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Analysis of Media Use in the Nutrition Education on Knowledge, Attitude and Practice of the Breakfast Habits on Elementary School Students

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Abstract: Breakfast is the most important food in the morning, but often missed and skipped. The objective of this study was to analyze the use of media in nutrition education on knowledge, attitude and practice (KAP) of the breakfast habits on elementary school students. The design of this study was quasy-experimental. Total subjects in the study were 166 elementary school students in grade 5 of public elementary school (PES) from 4 selected PES in Brebes City, Central Java-Indonesia. The intervention groups in this study were poster media group, leaflet, multimedia and without media. Scores of subjects' breakfast knowledge and attitudes were increased after the intervention. Subjects' breakfast practices also increased after the intervention, but still categorized as "less" and have yet to meet the nutritional adequacy. ANOVA test results based on changes in the scores of subjects' breakfast knowledge at baseline and end line showed no significant difference ($p>0.05$), while based on changes in the scores of subjects' breakfast attitudes showed significant difference between the media ($p<0.05$). Subjects' breakfast attitudes and practices showed better improvement in L (leaflet) group. This implied that the intervention of nutrition education using the media particularly leaflet, was more effectively improved subjects' breakfast attitudes and practices.

Key words: Breakfast, nutrition education, elementary school students, educational media

INTRODUCTION

School-age children are the future of human resource who will continue the development in Indonesia. Qualified human resources is characterized by a good child development, thus forming a healthy and intelligent generation both intelligence as well as emotion and spirituality (Health and Panaretto, 2005). This matter can not be separated from the role of nutrition and optimal parenting that contribute importantly to support the children's growth and cognitive development (Nasir *et al*., 2012). However, in fact, food intake in children is often can not be implemented properly due to the lack of household food availability and low nutrition knowledge. One of the causes of low intake of food is due to the low contribution of breakfast.

Breakfast is the most important food in the morning, but often missed and skipped (Affenito, 2007; Alexy *et al*., 2010). Ideal breakfast should meet a quarter (25%) of the total daily energy requirements (Khomsan, 2005; Dehdari *et al*., 2013). Breakfast is important because it is considered as a determinant of behavior and healthy lifestyle (Hoyland *et al*., 2009; Gibson and Gunn, 2011). Data of the National Health Survey conducted in 4.320 elementary school children and 5.339 adolescents in the United States in 1999-2006 showed 20% of school children and 31.5% of adolescents skipped breakfast (Taskar *et al*., 2010). In Indonesia, according to the analysis of food consumption data of Basic Health Research (Riskesdas) in 2010, it showed that there are still many children who are not accustomed to a healthy breakfast, that among 35.000 school-age children, 26.1% of them have only-water breakfasts and 44.6% generates energy intake less than 15% of their daily energy intakes (Hardinsyah, 2012). The study in Semarang, Central Java-Indonesia showed that 43.8% of elementary school children do not normally have breakfast (Mariza and Kusumastuti, 2013). A lacking breakfast habitual attitudes are due to the children's lack of knowledge about nutrition and health. Nutrition education program which is delivered to the school children has an influence on children's knowledge, attitudes and beliefs regarding to the better selection of foods (Prelip *et al*., 2012). The most appropriate concept of nutrition education in the school-age children is nutrition education combined with the media.

In this study, the media used were poster, leaflet and multimedia. Poster and leaflet are visual media that are widely used in the nutrition education (Siagian *et al*., 2010; Trepka *et al*., 2010). Computer technology and interactive multimedia have evolved in the past two decades as a tool of nutrition education (Hermina and Afriansyah, 2010). However, the utilization of multimedia in nutrition education in Indonesia is still rarely used. Considering the importance of breakfast habits, particularly among school children, it requires students to obtain nutrition education with appropriate and

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effective media. The good media are able to convey message, received and achieve a good target. Conveying the messages of the breakfast habits through poster, leaflet and multimedia is expected to be one of most the effective methods to improve the attitudes of children's breakfast habits. Therefore, the objective of this study was to analyze the use of media in nutrition education on knowledge, attitude and practice of the breakfast habits of elementary school students.

