Impacts of Fatigue, Stress, and Perceived Health Status on Women With Rheumatic Diseases: A Comparison Study

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ABSTRACT

Background: Rheumatic conditions, which increase in prevalence as populations age, are a growing public health problem that disproportionately affects women. Understanding the influences of rheumatic diseases (RDs) on fatigue, stress, and perceived health status is deemed important to the improvement of physical and mental health for women with RDs.

Purpose: This study was designed to compare the fatigue, stress, and perceived physical and mental health status of women with RDs (RD group) with those of peers who did not have chronic illnesses (comparison group).

Methods: A cross-sectional, purposive sample and comparative design was used. Four hundred forty-three women with a mean age of 46.2 years participated in this study. Those with physician-diagnosed RDs (n = 212) were enrolled in the RD group, and those without chronic disease were enrolled in the comparison group (n = 231). Measures used included a demographic datasheet, Fatigue Severity Scale, Perceived Stress Scale, and Short Form-12 Items Health Survey. Analysis of covariance was used to examine the intergroup differences for major variables based on demographic covariates.

Results: The RD group reported significantly more fatigue and stress than the comparison group. Moreover, the RD group reported significantly better perceived physical health status, significantly lower vitality, and better role emotional status than the comparison group.

Conclusions/Implications for Practice: The findings support the theory that RDs have a negative impact on perceived stress and fatigue in women. Physical function, bodily pain, and general health may be the most significantly affected domains of perceived physical health in women with RDs. Of note, with the exception of the vitality subscale, RDs did not adversely affect the perceived mental health status, significantly lower vitality, and better role emotional status than the comparison group.

Key Words: women’s health, stress, fatigue, rheumatic diseases.

Introduction

Rheumatic diseases (RDs), a broad category of symptoms and disorders, are characterized by the presence of inflammation and autoimmune problems (such as rheumatoid arthritis [RA], systemic lupus erythematosus [SLE], and fibromyalgia [FM]; American College of Rheumatology, 2019). RDs are heterogeneous with respect to their clinical presentation and may affect joints, tendons, ligaments, bones, muscles, and organs, which may lead to a concomitant diagnosis of musculoskeletal disease, multimorbidities such as RA overlapping with FM and disability, rapidly increasing healthcare costs, and significantly more days away from work (World Health Organization, 2018; Yu, See, Kuo, Chou, & Chou, 2013). These conditions have a significant impact on both individuals and society and carry a high risk of mortality, especially for RDs that are caused by autoimmune system defects (Yu et al., 2013). Furthermore, RDs are painful and typically become chronic and have a high prevalence worldwide in adult populations (Li et al., 2012; Zeng et al., 2008). With populations aging, the prevalence of RDs is projected to increase and become a large public health problem that disproportionately affects women (Goldblatt & O’Neill, 2013; Jokar & Jokar, 2018). It has been estimated that one in 12 women will develop an RD during her lifetime (Crowson et al., 2011).

Fatigue is a major problem associated with multiple RDs; it is a contributing factor to disability and an important indicator of overall health status (Sandik & Öz balkan, 2015). An international study found that severe fatigue affects one of every two patients with RDs. However, the etiology of fatigue in RDs remains largely unknown and inadequately...
addressed in clinical practice (Overman, Kool, Da Silva, & Geenen, 2016). In addition to fatigue, stress plays a pivotal role in inducing RD-related symptoms. Stress increases inflammation in patients with RA and SLE (Davis et al., 2008; de Brouwer et al., 2013; Jacobs et al., 2001), disrupts sleep in patients with SLE (Palagini et al., 2016), and exacerbates the activity of RDs (Jacobs et al., 2001). Thus, improving the physical function of patients with RDs is important (Chen & Wang, 2007; Sok, Ryu, Park, & Seong, 2019). As fatigue and stress are known factors that contribute to physical inactivity and the reduced effectiveness of coping strategies (Rieger et al., 2018; Taylor & Dorn, 2006), identifying the influences of RDs on fatigue and stress in women should play a key role in planning nursing interventions. However, few studies have studied the comparative impacts of fatigue and stress on women with RD and their healthy peers.

