

Association of balanced nutrition education with knowledge, attitude, and behavior of adolescents: a scoping review

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Abstract

Background and objective: Fulfilment of balanced nutrition is one of main issues of the government of Indonesia. A lot of interventions have been developed by the government to overcome various problems related to malnutrition in children and adolescents. This study aimed to analyze effectiveness of balanced nutrition education in elevation of knowledge and changing behavior and action of adolescents between 10 and 19 years of age.

Results and conclusion: According to a national survey, Indonesia has a big challenge in fulfilment of community nutrition. Indonesian population suffers from malnutrition at early ages and also adulthood. Therefore, the government has decided to focus on educational programs for adolescents between 10 and 19 years of age specifically other than those developed for children in the first 1000 days of life. Based on the scoping review has been done in the current study, teaching adolescents a balanced nutrition has significant effect on their knowledge and further behavior and actions in their life. Considering the high demographic diversity of Indonesia, development and monitoring of educational programs at national level is necessary for survival of country in the future.

Keywords: Action, balanced nutrition, behavior, education, knowledge

1. Introduction

Indonesia has demonstrated political commitment and taken important steps to narrow the nutrition gap in recent decades. Despite some progress, the country is still struggling to meet most of its global nutrition targets and is experiencing three nutritional burdens across all age groups: malnutrition which includes stunting

and wasting, micronutrient deficiencies that often manifest as anemia, and being overweight or obese [1].

One of the efforts of the Indonesian government to deal with nutritional problems is to run a youth nutrition program, one of which is to introduce balanced nutrition. Fulfillment of balanced nutrition should not only be given to children in

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the first 1000 days of life [2]. But this fulfillment must also be given at the age of adolescents between 10 and 19 years of age according to the World Health Organization (WHO) definition. Adolescents are defined as resources that have enormous potential to build a nation in the future, considering that Indonesia has a large demographic bonus [3].

Nutritional status of a person is influenced by the food he consumes. If a person gets enough nutrients, his/her nutritional status would be optimal. The optimal nutritional status will result in positive outcomes such as better brain function, enabling physical growth, increased workability, and good health level. On the other hand, if a person lacks various essential nutrients needed by the body, he/she faces with malnutrition [4]. Countries in the Southeast Asia region bore a high burden of malnutrition in the past and are still experiencing the three nutritional burdens across all age groups (malnutrition, micronutrient deficiency, and being overweight or obese) [5].

The global nutrition report in 2020 showed a decreasing prevalence of underweight from less than 39.5% in 2000 to 33.7% in 2016 among children and adolescents (aged 5-19 years) in Asian countries. Meanwhile, overweight and obesity showed an increasing trend from 2000 to 2016 with prevalence of 7 to 17.3% in children and 1.7 to 6.5% in adolescents, respectively [6]. Although, the prevalence of underweight has decreased, it remains a problem because the decline is too slow, while overweight and obesity are increasing rapidly [7]. Unfortunately, Indonesian adolescents experience the nutritional burdens, so that a quarter of them are short, about 8% are too thin, about 15% are overweight or obese, and about 10% of young men and 23% of young women are anemic [8].

Fulfillment of a balanced nutrition plays a significant role for improvement of health status. But it should be supported by individual knowledge as intellectual property. The knowledge possessed

by a person will greatly affect the person's behavior and actions. Therefore, it is expected that good knowledge about fulfillment of balanced nutrition has significant influence on the actions taken by people to meet their nutritional needs through their daily food consumption [1,9-11].

This scoping review tries to evaluate the influence of national nutritional education conducted by the nutritionists on knowledge, attitudes, and behavior of adolescents toward implementation of balanced nutrition in daily life. Furthermore, this review assists the learners to transfer their healthy behavior to their families and surrounding communities.

2. Method

This work was developed based on the methodological framework proposed by Arksey and O'Malley to align and define research objectives and questions. Researchers used the PICOS approach (Population, Intervention, Comparison, Outcome, Study Design) in compiling questions as a reference to identify key concepts that match the objective and determine inclusion and exclusion criteria (Figure 1). Our inclusion criteria were adolescents between 10 to 19 years of age, research reports on balanced nutrition education, studies which compared knowledge, attitude, and behavior with other interventions, and studies providing information about the role of balanced nutrition education in development of adolescent knowledge, attitudes, and behavior [12].

Researchers identified several studies using PubMed Central, SAGE Journal, and Google Scholar databases with respect to the scope of this study. Primary keywords were "balanced nutrition" and "nutrition education", and secondary keywords were "adolescent knowledge", "attitudes", and "behavior". At first, the articles published in the last decade (2012-2022) were screened. Then, the literatures published between 2017 and 2022 were used for further assessment [13].

