Is massage useful in the management of diabetes: a systematic review
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Authors' objectives
To address the following four questions:

1. Can massage improve insulin absorption, e.g. by increasing serum insulin in type 1 diabetes or increasing tissue insulin sensitivity in type 2 diabetes?

2. Can massage help normalise blood glucose levels?

3. Can massage provide relief of symptoms associated with diabetic neuropathy?

4. What are the known adverse effects, contraindications, or precautions related to massage for people with diabetes.

Searching
MEDLINE was searched from 1966 to 2001. The search terms included 'massage', 'touch', 'chiropractic', 'Trager', 'Rolfing', 'craniosacral therapy', 'neuromuscular therapy', 'acupressure', 'Shiatsu' and 'manual lymphatic drainage' combined with the terms 'diabetes', 'blood glucose', 'diabetic neuropathy', 'hyperglycemia' and 'insulin'. The authors also searched EMBASE, PsycINFO, MANTIS, University of Maryland's CAMPAIN database, the Cochrane Controlled Trials Register, the Cochrane Complementary Medicine Field Trials Registry, the Bodywork Knowledge Base and the database of the Touch Research Institute. No language restrictions were applied.

Study selection
Study designs of evaluations included in the review
The authors did not specify any inclusion criteria relating to the study design.

Specific interventions included in the review
Trials that involved either the manual or mechanical administration of massage were included in the review. The included studies were of Swedish massage and acupressure; no studies pertaining to bodywork or chiropractic therapy were identified.

Participants included in the review
Patients with diabetes were included.

Outcomes assessed in the review
Studies that measured at least one relevant primary diabetes outcome or a potentially relevant secondary diabetes outcome were included in the review. Relevant primary diabetes outcomes were insulin absorption, blood glucose, haemoglobin (Hb) A1c, or symptoms related to diabetic neuropathy. Relevant secondary diabetes outcomes were the induction of relaxation response, anxiety level, quality of life, sense of well-being, depression, cortisol level, blood-pressure, or heart rate.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Data were extracted on the patient characteristics, intervention details and results.

Methods of synthesis
How were the studies combined?
A narrative synthesis of the results was undertaken.

How were differences between studies investigated?
Heterogeneity was not assessed.

Results of the review
The authors identified one study pertaining to the first question, three publications (two studies) and one unpublished study relating to the second question, one study for the third question and one report for the fourth question.

1. Can massage improve insulin absorption, e.g. by increasing serum insulin in type 1 diabetes or increasing tissue insulin sensitivity in type 2 diabetes?

In a study of 8 well-controlled patients with type 1 diabetes who massaged their insulin injection sites with an electric vibrator for 3 minutes at 15 minutes post-injection, the patients experienced higher insulin levels and lower serum glucose levels by 15 minutes after the start of massage, although the changes were not statistically significant. However, serum glucose levels were 8.3% lower (P<0.05) 30 minutes after massage, compared with the control day when participants did not massaged their injection sites. The difference in glucose levels was even more striking at 45 minutes post-massage: 76 mg/dL (+/- 6%) versus 89 mg/dL (+/- 4%) for the control day. After 3 to 6 months of massage, the mean HbA1 for these 8 patients and 18 others (who had been massaging their injections sites for 3 minutes at each meal) fell from 10.56% (+/- 1.73) to 8.55% (+/- 1.69). After 12 to 18 months, 8 patients had mean HbA1 levels of less than 8.2% (normal HbA1 level according to the laboratory assay used) and 18 patients had mean HbA1 levels of 8.41% (+/- 1.58); this improvement from baseline was significant (P<0.001).