Perceived health status includes physical and mental health. Prior research has found a significant correlation between better perceived health status and better perceived illness control in individuals with chronic illnesses (Lange & Piette, 2005). Moreover, as self-reported health status reflects physical, psychological, and social well-being dimensions, self-reported health status may be considered when assessing healthcare outcomes (Weinert, Cudney, & Spring, 2008). A review of 37 studies that was designed to assess the health burden of patients with FM using a subjective health questionnaire (Short-Form Health Survey-12 [SF-12] and Short-Form Health Survey-36 [SF-36]) found that the SF-12 comprises a broad range of health profiles and is applicable for comparisons across groups with different health conditions (Hoffman & Dukes, 2008). Eliciting the multidimensional perceived health status of women who experience RDs may identify the health domains that are most affected by RDs and suggest interventions that may significantly improve their health. Therefore, the purpose of this study was to compare fatigue, stress, and perceived physical and mental health statuses between a group of women with RDs (RD group) and a comparison group of women without chronic diseases.

Methods

Design and Participants

A cross-sectional, purposive sampling and comparative design was used. Potential subjects were approached in the rheumatology clinics of teaching hospitals and in residential communities in southern Taiwan. Eligible subjects were invited to participate in this study after hearing a detailed explanation of the study purpose and providing informed consent. Inclusion criteria were as follows: (a) at least 20 years old, (b) diagnosed by a physician either as having an RD (RD group) or as having no chronic disease (comparison group), and (c) able to communicate in Mandarin Chinese or Taiwanese. Otherwise-eligible subjects with any of the following criteria were excluded from participation: (a) currently pregnant, (b) disabled, or (c) diagnosed with a psychiatric disorder. The healthy (without chronic disease) women in the comparison group were enrolled from the community. G-Power 3.1.2 (Heinrich Heine Universitat, Dusseldorf, Germany) was used to estimate sample size based on a significance level of $\alpha < .05$ and a power of 0.8, with a medium ($f = .25$) effect size (Faul, Erdfelder, Lang, & Buchner, 2007); a minimum of 135 participants in each group would be necessary to detect mean intergroup differences. As the typical response rate for paper-and-pencil questionnaires is about 73% (Kongsved, Basnov, Holm-Christensen, & Hjollund, 2007), a minimum sample size of 184 participants in each group was suggested for this study. The period of data collection was April 2015 to March 2016. Permission from the institutional review board was obtained before study implementation (Approval No. 15-046-B1).

Measures

Demographic data were collected on age, educational level, marital status, employment status, and health habits.

Fatigue severity scale

The nine-item Fatigue Severity Scale, which was designed to assess the severity of fatigue in different situations, was used to measure fatigue in this study, with scores ranging from 1 = strongly disagree to 7 = strongly agree (Krupp, LaRocca, Muir-Nash, & Steinberg, 1989). The range of total possible scores was 9–63, with higher scores associated with greater fatigue severity. The Cronbach’s alpha coefficient for this scale was .93 in this study.

Perceived stress scale

The 10-item Perceived Stress Scale (PSS) was used to measure stress in this study (Cohen, Kamarck, & Mermelstein, 1983). All of the items were scored on a 5-point scale ranging from 0 = never to 4 = very often, with a maximum possible score of 40 (Cohen et al., 1983), with higher scores associated with greater perceived stress. The Cronbach’s alpha for the PSS in this study was .90.

Short-Form Health Survey-12

Perceived health status is a subjective assessment of health that was measured in this study using SF-12 Version 2 (V2), developed by Ware, Kosinski, and Keller in 1996. The SF-12 V2 uses 12 items in each of the eight subscales of the SF-36 (physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health) to calculate two summary scores (Physical Component Summary [PCS] and Mental Component Summary [MCS]). The possible scores for this scale range from 0 to 100, with higher scores indicating better perceived physical and mental health status. The Cronbach’s alphas of the PCS-12 and MCS-12 in this study were .80 and .84, respectively.
Data Analysis
Data were analyzed using IBM SPSS Statistics Version 18.0 (IBM, Inc., Armonk, NY, USA). The demographic characteristics of the two groups were compared using an independent t test, a χ² test, and a Fisher exact test. Because employment status and alcohol consumption differed significantly between the groups, analysis of covariance was used to examine the intergroup differences for major variables.

