Lymphoedema and Obesity

Developed by Dr Mary E. Davis and Dr Caitriona Cunningham, University College Dublin, Ireland

What is lymphoedema?

Lymphoedema is a localized form of tissue swelling resulting from excessive retention of protein-rich lymphatic fluid in the interstitial compartment.

Lymphoedema is a chronic and currently incurable condition.

Lymphoedema is caused by impaired lymphatic drainage in the presence of normal capillary function

Lymphoedema is classified as primary or secondary.

- Primary lymphoedema is caused by developmental lymphatic vascular anomalies.
- Secondary lymphoedema is acquired and arises as a result of an underlying systemic disease (e.g. obesity), trauma, or surgery.

Lower limb lymphoedema is much more common than upper limb lymphoedema as adipose deposition in adults with obesity affects legs more than arms.

In the lower limbs, lymph transport is also further challenged by gravity and longer drainage pathways, making them more susceptible than the upper limbs.

Clinical presentation and considerations for physiotherapy assessment

What might a physiotherapist see?

- **Increased limb volume**
  - Persistent or fluctuating swelling that may cause heaviness, discomfort or fatigue
  - Can limit joint movement and make daily activities more difficult
- **Skin changes**
  - Thickening and fibrosis: skin becomes firm and less elastic, making compression therapy harder
  - Skin folds: areas where moisture and friction can accumulate, increasing risk of infection
  - Hyperkeratosis: thickened, rough, scaly skin caused by chronic swelling
- **Reduced mobility and function**
  - Swelling and stiffness can restrict range of motion
  - Daily activities (walking, dressing, reaching) may become more difficult
- **Increased risk of complications**
  - Cellulitis: bacterial skin infection causing redness, warmth, swelling and pain. This can worsen lymphoedema if untreated
  - Wounds and infections: cracks or breakdowns in skin may heal slowly due to impaired lymphatic drainage
  - Psychosocial impact: visible swelling and skin changes can affect self-esteem, confidence and activity participation

Assessment considerations

- Limb volume measurement pre and during follow-up (monitor response to treatment or disease progression)
- Observation: review skin integrity and look for skin changes and signs of infection (e.g. temperature changes, skin colour, etc.), wounds, maceration, fibrosis
- Consistent with most musculoskeletal assessments:
  - Functional mobility: gait, balance, transfers, stair climbing
  - Movement and function: joint range of motion, muscle strength and endurance and impact of limb size on movement
- Psychosocial factors: consider fear of movement, exercise avoidance and barriers to participation

Key treatment and safety points

Multidisciplinary working

- Clinical management of OIL should be coordinated within an MDT, including physiotherapists, lymphoedema nurses, surgeons, dietitians, occupational therapists, psychologists and primary care.
- Clear communication within the MDT is essential to align compression strategies, skin care, exercise and weight-management goals.
- Consider referral to a dietitian (if not already involved) to support sustainable lifestyle change and weight loss, which is central to long-term lymphoedema management.
- Recognise the psychological impact of obesity and lymphoedema (e.g. stigma, low mood, reduced self-efficacy) and consider referral for psychological support as relevant.

Physiotherapy-specific safety considerations

- **Skin integrity first**:
  - Modify or delay exercise and manual techniques if skin is fragile, broken, infected, or painful.
  - Be alert to signs of cellulitis (redness, heat, pain, systemic symptoms) and refer promptly.
  - Use caution during moving and handling or mobilisation of people with obesity and lymphoedema. Assess skin fragility and risk of shear, pressure or skin trauma as part of the physiotherapy risk assessment.
- **Compression safety**:
  - Ensure compression is correctly fitted and tolerated.
- **Manual lymphatic drainage safety**:
  - Physiotherapists should only provide MLD if appropriately trained and within their scope of practice.
  - Be aware of contraindications and precautions relevant to this treatment.
- **Exercise and mobility considerations**:
  - Adapt exercise to accommodate reduced mobility, joint pain, breathlessness and fatigue commonly associated with obesity.
  - Monitor vital signs, perceived exertion and symptom response, particularly in deconditioned individuals.
  - Consider comorbidities such as diabetes, cardiovascular disease and osteoarthritis: monitor vitals and symptoms closely during physiotherapy sessions.
  - Be mindful of manual handling risks for both patient and therapist. Consider co-working with occupational therapy and use of equipment as required.

Relevant national and international guidance documents:

Fletcher, J., Borthwick, Y., Brown, L. et al. The impact of obesity of lymphoedema. Wounds UK. 2025.

International Lymphoedema Framework: Best Practice Management of Lymphoedema

All-Ireland Lymphoedema Guidelines for the Diagnosis, Assessment and Management of Lymphoedema 2022

British Lymphology Society Manual Lymphatic Drainage Position Document

References:

- Davies LM, Koelmeyer L, Gaitatzis K, Paramanandam VS, Thompson B. Reaching consensus on exercise recommendations for individuals living with lower limb lymphoedema: a Delphi study. Disability and Rehabilitation. 2025 Oct 25:1-9.
- Fletcher J, Borthwick Y, Brown L et al. The impact of obesity of lymphoedema. 2025. Wounds UK
- Grada AA, Phillips TJ. Lymphedema: Pathophysiology and clinical manifestations. Journal of the American Academy of Dermatology. 2017 Dec 1;77(6):1009-20.
- Greene AK, Sudduth CL. 2020b. Lower extremity lymphatic function predicted by body mass index: a lymphoscintigraphic study of obesity and lipedema. Int J Obes (Lond) 45: 369–373. 10.1038/s41366-020-00681-6.
- Lymphoedema Framework. Best Practice for the Management of Lymphoedema. International consensus. London: MEP Ltd, 2006
- Rankin J, Morris K, Reilly A. The All-Ireland Guidelines for the diagnosis, assessment and management of lymphoedema. 2022. Available online: http://www.hse.ie/lymphoedema
- Sudduth CL, Greene AK. Current overview of obesity-induced lymphedema. Advances in wound care. 2022;11(7):392-8.
- Sudduth CL, Greene AK. Lymphedema and obesity. Cold Spring Harbor Perspectives in Medicine. 2022.;12(5):a041176.

