REVIEW ARTICLE

A Systematic Review on Methods Used in Health Education Intervention on Anaemia in Pregnancy

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ABSTRACT

Anaemia is a common health problem during pregnancy, which leads to adverse health consequences to both mothers and infants. Health education is an important strategy in preventing anaemia. It's success to improve haemoglobin level depends on the methods and design. This review aimed to identify the methods used and the effectiveness of health education intervention in improving anaemia in pregnancy. A systematic review of studies published in MEDLINE, CINAHL, Science Direct and PubMed from January 2010 to April 2017 was conducted using various keywords. Initial search revealed 274 articles, which later reduced to eight after being screened for inclusion criteria that consist of intervention study and involving pregnant women as participants. Health education intervention program with various delivery methods were proven to significantly reduce the prevalence of anaemia in pregnancy. Group discussion, health talk, poster presentation and educational pamphlet were common methods used in health education intervention.

Keywords: Health education, Anaemia, Pregnant women, Systematic review

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INTRODUCTION

Anaemia is one of the most common health problems during pregnancy especially in the developing country; globally the prevalence of anaemia for pregnant women was 38.2% (1). Untreated anaemia may lead to significant adverse health consequences to mothers and infants including maternal and neonatal mortality and has adverse impacts on social and economic development (1). Anaemia is defined by the World Health Organization as haemoglobin levels of less than 11 g/dl (2). Anaemia results from a number of causes, with the most significant contributor being iron deficiency (1). Generally, anaemia in pregnancy was managed by giving iron supplementation. In addition, health education and counselling during pregnancy are important strategies in preventing anaemia (3).

Health education is a very important factor in preventing illness (4). A successful health education program depends on the design, proper methods and the use of suitable theory. The implementation of the program should be able to improve the haemoglobin level and dietary practice of the mother (5). There are various health education methods used among anaemic pregnant women and these methods have their own advantages and limitation. Therefore, this systematic review is significant to justify the effective methods that can be used in the intervention program.

This systematic review aimed to assess the effectiveness of the health education intervention methods on women with anaemia in pregnancy, which are able to improve the haemoglobin level or dietary practice of the pregnant women. The effectiveness of the methods was determined by improvement of the outcome measures of the intervention. These measures can be in the form of haemoglobin level or their dietary practice.

MATERIALS AND METHODS

A search of all published articles was conducted in four electronic database: EBSCOhost medical collections (MEDLINE, CINAHL), Science Direct and PubMed. The Medical Subject Headings (MeSH) and the title/abstract terms were used to generate the results. A combination of AND/OR operators were used in the search. The terms which were used alone or in combination include the following: terms related to education - "health education", "nutritional education", "health programme" and terms related to anaemia in pregnancy - "low haemoglobin level" and "anaemia in pregnant women". The search was limited to full text research articles written in the English language and published from 2010 until present. The selected articles must only include those published in the journals of nutrition,

healthcare, including medical and nursing journals.
The inclusion criteria for selecting the research articles include:
Types of study
- Intervention studies including randomised control trials and non-randomised controlled studies.
- Health education programmes that mention education methods in their articles.
Types of participants
- Pregnant women.
Type of outcome measures
- Haemoglobin level or dietary practice of pregnant women.
The exclusion criteria for the reviews include:
- Studies that involved other designs such as qualitative, non-experimental, protocol, systematic review, meta-analysis, case reports.
- Studies related to clinical, trial or pharmacological treatments.

