Risk factors for work disability in Brazilian patients with systemic lupus erythematosus

Wanderley Porto Uchôa BK[1], Calfa Nogueira A[1], da Silva Pinto L[1], Sotero Fragoso T[1]

[1] Rheumatology Division, Faculty of Medicine, Universidade Federal de Alagoas, Brazil.

Correspondence to

Thiago Sotero Fragoso

E-mail: thiago.reumato@gmail.com

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Abstract

Background: Systemic Lupus Erythematosus (SLE) predominantly affects young females who are in their most productive years of life. SLE can cause organ damage and affects daily functioning and quality of life, causing work disability (WD).

Methods: We developed a longitudinal study with 110 SLE patients, whose data were collected through individual standardized interview and review of medical records. We aimed to determine the prevalence of WD and its possible associated risk factors (sociodemographic, lifestyle habits, quality of life, clinical characteristic, cumulative organ damage and disease activity). To identify variables associated with work disability, two different multivariate regression models using a stepwise backward method were performed.

Results: The percentage of WD due to SLE was 76.3%. An association was found between WD and lack of physical exercise (p=0.017) and high physical work demand (p=0.037). Clinical characteristics were not significant predictors of work dysfunction.

Conclusion: 76.3% of our sample developed WD after SLE diagnosis. Participants who did not practice physical exercise and those who had a high-demand physical work were, respectively, 3.78 and 4.80 times more likely to have WD. Although we were not able to analyze the influence of COVID-19 in WD development, COVID-19 pandemic could have exacerbated the inequalities among people with chronic health conditions, especially in a low-income population, which could have influenced our results. Additional researches to evaluate risk factors for WD in low-income SLE patients and on strategies for reducing its impact are needed.

Keywords: Work disability; Systemic lupus erythematosus; Productivity.

Introduction

Systemic Lupus Erythematosus (SLE) is a multi-system autoimmune disorder with a clinical course characterized by periods of both active disease and remission. SLE can occur at any age and in both genders, but it is more frequent in young women at the age range of 20-40, during their most productive years of life.[1] The clinical course of SLE is chronic and can affect any organ, and many of them cause loss of daily functioning and quality of life, as well as considerable contribution to the morbidity and mortality.[2]

Although an improvement in the survival of SLE patients has been seen during the past years because of earlier diagnoses and more effective treatments, patients often experience long-term morbidity that can adversely affect their ability to work.[3] Moreover, work disability, or inability to work due to an illness, can have profound effects on individual and their family, ranging from financial hardship, loss of self-esteem, opportunity to socialize, loss of current earning and ability to accumulate assets for retirement, especially in an illness with an early onset.[2] The available published studies show that work disability (WD) in SLE could be common.[3] Results from a systematic review including 9.886 patients reported that 32.5% (range 5–58) experience WD, which is related to a variety of psychosocial and disease-related factors including age, race, education, disease activity and duration, pain, fatigue, anxiety and neurocognitive involvement.[2]

Some studies have addressed WD in patients with SLE, but no studies have assessed its risks factors in a poor region of Brazil. We aim to address the proportion of patients not being able to work due to SLE at any time since diagnosis and which risk factors have a direct and independent relationship with WD, since it can imply social, economic and quality of life (physical and mental) embargoes.

Materials and methods

Study design and population

This was a longitudinal study with patients who fulfilled the classification criteria for SLE made by the American College of Rheumatology (ACR).[4] Authors retrospectively analyzed WD of the SLE patients since diagnosis. WD was self-reported and defined by the impairment to work due to SLE and its related complications at any time after SLE diagnosis. This impairment was represented as previous or actual cessation of employment and/or disability retirement, however some patients can return to work afterwards, and this definition is not related to

absenteeism. During the interview, we asked the following question to the patient: "Have you ever stopped working in consequence of SLE symptoms?" We informed that to answer yes, they should have quit their job due only to SLE, and not being on temporary sick leave.

We did not include students or individuals who chose not to work due to other reasons rather than SLE.

A consecutive sample of one hundred and ten (110) patients aged over 18 years old from the Lupus Outpatient Clinic at the Professor Alberto Antunes University Hospital (HUPAA), Federal University of Alagoas (UFAL), Brazil, from April 2021 to April 2022 was included. This SLE outpatient clinic is a reference unit for lupus care in the state of Alagoas, northeast of Brazil. The interview was done before the beginning of consultation by a health professional who was a non-integrant of the medical team. All patients were treated by rheumatologists and the data were collected during COVID-19 pandemic period.

