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QUESTION 1

DO LYCRA GARMENTS IMPROVE FUNCTION AND MOVEMENT IN CHILDREN WITH CEREBRAL PALSY?

The mother of a 5-year-old boy with athetoid cerebral palsy complains of difficulties putting his Lycra suit on each day. She is keen to know if it actually helps improve his function and movement.

STRUCTURED CLINICAL QUESTION

In children with cerebral palsy (population), do Lycra garments (intervention) improve function and posture (outcome)?

SEARCH STRATEGY

The search was performed in October 2009.

Primary sources

Medline, EMBASE and CINAHL were searched with the terms 'cerebral palsy' (as keyword and exploded MESH term) AND 'Lycra' (as keyword and exploded MESH term 'splints' and 'clothing' from search tree).

Limits were human, English language, age (0–18 years). Only papers from 1990 onwards were searched as Lycra splints/

suits were only developed in early 1990s.

Secondary sources

The Cochrane Library yielded no relevant results.

SEARCH OUTCOME

No systematic reviews were found; 66 papers were identified, but only eight were relevant to the research question. One paper was a descriptive study, cross-over and recipient trial, and one was a review article including two case studies. Five papers were case series and there was one case study.

COMMENTARY

Lycra splints and suits are made-to-measure garments designed for an individual child's needs. It is impossible to

generalise about suitability and specific designs of garments making individual assessment and prescription essential. The extent to which the garment covers the child depends on what is required and varies from a simple glove for the hand and wrist to a full body suit. The benefits of Lycra include it being flexible, breathable and non-invasive. Garments

Clinical bottom line

- ▶ Lycra garments are useful as they provide the child with improved proximal stability which enhances functional abilities (grade C).
- ▶ Lycra garments are expensive and can cause problems with a child's comfort and toileting (grade C).

Table 1 Do Lycra garments improve function and movement in children with cerebral palsy?