2. Can massage help normalise blood glucose levels?

A single-group pre-test post-test study reported that after one month of parents administering nightly full-body massage to their children with diabetes (n=14), the children's glucose levels decreased from an average of 158 to 118 mg/dL. Both the parents' and children's anxiety and depression levels decreased immediately after massage. However, the primary study authors did not state how the outcomes were measured. In another single-group pre-test post-test study, the clinical staff were trained to administer 15-minute sessions of breathing instruction, light touch and acupressure to 12 diabetic patients for 6 consecutive weeks. The patients experienced a reduction in blood glucose, anxiety, headaches, depression, work stress and anger. Self-reports also indicated that patients were sleeping better and had improved relations with their families. Statistical significance was not evaluated and the primary study authors did not state how or when the outcomes were measured.

There were unpublished preliminary data from a small randomised controlled trial that compared people with type 2 diabetes receiving 45 minutes' full-body massage three times a week for 12 weeks (n=6) to similar patients on a waiting list for massage (n=2). HbA1c decreased in 3 of the 6 patients receiving massage, from a baseline of 7.9, 8.3 and 9.8% to 7.3, 8.1 and 8.6%, respectively; in the other 3 patients it increased from 7.4, 8.2 and 8.0% to 7.9, 10.0 and 8.5%, respectively. However, the characteristics of the patients whose HbA1c increased were different from those whose HbA1c decreased. In the waiting list control group, the HbA1c level also declined from 7.3 and 8.6% to 6.9 and 8.4%, respectively.

3. Can massage provide relief of symptoms associated with diabetic neuropathy?

A single-group pre-test post-test study assessed 25 patients with symmetrical diabetic neuropathy of the lower extremities, whose duration of symptoms averaged 14 months. All of the patients received syncardial massage, a mechanical leg massage, every 2 days with the total number of treatments ranging from 10 to 30. After one month, 56% cases reported a good response, 32% reported an improvement in symptoms and 12% reported no effect.
4. What are the known adverse effects, contraindications, or precautions related to massage for people with diabetes?

The authors stated that none of the studies of massage and diabetes reported adverse effects. However, they stated that in the study of massage for diabetic neuropathy, contraindications and precautions for people with diabetes were cited.

**Authors' conclusions**

Massage at an insulin injection site can significantly increase serum insulin action, thereby decreasing blood glucose levels in people with type 1 diabetes. It is not known whether massage can improve insulin sensitivity and, therefore, be a useful adjunct to the management of diabetes for those with type 2 diabetes. Uncontrolled studies suggested that massage may help normalise blood glucose and symptoms of diabetic neuropathy. Randomised, placebo-controlled studies are needed to further clarify what an optimal massage treatment might be, and to elucidate any short- and long-term benefits of massage as a complementary treatment for diabetes.

**CRD commentary**

The authors specified their research questions clearly and inclusion criteria were defined for the participants, interventions and outcomes. A search of several relevant electronic databases was performed. The primary studies were not assessed for validity and were very small, with some studies failing to report important details such as how the outcomes were measured. Details of the study selection and data extraction processes were not provided. The narrative synthesis was appropriate given the small number of studies identified and the differences in study characteristics. The authors' conclusions should be interpreted with caution, owing to the small number of studies identified and the potential for bias within the primary studies.

**Implications of the review for practice and research**

Practice: The authors stated that there is little to suggest that massage may be harmful or contraindicated for people with diabetes. However, common sense can prevent potential problems. The authors also recommended that clinicians wanting to refer people with diabetes for massage should keep three things in mind:

- clinicians should provide guidance to insulin- or sulfonylurea-treated patients;
- clinicians may wish to suggest a practitioner who is trained in Swedish massage;
- a massage therapist holding a national certification from the National Certification Board of Therapeutic Massage and Bodywork or the American Massage Therapy Association would be preferred.

Research: The authors recommended the examination of whether massage can be used in type 1 diabetes to reduce and stabilise blood glucose, and whether massage can augment tissue insulin sensitivity similar to exercise in people with type 2 diabetes so that endogenous insulin can be used more efficiently. They also recommended that potential mechanisms of action should be explored and an optimal massage protocol established. The authors proposed further, potential research questions related to specific characteristics of massage, and stated that research into the use of massage for diabetic neuropathy is needed.

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