Ethical aspects and procedures

This study was approved by local Ethics Committee for Research of the Federal University of Alagoas (No. 4.546.371; CAAE: 42734020.0.0000.5013) and complied with the Helsinki Declaration. A written informed consent was obtained from each participant.

Data Collection

We analyzed the main published articles that are similar to our methodological proposal and created a questionnaire based on the most frequent and relevant questions. From this customized, an interview was performed, and sociodemographic information and lifestyle habits were collected. Data concerning clinical aspects/disease characteristics and organ or system involvement were obtained from electronic medical records and interview. We evaluated the following aspects related to work: current status (active or inactive); income; previous history of withdrawal and the reason (SLE itself or other reasons); current social security benefit, physical work demand. Kneeling, carrying objects, bending, crawling, as well as manual work related to agriculture, industry, transport and civil construction, besides excessive workload were considered as high physical work demand.[5] We did not analyze whether our SLE patients had COVID or not, thus we did not compare WD between those who did or did not have the disease.

It was used the Brazilian Economic Classification Criteria of the ABEP (Brazilian Association of Research Companies) for the economic classification.[6] The sum of socioeconomic variables is

aggregated in intervals to define social class categories: D/E (0–16 points); C (17–28 points); A/B (29–100 points).[6] It was considered low socioeconomic position (poverty) the categories D/E.

The 12-item Short Form Survey (SF-12) was used to assess different dimensions of life's quality, considering the individual's perception in the last four weeks, organized into Physical Component (PCS) and Mental Component (MCS).[7] The scores range from 0 to 100, with higher scores indicating better physical and mental health functioning. In this study, a score of 50 or less on the PCS-12 was used as a cut-off to determine a physical condition; while a score of 42 or less on the MCS-12 was used as a cut-off to identify probably clinical depression.[7]

The Systemic Lupus Erythematosus Disease Activity Index (SLEDAI), in its 2K version, was used to assess disease activity.[8] We consider low disease activity state when SLEDAI-2K ≤4.[9] The Systemic Lupus International Collaborating Clinics/ American College of Rheumatology – Damage Index (SLICC-ACR) was performed to verify organ damage[10]. It was considered irreversible organ damage when SLICC ≥ 1.[11]

In order to identify risk factors for WD, we analyzed its association with sociodemographic features, work-related factors, lifestyle habits, clinical manifestations, disease activity, organ damage due to SLE and quality of life.

Statistical analysis

Shapiro-Wilk test was used to determine the normality of the numeric variables distribution. Data were described as number (frequency) for categorical variables and median (interquartile range) for continuous variables. For numeric variables with non-normal distribution, the non-parametric Mann-Whitney test was used.

Chi-square, Yates' continuity correction and Fisher's exact tests were performed to compare the nominal variables. A contingency table was used to display the frequency distribution of variables. Yates' continuity correction was applied when any of the values in the cells were lower than 10. When at least 20% of the cells presented an expected value lower than 5, it was used Fisher's exact test. In the remaining cases, Chi-Square test was applied.

A multivariable logistic regression analysis was performed to verify the independent factors associated with WD. At first, all significant variables in the univariate analysis were included in the model. The selection of variables was performed using the backward method with the odds ratio as the selection criterion (variables with p-value > 0.05 were removed).

A two-sided *P* value ≤ 0.05 was considered statistically significant. All statistical analyses were performed using the Jeffreys's Amazing Statistics Program (JASP Team)® – version 0.16.1 for Windows Xp.

Results

A total of 110 patients were included. The sociodemographic and lifestyle habits are shown in Table 1. The clinical characterization of the patients was cumulative (from diagnosis until time of interview) and is shown in table 2.

The prevalence of WD was 76.3% (n=84) with 76 (69.0%) patients unemployed at any time of clinical history due to SLE. A total of 8 (7.2%) patients had early retirement. In our sample, 92 (83.6%) patients were professionally inactive and 18 (16.4%) patients were active at the time of the study. There were 84 patients with WD at the time of interviewing. Of these, 80 were inactive and 4 were professionally active. Of the inactive sample, there were 72 unemployed because of SLE and 8 early retired.

Table 3 illustrates the comparisons of demographics and life habits between patients with and without WD.