MATERIALS AND METHODS

Subjects: The design of this study was quasy-experimental. The selection of research sites was conducted purposively with these following criteria: (1) they are public elementary schools in Brebes City; (2) they have an good average value of National Exam; (3) they have not been given a nutrition education of breakfast in school. The populations in this study were all 5th-grade students of PES Brebes 01, PES Brebes 02, PES Brebes 07, dan PES Brebes 08. The subjects involved in this study were students who meet the criteria and have the data completeness. Students criteria as the research subjects were boys and girls aged 8-12 years who showed characteristics of children who want to know, want to learn, attentive and in the golden period of reading (Backes, 2007) and willing to follow every step of the research. The number of subjects for each group was calculated using this following formula (WHO, 1996):

$$n \geq \{(2xs^2x(Z\beta + Z\alpha)^2 / d^2)\}$$

Notation:

- n = Number of subjects per treatment group
- s = Standard deviation (SD) of breakfast knowledge score (11.9) (Nababan, 2012)
- $Z\beta$ = Normal distribution with 80% of power (0.84)
- $Z\alpha$ = Normal distribution with 95% of confidence interval (1.96)
- d = Increase or difference of the expected value (8.7) (Nababan, 2012):

$$n \geq \{(2x11.9^2x(0.84 + 1.96)^2) / 8.7^2)\} n \geq 29$$

Taking into account of the possibility of 15% dropout, then the number of subjects required was 33 students per group. The groups were determined randomly, furthermore acquired the students at PES 07 Brebes as a group without media (WM), the students at PES 02 Brebes as a poster group (P), the students at PES 08 Brebes as a leaflet group (L) and the students at PES 01 Brebes as a multimedia group (M). The required number of subjects in this study was more than the minimum number of subjects. Total population in the study was 180 people. After passing the step of data cleaning, the number of subjects who successfully involved this study were 166 people (41 people of WM group, 43 people of P group, 40 people of L group and 42 people of M group).

Types and methods of data collection: Types of data collected was primary data. Data collection was conducted through direct interview using a questionnaire instrument. The data collected were individual and family characteristics, subjects' preference levels to the media, breakfast knowledge and attitudes data and breakfast practices data (breakfast frequency, type of breakfast intake, nutritional quality of breakfast intake and intake and nutrient contribution of breakfast). The data of subjects' preference levels to the media obtained from the questionnaire based on four aspects of the question asked to the subject (material contents, size of text, images, colors) and the subject can assess nutritional education media through the score values given. Data of breakfast knowledge and attitudes each obtained from a questionnaire with 15 knowledge questions and 15 attitude statements about breakfast. Breakfast intake data was obtained with 2x24 h food recall questionnaire. The collection of knowledge, attitudes and practices of breakfast data was conducted twice, namely baseline (before the intervention) and end line (one month after the intervention).

Implementation of the intervention: Intervention of nutrition education was conducted on 5th-grade elementary school students from PES Brebes 01, PES Brebes 02, PES Brebes 07 and PES Brebes 08 which aimed to improve the knowledge, attitudes and practices of the breakfast habits of the students. Materials provided including breakfast definition, breakfast time, why breakfast is important, the consequences if skipping breakfast, the characteristics of children who have breakfast, the definition of a balanced diet, types of food on the breakfast menu, breakfast contribution in meeting the nutrition requirements and examples of nutritious and non-nutritious breakfast foods. The material was given twice during one month, by the researcher and classroom teacher. The method used in this nutrition education was a method of direct face to face in the classroom. The technique used was a lecture and discussion. Lectures were conducted by delivering the materials for 45-60 min. At the end of the session, a question and answer discussion was conducted between the researcher/classroom teacher and the respondents for 15-20 min. The media used were poster, leaflet, multimedia.

