

Educational Interventions Relating to Breakfast Consumption among Students: A Systematic Review

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ABSTRACT

Implementing interventions in the field of breakfast consumption and subsequently evaluating them is an appropriate solution to promote healthy breakfast consumption and improve health status. The present study aims to systematically investigate the educational interventions in relation to breakfast consumption among students.

In this study, the SID, IRANMEDEX, IRANDOC, ISI Web of Science, PubMed, Scopus, and Google Scholar databases were systematically searched for the period from January 2000 to March 2018. The selection criteria for final articles include having as their topics education and intervention relating to breakfast consumption among pre-school and other school students as well as the availability of the full text of the articles.

In general, 3742 articles were identified, out of which 17 articles—containing educational intervention relating to breakfast consumption among the students—were selected after removing duplicate articles and articles that did not meet the inclusion criteria. However, 5451 students had participated in the 17 investigated articles. The main emphasis in these interventions was on increasing breakfast consumption and knowledge and changing attitudes towards breakfast and its benefits.

The use of theories and models for intervention increased the frequency of breakfast consumption among the students in all the reviewed studies. Accordingly, it seems necessary to design, implement, and assess more educational and interventional programs. More attention should be devoted to different theories and models of health education and promotion and to some lesser noteworthy factors, such as the role of schools, teachers, and parents in education, and modern communication technologies.

Keywords: Breakfast Consumption, Students, Educational Intervention, Theory-Based Intervention, Systematic Review

INTRODUCTION

It is obvious that nutrition plays an important role in health and development and in the treatment of disease (e.g. obesity, diabetes, cardiovascular conditions) [1]. Providing a nutritional diet could lead to savings in different health care costs and to productivity in investments in the education sector; ultimately, it could rear a better generation and guarantee the political and economic independence of any society [2]. A person who does not have adequate access to health and education today could become disabled, negative, and problematic in the future [3]. Normal growth and development during the school years can be achieved by providing proper nutrition and continuous health protection. This represents an effective health investment and ensures the students' health in the future [4].

Nutrition is a key factor in health and in ensuring the academic success of students [5]. Breakfast is the first meal consumed every day and sufficient nutrient

intake is necessary for both children and adolescents. Breakfast is of importance for good health and growth in children and adolescents, and it plays an important role in providing nutrition [6]. The growth of children and students depends on proper nutrition and appropriate food habits [7], and breakfast consumption helps students to improve their learning [8-10]. The main goal of students is education and learning about new sciences. To achieve this goal, a student should have a dynamic mind and sufficient concentration. Moreover, having a healthy and nutritious breakfast helps him/her to study with more energy during the day [11]. Students who eat breakfast regularly have better BMI and weight, as compared to those who do not eat breakfast [12].

Studies have demonstrated that most children and adolescents tend not to have breakfast and replace it with junk and fast food. This has become prevalent among students [13-15]. Consuming premade breakfasts prepared by working mothers [16],

repetitive and monotonous foods, fear of going to school, etc., easily destroy the students' enthusiasm and tendency to eat breakfast [17]. Since eating habits and behaviour are formed during childhood and at school, diseases that emerge in adulthood can be prevented by modifying such habits in the early years of life, especially in educational environments [18]. In this regard, one important way to fight and overcome nutritional problems and the lack of breakfast consumption among students is education—an education that is based on promoting students' knowledge, modifying their attitudes and beliefs, and finally correcting their unhealthy behaviour [19].

Consider that students spend half their time at school and schools are a center where students, teachers, and parents, assemble. Therefore, schools are a good place to inculcate the habit of breakfast consumption [20]. Implementing interventional and educational programs at schools can change students' knowledge, attitudes, and performance in relation to consuming breakfast, and strengthen and institutionalize healthy breakfast consumption behaviour among them [21]. The knowledge and skills required for the students to understand the importance of eating a healthy breakfast should be provided through education in order to eventually improve their health status [4].