The flowchart of the systematic literature search is illustrated in Figure 1. The search was performed according to the Preferred Reporting Item for Systematic Reviews (PRISMA) guidelines published in 2009 (6). The database search was able to identify 304 published articles. Out of these, 30 were removed due to duplicate records. A total of 274 studies titles and abstract provided the basis for the initial decision and selection of articles, and among these, 257 records were excluded due to multiple reasons. The total full text articles that remained suitable for the systematic review amounted to 17. These articles were further screened for eligibility using the inclusion and exclusion criteria. Out of these 17, another 10 full text articles were excluded with reasons; non-intervention studies (3 articles), different types of outcome measures (4 articles) and did not involve pregnant women (3 articles). Following this, one additional publication was identified from the list of references published in the original papers. Hence, altogether, there were eight journal articles retrieved for the final analysis. These articles were then reviewed based on a set of important variables: methods of interventions (e.g teaching methods, time interval of intervention, assessment time), study designs, outcome measures, and results (Table I).

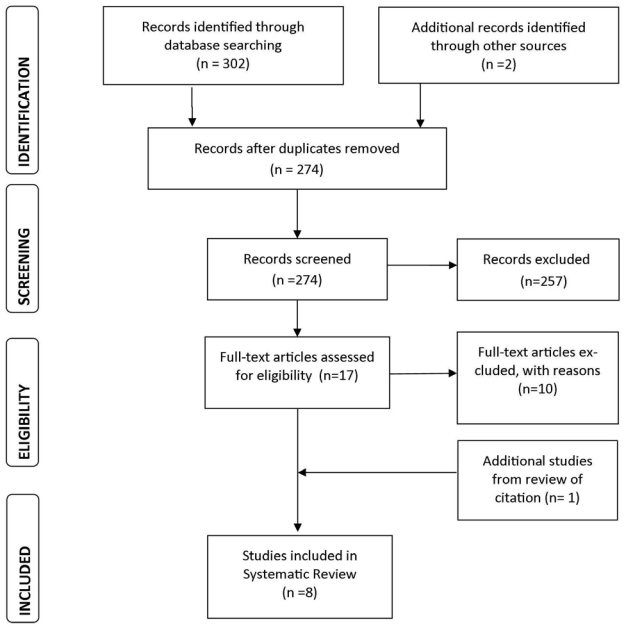

Figure 1: Flowchart of literature search

RESULTS AND DISCUSSION

General description of the selected articles

Eight articles were identified and assessed in final stage, and are summarized and presented in Table I.

All of the published articles reviewed were from 2010 to 2016. The studies were conducted in seven countries, of which, all of them were involving developing countries. Two studies were conducted in Iran (5,7), one in India (8), one in Palestin (9), one study in Indonesia (10), one study in Bangladesh (11), one in Saudi Arabia (12) and one in Sri Lanka (13). The respondents in all the eight articles comprised of pregnant women who have attended either primary health clinics or maternal clinics at university hospitals during their first and second trimester. The sample size of all studies ranged from 100 to 4436 participants.

All of the studies were intervention study, with two studies applying the randomized controlled trial design (5,11) while the others used the quasi experimental study design. Most of the studies attributed their justifications for using the quasi experimental study design to the usefulness of the experiment because they found difficulty to prevent contamination between the control and intervention study subject as their population were close to each other.

The reviews demonstrated that health education interventions can produce a positive effect on the anaemia preventive health behaviour change, and finally making an impact on their haemoglobin level. From eight articles, only four published articles had used the behavioural theory in their planned health education intervention. These four articles used the Health Belief Model theory (5, 7-9). The use of HBM has guided the researcher to provide holistic and comprehensive health education programmes. All the results gathered from these four studies showed that the health education intervention materials, based on the HBM, can deliver outcome measures effectively. The other four studies (10-13) did not use any theory in their interventions. Instead, Widyawati et al. (2015) used the four pillars approach which covers: a healthy lifestyle, social support, adequate midwifery treatment, and improved nurse-midwives professional attitude, as the strategy to enhance the prevalence of anaemia in pregnancy. These approaches not only catered to the respondents but also to the health care system.

