or RA.

The mean impairment scores for pain, joint motion, and hand function are shown in Table 2. A one-way ANOVA showed a significant difference between groups on all of these measures. For pain, the group with DM + RA had significantly more pain than the other three groups \((F[3,50] = 8.29, p < .0001)\). The control group and the group with DM had scores similar to those of the group with RA and the group with DM + RA. For the upper-extremity KFT scores, we found a significant difference between all groups except the group with DM and the control group \((F[3,50] = 15.05, p < .0001)\). The group with DM + RA had significantly more impairment than the other three groups, and the group with RA had significantly more impairment in joint motion than both the control group and the group with DM. For the lower-extremity items on the KFT, we found that the groups with RA and DM + RA had significantly greater lower-extremity impairment than the other two groups. For the total KFT, we found that the group with DM + RA had significantly more limitations than the other three groups, whereas the group with RA had significantly more limitations than did the control group and the group with DM \((F[3,50] = 16.08, p < .0001)\).

Regarding hand strength items for both hands, the control group and the group with DM had significantly greater strength than the groups with RA and DM + RA (right hand, \(F[3,50] = 0.45.10, p < .0001\); left hand, \(F[3,50] = 45.68, p < .0001\)). Although the control group and the group with DM were faster on pegboard dexterity, we found no significant differences between any of the groups. The group with DM + RA was significantly slower on the applied dexterity items than both the control group and the group with DM \((F[3,50] = 5.98, p < .001)\), but we found no significant difference between the group with RA and the group with DM. The group with RA + DM lifted significantly fewer cans and poured significantly less water than the other three groups.

The mean scores for each disease group on the HAQ and CIQ are shown in Table 3. The mean HAQ scores for the group with RA and the group with DM + RA

### Table 1. Demographic Characteristics of Participants by Disease Group

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Without DM or RA ((n = 16))</th>
<th>With DM ((n = 15))</th>
<th>With RA ((n = 16))</th>
<th>With DM + RA ((n = 13))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age in years (SD)</td>
<td>43.6 ± 10.4 a</td>
<td>46.5 ± 10.7 a</td>
<td>43.6 ± 14.6 a</td>
<td>55.7 ± 9.2 a</td>
</tr>
<tr>
<td>Disease duration in years</td>
<td>13.0 ± 8.5</td>
<td>11.8 ± 9.6</td>
<td>RA: 12.1 ± 12.9</td>
<td>DM: 7.9 ± 6.5</td>
</tr>
<tr>
<td>Marital status (% married)</td>
<td>41.2</td>
<td>53.3</td>
<td>50.0</td>
<td>53.8</td>
</tr>
<tr>
<td>Education level (%)</td>
<td>&lt;12 yr</td>
<td>12.5</td>
<td>33.3</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>2 yr</td>
<td>25.0</td>
<td>40.0</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>&gt;12 yr</td>
<td>62.5</td>
<td>26.7</td>
<td>62.5</td>
</tr>
</tbody>
</table>

**Note.** Means in the same row that do not share the same subscript differ at \(p < .05\) using the Student–Newman–Keuls test (SAS Institute, Cary, NC) for comparisons. DM = diabetes mellitus; RA = rheumatoid arthritis; DM + RA = both DM and RA; SD = standard deviation.