A systematic review is a type of review studies that can provide a proper understanding of the history (background) of a subject by investigating previous studies that are relevant. Such studies can be a guideline for researchers to conduct an effective research in the future [22]. Therefore, the main purpose of this paper was to prepare a systematic review of the published educational interventions relating to breakfast consumption among students.

MATERIALS AND METHODS

This review was conducted according to the 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA) statement [23].

Search strategy

In the present systematic review, articles from seven databases (SID, IRANMEDEX, IRANDOC, ISI Web of Science, PubMed, Scopus, and Google Scholar) written in the past 18 years (from January 2000 to March 2018), were searched to identify the interventional studies. For this purpose, keywords such as "having breakfast", "breakfast eating", "breakfast time", "breakfast intake", "morning meal", "breakfast eating habits", "students", "youth", "school", "breakfast consumption education", "health education intervention", "health promotion

intervention", "theory based intervention", and "educational intervention" were used. The main focus was on the educational programs in relation to breakfast consumption among students. The search strategy included the systematic use of English and Persian keywords with all possible combinations. Moreover, proceedings of the conferences, dissertations, etc. were searched in order to access more relevant articles.

Criteria for selection and quality assessment

The inclusion and selection criteria for articles included the following: (1) education and intervention in the field of breakfast consumption; (2) the target group was students in preschool, elementary, secondary, and high schools; (3) availability of the full text of the articles; and (4) publication of the articles in the past 18 years. However, descriptive studies, research lacking educational intervention, interventions with a disproportionate statistical population (e.g. university students or parents), and interventions with methods irrelevant to the present research were excluded from the study. A STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) checklist was used as it is the most comprehensive guide for reporting observational and interventional studies for evaluating the quality of reporting. The STROBE checklist included 22 major items: title and abstract, introduction, methodology, measurement of variables, statistical analysis, aims of the study, results, discussion, and conclusion. Papers that obtained the minimum score of 16 out of 22 were selected for investigation and were explained. Two of the authors reviewed the articles individually. In the case of disagreement between them, an agreement was reached by reviewing the third author's opinion.

RESULTS

After searching the above-mentioned databases, 3742 articles were identified. In the first step, 1856 articles were excluded due to duplication. In the next three steps, 1613, 228, and 45 articles were excluded based on the title, abstract, and full text. In the fourth step, 18 articles were excluded as the papers did not have appropriate data. Six articles were excluded due to being available in different journals both in English and Persian versions and one of them was considered. Moreover, four more articles were excluded due to a specific sample being included in the analysis. Finally, 17 articles matched the inclusion criteria. The flow diagram of the study selection process is shown in Fig.1.