Citation	Patient group	Study type	Outcome	Key result	Comments
Blair <i>et al</i> ¹	24 Patients (15 months to 14 years) with cerebral palsy (7 spasticity, 5 athetosis, 7 dystonia, 4 ataxia, 1 hypotonia) and 8 controls (matched by age and ability). 8 patients given Lycra suits, for 8 h/day (4 weeks' wear, 3 weeks without, 6 weeks' wear)	Descriptive study, crossover trial and recipient-control study (level 2b)	1. Care giver questionnaire. 2. Video recordings. 3. Spirometry. 4. Grip strength	1. Improved postural stability for group ($p=0.035$) and individually ($p=0.003$) with Lycra suit from video. 2. No significant difference in muscle strength/respiratory capacity	Lack of validated assessment tools. Unclear randomisation. Observers not adequately blinded for video assessment
Edmondson <i>et al</i> ²	15 Patients (2–12 years) with cerebral palsy (2 hypotonia, 6 spastic/athetoid, 4 spastic/diplegia, 2 spastic quadriplegia, 1 hemiplegia with ataxia) wearing Lycra suits for 6 h/day for 12 months	Case series (level 4)	1. Improvement in gross/fine motor skills	1. Wearing Lycra suit improved function and posture. 2. Useful aid to other therapies	No standardised assessment tool used
Nicholson <i>et al</i> ³	12 Patients (2–17 years old) with cerebral palsy (7 spasticity, 4 athetoid, 1 ataxic). Wore individually tailored Lycra garments for 6 h/day for 6 weeks plus usual therapy	Case series (level 4)	1. Paediatric Evaluation of Disability Inventory (PEDI). 2. Parent/carer questionnaire. 3. Motion analysis of 5 selected children	1. 11 Children had positive change in one or more PEDI domain. 2. Statistically significant improvement in group score for self-help domain $p<0.01$. 3. Less significant improvement noted with care giver scores ($p<0.05$). 4. Practical difficulties of garments highlighted in questionnaire. Only 1 from the 12 wanted second garment	Small sample size with no control group. Only focused on upper limb. Heterogeneous group of children with cerebral palsy. 7 Families reported their child did not like the garment
Knox ⁴	8 Patients (3–13 years) with cerebral palsy (2 spastic quadriplegia, 2 spastic diplegia, 2 choreoathetosis, 2 dystonic quadriplegia subgroups). Wearing Lycra garment for more than 4 h for 4 weeks	Case series (level 4)	1. Gross Motor Function Measure (GMFM). 2. Quality of Upper Extremity Skills Test (QUEST). 3. Parent/child questionnaire Measured at baseline and 4 weeks	1. 4 Children withdrew owing to non-compliance ($n=3$) or wearing spinal orthosis ($n=1$). 2. Children who continued to wear garments showed benefits on standardised tests and questionnaire	Unable to carry out statistical analysis owing to small sample size. Lack of control group. Potential assessor bias as author was main assessor in every case except one. Lack of patient appropriate upper limb assessment tool
Rennie <i>et al</i> ⁵	8 Patients (5–11 years) (7 with cerebral palsy, 1 with Duchenne's muscular dystrophy). Predominant impairment: 5 spasticity, 1 athetosis, 1 hypotonia, 1 weakness. Wearing whole-body Lycra garments for at least 6 h/day for 6 weeks	Case series (level 4)	1. 3D Gait analysis. 2. PEDI. 3. Parental reports (lower limb) Measured at baseline and 6 weeks	1. 5/8 Children showed improved gait pattern. 2. No statistically significant improvement in PEDI scores. 3. 7/8 Parents would not use Lycra garment again because of practicalities	Small sample size. Only lower limb assessed. Heterogeneous sample group
Corn <i>et al</i> ⁶	4 Patients (8–16 years) with cerebral palsy (1 ataxic cerebral palsy, 3 spastic quadriplegia). 2 were new to wearing splints and 2 had worn splint for more than 12 months. Lycra splints for upper limb worn for up to 6.5 h/day	Case series (level 4)	1. Melbourne Assessment (upper limb). Assessed at baseline and intervention phase twice weekly. Data collection period ranged from 14 to 17 weeks	1. No change in quality of unilateral upper limb movement. 2. 1 Patient had a decrease in movement with long-term use	Within-patient trends were analysed. Study lacked large homogeneous group of subjects. Patients were required to participate in many assessments to ensure validity
Attard and Rithalia ⁷	2 Patients (6 and 9 years) with cerebral palsy (spastic, athetoid quadriplegia and hemiplegia). Review of Lycra body suit and glove	Literature review. Case study (level 4)	1. Patient/carer attitudes		No validated assessments used. Small patient numbers
Hylton and Allen ⁸	3 Patients (10 months to 12 years) with neuromotor deficits (spastic diplegia, quadriplegia and extensor posturing/poor postural control). Use of Lycra compression bracing	Case study (level 4)	1. Patient/carer attitudes. 2. Observational discussion	1. Reported improved walking, balance, proprioceptive awareness and ability to complete complex skills	No validated assessments used. Small patient numbers

can be reinforced if greater pressure is needed for particular muscles.⁷

No systematic reviews or randomised controlled trials of Lycra garments have been conducted. Most of the published papers in this field are case series with small patient numbers. The available studies suggest wearing Lycra garments helps to improve proximal stability and function in some children with cerebral palsy, but evidence is limited. Many of the studies include children with different types of cerebral palsy and do not use objective outcome measures such as Gross Motor Function Measure.⁹

It is important to consider the practical difficulties of wearing Lycra garments. They are tight fitting and difficult to get on and off. Children often complain of discomfort and they cause problems when bathing and toileting. Many of these problems could be overcome by improved design and considering toileting needs carefully.

The issue of cost cannot be ignored, with some garments costing over £1000 if extra boning is required and these garments need to be replaced as children grow. It is vital to consider the individual patient and carer attitudes to wearing Lycra splints and suits. Unless they can be made more functionally attractive they will only be used for children for whom the improvements in function outweigh the disadvantages of wearing the garment. At present, evidence suggests that this would include children with athetosis, ataxia and poor truncal tone.

Involvement of families in research and development could, via focus groups, address some of the functional issues of Lycra suits. With families, appropriate outcome measures for measuring success with Lycra suits could be developed. Randomised controlled trials with more homogeneous patient groups and adequate power to identify these outcomes are required. Cost-effectiveness also needs to be addressed. More research is needed before we can implement an evidence-based approach to using Lycra garments in the management of children with cerebral palsy.

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