### Table 2. Mean Scores for Body Function or Structure Variable by Disease Group

<table>
<thead>
<tr>
<th>Body Function and Structure Variables</th>
<th>Control Participants, (M (SD)) ((n = 16))</th>
<th>With DM, (M (SD)) ((n = 15))</th>
<th>With RA, (M (SD)) ((n = 16))</th>
<th>With DM + RA, (M (SD)) ((n = 13))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain (1–5)</td>
<td>4.3 (0.9) a</td>
<td>3.5 (1.1) a</td>
<td>2.8 (1.2) b</td>
<td>2.5 (0.9) b</td>
</tr>
<tr>
<td>Upper-extremity KFT (0–52)</td>
<td>4.9 (1.7) a</td>
<td>5.2 (1.5) a</td>
<td>12.6 (9.9) b</td>
<td>19.5 (8.4) c</td>
</tr>
<tr>
<td>Lower-extremity KFT (0–40)</td>
<td>1.1 (1.1) a</td>
<td>3.7 (4.3) b</td>
<td>8.0 (10.3) b</td>
<td>11.1 (10.3) b</td>
</tr>
<tr>
<td>Total KFT (0–92)</td>
<td>5.9 (2.1) a</td>
<td>9.1 (5.1) a</td>
<td>20.6 (11.9) b</td>
<td>30.6 (17.8) c</td>
</tr>
<tr>
<td>Hand strength (lb)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>94.2 (8.6) a</td>
<td>87.4 (12.1) a</td>
<td>51.6 (17.0) b</td>
<td>42.0 (19.8) b</td>
</tr>
<tr>
<td>Left hand</td>
<td>93.2 (8.3) a</td>
<td>87.7 (10.0) a</td>
<td>48.3 (19.9) b</td>
<td>39.3 (20.6) b</td>
</tr>
<tr>
<td>Dexterity (s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>19.4 (2.4) a</td>
<td>20.9 (3.0) a</td>
<td>22.8 (7.6) a</td>
<td>24.9 (6.4) a</td>
</tr>
<tr>
<td>Left hand</td>
<td>19.5 (3.3) a</td>
<td>21.2 (2.4) a</td>
<td>22.9 (7.1) a</td>
<td>24.5 (7.4) a</td>
</tr>
<tr>
<td>Applied dexterity (s)</td>
<td>84.4 (10.7) a</td>
<td>104.9 (13.7) a</td>
<td>128.3 (38.6) b</td>
<td>145.5 (77.0) b</td>
</tr>
<tr>
<td>Applied strength (no. of cans)</td>
<td>12.0 (0.0) a</td>
<td>12.0 (0.0) a</td>
<td>12.0 (0.0) a</td>
<td>9.1 (4.2) b</td>
</tr>
<tr>
<td>Applied strength (mL water)</td>
<td>2,000 (0.0) a</td>
<td>2,000 (0.0) a</td>
<td>1,984.4 (533.0) a</td>
<td>1,696.2 (455.7) b</td>
</tr>
</tbody>
</table>

**Note.** Means in the same row that do not share the same subscript differ at \(p < .05\) using the Student–Newman–Keuls test (SAS Institute, Cary, NC) for comparisons. DM = diabetes mellitus; RA = rheumatoid arthritis; DM + RA = both DM and RA; KFT = Keital Functional Test.
were significantly higher than the scores for the control group and the group with DM, indicating more disability \( (F[3,50]= 21.09, p < .0001). \) On the CIQ, scores for the group with DM + RA were significantly lower than scores for the other three groups, whose scores were similar \( (F[3,50]= 7.85, p < .001). \)

For the QOL measures, all four groups scored similarly on the present and past-5-yr scores on Cantril’s (1965) Ladder (Table 3). However, for the future-5-years score, the scores for the group with DM + RA were significantly lower than the scores for the control group but similar to the scores for the group with DM and the group with RA \( (F [3,48]= 2.56, p < .05). \) On the COOP, the control group had significantly higher QOL than the other three groups, whereas the group with DM + RA had significantly lower QOL \( (F [3,50]= 8.90, p < .0001). \) Scores for the group with DM and the group with RA were similar.

To examine the relationship between sociodemographic and impairment measures and between activity limitations and participation restrictions, we calculated correlation coefficients (Table 4). Health status was the only sociodemographic measure that correlated significantly with activity limitation and participation. For the group with DM, the only significant correlations were found between health status, pain, total KFT, left-hand strength, and the HAQ. For the group with RA, health status, total KFT, and pegboard dexterity scores for both hands correlated significantly with the HAQ. No impairment measures correlated with the CIQ in either the group with RA or the group with DM. For the group with DM + RA, health status and left-hand strength correlated with the HAQ and the CIQ. For the control group, pain correlated with the CIQ, whereas the total KFT correlated with the HAQ.