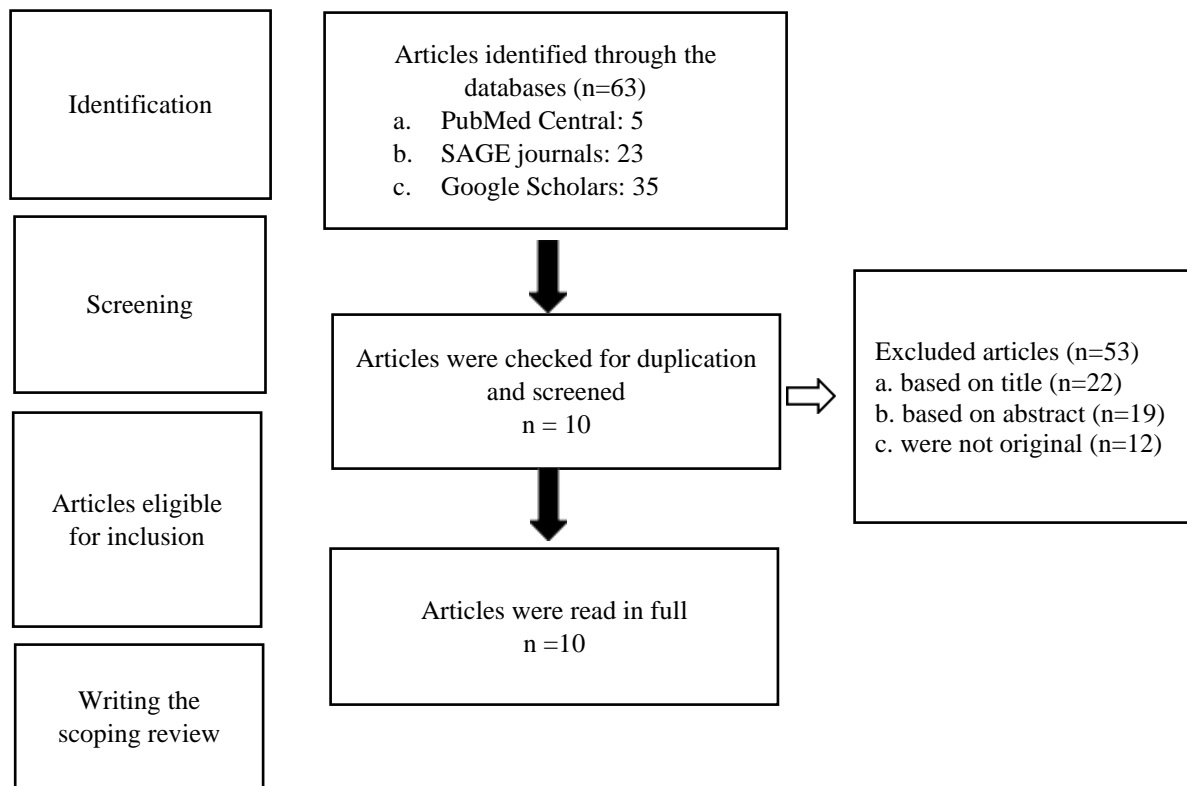


Figure 1- Flowchart of methodology; Source: primary data

3. Unhealthy diet and malnutrition in the world and developed strategies

Unhealthy foods increase the rate of non-communicable diseases such as cardiovascular disorders, cancers, diabetes, and respiratory diseases. For example, high salt or fat intake a day is directly associated with hypertension and cardiovascular diseases, or intake of trans fat may lead to cancer. Other than the subjects' education, intervention of governments is of concern. Following the high prevalence of mortality and morbidity arisen from the non-communicable diseases, the WHO developed an action plan in 2013 for control and prevention of non-communication by focusing on nutritional and behavioral risk factors. One of the main strategies was reduction of salt intake up to 30% by 2025. To cope with the WHO action plan, several countries have developed national strategies including reformulation of industrial foods to lower the intake of salt and trans fat in the

population [7]. In addition, nutritional traffic light was designed by the authorities and inserted on the food labels to help the consumers in better selection of the foods. Nutritional traffic light was one of educational strategies to boost the consumers' awareness and knowledge about healthy status of the foods within the packages [14].

Apart from the health strategies developed by the countries, educational programs are interested globally due to the high incidence of malnutrition. In 2020, prevalence of underweight in late adolescent girls aged 15-19 years varied from 0.3% in the Arab Republic of Egypt to 47% in India. In boys aged 15-19 years, prevalence of underweight was in the range of 1% in Egypt to 66% in Ethiopia. In most countries of Sub-Saharan Africa, prevalence of underweight in boys is significantly higher than girls. Survey of underweight in men aged 15-49 years of 15 countries revealed that prevalence of underweight in

late adolescent boys was at least two times higher than the others participants [15].