There was no association between clinical characteristics and WD. Table 4 illustrates the comparisons of disease characteristics between patients with and without WD.

Age, formal education and marital status were initially included in the first model, but did not reach a significance level of 0.05 and were removed from the final model (Table 5).

As a result, a statistically significant model was obtained, with $\chi 2 = 17.40$ and p-value < 0.001, which correctly classified 73.7% of the cases. Lack of physical exercise (p-value = 0.010; OR = 3.78; CI 95% 1.37 – 10.33) and high physical work demand (p-value = 0.002; OR = 4.80; CI 95% 1.76 – 13.06) were significant predictors of WD in patients diagnosed with SLE in this sample.

Discussion

SLE mainly affects young women during the career-building phase of life.[11] The survival of patients with SLE has improved over the past three to four decades; nevertheless, patients accrue damage and functional limitations that compromise daily activities and their ability to work.[12]

This is the first prevalence report of WD in SLE patients from Brazil in a low-income region (northeast of Brazil) during COVID-19 pandemic. We observed a rate of 76.3% and this finding is higher than previous published research before the COVID-19 pandemic[2,3,12,13,14,15,16], including a systematic review of 26 studies with a total of 9886 SLE patients that verified a mean of 32% of WD (range 5-58%).[2] The differences in prevalence reported among SLE studies can be also explained by the heterogeneity in the definition of WD, and the comparison with other series may be also difficult for this reason. Several studies defined WD as unemployment status only at the interview time with no inclusion of previous history of work interruption due to SLE.[17,18,19]

We used the broadest possible definition, because it was considered any cessation of employment during the illness, what may have contributed for a higher rate of WD in our study. Furthermore, information on employment status and WD was self-reported.

Multiple factors may influence WD. These include age[20,21], disease activity[17,21], organ damage[17,21], educational level[16,17,20], neurocognitive impairment[17], fatigue and the nature of the job itself (physical or psychological demand).[16,20] We didactically separate the risk factors into two large blocks: sociodemographic/lifestyle habits and clinical characteristics. We showed that lack of physical exercise and high physical work demand were significant predictors of WD, while we did not observe association with any clinical characteristic.

Although associations of WD with clinical characteristics are common in medical literature[16,17,21], we did not confirm this finding. However, we evaluate the disease activity only in the moment of interview, so we cannot conclude about its interference in previous work cessation. Moreover, there was, proportionally, a small number of patients with active disease and organ damage, with a cohort profile predominantly of patients with remission disease and no organ damage. We had the limitation of not evaluating fatigue and cognitive impairment that are described as possible contributors to WD.[13,17,22]

It was observed that both components of SF-12 indicated critical levels of QoL in these patients. Our study found that patients had an unsatisfactory level in both domains, especially physical.[23] The score of physical components was lower in WD group. It makes us consider the possibility that the worst physical conditions of these patients may be indirectly impacting the work capacity. Although there is no statistically significant difference, we need to consider the disproportion of the sample size between the groups with and without WD.

We utilized retrospective and current data collected during the clinical consultation. Unfortunately, it is not possible accurately describe patient data when they had work disability and this was one of the study's limitations.

We had a limitation related to temporality in our study: risk factors (independent variables – assessed at the time of the current evaluation) and the WD (dependent variable – assessed retrospectively) were not evaluated at the same time. Probably, this is an additional reason why we did not find association between some of the variables tested, such as the SF-12, the SLE disease activity or the SLICC damage index and the WD.

A significant association between lack of physical exercise and WD was also observed by Pisoni *et al*[12] who described the same finding in SLE patients. Physical activity could have a direct influence both on how the person with SLE can face their routine, as well as on their level of independence and sense of well-being. A systematic review published in 2017[24] demonstrated that therapeutic exercises in SLE appear to be safe, and do not adversely affect disease activity.

Fatigue, depression, and physical fitness were improved following exercise-based interventions. A multimodal approach may be suggested; however, the optimal exercise protocol remains unclear.[24] This outcome was associated, in our study, with probability of WD in 3.78 times.