Subjects' preference levels to the media: An assessment of subjects' preference levels to the media was conducted through four multiple-choice questions with four levels of answer choices. The scoring for each

answer in the questionnaire were as follows: a score of 3 (strongly like); a score of 2 (moderately like); a score of 1 (less like) and a score of 0 (dislike), then the assessment scores of the four aspects were summed to conclude the overall score level of subjects' preferences. A media is considered accepted by the children if it received a score of preference level more than 80 or strongly like (Nababan, 2012).

Breakfast knowledge: An assessment in breakfast knowledge was obtained from 15 questions and then a score for each answer was given. Each correct answer was given a score of 1 and a wrong answer was given a score of 0. The maximum score of breakfast knowledge subject was 15 and the minimum score was 0. The subjects' breakfast knowledge then classified into three, namely less (total value of <60%), moderate (total value of 60-80%) and good (total score of >80%) (Khomsan *et al*., 2013).

Breakfast attitudes: The attitude assessment was conducted using two scales: agree and disagree. For positive statement, if "agree" was given a score of 1 and if "disagree" was given a score of 0. As for negative statement, if "agree" was given a score of 0 and if "disagree" was given a score of 1. The maximum score of breakfast attitudes subject was 15 and the minimum score was 0. The subjects' breakfast attitudes then classified into three, namely negative (total value of <60%), neutral (total value of 60-80%) and positive (total score of >80%) (Khomsan *et al*., 2013).

Breakfast practices: Data of subjects' breakfast practices included nutrient intake were calculated using 2007 Food Composition List (*Daftar Komposisi Bahan Makanan*, DKBM), then the adequacy of energy and nutrients was calculated. Adequacy of energy and protein levels were categorized into heavily deficit (<70% of RDA), moderately deficit (70-79% of RDA), mildly deficit (80-89% of RDA), normal (90-119% of RDA) and excess (≥120% of RDA) (Balitbangkes, 2007). The adequacy of vitamins and minerals levels were categorized into deficit (<77% of RDA) and adequate (≥77% of RDA) (Gibson, 2005). Breakfast frequency data were categorized into always having breakfast (7 times/week), often having breakfast (4-6 times/week), rarely having breakfast (1-3 times/week) and never having breakfast (Khan, 2006). Breakfast intake types data were classified into nine groups of the type of breakfast intake, based on the development of breakfast intake types according to Hardinsyah (2012) where the side dishes which are proteins, are divided into animal and vegetable-derived proteins. Nutritional quality of breakfast intake was obtained from the total nutrient adequacy level divided by the amount of nutrients that were considered in the assessment of the nutritional quality of children's breakfast intakes. They were grouped into four categories, namely very inadequate (<55%), less adequate (55-69%), adequate (70-84%) and good (≥85%) (Hardinsyah, 1996).

Statistical analysis: Data were analyzed by descriptive statistics (frequency, mean, standard deviation) and inferential statistics (kruskal wallis test, paired sample t-test and one-way ANOVA) using 2010 Microsoft Excel computer program and SPSS software version 16. Kruskal wallis test was used to analyze the differences between treatment groups in the form of ordinal or categorical data. Paired sample t-test was used to analyze differences in the increase in breakfast knowledge, attitudes and practices (breakfast frequency, nutritional quality of breakfast intake, intake and nutrients contribution) of baseline and end line in one treatment group. Meanwhile, one-way ANOVA test was used to analyze differences in the scores of breakfast knowledge, attitudes and practices (breakfast frequency, nutritional quality of breakfast intake, intake and nutrients contribution) of baseline and end line towards the media interventions used. If the results of one-way ANOVA test showed significant differences ($p<0.05$), then a post *hoc tukey* test needs to be conducted to see the most different media intervention.

