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Cochrane Database of Systematic Reviews 1996, Issue 1. Art. No.: CD000079.

DOI: [10.1002/14651858.CD000079](https://doi.org/10.1002/14651858.CD000079).

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[Intervention Review]

Transcutaneous electrostimulation for suspected placental insufficiency (diagnosed by Doppler studies)

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Editorial group: Cochrane Pregnancy and Childbirth Group

Publication status and date: New search for studies and content updated (no change to conclusions), published in Issue 1, 2010.

Citation: Say L, Gülmezoglu AM, Hofmeyr GJ. Transcutaneous electrostimulation for suspected placental insufficiency (diagnosed by Doppler studies). *Cochrane Database of Systematic Reviews* 1996, Issue 1. Art. No.: CD000079. DOI: [10.1002/14651858.CD000079](https://doi.org/10.1002/14651858.CD000079).

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ABSTRACT

Background

Transcutaneous electrostimulation is thought to be able to improve blood flow and so it has been suggested that it may help to promote fetal growth.

Objectives

The objective was to assess the effects of transcutaneous electrostimulation in suspected placental insufficiency on the promotion of fetal growth.

Search methods

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (June 2009).

Selection criteria

Acceptably controlled trials of transcutaneous electrostimulation compared with placebo or no treatment in women with suspected impaired fetal growth or placental insufficiency.

Data collection and analysis

Trial quality was assessed.

Main results

No studies were included.

Authors' conclusions

There is not enough evidence to evaluate the use of transcutaneous electrostimulation in the management of women with suspected placental insufficiency.

PLAIN LANGUAGE SUMMARY

Transcutaneous electrostimulation for suspected placental insufficiency (diagnosed by Doppler studies)

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No evidence to show whether blood flow through the placenta is improved in pregnant women who have transcutaneous electrical nerve stimulation (TENS) therapy for suspected placental insufficiency.

Babies who do not get enough nutrients and oxygen from their mothers may compensate this situation with some changes in the blood vessels which may lead to placental insufficiency. Doppler ultrasound uses sound waves to detect the movement of blood between the uterus, placenta and baby during pregnancy. TENS is a therapeutic non-invasive therapy that provides electrical stimulation via electrodes placed onto the skin. For women who have suspected placental insufficiency diagnosed by Doppler ultrasound, the review has found no evidence to show whether TENS therapy improves blood flow between the uterus, placenta and the baby.

BACKGROUND

Impaired fetal growth is the failure of a newborn to achieve its genetically determined growth potential, which may cause death as well as short or long-term childhood morbidity. It has been reported that 3% to 10% of neonates are small for corresponding gestational age and an estimated 30% of this is due to impaired fetal growth. Remaining 70% is due to constitutional factors such as maternal ethnicity, parity, weight and height (Lin 1998). The condition occurs with limited flow of nutrients or oxygen, or both, from mother to fetus as a result of fetal (e.g. chromosomal abnormalities, congenital malformations), placental factors (e.g. small placenta), or maternal factors (e.g. malnutrition, vascular/renal disease, drugs or other metabolic conditions) (Resnik 2002).

Ultrasound evaluation of the fetus by measuring the abdominal circumference, head circumference, length of upper leg and interpreting these using standardised formulae allows the clinician to estimate the fetal weight, to relate this to the gestational age and to follow the growth progress. Ultrasound evaluation also allows to some extent to estimate the timing and the cause of the impairment. Symmetrical growth of the fetus is generally due to early problems such as chromosomal abnormalities, drugs, chemical agents or infection. Asymmetric growth usually results from inadequacy of substrates the fetus needs particularly later in pregnancy (Resnik 2002). In low-income settings where early pregnancy ultrasound is not available fetal growth can be monitored by serial symphysis fundus measurements. However, there is no proven effective treatment that can be applied once growth impairment is diagnosed. In general, when no apparent congenital abnormality exists, management is conservative by frequent growth measurements, smoking cessation if the mother smokes and early delivery when the fetus is thought be mature enough to survive outside the womb.