We found that high physical work demand is a risk factor for work cessation, and it is consistent with the results of Partridge *et al*[16] and Yelin *et al.*[20] Our sample is composed, predominantly, of a socioeconomically vulnerable population with a low educational level, which means that job offered are mostly directed to higher physical work demand. Considering that our patients had a high percentage of joint involvement (60.9%), critical indices of quality of life in the physical component, in addition to the possibility that other unchecked components such as fatigue and cognitive impairment may be present, we can think that a reasonable number of patients with SLE are able to manage exclusively simpler duties and shorter working hours and could not maintain their jobs in face of these limitations, resulting in WD.[13] This hypothesis could justify the data of our study as patients with high physical work demand were 4.80 times more likely to have WD.

This research was developed between April of 2021 to April of 2022. In that time, Brazil was suffering with epidemic picks of COVID-19, with high economic impact and increase of unemployment.[25] Due to various labor market barriers, employment rates remain low among people with disabilities and chronic health conditions as SLE. This was the case even prior to the pandemic and recent evidence indicates that COVID-19 exacerbating these inequalities.[26] Most of the patients included had low education level, high physical demand work profile and probably only manage simpler duties and/or shorter working hours. This work profile is aggravating to finding jobs[13] and may have increased the work cessation, especially when added a COVID-19 socioeconomic context.

Conclusion

The WD was higher (76.3%) than other published research before the COVID-19 pandemic and, possibly, this context could have contributed to this prevalence. However, we did not directly evaluate the impact of COVID-19, so we need to observe this hypothesis with restrictions and more studies with this aim are needed. Lack of physical exercise and high physical work demand were independent predictors of WD. Once the lack of physical exercise is a risk factor of work disability, exercise programs may be helpful and should be prescribed assertively by rheumatologists, not only suggested occasionally. Furthermore, health care providers should encourage the improvement of SLE patients' educational levels in the way of expanding the job offers with less physical demand and stimulate to choose a work that requires less physical strength.

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Tables and Figures

Table I. Sociodemographic and lifestyle characterization of SLE patients.

	General N=110
Sociodemographic characteristics	
Age (years), median	38.5 (30.0 – 48.0)
Female (%)	108 (98.1)
Non-Caucasian Ethnicity (%)	86 (78.1)
Formal education ≤ 10 years old (%)	41 (37.2)
Socioeconomic status (%)	
Poverty	82 (74.5)
Married (%)	68 (61.8)
Residency (%)	
Inland city	68 (61.8)
Internet access (%)	102 (92.7)
High physical work demand (%)	83 (75.4)
Life habits	
Smoking (%)	2 (1.8)
Alcohol consumption (%)	4 (3.6)
Lack of physical exercise (%)	83 (75.4)

Data presented as n (%) or median (first and third quartile).

Table II. Clinical characteristics of SLE patients.

Characterization	General N=110
Disease duration (years), median	7.0 (5.0 – 11.0)
Pregnancy (%)	2 (1.8)
Previous hospitalization (%)	63 (57.2)
Clinical manifestations (%)	
Arthritis	67 (60.9)
Serositis	26 (23.6)
Mucocutaneous manifestations	67 (60.9)
Neuropsychiatric manifestations	9 (8.1)
Renal disease	52 (47.2)
Hematological manifestations	61 (55.4)
SLEDAI≥ 4* (%)	29 (26.8)
SLICC≥ 1(%)	43 (39.8)
SF-12, median	
Mental component	36.2 (30.5 – 42.6)
Physical component	33.9 (26.5 – 43.0)

Data presented as n (%) or median (first and third quartile).
*At the time of assessment.

Table III. Sociodemographic and lifestyle habits related to work disability: univariate analysis.

Sociodemographic characteristics and life habits	General N=110	Work disability		P value
		Yes n=84	No n=26	
Age (years), median	38.5 (30.0 – 48.0)	39.5 (33.7 – 49.2)	30,0 (24.2 – 41.2)	**0.006[a]**
Non-Caucasian ethnicity (%)	86 (78.1)	68 (80.9)	18 (69.2)	0.321[b]
Formal education ≤ 10 years (%)	41 (37.2)	38 (45.2)	3 (11.5)	**0.004[b]**
Socioeconomic status (%)				
Poverty	82 (74.5)	60 (71.4)	22 (84.6)	0.275[b]
Married (%)	68 (61.8)	57 (67.8)	11 (42.3)	**0.019[d]**
Residency (%)				
Inland city	68 (61.8)	55 (65.4)	13 (50.0)	0.156[d]
Internet access (%)	102 (92.7)	77 (91.6)	25 (96.1)	0.678[c]
High physical work demand (%)	83 (75.4)	70 (83.3)	13 (50.0)	**<0.001[d]**
Lack of physical exercise (%)	83 (75.45)	69 (82.14)	14 (53.85)	**0.003[d]**

Data presented as n (%) or median (first and third quartile).
Significant p-value < 0.05.
[a] Mann-Whitney Test.
[b] Chi-square test with continuity correction.
[c] Fisher's exact test.
[d] Chi-square test.

