Interventions to improve diet and weight gain among pregnant adolescents and recommendations for future research


CRD summary
The authors concluded that educational interventions to improve gestational weight gain and diet quality among pregnant adolescents are feasible, have achieved modestly positive results and appear cost-effective, although better-designed research is needed. Despite limitations in the reporting of review methods and lack of a systematic account of study validity, these cautious conclusions appear likely to be reliable.

Authors' objectives
To assess the effectiveness of nutrition education interventions among pregnant adolescents.

Searching
The following databases were searched from 1980: MEDLINE, Social Sciences Citation Index and AGRICOLA. Search terms were reported. The reference lists of relevant articles were also searched.

Study selection
Studies of prenatal interventions that included nutrition education, in which at least some of the participants were adolescents, were eligible for the review. Interventions in the review included enhanced: prenatal care (PNC) comprising one-to-one nutrition/psychosocial risk assessment and counselling; PNC with nutrition health education (often included within wider health education); PNC with home visits with a nutrition focus; and nutritional prescriptions for increased intake of nutrients. Control participants, where reported, received usual care. Studies of the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) or of supplementation (as sole interventions) were excluded.

Studies of any design were eligible for inclusion. The review included randomised and non-randomised controlled trials, uncontrolled trials, observational studies and a qualitative study. Twenty-five studies were conducted in the USA, one in Canada and one in Scotland.

Several studies in the review included both adults and adolescents. The upper age limit for adolescents was defined as 17 to 20 years in most studies. The intervention usually commenced at the first prenatal visit, which (where stated) was at a mean of 15 to 21 weeks' gestation. The intensity of the intervention varied widely but generally comprised about six to nine sessions/visits, where stated. There were no specific inclusion criteria for outcomes. Outcomes reported in the review included mean birth weight, low birth weight (LBW), small size for gestational age (small size), gestational weight gain, dietary changes, nutrition knowledge and cost-effectiveness.

The authors did not state how the papers were selected for the review or how many reviewers performed the selection.

Assessment of study quality
No systematic assessment of study validity was reported, but the authors commented in the text and tables on aspects of validity in individual studies. These comments included the use of an explicit theoretical framework, study design, suitability of controls, sample size, use of power calculation, potential for selection bias, control of confounding, quality of reporting of intervention content and retention rate.

Data extraction
For controlled studies the authors reported statistically significant differences in specific outcomes between groups. For small studies, or where there was no control group, it is unclear whether the authors included all results reported by the primary studies.

The authors did not state how the data were extracted for the review or how many reviewers performed the data.
Methods of synthesis
The studies were combined in a narrative synthesis. The findings were grouped by study design, sample size and by the type of intervention. Heterogeneity between the studies was discussed in the text.

Results of the review
Twenty-seven studies were included (n>108,732). Nineteen were large controlled trials: four randomised controlled trials (RCTs, n=2,209) and 15 non-randomised controlled clinical trials (CCTs), eight of which were prospective (n>7727) and seven retrospective (n=97,468). Most used historical or matched controls. The other eight studies were very small and/or uncontrolled, and comprised one RCT (n=20), one quasi-RCT (n=46), two CCTs (n=177), three observational studies (n=1,059) and one qualitative study (n=26). Only two of the included studies referred to a theoretical framework for the intervention and few conducted formative research. Most studies failed to report participant exposure to the nutritional component of the intervention, did not describe the intervention in detail and/or did not control for confounders. None rigorously assessed the independent influence of nutrition education on dietary outcomes (e.g. changes in dietary behaviour) as opposed to distal outcomes such as birth weight.

Results of large controlled trials (19 trials):
A statistically significant improvement in the intervention group, compared to controls, was found in six (of 12) trials measuring mean birth weight; nine (of 16) trials measuring LBW/small size; two (of nine) trials measuring gestational weight gain; and all studies measuring changes in dietary intake (four trials) and prenatal health knowledge (three trials). No other statistically significant differences were found between the groups for the outcomes reported.

Results of large controlled trials, by intervention model:
A statistically significant improvement in the intervention group compared to controls, was found for one or more outcomes in three (of seven) trials utilising enhanced PNC; seven (of eight) trials utilising PNC plus nutrition health education; all three trials utilising PNC with home visits; and both the trials that utilised nutrition prescriptions. No other statistically significant differences were found between the groups for the outcomes reported.

Results of small and/or uncontrolled studies (8 studies):
A statistically significant improvement associated with the intervention (which in all these eight studies was nutrition health education) was reported in one (of five) studies measuring changes in dietary intake and in both studies measuring nutrition knowledge. Studies measuring gestational weight gain (six studies) and excessive gestational weight gain (one study) reported no significant effect associated with the intervention.

Cost information
A cross-sectional CCT (n=1233) of prenatal health education counselling (including nutrition counselling) reported estimated savings on neonatal intensive care of $890,000 over four years. A retrospective record review (n=200) of prenatal nutrition counselling measured programme costs versus savings in infant care and reported a cost:benefit ratio of 1:5.

Authors’ conclusions
Nutritional education interventions to improve gestational weight gain and diet quality among pregnant adolescents are feasible, have achieved modestly positive results and appear to be cost-effective. However, better-designed research is needed.

CRD commentary
The review question and inclusion criteria were clear, though no inclusion criteria for outcomes were specified. The search was adequate, except that it did not appear that an attempt was made to locate unpublished studies. It was not stated whether any language restrictions were applied. It was unclear whether steps were taken to minimise error and bias in study selection and data extraction by having more than one reviewer make decisions independently. Moreover no systematic assessment of study validity was reported. However, the authors gave precedence to the more robustly designed studies and highlighted important aspects of study validity in the text and tables. Given the heterogeneity between studies, the choice of a narrative synthesis rather than statistical pooling was appropriate. Despite limitations in
the reporting of review methods and lack of a systematic account of study validity, the authors’ cautious conclusions appear likely to be reliable.

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

Practice: The authors stated that preventive health initiatives to improve diet and weight gain among pregnant adolescents are likely to be cost-effective in terms of reduced short and long term health complications for mother and child.

Research: The authors stated that well-designed controlled studies are needed in this field. Study objectives and interventions should be based on relevant theoretical frameworks and should test programmes found effective with other adolescent or pregnant populations. Detailed recommendations for research are presented in the review.

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