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Effect of Exercise Intervention on Facioscapulohumeral Muscular Dystrophy (FSHD)

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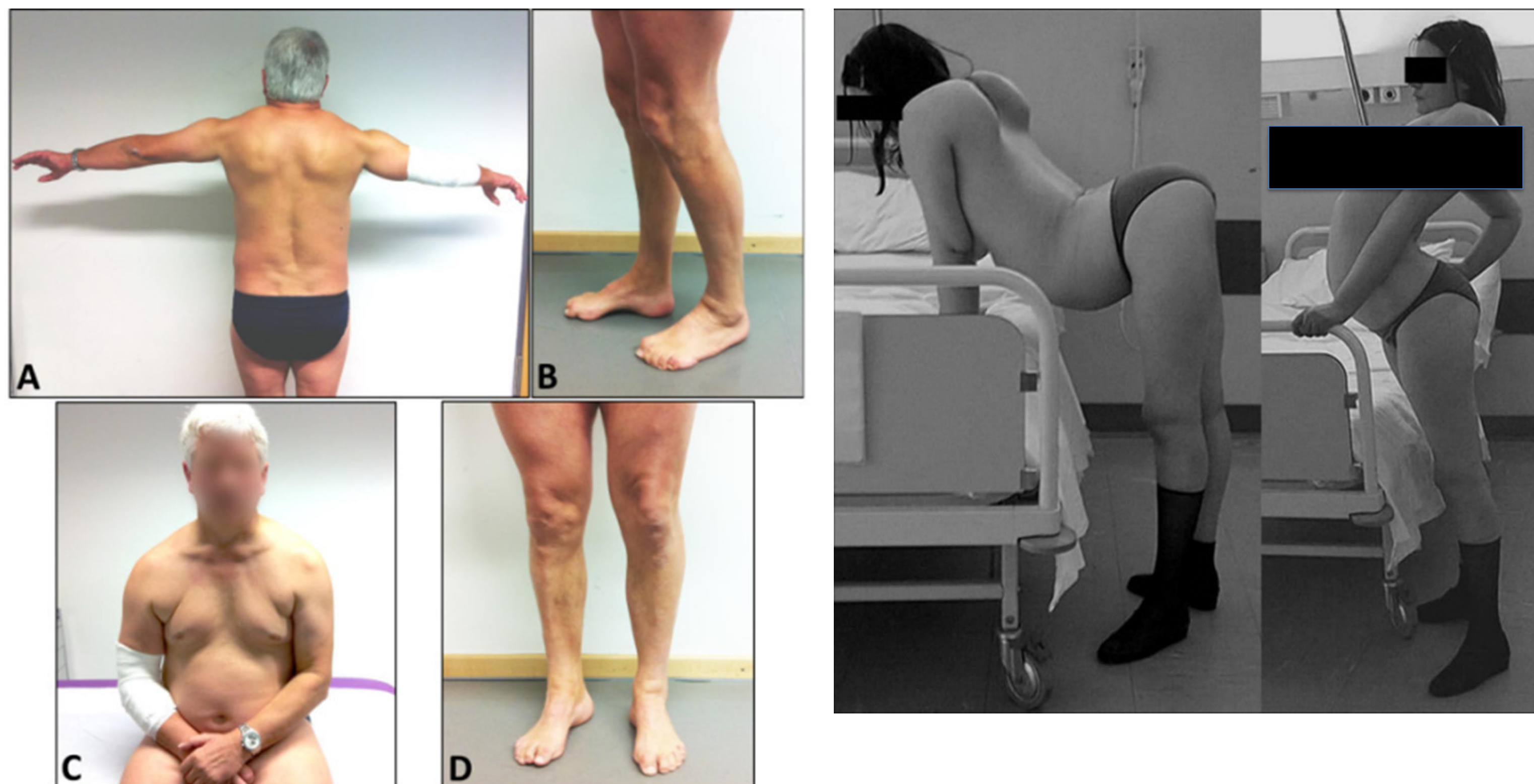
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Effect of Exercise Intervention on Facioscapulohumeral Muscular Dystrophy (FSHD)