Table IV. Clinical characteristics related to work disability: univariate analysis.

Characterization	General N=110	Work disability		p-value
		Yes n=84	No n=26	
Disease duration (years), median	7.0 (5.0 – 11.0)	7.0 (5.0 – 12.2)	6.5 (4.2 – 8.0)	0.095[a]
Previous hospitalization (%)	63 (57.2)	52 (61.9)	11 (42.3)	0.078[b]
Clinical manifestations (%)				
Arthritis	67 (60.9)	51 (60.7)	16 (61.5)	0.940[b]
Serositis	26 (23.6)	22 (26.1)	4 (15.3)	0.385[d]
Mucocutaneous manifestations	67 (60.9)	54 (64.2)	13 (50.0)	0.192[b]
Neuropsychiatric manifestations	9 (8.1)	7 (8.3)	2 (7.6)	>0.999[c]
Renal disease	52 (47.2)	40 (47.6)	12 (46.1)	>0.896[b]
Hematological manifestations	61 (55.4)	42 (50.0)	19 (73.0)	0.065[d]
SLEDAI≥ 4 (%)	29 (26.8)	24 (29.2)	5 (19.2)	0.452[d]
SLICC≥ 1 (%)	43 (39.8)	36 (43.9)	7 (26.9)	0.190[d]
SF-12, median				
Mental component	36.2 (30.5 – 42.6)	35.72 (29.9 – 41.0)	38.9 (34.3 – 48.5)	0.061[a]
Physical component	33.9 (26.5 – 43.0)	33.83 (27.3 – 41.0)	39.9 (25.3 – 46.8)	0.552[a]

Data presented as n (%) or median (first and third quartile).
Significant p-value < 0.05.
[a] Mann-Whitney test.
[b] Chi-square test.
[c] Fisher's exact test.
[d] Chi-square test with continuity correction.

Table V. Sociodemographic and lifestyle habits related to work disability: multivariate analysis.

Dependent measures	Estimation (B)	Standard error (S.E.)	p-value	Odds ratio (OR)	95% C.I.	
					Inferior	Superior
Lack of physical exercise	1.32	0.52	0.010	3.78	1.37	10.33
High physical work demand	1.57	0.51	0.002	4.80	1.76	13.06

OR (IC 95%): Odds ratio (Confidence interval 95%); Significant p-value < 0.05.

SUPPLEMENTARY MATERIAL - Main questionnaire

RISK FACTORS FOR WORK DISABILITY IN SYSTEMIC LUPUS ERYTHEMATOSUS BRAZILIAN PATIENTS

NAME: INDIVIDUAL REGISTRATION:
COLLECTION DATE: RECORD NUMBER:

SOCIODEMOGRAPHIC DATA AND LIFE HABITS

[1] Age (year):
[2] Gender: □ Male □ Female
[3] Ethnicity: □ White □ Black □ Mestizo □ Indian
[4] Marital status: □ Married □ Single
[5] Residency: □ Inland city □ Capital
[6] Formal education: □ ≤ 10 years □ > 11 years
[7] Current work status: □ Inactive □ Active
[8] Stopped working in consequence of SLE symptoms: □ Yes □ No
[9] Current smoking: □ Yes □ No
[10] Current alcohol consumption? □ Yes □ No
[11] ABEP:
[12] Any type of internet access: □ Yes □ No
[13] Pregnant at interview: □ Yes □ No
[14] Practice of regular physical exercise: □ Yes □ No

OCCUPATIONAL DATA
[1] Physical demand related to current or last job:
□Activities with high physical work demand (kneeling, carrying objects, bending over, crawling), as well as manual work related to agriculture, industry, transport and civil construction and with excessive working hours
□Activities with low physical work demand, such as administrative and managerial services

DISEASE DATA
[1] How long ago were you diagnosed with SLE (year)?
[2] Previous hospitalization caused by SLE? □ Yes □ No
[3] SLEDAI (insert number):
[4] SLICC: Presence of organic damage □ Absence of organic damage