At least, 10% of late adolescent boys and girls are overweight or obese in several countries. Overweight and obesity is more prevalent in girls than boys. The difference between boys and girls was high in Lesotho, Swaziland, Egypt, and the Dominican Republic in 2015. In six countries (Albania, Azerbaijan, Guyana, Namibia, São Tomé and Príncipe, and Swaziland), prevalence of overweight and obesity in men was more than 10% in 2015 [15].

It is assumed that elevation of individual knowledge especially at early ages decreases further financial burden arisen from malnutrition in the population. Effectiveness of this strategy is different and depends on the subjects' willing and other environmental factors. Indonesia is of countries faced with this issues. Prevalence of undernutrition in Indonesian adolescents aged 13-15 years is 8.7% (1.9% very thin and 6.8% thin), and 16% overnutrition is estimated in the Indonesian adolescents (11.2% overweight and 4.8% obese) [4,8,15].

4. Nutrition education policies and programs

As we have approached the post Millennium Development Goals (MDGs) era since 2016, reduction of child undernutrition has become a high priority for governments as a marker of development. Population data of 116 countries from 1970 to 2012 revealed that access to drinking water, sanitation, women's education, and quality of available foods were the main drivers of stunting reduction. In addition to nutrition-specific programs and policies, accelerating undernutrition reductions in the future will require increased investments in other associated priorities [16].

To reduce nutritional problems in Indonesia, the National Action Plan for School Children and Adolescent Health 2017-2019 was launched by the Coordinating Ministry for Human Development and Culture of Indonesia in 2017. The action plan aimed to increase knowledge and skills of

adolescents in reproductive health, addictive substances, mental health, personal hygiene, non-communicable diseases, and nutrition. In support of this holistic approach, UNICEF in collaboration with the government of Indonesia designed a comprehensive gender-responsive multisectoral nutrition program targeting youth in school in the first phase, followed by targeting out-of-school youth in the second phase. The program was developed in accordance with the national UKS/ M (Usaha Kesehatan Sekolah/Madrasah) policies to improve nutrition and health status of adolescents in schools. It focused on prevention of anemia, promotion of healthy eating, and increasing physical activity. This program was known as Action Nutrition in the country [17].

5. Effectiveness of balanced nutrition education on knowledge of adolescents aged 10-19 years

Health, and more importantly, individual perception of health are important parameters in prediction of epidemiological transition. The current lifestyle such as eating habits and reproductive behavior is deterministic factor in health status of people in the future [18,19].

Apart from its impact on individual life, knowledge of healthy behavior affects the family life positively. Effect of balanced nutrition education on adolescent knowledge was analyzed in other studies (Table 1). The authors reported that education of adolescents by nutritional concepts has a positive and significant impact on their thinking ability and cognitive function [20-22]. Balanced nutrition education is defined as a process with intellectual, psychological, and social dimensions associated with activities that enhance ability of people to make appropriate decisions affecting their own and community well-being [23]. Based on scientific principles, it facilitates conceptual learning in both healthcare professionals and consumers including children and adolescents [24,25]. In other words, balanced nutrition education is effective in increasing cognitive function and knowledge of adolescent.

For example, there are four major nutritional deficiencies in Indonesia including lack of protein and energy, iron deficiency, iodine deficiency, and vitamin deficiency [26,27]. It is obvious that development of educational prog-

rams toward elevation of Indonesian knowledge about use of nutrient-rich foods and supplements can significantly prevent a severe malnutrition among Indonesian families.

Table 1- Balanced nutrition education with school intermediaries

Type of study	Location	Result	Reference
Quasi-experimental research design	Rajeg Health Center and the Kemeru Public Health Center, Tangerang, Indonesia	Stunting is a nutritional problem that hurts optimal growth and development in children. Chronic malnutrition greatly affects growth and development of toddlers.	[28]
Pre-experimental design	SDN Paringin 2 South Kalimantan, Indonesia	Knowledge about fulfilment of balanced nutrition led to motivation of students in primary school. Their knowledge promoted from less to sufficient level. As a result, children were motivated to have nutritious lunch at school.	[20]
Research experiment	Madrasah Ibtida'iyah Negeri (MIN) in Tanjung Morawa District, Indonesia	No significant correlation was observed between improvement of balanced nutrition using educational posters and knowledge in primary school students. Therefore, poster was not effective enough in fulfilment of balanced nutrition.	[29]
Cross-sectional interventional study	India	An alternative hypothesis highlighted the role of nutrition education in improving the nutritional literacy of school children aged 8-14 years about iron deficiency anemia. This study increased the knowledge of children about iron education module.	[21]
Quasi-experimental design	Pretoria, South Africa	Tailored school-based nutrition education program had a potential to develop healthy eating behavior of resource-limited primary school students, specifically their knowledge and food choice intentions.	[30]
Interventional study	Delhi, India	Knowledge of nutrition was poor among schoolgirls aged 10-18 years and it was increased significantly after nutrition education session. Nutrition education materials were prepared by the Public Health Department of a tertiary care hospital.	[31]

