

Role of Textiles in the Treatment of Rheumatoid Arthritis



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Abbreviations: RA: Rheumatoid Arthritis; Ge: Germanium; Zirconium; FIR: Far-Infrared

Introduction

Functional textiles are increasingly playing a supportive role in the management of rheumatoid arthritis (RA) symptoms, focusing on pain relief, improved joint function, and enhanced quality of life. These advanced materials, including smart garments and compression items, often utilize specialized elements to provide therapeutic benefits, such as, Far-Infrared (FIR) emission and controlled compression.

Key Therapeutic Roles of Textiles in RA Treatment

Pain and Stiffness Reduction: Functional textile socks, especially those embedded with germanium (Ge) and zirconium (Zr), have demonstrated significant reductions in foot and ankle joint pain and stiffness in patients with RA and Psoriatic Arthritis.

Thermal and Compression Therapy: Arthritis gloves (e.g., nylon/spandex) and thermal apparel provide warmth and compression, which help reduce joint stiffness, improve blood flow, and alleviate pain by removing extracellular fluid from inflamed joints.

Advanced Drug Delivery & Smart Wearables: Research is developing e-textiles with conductive threads that deliver low-voltage pulses to affected joints, as well as smart textiles that can release drugs through molecular switches controlled by temperature, providing on-demand therapy.

Improved Mobility: Adaptive clothing designed for RA patients, featuring easier fasteners (Velcro, magnetic snaps) and modified, comfortable designs, helps overcome mobility restrictions and supports independent dressing.

Physical Function Improvement: Studies show that wearing functional apparel (such as compression garments) can enhance daily activity scores, improve range of motion and reduce functional limitations.

Commonly Used Materials and Technologies:

Germanium and Charcoal: Embedded in textiles for potential bioactivity, increased circulation, and potential cartilage regeneration support.

Compression Fabrics: Lycra or spandex-based garments to reduce swelling.

Functional Fibers: Materials with antimicrobial properties, such as silver-chitosan blends, for wound care.

While these textile solutions offer promising, non-invasive, and patient-friendly support, they are generally considered complementary to, not a replacement for conventional, pharmacological treatments

In 2026, textiles served both supportive aids and active therapeutic platforms in the management of rheumatoid arthritis (RA). While traditional textiles focus on comfort and ease of dressing, advanced “smart” and functional textiles are increasingly used to directly mitigate symptoms like pain, stiffness, and inflammation.

Active Therapeutic Textiles

Recent clinical research highlights textiles engineered with bioactive elements to improve patient outcomes:

Bio-functional Garments: Modern functional socks and sleeves embedded with elements like Germanium (Ge) and zirconium (Zr) have shown statistically significant reductions in joint pain and stiffness for RA patients. These materials may work by emitting far-infrared radiation when warmed by body heat, potentially enhancing blood circulation and accelerating metabolic waste removal from inflamed tissues.

Compression Therapy: Specialized “arthritis gloves” use elastane-based fabrics to apply therapeutic compression (typically 15 to 32 mmHg). This mechanism helps remove extracellular fluid to reduce swelling and pain, while the textile’s insulating properties provide warmth.

E-Textiles & Wearable Tech: Smart textiles now integrate conductive yarns and electrodes to deliver low-voltage electrical pulses (TENS) directly to affected joints for chronic pain management.

Adaptive Clothing for Mobility

RA-specific clothing designs prioritize “dressing ease” to accommodate limited dexterity and strength:

Fasteners: Replacement of standard buttons with Velcro, snap buttons, or magnetic closures to reduce hand strain.

Design Modifications: Features such as front-opening garments, larger armholes, elasticized waistlines, and side-seam

openings for pants help maintain independence in daily living.

Material Selection: Practitioners recommend quick-drying, breathable fabrics like silk, wool blends, or polyester rather than cotton, which holds moisture and can lead to joint chilling.

Smart Textiles for Monitoring

Advanced textile-based biosensors allow for non-invasive, real-time monitoring of RA biomarkers:

Inflammation Tracking: Wearable sensors can monitor skin temperature and pH levels to detect early signs of localized inflammation or “flares”.

Drug Delivery: Emerging research focuses on smart textiles with molecular switches that can release medication (like NSAIDs) through the fabric in response to external stimuli like temperature changes.

Occupational Risks (Textile Dust)

It is critical to note that while textiles are used for treatment, occupational exposure to textile dust (natural or synthetic fibers) is a known risk factor. Studies have found that women exposed to textile dust in manufacturing are nearly three times more likely to develop RA, likely due to inflammatory responses triggered in the lungs.



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