The outcomes of impaired growth are variable and usually related to the specific cause. For example, if the growth impairment is due to chromosomal anomalies or congenital abnormalities, the fetus is more at risk of a perinatal death. Other short-term outcomes may be moderate to mild metabolic problems (hypoglycemia, polycythemia, meconium aspiration, etc.) due to the chronic oxygen and nutrient deprivation. Depending on the severity and the duration of the condition, long-term outcomes may differ from normal to small decreases in IQ to an increased risk of cerebral palsy (Bernstein 2000).

Restricted flow of maternal oxygen and nutrient supplies to the fetus is associated with an adaptation mechanism of decreased fetal growth, redistributed blood vessels in favour of vital organs and increased placental vascular resistance (Lin 1998). These changes in fetal blood vessels can be detected by Doppler ultrasound techniques and are suggestive of poor fetal condition. In contrast, normal blood flow shown by Doppler is rarely associated with significant morbidity and likely indicative of a constitutionally small fetus (Resnik 2002).

Transcutaneous electrostimulation has been widely researched for its role in pain control and is also thought to improve blood flow by an effect on autonomic control of vascular contractility. It has therefore been suggested that it could improve blood flow to the fetus in cases in which an increased resistance to flow is detected by Doppler techniques.

OBJECTIVES

To assess the effects of transcutaneous electrostimulation for suspected placental insufficiency (diagnosed by Doppler studies).

METHODS

Criteria for considering studies for this review

Types of studies

All acceptably controlled evaluations of transcutaneous electrostimulation for suspected placental insufficiency.

Types of participants

Women with suspected impaired fetal growth or placental insufficiency.

Types of interventions

Transcutaneous electrostimulation, compared with dummy treatment or no treatment.

Types of outcome measures

Fetal growth, perinatal mortality, neonatal morbidity, adverse effects.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register by contacting the Trials Search Co-ordinator (June 2009).

The Cochrane Pregnancy and Childbirth Group's Trials Register is maintained by the Trials Search Co-ordinator and contains trials identified from:

1. quarterly searches of the Cochrane Central Register of Controlled Trials (CENTRAL);
2. weekly searches of MEDLINE;
3. handsearches of 30 journals and the proceedings of major conferences;
4. weekly current awareness alerts for a further 44 journals plus monthly BioMed Central email alerts.

Details of the search strategies for CENTRAL and MEDLINE, the list of handsearched journals and conference proceedings, and the list of journals reviewed via the current awareness service can be found in the 'Specialized Register' section within the editorial information about the [Cochrane Pregnancy and Childbirth Group](#).

Trials identified through the searching activities described above are each assigned to a review topic (or topics). The Trials Search Co-ordinator searches the register for each review using the topic list rather than keywords.

We did not apply any language restrictions.

Data collection and analysis

Trials under consideration are evaluated for methodological quality and appropriateness for inclusion, without consideration of their results. Included trial data are processed as described in [Clarke 2000](#).

RESULTS

Description of studies

One study is located, but not included in the review because the allocation was not random.

Risk of bias in included studies

Not applicable.

Effects of interventions

None.

DISCUSSION

See 'Conclusions'.

AUTHORS' CONCLUSIONS

Implications for practice

The value of transcutaneous electrostimulation for suspected placental insufficiency cannot be assessed on the basis of this trial (see '[Characteristics of excluded studies](#)').

Because of the possibility of selection bias resulting from the method of allocation used, the imbalance between the groups both in terms of numbers and pre-treatment Doppler categorisation and exclusion of a significant number of participants in the analysis (16/72), the results of this study should not be used to support the use of transcutaneous electrostimulation in routine practice.

Implications for research

Future trials of this method of therapy should employ rigorous randomization procedures.

ACKNOWLEDGEMENTS

None.

REFERENCES

References to studies excluded from this review

Enzelsberger 1991 {published data only}

Enzelsberger H, Skodler WD, Kubista E. Optimisation of Doppler sonographic findings after transcutaneous electrostimulation in women with placental insufficiency. *Zeitschrift fur Geburtshilfe und Perinatologie* 1991;**195**:172-5.