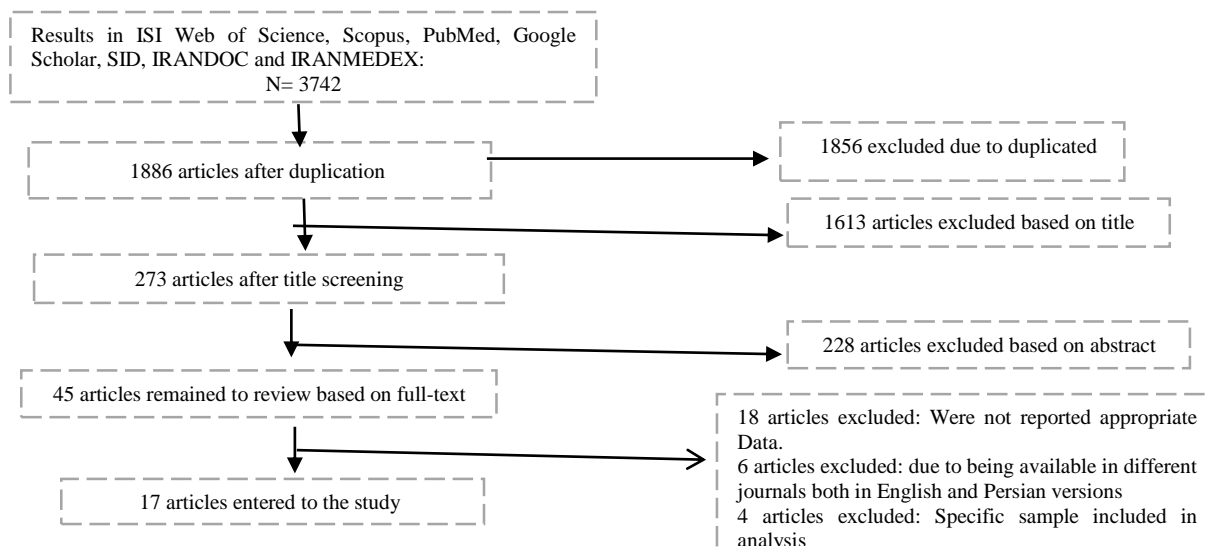


Fig 1: Flow Chart of Systematic Search and Studies Selection

Table 1 summarizes the characteristics of the selected studies. Each article was classified by several categories, which are as follows: author (reference), country (year), research objective, study sample, study design, education/intervention method, and find. The studies were conducted in different countries: Iran (12 articles), Norway (one article), Israel (one article), Indonesia (one article), China (one article) and Netherland (one article). In the selected articles, 5451 students (male and female) participated, and they were often placed in two groups based on the method used. The study samples selected were the following: one intervention among pre-school (kindergarten), nine among elementary, two among secondary, and five among high school students.

The selected studies were divided into two categories:

- Studies in which the interventions were based on the theories and models of health education and health promotion [24-33]. The used theories and models included the Theory of planned behaviour (four articles), Health belief model (two articles), Trans theoretical model (two articles), Pender's Health promotion model (one article), Theory of reasoned action (one article).

- Studies that had performed the interventions without using the theories and models of health education and health promotion [34-40].

Other findings were investigated in terms of the following five parameters:

1-Aim and educational content: The results showed that most of the interventions were performed in order to affect the rate, frequency, and increase in healthy breakfast consumption [25-28, 30-37]. The objective of the four interventions was to affect breakfast-related

perception, knowledge, attitude, and practice [29, 38, 40]. Two other intervention objectives were to affect the perception of breakfast consumption [24] and to affect the children's breakfast patterns [39]. In general, the objective of the interventions was to improve the students' knowledge and perception, changing attitudes, and ultimately increase the frequency and rate of healthy breakfast consumption.

2-Type of interventions: Most of the interventions were executed in the form of experimental and quasi-experimental interventions. This was done in order to prove the effectiveness of the interventions and facilitate logical justification of the interventions' outcomes.

3-Intervention method: In most of the interventions, education and intervention were associated with lectures and educational aids such as booklets, leaflets, pamphlets, posters, multimedia, and educational pamphlets. Health educators and personnel of the schools directed the interventions using group discussion, questions and answers, and other methods.

4-Learners: In all the reviewed studies, the students comprised the target group. Therefore, the learners were homogenous and differed only in terms of gender and level of education. Eight interventions were designed for elementary students [24-26, 29, 34, 35, 37, 38, 40]. This is justified as education right from an early age and higher educability of these kids was very important. Furthermore, some interventions were designed and implemented for high [27, 30-32, 36], secondary [28, 33], and pre-school students [39].

5-Results of educational interventions: Generally, the outcomes of the interventions were studied in three overall levels: improving the students' level of knowledge and knowledge about breakfast, changing

their attitude toward breakfast and its benefits, and ultimately improving the students' performance and increasing healthy breakfast consumption among the students.