RESULTS

Socio-economic characteristics: More than half of the subjects (53.6%) were female and 46.4% of the subjects were male. Age of subjects ranged from 10-12 years old where the majority of subjects (90%) aged between 10-11 years old. Most subjects (65.7%) have an allowance between >Rp 3.000-Rp 5.000 and more than half of the subjects (52.4%) have pocket money between Rp 1.000-Rp 3.000. There were no significant differences in gender and age of subjects in all groups ($p>0.05$), whereas the results of ANOVA showed that there were significant differences in subjects' pocket money and allowances in all groups ($p<0.05$).

The majority of subjects have fathers (53.0%) and mothers (48.8%) who were senior high school educated. More than a third of the subjects have fathers (38.0%) who were self-employed and 47.6% of subjects have housewife mothers. More than half of the subjects (54.8%) have small number of families (≤4 people). 44.6% of the subjects have parents with income rates of Rp 1.000.000-Rp 2.999.999 and the majority of subjects in all groups were categorized as non-poor (79.5%). Kruskal wallis test results indicated that there were significant differences in the subjects' parents type of works in all groups ($p<0.05$). Results of ANOVA test showed that there were significant differences in the subjects' parents education levels (years), as well as subjects' parents incomes in all groups ($p<0.05$), whereas subjects' family sizes did not differ significantly in all groups ($p>0.05$).

Subjects' preference levels to the media: The subjects' assessments to the "Go Healthy Breakfast!" poster, leaflet and multimedia consisted of four aspects, namely the contents of the material, the size of the text, images and colors. Here are the assessment aspect of preference levels which most favored by the subjects of each media (Fig. 1).

Figure 1 shows that a score of 3 which means the subject strongly liked the aspects of the media presented, while a score of 2 means the subject was moderately liked the aspects in the media. In the poster media, the subject preferred aspect was the size of the text. In the leaflet media and multimedia, the was strongly liked the size of the text, images and colors presented, while for the contents of the material, the subject was adequately liked the contents of the material provided. Kruskal wallis test results showed that there was no significant differences in the subjects' level of preference from the aspects of material contents ($p = 0.490$) and the size of the text ($p = 0.146$), but there were significant differences in the subjects' level of preference from the aspects of images ($p = 0.005$) and colors ($p = 0.001$) in all groups.

An assessment of subjects' preference level of the aspects of the contents of the material, the size of the text, images and colors in each media (poster, leaflet and multimedia) was then summed to infer the subjects' preference level to the overall media. The average scores of subjects' preference level to the poster, leaflet and multimedia were 85.7; 92.7 and 91.9, respectively. This shows that the three nutrition education media (poster, leaflet and multimedia) have been accepted by the subject. However, the score of subjects' preference level on the leaflet media was higher than on the poster and multimedia.

Breakfast knowledge: In general, the average score of subjects' breakfast knowledge was increased at the end line. The results of paired samples t-test showed that subjects' breakfast knowledge were increased between baseline and end line in all groups. The average scores of subjects' breakfast knowledge in P and M groups were higher than the other groups at the baseline and end line. ANOVA test results based on the scores of subjects' breakfast knowledge at the baseline and end line showed there were significant differences between the media ($p<0.05$), but this results have yet to illustrate the media effectiveness used due to the difference of the baseline, thus the score changes were observed. ANOVA test results based on the score changes in subjects' breakfast knowledge at the baseline and end line showed no significant difference ($p>0.05$) (Table 1).

Breakfast attitudes: In general, the average scores of subjects' breakfast attitudes increased at the end line. The results of paired sample t-test showed that subjects' breakfast attitudes increased between the baseline and end line in all groups. The average scores of subjects' breakfast attitudes in P and M groups were higher than the other groups at the baseline and end line. ANOVA test results based on the subjects' breakfast attitudes scores at the baseline and end line showed there were significant differences between the media ($p<0.05$), but this results have yet to illustrate the media effectiveness used due to the difference of the baseline, thus the score changes were observed. Unlike in the knowledge, the ANOVA test results based on the score changes in subjects' breakfast attitudes at the baseline and end line showed there were significant differences between the media ($p<0.05$). The highest score increase in subjects' breakfast attitudes was in the L (leaflet) group. Nutrition education intervention can improve subjects' breakfast attitudes scores in all groups (Table 2).