Table 4 also shows the correlation coefficients between sociodemographic, impairment, and QOL measures. Again, health status was the only sociodemographic measure to correlate with any QOL measure. In the group with DM, health status and pain related to present and future QOL and the COOP. The total KFT correlated with future QOL and the COOP, and left-hand strength correlated with future QOL. For the RA group, pain correlated with only past-5-yr QOL and the COOP, and health status and total KFT correlated with present QOL and the COOP. Pegboard dexterity correlated with the COOP. For the group with DM + RA, health status, total KFT, and left-hand strength correlated with the COOP, and pegboard dexterity correlated significantly with future QOL and the COOP. In the control group, health status correlated with the COOP, and pain correlated significantly with present QOL.

### Discussion

The main focus of this study was to compare QOL and factors related to QOL in American Indian women with chronic diseases. The results showed that the group with DM + RA generally had decreased QOL, more physical impairments, and more activity and participation limitations than the other groups. However, with the exception of a few variables, the scores of the group with DM + RA were not significantly different from the scores of the group with RA, suggesting that RA alone also results in significant impairments in body structure and function and limitation and restriction in activities and participation. The performance of the group with DM was more similar to that of the control group on most of the impairment measures. This finding is somewhat surprising because musculoskeletal complications have been reported to be common in people with DM (Ardic, Soyupek, Kahraman, & Yorgancioglu, 2003), and people with DM have also been found to have decreased hand strength and dexterity than healthy control groups (Casanova, Casanova, & Young, 1991; Gamstedt, Holmgard, Ohlson, & Sundström, 1993).
We found no significant difference between groups for present QOL. For future QOL, however, the group with DM + RA reported similar QOL to the groups with RA and DM alone but poorer QOL than the control group. This finding is similar to that of another study that used Cantril’s Ladder to compare QOL across chronic diseases in the Netherlands (Arnold et al., 2004). Although the U.S. and Dutch health care systems are different, the QOL scores for the control group in Arnold et al.’s (2004) study were similar to those of the current study’s control group. Yet Arnold et al. found no differences between healthy control participants and people with DM and RA. One explanation may be that the coexistence of two chronic diseases significantly lowers QOL (Sprangers et al., 2000).

Regarding the COOP, the control group had significantly higher QOL than the other groups. Arnold et al. (2004) suggested that QOL may be higher on more global measures such as Cantril’s Ladder than on more specific measures such as the COOP. Cantril’s Ladder requires a person to evaluate a combination of different domains and integrate their reflections into a generic evaluation of life in general, whereas a domain-specific QOL measure provides information about which domains have been affected. Indeed, Arnold et al. found that adults with DM, RA, and other chronic conditions did not differ on global QOL measures from healthy participants. Yet, when a domain-specific measure was used, Arnold et al. found that people with RA reported significantly lower QOL than healthy control participants for physical and social domains.

Even though the groups with RA and DM + RA had more impairments, activity limitations, and participation restrictions, few impairments correlated with activity or participation measures. Only range of motion as measured by the KFT correlated with the HAQ in all groups except the group with DM + RA, suggesting that joint motion may be important for continued activity participation in these populations. No physical impairment measures correlated with the CIQ. The same was true of impairment and QOL. However, more impairments correlated with future QOL than with present or past-5-yr QOL. These finding are similar to those of others who found that pain and joint motion were related to QOL in people with RA (Borman et al., 2007; Suurmeijer et al., 2001). Our findings are also similar to the few studies examining QOL in people with DM (Sprangers et al., 2000) and RA (Arnold et al., 2004), which reported that physical and social functioning and pain were related to QOL. No studies have examined QOL and factors related to QOL in American Indians with two or more chronic conditions; therefore, we cannot easily make comparisons to the literature.