Table I: Literature summary of the included studies

No	Author/ Year/ Country	Subject/ Study location/ Sample size	Theory (if any)	Study design	Health education Intervention Methods	Outcome measures	Result	Conclusion
1.	Norontha et al., 2013	Anaemic pregnant women (Hb <11g/ dl) from hospital in Udupi district, India involved 75 subjects in both intervention and control group	Health Belief Model (HBM)	Quasi experimental (pre-posttest with control group design)	Teaching Methods ; - Lecture, - group discussion and question answer session - Pamphlets Intervention delivered by the researcher Time ; 1-2 hour per session Assessment time ; Baseline (T1) and evaluation (T2) Time interval ; 3 month Interviewed questionnaires Control group : usual care	Haemoglobin (Hb) level Food selection ability	**Food selection ability (FSA)** Mean FSA in experimental group more than control group, *P*<0.001 **Haemoglobin (Hb) level** Mean gain Hb in intervention group was higher than control group, *P*<0.001	The intervention able to improved food selection ability and mean Hb level of intervention group
2.	Sennayake et al., 2010	Anaemic pregnant women attended antenatal clinic of University hospital in Sri Lanka that involved 107 subjects in the intervention group and 111 subjects in control groups.	No theory	Quasi experimental	Teaching method ; Detailed interactive educational session in small group. Intervention delivered by the researcher Time : not mention Assessment time ; Baseline (T1) and evaluation (T2) Time interval ; 4 month Self-administered questionnaires Control group : usual care	Haemoglobin (Hb) level	There were significant differences between the two groups at 34 weeks with a favourable outcome in the study group in the Hb level, (*P*<0.001)	The intervention improved the mean Hb level and efficacy of iron supplementation
3.	Khorramabadi et al., 2016	Anaemic pregnant women in University of Medical Sciences, Iran that involved 64 subjects both in the intervention and control groups.	Health Belief Model (HBM)	Randomized Control Trial	Teaching methods; - Group discussion with question and answer session, - Lecture, - Presentation of poster, - Photograph, - Training Pamphlet, Intervention delivered by researcher Time : 2 hour per session Number of session ; 2 Intervention period : not mention Assessment time ; Baseline (T1) and evaluation (T2) Time interval ; 4 month Self-administered questionnaires Control group :usual care	Dietary practice <u>Other outcome</u> Perception (HBM Construct)	**Within group** Mean dietary practice score pre and post intervention in intervention group were significant difference, (*P*<0.001) **Between group** Significant difference in mean dietary behaviour between intervention and control group, (*P*<0.001)	The intervention improved the dietary practice and perception towards anaemia in pregnancy.
4.	Mariam et al., 2010	Anaemic pregnant women in 4 Maternal clinics in Palestin that involved 51 subjects both in the intervention and control groups.	Health Belief Model (HBM)	Quasi experimental study design with control group.	Teaching Methods; - Booklet and - Group discussion. Intervention delivered by researcher Time : not mention Intervention period : 4 month Assessment time ; Baseline (T1) and evaluation (T2) Time interval ; 4 month Interviewed questionnaires Control group :Usual care	Dietary practice Haemoglobin level Other outcome Perception	**Relationship between women's perception regarding anaemia and their eating practice** Low level of perceiving risk and seriousness of anaemia and the low estimation of perceived susceptibility to anaemia and its complications is significantly associated with poor dietary practices as a preventive behaviour. **Relationship between changing dietary practices level of pregnant women and their haemoglobin level** There a significant difference in relationship between dietary practices and improving of haemoglobin level in the intervention group.	Theory based intervention was effective to improve the dietary practice of pregnant women after the intervention.

