The Effectiveness of Exercise Program for aerobic Fitness in Adults with Systemic Lupus Erythematosus: A Systematic Review and Meta-Analysis

Mei-Ling Wu, MSN, RN
Doctoral Candidate
School of Nursing, National Yang-Ming University, Taiwan

E-mail: mlwu@gw.cgust.edu.tw
Mei-Ling Wu

Objectives:
- Learners will understand the effectiveness of exercise program for aerobic fitness in adults with SLE.
- Learners will understand steps of conducting systemic review.

- This study did not receive any funding from any public, for-profit, or non-for-profit organization.

- The authors declare that there is no conflict of interest in conducting this study.

Affiliation:
- Department of Nursing, Chang Gung University of Science and Technology, Taiwan
Systemic Lupus Erythematosus (SLE) is a chronic immune system disorder that affects various organ systems.

Hyperactive B cells, resulting from T-cell and antigen stimulation, increase the production of these anti-bodies against antigens.

Autoantibodies and immune complexes formation and deposition lead to multiple organs damage.

SLE patients may suffer from a variety of distress symptoms (i.e., fatigue, pain, depression, and sleep disturbance)
SLE patients perform sedentary life style and have lower aerobic fitness, exercise capacity, muscle strength and pulmonary function than healthy people.

High correlation between physical inactive and fatigue was reported.

Gualano et al. (2010) proposed a vicious cycle that lack of physical exercise lead to physical inactivity and variety of symptoms aggravation. Accumulative symptoms (i.e. fatigue and muscle weakness) may drive patients to live in a physical inactive life style.

Physical exercise could be a treatment that break the vicious cycle.
Research Question

- Can exercise increase SLE patients’ physical fitness and decrease SLE patients’ fatigue?

- **PICO**

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<tr>
<td>Adult SLE patients</td>
<td>Exercise program</td>
<td>Usual care</td>
<td>1. Physical fitness 2. Fatigue</td>
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Purpose of the study

- To examine the effectiveness of exercise program on physical fitness and fatigue in adult SLE patients.
Methodology

- Systematic review and meta-analysis
  - Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) recommended guidelines

- Search strategy
  - Databases: Cochrane Library, PubMed, PsycINFO (ovid), MEDLINE, CINAHL Plus with Full Text (EBSCO)
  - In order to reduce publication bias, we also searched the System for Information on Grey Literature in Europe (SIGLE) database.
Keywords and terms used

- Participant: lupus or systemic lupus erythematosus
- Interventions: exercise, physical exercise, physical activity
- Types of studies: experimental study, randomized control trial, or quasi-experimental study
- Outcome measures: no key words used to avoid missing any potentially relevant studies during the search process
Inclusion criteria

- participants were adult participants aged over 18 years;
- participants were diagnosed with SLE;
- intervention was a exercise program;
- comparisons were usual care or no treatment;
- outcome measures were cardiovascular fitness or psychological distress symptoms;
- types of studies were primary research reports of randomized control trial, or quasi-experimental studies.
Methodology

- Exclusion criteria
  - animal studies;
  - not published in English
Methodology

Assessment of methodological quality

- Jadad scale (Jadad et al., 1996; Olivo et al., 2008)
  - randomization (0-2)
  - double blinding (0-2)
  - dropouts (0-1)

- the score $\geq 3$ consider as a high quality trial (Jadad et al., 1996)
Methodology

- **Data synthesis**
  - Cochrane Collaboration’s Review Manager Software (RevMan 5.2)
  - We used the degree of inconsistency ($I^2$) to examine the heterogeneity between studies.
  - If $I^2 > 50\%$ (p < 0.1) indicate notable heterogeneity, which need random effects model

(Borenstein, Hedges, Higgins, & Rothstein, 2009).
158 articles identified from database searching

0 additional articles identified from other sources

36 duplicates were removed using Endnote software

122 articles screened

19 full-text articles assessed for eligibility

9 articles included in this systemic review

4 RCTs included in this meta-analysis

103 articles were excluded

10 full-text articles excluded.
1 article sample cannot distinguish SLE patient from other rheumatic disease
4 articles conducted short term exercise testing only
1 article was physical exercise survey
4 articles were not original research
Results