DISCUSSION

The present systematic review showed that studies on breakfast consumption among the students have been conducted in several major areas. Some studies investigated the application of health education and health promotion theories and models on breakfast consumption [24-33]. However, other articles did not apply theories and model in their interventions [34-40]. The aims of interventions were different: More studies were implemented for increasing the amount and frequency of healthy breakfast consumption [25-28, 30-37, 39]. However, some interventions were implemented not only to change the practice but also to increase the knowledge and change students' perception and attitude toward breakfast consumption [24, 29, 38, 40]. The findings of the selected studies show that educational interventions have positive results. Generally, the students' awareness, perception, and attitude increased, improved, and changed in relation to breakfast and eventually increased their breakfast consumption. The positive results of such interventions indicate that such interventions must be continued.

Theories and models have an extensive view of the individual and the environment in which the behaviour occurs. Furthermore, these provide a basis for understanding why people do or do not behave in a particular manner, They also provide fundamental assumptions to influence the health-enhancing behaviour [41]. Therefore, applying health education and health promotion theories and models as a conceptual framework would increase the purposefulness and effectiveness of the interventions. As noted, there are few studies on the application of the theories and models of health education and health promotion in order to affect breakfast consumption among students [24-33]. The results of the few interventions that used the theories and models showed that they significantly affect breakfast consumption. Behaviour is better institutionalized at an early age and students would have a better and healthier future if their behaviour were modified in schools. Therefore, it is important to take into consideration the theory-based interventions in order to affect this process. Another notable point is that most of the above-mentioned interventions in most cases were founded on the basis of the theories and models of health education—especially the Theory of planned behavior [25, 28, 30, 32], Health belief model [24, 29], Trans theoretical model [26, 33], Theory of reasoned action [31], and Pender's Health Promotion

model (only one intervention) [27]. Therefore, these theories should be used continuously. But other theories must be applied in intervention to breakfast consumption such a physical activity that influences by many variables and factors and all of these variables and intended factors may not be considered in this few health education theories. Therefore, it is necessary to use other behavior change theories in future interventions. Furthermore, it should be noted that there is a lack of interest in applying health promotion theories and models in the studies. Although health education theories are important, health promotion models and theories also pay attention to the different context in which applying them can affect the rate and function associated with it. However, the application should be done while taking into account the behavior of taking breakfast in different conditions.

The studied interventions used educational methods such as group discussions, questions-and-answers, pamphlets, posters, and leaflets. The positive results of the interventions indicate the effectiveness of these methods in improving knowledge and changing attitudes and practice. It is expected that improving knowledge and changing attitudes toward a behaviour lead to a change in the individual's performance in relation to that behaviour. In a study, scores of knowledge and attitudes were increased after the intervention, but the practice score was still low despite the knowledge and attitude increasing [38]. This could be because all the dimensions affecting breakfast consumption were not taken into account. Moreover, both intrapersonal reasons and external and environmental situations might cause the non-consumption of breakfast. Since breakfast consumption is influenced by different levels, it is recommended to use theories and models which consider interpersonal and environmental factors simultaneously. Furthermore, practical methods are more appropriate in breakfast consumption training as school students are the target of education. Relying too much on traditional interventions and teacher-centred methods training—such as lectures, booklets, posters, leaflets, and pamphlets—for students are not suitable, despite the positive results. Although questions and answers and group discussion were used in the reviewed studies, the methods provide an objective experience for individuals. Those covering objective experiences, like role-playing, practical show, theater, etc. are more appropriate methods but have not been used and noted in these studies.