Continued

Table I: Literature summary of the included studies (*Continued)*

No	Author/ Year/ Country	Subject/ Study location/ Sample size	Theory (if any)	Study design	Health education Intervention Methods	Outcome measures	Result	Conclusion
5.	Widyawati et al., 2015	Anaemic pregnant women in primary health care in 2 provinces in Java that involved 360 respondents.	No theory	Non randomized controlled intervention	Four pillar approach includes; - Healthy lifestyle - Social support from husband/ family member - Adequate midwifery treatment - Improved nurse-midwives professional attitudes. Teaching methods : - Booklet, - Group discussion in class, - Lecture Intervention delivered by the doctor, midwives Time : not mention Assessment time ; Baseline and evaluation Time interval; 5 month Interviewed questionnaire Control group : usual care	Haemoglobin (Hb) level Other outcome Number Antenatal care visit Number of birth attended by skilled birth attendants	The Four Pillars Approach is effective in managing pregnant women with anaemia in public health centers. Participants in the intervention group had an adjusted odds ratio of 25 (95% CI=12.03, 52.03) for increase haemoglobin level of > 0.5g/dL at 35-37 weeks of gestation compared with the control groups.	The four pillar approach is effective increasing the Haemoglobin level
6..	Badawy et al., 2014	Subjects consisted of 100 anaemic pregnant womens in two hospitals; Maternity Hospital of King Saud Medical Complex and Yamamah Maternity Hospital in Riyadh, Saudi Arabia.	No theory	Intervention study	Teaching Methods ; ● Group discussion\ ● Food item demonstration ● Pamphlets Control group: not mention Interviewed questionnaires Intervention delivered by researcher Time : 30-45 minutes per session Intervention period : not mention Assessment time ; Baseline (T1) and evaluation (T2) Time interval; 2 month	Haemoglobin (Hb) level at delivery Dietary intake	There are significant increase in Hb level post intervention and improved dietary practice among intervention group.	The education intervention was able to increase the Hb level and dietary practice among the intervention group
7.	Persson et al., 2012	4436 pregnant womens in Matlab, Bangladesh	No theory	RandomizedControl Trial with the factorial design	Teaching methods; ● Lecture Intervention delivered by the researcher Time : 90 minute per session Assessment time ; Baseline (T1) and evaluation (T2) Time interval; 3 month Self-administered questionnaires	Haemoglobin (Hb) level	The was a significant difference in the mean maternal haemoglobin level between intervention and control (P=0.04).	The intervention able to improve Haemoglobin level in the intervention group.
8.	Baharzadeh et al., 2016	80 pregnant womens at Health Center of Shushtar, Iran	Health Belief Model (HBM)	Quasi experimental	Teaching Methods; ● Lecture ● Group discussion with question and answer ● Pamphlets Intervention delivered by the researcher Time : 60-90 minute per session Number of session =2 Intervention period ; 2 week Assessment time ; Baseline (T1) and evaluation (T2) Time interval; 3 month Self-administered questionnaires Control group : usual care	Dietary behaviour	The was a significant difference in dietary practice between intervention and control (P<0.001).	The intervention was associated with the improvement of nutritional behaviours regarding anaemia in pregnancy

Overview of the health education intervention

Seven studies used various methods of health education intervention: verbal (e.g. health talk/lecture, group discussion) and written (e.g. pamphlet, booklet and poster) (5, 7-12). Only one study used a single method of health education in the form of detailed interactive educational session in small groups (13). Evidence drawn from Khoramabadi et al. (2016) indicated that educational interventions based on the HBM using lectures, question and answer sessions, presentation of posters, training pamphlets and group discussions based on the health promotion patterns, were effective in enhancing the pregnant women's awareness. It has the potential to develop their understanding of the risks and reduce the barriers to practice healthy behaviours. Ultimately, this improved the pregnant women's health, and their nutritional performance during pregnancy. The health education in all these studies was delivered by healthcare personnel (e.g. nurse, nutritionist and/or physician).

The duration of verbal health education methods in the studies ranged between one to two hour per session. The shortest teaching duration was one hour (7) and four studies used more than one hour to deliver the health education (5, 8-9,12). However, two studies did not report the duration of teaching (10-11). For time of assessment, all of these studies were assessed twice, during baseline and next evaluation was conducted after health education intervention given. The time interval from the baseline to the study evaluation differs between the studies. Six studies reported their time interval as 4 month (5,9,13) and 3 month (7-8,11). The longest time interval documented in one study was 5 months (10) and shortest time of evaluation was two months (12). The time interval of studies depended on the study outcome; longer interval was reported when assessing behavioural change.