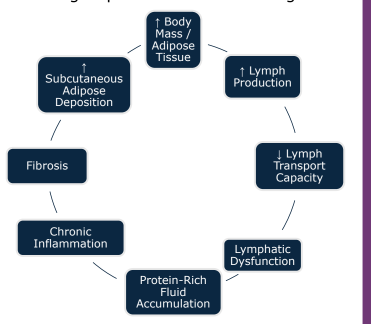
Pathophysiology of obesity induced lymphoedema (OIL)

Obesity and lymphoedema have a reciprocal relationship.

Obesity	Lymphoedema
• Increases the risk and morbidity of lymphoedema	• results in subcutaneous adipose deposition that contributes to obesity.

OIL develops when lymphatic load exceeds lymphatic transport capacity.

1. Excess subcutaneous adipose tissue increases tissue volume, mechanical load and metabolic inflammation, particularly in the lower limbs
2. Greater adipose tissue produces more interstitial fluid and lymph, increasing the volume that must be transported by the lymphatic system.
3. At the same time, obesity reduces lymphatic clearance due to
   - impaired lymphatic vessel function
   - reduced muscle pump activity
   - increased mechanical pressure on lymphatic vessels
4. When lymphatic load exceeds transport capacity, protein-rich lymph accumulates in the interstitial tissues, leading to persistent limb swelling.


↑ Body Mass / Adipose Tissue
↑ Lymph Production
↓ Lymph Transport Capacity
Lymphatic Dysfunction
Protein-Rich Fluid Accumulation
Chronic Inflammation
Fibrosis
↑ Subcutaneous Adipose Deposition

5. Accumulated proteins act as inflammatory stimuli, attracting immune cells and causing persistent, low-grade inflammation. Excess adipose tissue further contributes by releasing pro-inflammatory cytokines.
6. Chronic inflammation activates fibroblasts, leading to excess collagen deposition in the skin and subcutaneous tissues. This results in fibrosis, causing tissue thickening, stiffness and reduced elasticity.
7. Fibrotic tissue compresses and restricts lymphatic vessels, reduces lymphatic pumping efficiency and limits the effectiveness of muscle contraction and external compression.

Note: Reduced ambulation and muscle contraction, which may impact adults living with greater severities of obesity, will further limit lymph flow.

Management of lymphoedema

The management of lymphoedema aims to reduce oedema, maintain skin integrity and optimise movement and function.

Best-practice lymphoedema management is holistic and **multidisciplinary (MDT),** incorporating (but not limited to):

- Exercise and movement
- Compression and/or lymphatic massage
- Skin care
- Risk reduction to minimise exacerbation

MDT management

Compression therapy:

- Reduces limb volume, improve venous and lymphatic return, prevent re-accumulation
- Type of compression therapy used will depend upon severity of lymphoedema, where in the body it affects and the stage of the treatment:
  - Multi-layer bandaging
  - Compression garments
- Must be individualised and reassessed regularly to ensure swelling is not worsening and skin integrity is maintained

Physiotherapy management

Exercise/physical activity:

- Enhances lymphatic and venous flow
- In the absence of OIL specific guidance, general lymphoedema guidance recommend a combination of resistance (RE) and aerobic exercise (AE):
  - AE= 3-7 sessions x 5-40 minutes in duration (≥150 minutes total), moderate intensity
  - RE= 2-4 sessions x 20-30 minutes in duration, minimum 2x8-15 reps at ≥1 rep max
- Advise those beginning any activity programme to start slowly and gradually build up repetitions and intensity.
- Advise that the swelling may appear worse for a short while after an activity but that this exercise induced swelling it should resolve/ return to baseline. If it does not, then advise patient to reduce or stop the activity and seek guidance from their therapist.
- Compression garments to be worn during exercise
- However, if compression garments are a barrier to performing exercise, person can closely monitor their response while they trial wearing sports compression or trial exercise without a garment. Swelling should resolve quickly after exercise.

Note: compression garments are not required for water-based activities

Patient education:

- Advise patient regarding the importance of skin care:
  - Daily skin inspection and hygiene
  - Regular moisturising to prevent cracks
  - Prompt management of wounds, fungal infections and cellulitis
  - Advice on risk reduction (cuts, bites, burns)
- Provide training on simple lymphatic drainage (SLD), a simplified self-administered version of manual lymphatic drainage that patients/carers can apply themselves
- Advise re pain management
- Reinforce self-management and infection prevention

Manual lymphatic drainage (MLD):

- Physiotherapists may also provide MLD to help support swelling reduction in some adults with OIL.
- MLD on its own is not sufficient treatment for lymphoedema; it should be combined with exercise and compression therapy to support and maintain its effects.
- However, where compression is difficult or is not well tolerated (e.g. lymphoedema of the head, neck, trunk, breast and genitalia) MLD may be the only realistic option.
- MLD, if indicated, should be provided between 2-5 sessions per week and until symptoms have plateaued and agreed goals have been reached.
- Contraindications to MLD include acute cellulitis, active lymphangitis, active erysipelas, acute inflammation, untreated/unstable heart failure, acute deep vein thrombosis and superior vena cava obstruction.