Breakfast practices: The measurement of breakfast practices in this study was assessed from several aspects, namely breakfast frequency, nutritional quality of breakfast intake, intake and nutrients contribution of subjects' breakfasts at the baseline and end line.

Breakfast frequency: Breakfast is the activity of eating and drinking conducted before 09.00 am. (Hardinsyah, 2012). In general, the frequency of subjects' breakfasts during the whole week increased at the end line. The highest increase in the average frequency of subjects' breakfasts was in the WM group. The results of paired sample t-test showed that the frequency of subjects' breakfasts between baseline and end line was significantly increased in all groups ($p<0.05$). The frequency of subjects' breakfasts at the baseline was categorized as often having breakfast. While at the end line, the frequency of subjects' breakfasts increased and categorized as always having breakfast. ANOVA test results showed that the frequency of subjects' breakfasts at the baseline and end line did not differ significantly in all groups ($p>0.05$) (Table 3).

Breakfast intake type: Grouping of breakfast intake type was developed by the breakfast intake type according to Hardinsyah (2012), but the side dishes (proteins) were divided into animal and vegetable-based proteins. According to the classification of these proteins, the grouping of breakfast intake type consisted of nine groups. Baseline data showed that most of the subjects have breakfasts with carbohydrates, animal-based proteins and beverages menu (61.4%). End line data indicated that there was an increase in subjects who have breakfast with a full-course menu (carbohydrates, animal-based proteins, vegetable-based proteins, vegetables/fruits and beverages) at 8.5% (from 5.4% to 13.9%), as well as a decrease in subjects who have breakfast only with carbohydrates, animal-based proteins and beverages menu at 27.1% (from 61.4% to

Table 1: Average and score changes of subjects' breakfast knowledge (baseline and end line)

Breakfast knowledge	WM [n = 41]	P [n = 43]	L [n = 40]	M [n = 42]	Total [n = 166]
Score changes[1]	9.27*	8.06*	8.33*	7.94*	8.39*
Baseline	80.0±16.5[a]	88.2±10.1[b]	86.3±9.4[a,b]	88.7±8.1[b]	85.9±11.9
End line	89.3±11.6[a]	96.3±7.3[b]	94.7±7.6[b]	96.7±7.4[b]	94.3±9.1
Score changes[2]	9.27[a]	8.06[a]	8.33[a]	7.94[a]	8.39

Notation: WM: Without Media, P: Poster, L: Leaflet, M: Multimedia. [1]Results of paired sample t-test
[2]Results of ANOVA test based on the score changes at the end line-baseline. *Results of significant test ($p<0.05$)
[a,b,c]Are the variables followed a different letter on the same lines showed different results between treatments ($p<0.05$)

Table 2: Average and score changes in subjects' breakfast attitudes (baseline and end line)

Breakfast attitudes	WM [n = 41]	P [n = 43]	L [n = 40]	M [n = 42]	Total [n = 166]
Score changes[1]	7.64*	1.55	9.33*	1.75	4.98*
Baseline	75.0±12.8[a]	86.0±7.9[b]	77.5±11.4[a]	86.3±11.6[b]	81.3±12.1
End line	82.6±10.3[a]	87.6±6.8[b]	86.8±7.5[a,b]	88.1±9.0[b]	86.3±8.7
Score changes[2]	7.64[b]	1.55[a]	9.33[b]	1.75[a]	4.98

Notation: WM: Without Media, P: Poster, L: Leaflet, M: Multimedia. [1]Results of paired sample t-test
[2]Results of ANOVA test based on the score changes at the end line-baseline. *Results of significant test ($p<0.05$)
[a,b,c]Are the variables followed a different letter on the same lines showed different results between treatments ($p<0.05$)