Four studies used self-administered and the other four studies used interviewed questionnaires to measure the outcome. Self-reported questionnaire are prone to validity issues, misclassification and less precise. The included studies also reported that the control groups received usual treatment and care in their respective clinics.

Regarding the outcome measure, three studies evaluated their effectiveness of health education intervention through the improvement of haemoglobin level (10-11,13). Three studies measured more than one outcome, using haemoglobin level as the primary outcome and dietary practice ans the secondary outcome (7-9). Two studies only measured dietary practice as their outcome (5,7). With regards to the effectiveness of the intervention, all included studies reported significant improvements in their outcome measures, thus concluding that their interventions were effective.

Types of health education intervention applied in previous studies

Various methods were used in the health education interventions reported by the eight studies. It can be further summarised that most of them had employed small group discussions (6 studies), pamphlet presentations (5 studies), health talks (3 studies), and poster presentations (1 study). In addition, other methods uncovered include food demonstration (1 study). These methods are further elaborated.

Group discussion

Most of the studies in this review (5, 7-9, 12-13) used this type of method for their health education intervention. Sennayake et al. (2010) was the only study had used small group discussions as their teaching method. The results showed a significant difference in the haemoglobin level between the control and intervention groups. Group discussion was able to provide a supportive and nurturing environment to participant and inducing behaviour modification. The question and answer sessions conducted in the small groups had also enabled the pregnant women's questions to be directed towards the person who has the answer, and this can convince them even more, hence it was more effective than just giving the pregnant mothers pamphlets or brochures to read. Through the small group discussions, both parties get a face to face interaction, hence the evaluation of common beliefs became a useful strategy for the health care providers (5). If the educator detected that the audience has incorrect beliefs, the educator has the means to instantly address that fallacy, thereby enabling the participants to overcome the problem immediately, with the provision of correct information (14).

Health talk / Lecture

The health talk was employed by three studies (5,7-8). All these studies had also mentioned that this method was less costly yet effective for delivering information and knowledge about anaemia to its targeted population. This method is used very commonly throughout the world and able to deliver information and reach fairly large number of people at the same time. The pregnant women, as participants, also had the opportunity to ask questions during the health talks.

Pamphlets and poster presentation

This method was the second most commonly used for the health education intervention, as noted in the review (5,7-9,12). These studies had used pamphlets and posters, in combination with the other methods of health education intervention. Presentation of posters and pamphlets make teaching interesting, continuous and receptive. Results of all these studies also showed that, combinations of these methods with others are effective to significantly improve the outcome of the study. Only one study by Norontha et al. (2016) engaged in the poster presentation as a method for

their health education intervention (8). Although this particular method is less popularly used on its own in the intervention, it is an effective method as a long term plan in highlighting the awareness of specific issues among the pregnant women. This is because pregnant women come regularly to the clinics for the antenatal check-up, hence their constant exposure will have some impact on their knowledge and understanding of the issue. In addition, posters are also visuals which can be placed in strategic places to attract the pregnant mothers' attention to read.

Strength and limitation

The strength of this systematic review include the large number of articles screened to get multiple studies with different effective methods that can be used as health education intervention methods among pregnant women. However, the limitation of this systematic review is that it only included articles in English language. This may have limited other relevant articles in other languages to be included in the review.

CONCLUSION

All health education interventions implemented by the various researchers showed improvement in their outcome measures where the haemoglobin level or dietary practice among the pregnant women had increased or improved. This review suggests that the health education intervention methods such as group discussion, health talk, question and answer session, poster presentation and educational pamphlet on adjusting dietary intake, were most commonly method used in health education intervention. It appears that continuously exposing the participants to these methods would be able to increase their understanding which then enables them to become compliant with the health needs and requirements, as proposed by the aim of the health education intervention programmes.

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