Results
Four hundred forty-three of the 458 individuals who were invited to participate submitted valid questionnaires—a response rate of 96.7%. The 212 participants with physician-diagnosed RDs were enrolled in the RD group, and those without chronic disease were enrolled in the comparison group (n = 231). The average age of the participants in this study was 46.2 years (range: 21–80 years). Most (71.8%) were married, and half (51.0%) were educated to the high school level or less. The top three diagnoses among the participants in the RD group who had a single RD (n = 196, 92.5%) were RA (n = 139, 65.6%), SLE (n = 45, 21.2%), and Sjögren's syndrome (n = 40, 18.9%). The mean duration from the first physician diagnosis of RD was 6.4 years. Nearly all (n = 196, 92.5%) in the RD group received regular medical care, including prescribed oral drugs (90.6%) such as disease-modifying antirheumatic drugs, steroids, and analgesics; biologic therapies (17.9%); and traditional Chinese medicine (6.1%). Table 1, which compares the demographic characteristics of the two groups, highlights significant intergroup differences in employment status (p = .006) and alcohol consumption (p = .003). The RD group had a significantly higher rate of unemployment and a significantly lower level of alcohol consumption. Thus, employment status and alcohol consumption were identified as significant covariates. In addition, a borderline significant difference was identified in marital status between the groups (p = .052), with fewer married individuals in the RD group. Table 2 shows differences in stress, fatigue, perceived physical health status, and perceived mental health status. A significant difference in fatigue was found between the groups (p = .001), with the RD group self-reporting as experiencing significantly more fatigue. Mean (SD) PSS scores of 15.44 (6.86) for the RD group and 12.89 (6.51) for the comparison group were found to be significantly different (p = .001).

### TABLE 1.
Basic Characteristics by Group (N = 443)

| Characteristic         | RD Group (n = 212) | Comparison Group (n = 231) | t/χ² | p     |
|------------------------|-------------------|----------------------------|------|-------|
| Age (years; M and SD)  |                   |                            |      |       |
| Age 46.46              | 12.53             | 46.26                      | 8.04 | .0204 |
| Education              |                   |                            |      |       |
| Senior high school or lower | 108 | 60.0 | 118 | 51.1 | 2.245 | .297 |
| College/university     | 94                | 44.3                       | 94   | 40.7  |       |
| Graduate school or higher | 10  | 4.7  | 19  | 8.2   |       |
| Marital status         |                   |                            |      |       |
| Married                | 143               | 67.5                       | 175  | 75.8  | 3.764 | .052 |
| Single                 | 69                | 32.5                       | 56   | 24.2  |       |
| Living with            |                   |                            |      |       |
| Family members         | 192               | 90.6                       | 211  | 91.3  | 2.945 | .225 |
| Alone                  | 16                | 7.5                        | 11   | 4.8   |       |
| Others                 | 4                 | 1.9                        | 9    | 3.9   |       |
| Employment status      |                   |                            |      |       |
| Yes                    | 132               | 62.3                       | 171  | 74.0  | 7.472 | .006 |
| No                     | 80                | 37.7                       | 60   | 26.0  |       |
| Regular exercise       |                   |                            |      |       |
| Yes                    | 74                | 34.9                       | 87   | 37.7  | 0.320 | .572 |
| No                     | 138               | 65.1                       | 144  | 62.3  |       |
| Smoking status         |                   |                            |      |       |
| Yes                    | 3                 | 1.4                        | 7    | 3.0   | 1.307 | .253 |
| No                     | 209               | 98.6                       | 224  | 97.0  |       |
| Alcohol consumption   |                   |                            |      |       |
| Yes                    | 1                 | 0.5                        | 12   | 5.2   |       |
| No                     | 211               | 99.5                       | 219  | 94.8  |       |

Note. RDs = rheumatic disease.
*Fisher’s exact test.
group and 13.03 (5.57) for the comparison group revealed a significant intergroup difference in stress ($p = .010$), with the RD group perceiving significantly greater stress.

Mean (SD) PCS scores were 43.93 (8.44) and 48.40 (8.63), respectively, for the RD and comparison groups, showing that perceived physical health status was poorer in the RD group. In addition, the scores for the four subscales of PCS were analyzed. The respective mean scores for physical function, bodily pain, and general health were 69.34, 68.28, and 32.88 in the RD group and 86.68, 80.02, and 47.34 in the comparison group, indicating a significant intergroup difference for each of the three subscales. No significant intergroup difference in role physical was found ($p = .296$). In summary, the RD group reported poorer physical functioning and general health and greater bodily pain than the comparison group.

Mean (SD) MCS scores were 48.40 (8.63) and 45.67 (7.37), respectively, for the RD and comparison groups. The RD group reported significantly better perceived mental health status. Subsequent analysis of the scores of the four MCS subscales found the mean scores for vitality and role emotional to be 53.89 and 71.70 in the RD group and 61.46 and 66.21 in the comparison group, which identify a significant intergroup difference for these two subscales. No significant intergroup differences in social functioning ($p = .969$) or mental health ($p = .146$) were found. Thus, the RD group reported lower scores for vitality and higher scores for role emotional.