Quasi-experimental design	Launa city, Philippine	Nutrition education module was developed in the study which greatly assisted the teachers in education of elementary school aged 7-9 years. School children successfully implemented a proper nutrition and good eating habit. Maternal nutrition knowledge was also developed in nutrition education campaigns for mothers. Educational sessions for mothers were effective to bridge the gap between school and community nutrition interventions.	[32]
Randomized control study	Beijing, China	Effect of nutrition education on knowledge, attitude, and behavior (KAB) and adjusted dietary balance index (DBI) of Chinese male soccer players aged 16-18 years was studied. In the intervention group, significant differences were found in scores of general nutrition knowledge, sport nutrition knowledge, and total score of KAB questionnaire after four weeks education. However, there was no significant difference in dietary attitude and behavior in both groups. Furthermore, there was no significant change in DBI-low bound scores, DBI-high bound scores, and DBI-diet quality distances of both groups.	[33]
Descriptive quantitative-qualitative study	Medan city, Indonesia	Objective of this research was development of nutritional posters and stickers about balanced nutrition for adolescents to analyze nutritional behavior of junior high school students. Fourteen dietary messages were inserted into the guidelines. The pilot test showed that the nutritional posters and stickers could increase nutritional behavior of the subjects.	[34]
Qualitative research, cross-sectional study	Sharjah, United Arab Emirates	This study aimed to provide baseline data on nutritional knowledge and eating habit of adolescents. Data were collected from 300 adolescents aged 9-13 years using a validated self-administered questionnaire. Most students (86%) had poor nutritional knowledge, especially in key areas such as daily nutritional requirements and components of foods (e.g., fiber, fat, sugar). As a result, the school-based educational program could warrant a sound nutritional knowledge among adolescents and motivate them for implementation of healthy diet.	[35]

6. Effectiveness of balanced nutrition education on behavior of adolescents aged 10-19 years

Nutritional problems that occur in adolescents are generally due to lack of energy, fat, carbohydrate, and protein in childhood. Early education of people with regard to following a balanced nutrition in daily life is of main strategies toward approaching a qualified life and healthy behavior [36]. In agreement, Setia et al. reported that nutrition education greatly affects cognitive and psychomotor development in children [28]. In other words, balanced nutrition education changes the psychomotor aspects or behavior of people. Therefore, psychomotor aspects of children will develop appropriately by providing them with adequate nutrition literacy at early ages [37,38]. Although, promotion of mothers' knowledge to change their habit toward healthier lifestyle by feeding children with balanced nutrition is of great concern.

7. Effectiveness of balanced nutrition education on action of adolescents aged 10-19 years

Healthy eating practice is essential for optimal growth and development. It is influenced by individual factors such as food preferences of people and also the environment they are growing up. Unhealthy eating in childhood harms physical and mental development, and would be a major challenge in adulthood due to taste adaptation [39,40]. Several studies reported a positive correlation between balanced nutrition education and the actions taken by adolescents, through which the educated individuals were more likely to adopt a healthy lifestyle (Table 1) [30,32,41].

Nutrition education is accompanied by environmental supports to facilitate a voluntary adoption and relevant behaviors. It is obvious that nutrition education has been a promising solution to improve eating habits. Lack of knowledge about dietary requirements and nutritional value of foods is of major contributors to poverty in developing countries such as India. Such problems can be solved by development of educational pro-

grams in favor of improved knowledge, attitudes, and behavior of individuals [42].

8. Conclusion

Indonesia has a serious problem in fulfillment of balanced nutrition. The current situation can be changed by either education of children in the first 1000 days of life or attention of government to fulfillment of balanced nutrition in adolescents. Indonesia is a country with large demographic bonus and such strategies are important for survival of Indonesians in the future. In this review, we reported that three variables of knowledge, behavior, and action are strongly influenced by educational programs with respect to fulfillment of balanced nutrition. Therefore, development of impressive strategies such as preparation of educational courses in schools and universities are recommend to help prevention of nutritional deficiency in adulthood. Preparation of gender responsive, innovative, and informative package is feasible in designing a balanced nutrition intervention. By applying the lessons learned and taking appropriate actions, a balanced nutrition program would have a positive impact on youth in the country and would be a strong foundation for Indonesia's future.

9. Conflict of interest

The authors declare that there is no conflict of interest.

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