- 9 experimental studies are included in systemic review
- 4 studies are included in meta-analysis
- Characteristics of the included studies
  - Country: Brazil, USA, UK, Norway
  - Study design: 6 RCTs, 2 one group pretest-posttest designs, 1 quasi-experimental design
  - Sample size: 6-93; 337 individuals in total
  - Mean age of sample: 30-50
Results

- Characteristics of intervention
  - Frequency
    - 2 times/wk - 1 study
    - 3 times/wk - 10 studies
  - Intensity
    - Fairly light to moderate - 1 study
    - Moderate - 2 studies
    - Moderate to vigorous - 3 studies
    - Not mentioning - 3 studies
Results

- **Mode**
  - Walking - 4 studies
  - Stationary bicycling - 1 study
  - Aerobic exercise - 4 studies

- **Duration**
  - <30 min – 1 study
  - 30-60 min – 7 studies
  - > 60 min – 1 study
Results

- Study period
  - 8 weeks – 2 studies
  - 10 weeks - 1 study
  - 12 weeks- 5 studies
  - 16 weeks- 1 study

- Supervised exercise or home-based exercise
  - Supervised exercise program- 4 studies
  - Home-based exercise- 4 studies
  - Mixed- 1 study
Results

Meta-analysis

- Physical fitness-$\text{VO}_2\text{ max (ml/kg/min)}$

![Graph showing meta-analysis results for physical fitness]

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Experimental</th>
<th>Control</th>
<th>Mean Difference</th>
</tr>
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<tbody>
<tr>
<td>Robb-Nicholson 1989</td>
<td>3.8 3.34</td>
<td>14</td>
<td>1.14</td>
</tr>
<tr>
<td>Carvalho 2005</td>
<td>1.68 4.43</td>
<td>41</td>
<td>0.19</td>
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Total (95% CI) 55 27 100.0% 2.09 [0.44, 3.74]

Heterogeneity: $\chi^2 = 0.48$, $df = 1$ ($P = 0.49$); $I^2 = 0$
Test for overall effect: $Z = 2.49$ ($P = 0.01$)
Results

- Physical fitness-exercise tolerance (min)
Results

- Fatigue- Fatigue Severity Scale (FSS) (0-7)
Discussion

- Effect on physical fitness
  Exercise is effective in improving VO\textsubscript{2 max} and walking endurance in adults SLE patients.

- Effect on fatigue
  Exercise is effective in decreasing fatigue.
  Statistic significance does not imply clinical importance.

- Exercise is medicine
  Exercise is a treatment that could interrupt physical inactivity caused vicious cycle.
Limitations

- Publication bias
- Methodology quality
- Small sample size
- Small number of eligible studies
- Different physical variables/ unit
Conclusion and Suggestions

- Regular exercise with moderate intensity perform at least 8 weeks can improve adult SLE patients physical fitness and decrease fatigue severity.

- Exercise recommendation for adult SLE patients
  
  **Regular exerciser:**
  
  ✓ 150 min of moderate intensity aerobic activity/wk
  ✓ 75 min of vigorous intensity aerobic activity/wk
  + muscles-strengthening activities on 2 or more days/wk
  (major muscle group-legs, hips, back, abdomen, chest, shoulder, arms)
Exercise recommendation for adult SLE patients

Sedentary lifestyle:
✓ Begin with 20min a day, 3 days a week, moderate intensity, gradual progression to 150 min a week.
✓ Light to moderate exercise for deconditioned individuals is acceptable.

Caution:
✓ Patients have severe joint pain and osteoporosis should avoid doing high impact exercise.
Suggestions

- Patient centered exercise prescription is recommended.

- Exercise education or exercise counseling should be a part of clinical care.

- Health care providers should encourage SLE patients do exercise regularly.
THANK YOU

FOR YOUR ATTENTION!