**Limitations and Future Research**

The study’s limitations were the small sample size and narrow geographic area, both of which limit generalization of the results. The lack of a more precise measurement of psychological functioning was also a limitation. Future studies should include a measure of depression because depression has been reported to be a documented but untreated chronic condition in American Indian elders (John et al., 2003). The current study also relied on self-report to assess activity- and participation-level variables, which may be inaccurate because of memory errors and misunderstanding of questions. It would be important for

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**Table 4. Significant Correlations Among Impairment and Activity, Participation, and Quality-of-Life Measures for Each Disease Group**

<table>
<thead>
<tr>
<th>Variables</th>
<th>HAQ</th>
<th>CIQ</th>
<th>5QOL</th>
<th>PQOL</th>
<th>FQOL</th>
<th>COOP</th>
<th>HAQ</th>
<th>CIQ</th>
<th>5QOL</th>
<th>PQOL</th>
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*Note. HAQ = Health Assessment Questionnaire; CIQ = Community Integration Questionnaire; 5QOL = 5-yr past QOL; PQOL = present QOL; FQOL = 5-yr future QOL; COOP = Dartmouth Primary Care Cooperative Information Project; DM = diabetes mellitus; RA = rheumatoid arthritis; DM + RA = both DM and RA; TKielta = total Keital scores; LSstrength = total left hand strength. **p < .01.
future studies to examine height, weight, and body mass index because obesity is often observed in people with DM (Goldberg, 1998) and RA (Giles et al., 2008) and may affect activity and participation (Alley & Chang, 2007).

Clinical Implications

The severity of the impairments, activity limitations, participation restrictions, and poor QOL increases with the existence of more than one chronic disease. Because the prevalence of chronic conditions such as DM is increasing (Centers for Disease Control and Prevention, 2005), occupational therapists will begin to work with more clients who have chronic conditions in addition to the primary condition for which they are referred to occupational therapy. Practitioners will need to consider the impact of one chronic disease on activity and participation versus the cumulative effect of several chronic diseases. The physical and psychosocial variables are amenable to occupational therapy intervention, as are the activity and participation variables. In addition, psychosocial variables seem as important as physical measures for activity and participation and QOL. Trombly Latham (2008) suggested that the ability to carry out one’s roles and life activities (activity and participation on the ICF) is dependent on basic capabilities (body structure and function on the ICF). Therefore, providing assessment and intervention that correspond to the different levels of the ICF may allow occupational therapists to decide whether remediation of body structure and function or adaptation to improve activity and participation is indicated.

When a condition such as DM coexists with RA, interventions may need to focus on wellness and health promotion as well as the traditional considerations of joint protection, use of assistive devices, and splints. Therapists will also need to consider the culture of the person with the disease. For example, although assistive device usage is commonly introduced by occupational therapists for people with arthritis, in the current study only 6 participants of the 54 tested reported using any assistive device (4 had RA and 2 had DM + RA). The devices consisted of two ambulation devices, two raised commodes, and two bathtub bars. Assistance, in general, was provided by people, not devices; therapists need to be cautious when suggesting assistive devices that may be incongruent with a person’s cultural values and norms. Whether preferences for personal assistance were the result of cost, availability, or cultural attitudes toward assistive devices remains unknown. Mann et al. (2005) reported that a commonly indicated reason for not using a dressing device was a perceived lack of need. Future studies should examine perceived need, use and type of assistance for activity limitations, and participation restrictions in American Indians.

This study provides important information about the variables that affect QOL in American Indian populations. Ultimately, this information should be translated into sets of guidelines for practice that can be used to help this population enhance its activity participation in desired life occupations despite chronic conditions. When developed, such guidelines should then be tested for effectiveness and efficacy to determine whether (1) occupational therapy intervention can help this population to preserve activity and participation in daily life functions and (2) such intervention is congruent with this population’s cultural values and health goals. ▲

Acknowledgments

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References