**Discussion**

RA was the most common disease reported in the RD group. This finding is similar to the findings reported in the population-based studies of Yu et al. (2013), which studied the general population in Taiwan, and Jokar and Jokar (2018), which studied a population of outpatients with RD in Mashhad, Iran. Moreover, Yu et al. found RA to be the most prevalent of the autoimmune RDs, with an incidence rate three times higher in women than men. The prevalence of RA in this study of 65.5% is higher than the 47.30% reported in Jokar and Jokar. A possible explanation for this is that the latter study included both men and women as subjects, whereas this study included women only. Participants in the RD group were significantly more likely to be unemployed than their comparison group peers. This finding partially echoes the results of a prior study (Wolfe & Michaud, 2009). Women with RDs frequently experience multiple disorders (e.g., pain extent, joint deformities, disrupted sleep) that lead to loss of function and an inability to continue working (Matcham, Rayner, Steer, & Hotopf, 2013; Westhoff, Dörner, & Zink, 2012). In this study, the participants in the RD group reported a lower mean consumption of alcohol than their healthy peers. Several researchers have identified a higher incidence of RDs among individuals with infrequent alcohol consumption than among individuals with baseline, low-to-moderate alcohol consumption (Bergström, Jacobsson, Nilsson, Wirfält, & Turesson, 2013; Jin, Xiang, Cai, Wei, &He, 2014). One possible explanation is the antinociceptive and anti-inflammatory effects of alcohol (Maxwell, Gowers, Moore, & Wilson, 2010).

In terms of stress, the findings of this study revealed higher levels of stress in the RD group than in the comparison group. Few prior studies have compared stress levels between individuals with RDs and individuals in the general, healthy population, with most focused on identifying RD-related stress (Davis et al., 2008; Jacobs et al., 2001). Curtis, Groarke, Coughlan, and Gsel (2005), who investigated 59 women with RA with a mean age of 60 years, found that women with higher perceived levels of stress had higher depression and that women with higher depression had lower adaptive coping. Furthermore, the results of Delgado (2007) found that patients with chronic

### TABLE 2.

ANCOVA for Stress, Fatigue, Physical, and Mental Status Between Groups (N = 443)

| Variable                          | RD Group |       |       |       | Comparison Group |       |       |       |       |
|----------------------------------|----------|-------|-------|-------|------------------|-------|-------|-------|-------|
|                                  | Mean     | SD    | Mean  | SD    | F      | p     | Mean  | SD    | F      | p     |
| Fatigue                          | 37.70    | 13.85 | 33.06 | 12.46 | 12.05  | .001  | 13.03 | 5.57  | 6.64   | .010  |
| Stress                           | 15.44    | 6.86  | 13.03 | 5.57  | 6.64   | .010  |       |       |       |       |
| Perceived physical health status | 43.93    | 8.44  | 50.17 | 6.16  | 76.25  | < .001| 6.64  |       |       |       |
| Physical functioning             | 69.34    | 29.97 | 86.68 | 22.40 | 45.44  | < .001|       |       |       |       |
| Role physical                    | 63.74    | 27.12 | 66.87 | 18.25 | 1.10   | .296  |       |       |       |       |
| Bodily pain                      | 68.28    | 23.95 | 80.02 | 18.93 | 30.42  | < .001|       |       |       |       |
| General health                   | 32.88    | 22.81 | 47.34 | 26.31 | 41.41  | < .001|       |       |       |       |
| Perceived mental health status   | 48.40    | 8.63  | 45.67 | 7.37  | 12.36  | < .001|       |       |       |       |
| Vitality                         | 53.89    | 22.56 | 61.46 | 21.13 | 11.27  | .001  |       |       |       |       |
| Social functioning               | 70.17    | 22.25 | 70.20 | 21.04 | 0.00   | .969  |       |       |       |       |
| Role emotional                   | 71.70    | 23.55 | 66.21 | 17.08 | 8.25   | .004  |       |       |       |       |
| Mental health                    | 68.51    | 18.55 | 66.05 | 16.81 | 2.12   | .146  |       |       |       |       |

Note. ANCOVA = analysis of covariance; RD = rheumatic disease.
illness who reported lower perceived levels of stress had a higher sense of coherence and spirituality.