Enzelsberger 1993 {published data only}

Enzelsberger H, Skodler WD, Kubista E. On the influence of transcutaneous nerve stimulation (TNS) on sonographic parameters in women with placental insufficiency. Proceedings of 2nd World Congress of Perinatal Medicine; 1993 Sept 19-24; Rome, Italy. 1993:454.

Additional references

Bernstein 2000

Bernstein IM, Horbar JD, Badger GJ, Ohlsson A, Golan A. Morbidity and mortality among very low birth weight infants

with intrauterine growth restriction. The Vermont Oxford Network. *American Journal of Obstetrics and Gynecology* 2000;**182**:198.

Clarke 2000

Clarke M, Oxman AD, editors. Cochrane Reviewers' Handbook 4.1 [updated June 2000]. In: Review Manager (RevMan) [Computer program]. Version 4.1. Oxford, England: The Cochrane Collaboration, 2000.

Lin 1998

Lin C, Santolaya-Forgas J. Current concepts of fetal growth restriction: Part 1. Causes, classification, and pathophysiology. *Obstetrics & Gynecology* 1998;**92**:1044-55.

Resnik 2002

Resnik R. Intrauterine growth restriction. *Obstetrics & Gynecology* 2002;**99**(3):490-6.

CHARACTERISTICS OF STUDIES

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Enzelsberger 1991	<p>(1) Method of allocation quasi-random (odd-even calendar dates).</p> <p>(2) Out of 72 participants, 56 had full details at the time of discharge so the data are given for these 56 participants (16 participants excluded).</p> <p>(3) Data available are in unsuitable form for analysis.</p> <p>The ratio of type 1 (mean + 1 SD): type 2 (mean + 2 SD): type 3 (mean + 3 SD) Doppler A/B ratios in the study group improved after therapy for both the umbilical artery measurements (16:11:6 versus 2:18:13 before therapy) and the fetal aorta measurements (20:10:3 versus 14:14:5). The study group had greater birthweights (2605 versus 2300 gm, $P < 0.05$) and placental weights (501.2 versus 389.5 gm, $P < 0.05$). There were no significant differences between the groups with respect to enrolment to delivery interval (3.9 versus 3.2 weeks), head circumferences (33.1 versus 32.2 cm), operative delivery (8/33 versus 6/23) or Apgar scores.</p>
Enzelsberger 1993	<p>This study, presented 2 years after the publication of a similar trial by the same authors is available only as a Congress Abstract and very few data are given. Furthermore, it appears as if it is a continuation of the published trial Enzelsberger 1991 with 10 more participants in each arm so the limitations of the previous trial are likely to be applicable here as well (see report for the Enzelsberger 1991 trial).</p>

SD: standard deviation

WHAT'S NEW

Date	Event	Description
24 June 2009	New search has been performed	Search updated. No new trials identified.

HISTORY

Protocol first published: Issue 1, 1995

Review first published: Issue 1, 1995

Date	Event	Description
20 September 2008	Amended	Converted to new review format.
24 November 2006	New search has been performed	Search updated but no new trials identified.
30 June 2004	New search has been performed	Search updated but no new trials identified.

CONTRIBUTIONS OF AUTHORS

Justus Hofmeyr wrote the original review for the Cochrane Pregnancy and Childbirth Database. Metin Gülmezoglu updated the review, and has been responsible for maintaining the review since 1995. Both review authors did the data extraction and contributed to the text of the review. Lale Say contributed to the recent update by checking the data entries and revising the text of the review.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- University of the Witwatersrand, South Africa.
- UK Cochrane Centre, NHS R&D Programme, Oxford, UK.
- HRP - UNDP/UNFPA/WHO/World Bank Special Programme in Human Reproduction, Geneva, Switzerland.

External sources

- No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)

*Electric Stimulation Therapy; Fetal Growth Retardation [therapy]; Placental Insufficiency [diagnostic imaging] [*therapy]; Ultrasonography, Doppler

MeSH check words

Female; Humans; Pregnancy