One of the important steps in changing breakfast consumption is taking breakfast together at school. Making the students eats breakfast at school while simultaneously training them about the importance of breakfast and trying to change the students' attitude

toward it can be useful. In a study, parents reported that children were more inclined to eat breakfast at school than at home [42]. This could be a result of the peers' influence on the students (as a result, the student loses the desire to consume breakfast). Thus, the concurrency of eating breakfast together at school together with educational interventions can lead to positive and stable results. Moreover, it helps internalize this behaviour/habit in a person because he/she learns it theoretically, practically, and simultaneously. In fact, change in the school environment and schools policies can have a positive effect and may provide the context for adopting healthy behaviour. For example, conducting free nutrition programs in schools can create a culture of nutrition and making healthy food accessible at school—like free healthy breakfast—is important in this case. Summation and analysis of the articles indicated the necessity of considering the issue of breakfast consumption among the students. However, this is often neglected despite its obvious positive effects on the physical, mental, and academic performances of the students. The results of previous studies have indicated that the use of interventions improves knowledge, attitude, and performance and increases the rate of breakfast consumption among the students. To achieve more effectiveness, some other points should be considered besides performing numerous interventions, especially using the theories and models of health education and health promotion. For example, the content of textbooks should include more material on healthy nutrition, especially breakfast, and the training consumption of a healthy breakfast at school should become a fixed part of the school programs. Moreover, interventional programs and educational workshops for parents and teachers can be effective. In particular, the role of teachers was neglected in researches conducted in this field. However, considering the teacher-student relationship, using teachers in these interventions is of great importance. Further, technological progress, especially in the field of computer and internet, can also be considered for such interventions.

Merits and limitations

The aims of these studies are a systematic review, regular and systematic consideration of documents, a combination of the results of different studies, and providing a general interpretation of the results. Therefore, presenting an overall result of intervention studies about breakfast consumption among students is a merit of the present study. On the other hand, one of the limitations of this study was that only a few databases (seven electronic databases) were searched to identify and access the articles, which was one of the reasons for limited access to the intended researches. We might have missed some related

articles. Moreover, accessibility to the full text of some of the studies was not possible.

CONCLUSION

The results obtained from investigating the interventions showed that education along with the use of the models and theories, health education, and health promotion is fundamental and vital for achieving the desired results and changing the performance related to breakfast consumption among the students. Therefore, the design, implementation, and assessment of theory-based interventions should be taken into consideration (as an agenda) by the health system. These should be achieved using combined methods and paying more attention to some less noteworthy factors as the role of the schools, teachers, parents, and modern communication technologies.

ETHICAL ISSUES

This study is not involved in human subjects, but ethical issues such as plagiarism have been observed by the authors.

CONFLICT OF INTEREST

Authors have no conflict of interests in relation to the publication of this article.

AUTHORS' CONTRIBUTION

All authors contributed in throughout the project.

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Table 1: Summary of results of the systematic literature review