Fatigue is an ambiguous symptom. Because of the lack of a single, widely accepted measurement instrument, the Fatigue Severity Scale and the vitality scale of SF-12 V2 were used in this study as a comprehensive measure of fatigue. This study found higher rates of severe fatigue and low vitality in the RD group. These results are similar to Godaert et al. (2002), who compared daily fatigue with repeated measures in women patients with SLE ($n=20$) and with primary Sjögren’s syndrome ($n=28$) and in healthy women subjects ($n=30$) and found significantly more severe levels of general and physical fatigue in patients with SLE and primary Sjögren’s syndrome. In addition, the results of this study echo Overman et al. (2016), who used the RAND (SF)-36 Vitality scale to conduct an online measurement of fatigue in patients with RDs in several European countries and found significantly more severe fatigue in patients with FM than in those without. Chronic, widespread pain is a typical complaint among patients with FM, and related musculoskeletal conditions and mental disorders are known to confound related diagnoses (Häuser, Perrot, Sommer, Shir, & Fitzcharles, 2017). In this study, only one participant with RA reported concomitant FM. In clinical settings, chronic fatigue is a difficult condition to communicate to healthcare providers, and rheumatology nurses typically do not know how to manage fatigue in patients with RDs (Repping-Wuts, Sarah, Van Riel, & Van Achterberg, 2008). Thus, the findings of this study support the importance of obtaining an early diagnosis of fatigue to implement the self-management strategies necessary to cope with, ameliorate, and resolve fatigue.

Fatigue reflects bodily pain that limits physical functioning (Nijrolder, van der Windt, Twisk, & van der Horst, 2010). As expected, the RD group in this study reported significantly worse perceived physical health in terms of physical functioning, general health, and bodily pain. These findings reinforce the findings of Salaffi et al. (2009), who compared 380 patients with FM, 693 patients with RA, and 1,579 individuals from the general population in Italy using SF-36 scores and found that those with FM or RA reported more significantly impaired physical and mental health on all eight subscales than the general population. The partially different findings in Salaffi et al. may be because of that study’s exclusion of patients with concomitant RDs and its nonexclusion of subjects with chronic illness comorbidities from the comparison groups. In contrast, this study excluded women with chronic disease comorbidities. The participants with RDs in this study reported greater role physical functioning difficulties than their healthy peers, although the intergroup difference did not reach significance. The role physical subscale is designed to measure the severity of role limitations caused by physical problems (Hoffman & Dukes, 2008; Ware et al., 1996). There are several possible explanations why the RD group in this study did not face role physical functioning limitations. First, more than 90% of the participants in the RD group were currently receiving medical treatment (i.e., prescribed oral drugs and biologic therapies). More than 98% of Taiwan’s population is covered under universal National Health Insurance, which provides minimal-cost access to healthcare at nearly all healthcare facilities (Lee et al., 2010). Moreover, Pollard, Choy, Gonzalez, Khoshaba, and Scott (2006) revealed that biologic and disease-modifying antirheumatic drug therapies significantly improve joint activity, pain, and fatigue. Second, the RD group reported higher ratios of unemployment and being single (unmarried) than the comparison group. Third, the RD group reported better perceived mental health than the comparison group, particularly in the role emotional subscale. Matcham et al. (2014) associated longer RA disease duration with improved mental health. Disease duration may increase acceptance of a disease (Kiebles, Doerfler, & Keefer, 2010). In this study, mean disease duration in the RD group was 6.4 years. Thus, this relatively long duration of time may have positively influenced acceptance of chronic conditions.

A major limitation of this study is that all of the measures were based on self-reported data. In addition, the disease activity of RDs is known to manifest and abate unpredictably, which has been linked to poorer physical and psychological health. Cross-sectional studies gather subject data at one point in time and thus cannot elucidate the longitudinal effects of variations in disease activity on stress, fatigue, and perceived health status or support unidirectional effects. Moreover, data were collected from southern Taiwan only, which limits the generalizability of findings to populations in other areas. Finally, potential confounders such as past histories of trauma and abuse, which may have long-lasting effects on physical and mental health, were not investigated in this study.

Conclusions

The findings of this study indicate that RDs have a significant and negative impact on perceived stress and fatigue in women. The most significant impacts occurred in the following three domains of perceived physical health: physical functioning, bodily pain, and general health. In addition, with the exception of the vitality subscale, no adverse impact was found in the domains of perceived mental health. The underlying physical and psychological problems that induce RDs remain unclear. Future studies should focus on clarifying this issue to provide the evidence necessary to develop early interventions that will effectively improve the physical and psychological health of women with RDs. In conclusion, healthcare professionals should cooperate with clinical rheumatologists, psychologists, and physiotherapists to provide comprehensive care that includes long-term education to help patients with RD self-manage stress, restore vitality, relieve pain, and increase physical functioning.

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