Table 3: Average and changes of the subjects' breakfasts frequency (baseline and end line)

	Average±SD				
Breakfast frequency	WM [n = 41]	P [n = 43]	L [n = 40]	M [n = 42]	Total [n = 166]
Score changes[1]	0.78*	0.37*	0.58*	0.43*	0.54*
Baseline	6.2±1.4[a]	6.6±1.1[a]	6.4±1.3[a]	6.6±1.0[a]	6.4±1.2
End line	6.95±0.3[a]	6.93±0.5[a]	6.92±0.5[a]	7.0±0[a]	6.95±0.4

Notation: WM: Without Media, P: Poster, L: Leaflet, M: Multimedia. [1]Results of paired sample t-test
*Results of significant test ($p<0.05$)
[a,b,c]Are the variables followed a different letter on the same lines showed different results between treatments ($p<0.05$)

Table 4: Subjects distribution by the type of breakfast intake (baseline and end line)[1]

	WM [n = 41]		- P [n = 43] -		--- L [n = 40] ---		--- M [n = 42] ---		Total [n = 166]	
Type of breakfast intake	n	%	n	%	n	%	n	%	n	%
C+B	0	0	1	2	2	5	0	0.0	3	1,8
C+AP+B	27	65.9	29	67.4	18	45.0	28	66.7	102	61.4
C+VP+B	0	0	0	0.0	3	7.5	2	5	5	3.0
C+AP+VP+B	7	17.1	8	18.6	11	27.5	7	16.7	33	19.9
C+AP+VP+V/F+B	3	7.3	2	4.7	1	2.5	3	7.1	9	5.4
C+AP+V/F+B	3	7.3	3	7.0	3	7.5	2	4.8	11	6.6
C+VP+V/F+B	1	2.4	0	0	2	5.0	0	0.0	3	1.8
C+AP+VP+V/F+S+B	0	0	0	0	0	0	0	0	0	0
S+B	0	0	0	0	0	0	0	0	0	0
P	0.516									
C+B	0	0	0	0	0	0	0	0	0	0
C+AP+B	15	36.6	17	39.5	10	25.0	15	35.7	57	34.3
C+VP+B	0	0	0	0	0	0	0	0	0	0
C+AP+VP+B	10	24.4	12	27.9	15	37.5	10	23.8	47	28.3
C+AP+VP+V/F+B	8	19.5	4	9.3	6	15.0	5	11.9	23	13.9
C+AP+V/F+B	7	17.1	10	23.3	9	22.5	8	19.0	34	20.5
C+VP+V/F+B	1	2.4	0	0	0	0	4	9.5	5	3.0
C+AP+VP+V/F+S+B	0	0	0	0	0	0	0	0	0	0
S+B	0	0	0	0	0	0	0	0	0	0
P	0.785									

Notation: [1]The grouping of intake types is based on the modification from Hardinsyah (2012)[10]
WM: Without Media, P: Poster, L: Leaflet, M: Multimedia, *The results of significant test ($p<0.05$).
C: Carbohydrates, P: Proteins, AP: Animal-based Proteins, VP: Vegetable-based Proteins, V: Vegetables,
F: Fruits, S: Snacks, B: Beverages

34.3%). Kruskal wallis test results showed that there was no significant difference in the subjects' type of breakfast intake in all groups at the baseline and end line ($p>0.05$) (Table 4).