First Author (reference)	Country (year)	Research objective	Study sample	Study design	Education / interventions method	Results
Sadrzadeh [34]	Iran (2006)	Comparison of the effect of breakfast-related nutritional education on performance	150 Grade-4 elementary students	Controlled interventional	First group: lecture Second group: educational booklet	There were no significant differences between the mean scores of performance after education in three intervention and control groups.
Khalaj [35]	Iran (2006)	Effect of health education on changing the nutritional behaviours	176 Grade-5 elementary students	Quasi-experimental	Direct (face-to-face with questions-answers) and indirect (pamphlet & etc.)	Nutritional knowledge and performance were increased. Moreover, the positive effect of the educational program on changing the breakfast habit was observed.
Ask [36]	Norway (2006)	dietary intervention with school breakfast	55 Grade 10 lower secondary school	Controlled study	Education of importance of breakfast by educator	Students in the class who received breakfast had returned to their normal breakfast pattern.
Khazaiepool [24]	Iran (2008)	Effect of education using the health belief model on the perception of breakfast consumption	100 Grade-4 elementary female students	Experimental	Lecture, questions and answers using teaching aids such as pamphlets	A significant increase in the mean scores for perceived susceptibility, perceived intensity, perceived benefits, and perceived barriers in the intervention group.
Eilat-Adar [37]	Israel (2011)	School-based interventions to promote healthy and daily breakfast consumption	1000 Elementary male students	Case-Control	Education based on the "Fit me" program	65% of the students reported daily consumption of healthy breakfast after the intervention.
Mohammadi Zeidi [25]	Iran (۲۰۱۳)	Effect of education based on the theory of planned behaviour on breakfast consumption	150 elementary students	Quasi-experimental	Lectures, educational pamphlets	12.6% significant improvement in breakfast consumption, and significant change in attitude, social norm, and intention in the experimental group.
Mohammadi Zeidi [26]	Iran (2013)	Effect of education based on the trans theoretical model on breakfast consumption	300 elementary students	Quasi-experimental	Lectures, individual counselling	A significant increase in change processes, benefits, increase in regular breakfast consumption in the experimental group
Dehdari [27]	Iran (2014)	Effect of the intervention of nutrition education with Pender's Health Promotion model on increase of frequency and consumption of healthy breakfast	100 Grade-2 junior high schools female students	Quasi-experimental	Education of nutrition by health educator (lectures)	A significant increase in perceived benefits, perceived self-efficacy, positive activity-based effect, interpersonal and situational effectors, commitment to the action map in the experimental group.
Hosseini [28]	Iran (2015)	effect of a training program based on the theory of planned behaviour on the promotion of breakfast consumption	88 middle-school students	Quasi-experimental	lecture, group discussion, and question and answer, booklet	Perceived behavioural control and intention of having breakfast were increased in the intervention group.
Shojaezadeh [29]	Iran (۲۰۱۵)	effect of education based on health believe model on knowledge, perception and performance about having Breakfast	200 primary school student boys	Quasi-experimental study	group discussion, lecture, question and answer, role play and pamphlets	Knowledge and perceived susceptibility, severity, benefits, barriers, and performance were significantly higher in the intervention group, as compared to the control group and the perceived barriers diminished after the intervention.
Mohammadi manesh [30]	Iran (۲۰۱۵)	increase breakfast consumption based on the Theory of Planned Behavior	140 high school students	Quasi-experimental	Lectures, question and answer, group discussion, booklet	The mean score of the constructs of the TPB in the intervention group changed significantly after the intervention.
Hosseini [31]	Iran (2015)	Applying the Theory of Reasoned Action to promote breakfast consumption	88 high school students	Quasi-experimental	5 sessions of group discussions, lectures, and questions-answers	A significant increase in scores of knowledge about the benefits of breakfast, positive attitude towards breakfast, and subjective norms after the intervention.

Gharlipour [32]	Iran (2015)	Educational intervention based on the theory of planned behavior on breakfast consumption	194 High School Students	Experimental study of case-control	5 sessions of lectures and group discussion along with pamphlets and posters	Significant differences between the mean scores of attitude, perceived behavioral control, intention, and performance of breakfast consumption in the experimental and control groups.
Fitriana [38]	Indonesia (2015)	Using media for nutrition education in terms of knowledge, attitude, and performance of breakfast habits	166 elementary students	Quasi-experimental	Posters, leaflet, multimedia, and education without media	Scores of knowledge and attitudes increased after the intervention, but the performance score was still low despite the increase in knowledge
Youngling [39]	China (2016)	effect of nutritional education on children's breakfast patterns	2012 children of Kindergarten	Interventional Study	Lecture, picture, book, pamphlets	There were changes not only in breakfast frequency but also in breakfast selection.
Houtzager [40]	Netherland (2016)	intervention to change knowledge, attitude and behaviour	242 elementary students	Interventional Study (Pre-Post-test)	tailored feedback, classroom education, role models	Self-reported behaviour was improved over time for all conditions but tailored feedback improved it more.
Purnarani [33]	Iran (2017)	Effect of using the transtheoretical model in students breakfast consumption	290 First-level student of secondary school	Semi-experimental	Lecture	Interventional results show a meaningful average increase in balancing decision from 31 to 46 and self-efficacy from 27 to 34.

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