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Background

Facioscapulohumeral Muscular Dystrophy (FSHD) is a common muscular dystrophy. The facial muscles, shoulder girdles, and upper arms are notably affected.¹ A common presenting symptom is asymmetrical scapular winging and further symptoms may include but are not limited to: loss of pectoral muscles, fatigue, severe pain, pathologic spinal curvatures, foot drop, and even inability to sip through a straw.² It is a particularly debilitating muscular dystrophy, with 20% of people >50 y.o. requiring a wheelchair.³ With no approved therapeutics, patients are managed symptomatically.³ It is hypothesized that exercise may prevent need for assistive devices and increase patient quality of life. The goal of this review is to determine the effect of different exercise interventions on patients with FSHD. With this information, patients and their providers can formulate an ideal exercise routine to help alleviate symptoms and improve functionality.



Figures 1 & 2: Examples of patients displaying symptoms of FSHD. Both images were modified from 'Open i' open access biomedical image search engine.

Methods

Search Strategy

Databases searched	Date searched	Key Word String	Number of Results
PubMed, Cochrane library, Web of Science and Embase	04/29/2023	("Facioscapulohumeral") AND ((“exercise”) OR (“training”) OR (“aerobic”) OR (“strength”) OR (“resistance”))	992

(“www.Rayyan.ai” was utilized to organize results and perform article inclusion & exclusion)

Study Selection

- Peer-reviewed articles of any research design that discussed the association between any form of exercise and patient's with FSHD were deemed relevant and included in this review. There was no exclusion on date of publication.
- Outcome measures of interest include any trackable variable responding to an exercise intervention, including muscle strength, walking speed, self-assessed health, etc.
- Following title and abstract analysis and then full text analysis, **15 articles** were included in this review starting from the original 992.

Data Analyses

Qualitative data was organized thematically by intervention type: aerobic, strength training, and high intensity interval training / anaerobic.

Results



Aerobic

- Reduction in severity of chronic fatigue in patients with FSHD and severe chronic fatigue⁴
- Twelve weeks of aerobic exercise led to improved oxygen uptake, no signs of muscle damage⁵
- Improved fitness, walking speed, and self-assessed health, no signs of muscle damage⁶
- Preserved lean body mass and protection against exercise intolerance⁷
- Intermittent arm cycling training is particularly feasible for patients and postexercise protein-carbohydrate supplementation does not add any further improvement⁸



Strength

- Gain in strength due to neural adaptation⁹
- Positive effects on muscle function, strength, and capacity for daily activities¹⁰
- Strength training and albuterol do not have a positive or negative effect on pain, experienced fatigue, functional status and psychological distress¹¹
- Positive impact on psychological health and quality of life¹²
- Twice-a-week, 12-week, resistance training -> increased knee flexion strength and improvements in functional task¹³
- Combined strength and interval cycling exercise -> significant functional benefits without compromising muscle tissue¹⁴



Anaerobic / HIIT

- RCT showed that regular HIIT is safe, efficacious, and well liked¹⁵

Figure 3: Results from the literature review were organized into three categories of exercise: aerobic, strength, and anaerobic/hiit (High intensity interval training). All clip art was sourced from openclipart.org's open access database.

Discussion & Conclusion

All three forms of training, aerobic, strength, and anaerobic, were found to have positive effects on patients with FSHD. Aerobic training and strength training have the most amount of supportive research. Some of the positive effects of these interventions include reduced levels of fatigue, increased oxygen uptake, improved muscle strength, and functional improvements in fitness, walking speed, and other functional tasks.^{1-3,6-7} Most importantly, neither aerobic nor strength training resulted in any signs of further muscle damage.^{2-3,11} However, one article stated that they found strength training and albuterol to have neither a positive or negative effect on pain or experienced fatigue.¹¹ Notably less research has been conducted on the impacts of HIIT or other forms of anaerobic training on patients with FSHD. However, the single article that analyzed the impact of HIIT revealed a safe and effective impact.¹² Ultimately, exercise interventions have an overwhelmingly positive effect on patients with FSHD. Further research should be performed to determine the specifically most optimal routine for these patients in addition to further evaluation of the effects of anaerobic exercise.

References