Nutritional quality of breakfast intake: The nutritional quality of food is a nutritional quality assessment based on the nutritional quality components that are not only determined by the content of energy, carbohydrates,

Table 5: Average and score changes in nutritional quality of subjects' breakfast intakes (baseline and end line)

	Average±SD				
Nutritional quality of breakfast intake	WM n = 41	P n = 43	L n = 40	M n = 42	Total n = 166
Score changes[1]	1.70*	-0.87	3.75*	3.43*	1.97*
Baseline	20.5±3.7[a,b]	23.2±5.9[b]	20.1±20.7[a]	18.6±5.2[a]	20.7±5.1
End line	22.2±3.8[a]	22.4±5.4[a]	23.9±4.1[a]	22.1±4.6[a]	22.6±4.5
Score changes[2]	1.70[a,b]	-0.87[a]	3.75[b]	3.43[b]	1.97

Notation: WM: Without Media, P: Poster, L: Leaflet, M: Multimedia. [1]Results of paired sample t-test
[2]Results of ANOVA test based on the score changes at the end line-baseline. *Results of significant test ($p<0.05$)
[a,b,c]Are the variables followed a different letter on the same lines showed different results between treatments ($p<0.05$)

Table 6: Nutrients contribution of subjects' breakfasts towards the Recommended Dietary Allowances (RDA) (baseline and end line)

	Nutritional adequacy level (%)				
Nutrients contribution of breakfast	WM n = 41	P n = 43	L n = 40	M n = 42	Total n = 166
Energy (kkal)					
Score changes[1]	0.20	-0.24	1.86*	-0.74	0.25
Baseline	14.4[a]	17.0[b]	14.8[a]	17.2[b]	15.9
End line	14.6[a]	16.8[b]	16.7[b]	16.4[b]	16.1
Score changes[2]	0.20[a,b]	-0.24[a]	1.86[b]	-0.74[a]	0.25
Proteins (g)					
Score changes[1]	0.43	-1.10	2.53*	-0.70	0.25
Baseline	14.7[a]	18.5[b]	15.1[a]	18.6[b]	16.8
End line	15.2[a]	17.4[a,b]	17.6[b]	17.9[b]	17.0
Score changes[2]	0.43[a,b]	-1.10[a]	2.53[b]	-0.7[a]	0.25
Iron (mg)					
Score changes[1]	1.10	-2.20	3.60*	3.30	1.40
Baseline	13.7[a]	19.7[b]	14.5[a]	16.9[a,b]	16.3
End line	14.8[a]	17.5[a,b]	18.1[a,b]	20.2[b]	17.7
Score changes[2]	1.10[a,b]	-2.20[a]	3.60[b]	3.30[b]	1.40
Calcium (mg)					
Score changes[1]	0.91	-1.37	1.95*	1.25	0.66
Baseline	3.6[a]	9.7[b]	3.3[a]	8.0[b]	6.2
End line	4.5[a]	8.3[b,c]	5.3[a,b]	9.3[c]	6.9
Score changes[2]	0.91[a]	-1.37[a]	1.95[a]	1.25[a]	0.66
Phosphorus (mg)					
Score changes[1]	-0.27	-1.00	1.83*	-0.52	0
Baseline	9.0[a]	11.7[b]	8.7[a]	11.7[b]	10.3
End line	8.7[a]	10.7[b]	10.5[a,b]	11.2[b]	10.3
Score changes[2]	-0.27[a,b]	-1.00[a]	1.83[b]	-0.52[a]	0
Vitamin A (RE)					
Score changes[1]	-2.46	-6.03	14.39	19.75	6.30
Baseline	88.0[b]	88.6[b]	83.6[b]	45.2[a]	76.3
End line	85.5[a]	82.5[b]	98.0[b]	65.0[b]	82.6
Score changes[2]	-2.46[a,b]	-6.03[a]	14.39[a,b]	19.75[b]	6.30
Vitamin B1 (mg)					
Score changes[1]	12.10*	5.62	3.30	3.80	6.10*
Baseline	18.1[a]	17.0[a]	22.8[a]	23.8[a]	20.4
End line	30.2[a]	22.6[a]	26.1[a]	27.4[a]	26.5
Score changes[2]	12.10[a]	5.62[a]	3.30[a]	3.80[a]	6.10
Vitamin C (mg)					
Score changes[1]	0.81	-3.80	-0.26	0.46	-0.73
Baseline	1.7[a]	7.5[b]	2.0[a]	3.8[a,b]	3.8
End line	2.5[a]	3.7[a]	1.7[a]	4.3[a]	3.1
Score changes[2]	0.81[a]	-3.80[a]	-0.26[a]	0.46[a]	-0.73

Notation: WM: Without Media, P: Poster, L: Leaflet, M: Multimedia. [1]Results of paired sample t-test
[2]Results of ANOVA test based on the score changes at the end line-baseline. *Results of significant test ($p<0.05$)
[a,b,c]Are the variables followed a different letter on the same lines showed different results between treatments ($p<0.05$)

proteins and fats, but also determined by the content of vitamins and minerals (Clark and Fox, 2006). In general, the nutritional quality of breakfast intake on the subjects in all groups increased at the end line. The results of paired sample t-test showed the nutritional quality of subjects' breakfast intakes between the baseline and

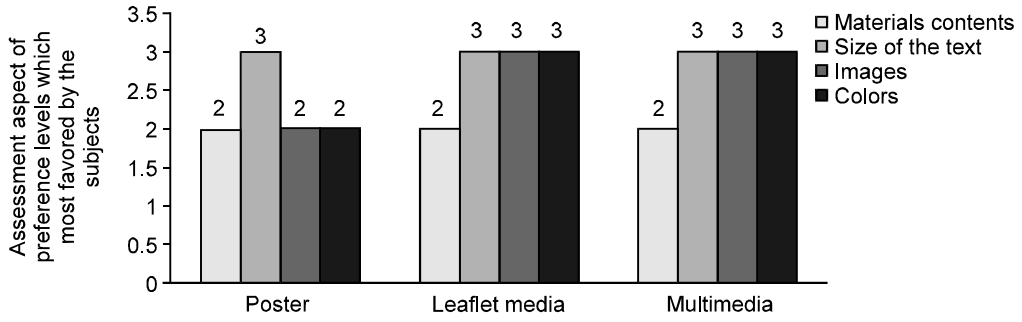

Fig. 1: Assessment aspect of preference levels which most favored by the subjects of each media

end line was significantly increased in all groups ($p<0.05$). The average score of nutritional quality of subjects' breakfast intakes at the baseline and end line was categorized as very inadequate. ANOVA test results at the baseline showed that the average nutritional quality of subjects' breakfast intakes was significantly different in all groups ($p<0.05$).

After the intervention (end line), the results of the ANOVA test showed no significant difference on average nutritional quality of subjects' breakfast intakes in all groups ($p>0.05$). However, this results have yet to illustrate the media effectiveness used due to the difference of the baseline, thus the score changes were observed. ANOVA test results based on the score changes in nutritional quality of subjects' breakfast intakes at the baseline and end line showed a significant difference between the media ($p<0.05$). The highest score increase in the nutritional quality of subjects' breakfast intakes was in the L (leaflet) group (Table 5).

Intake and nutrients contribution of breakfasts: In general, intake and nutrients contribution of subjects' breakfasts was significantly increased in the treatment group, except for phosphorus and vitamin C. The results of paired sample t-test showed that the intake and nutrients contribution of subjects' breakfasts was significantly increased at the end line ($p<0.05$), except for phosphorus and vitamin C of subjects' breakfasts. ANOVA test results showed that the average intake and contribution of energy, proteins, iron, calcium, phosphorus, vitamin A and vitamin C of subjects' breakfasts at the baseline were significantly different ($p<0.05$). After the intervention (end line), ANOVA test results indicated that the average intake and nutrients contribution of subjects' breakfasts (intake of energy, proteins, iron, calcium, phosphorus, vitamin A) at the end line was significantly different in all groups ($p<0.05$), except for the intake and contribution of vitamin B1 and vitamin C of subjects' breakfasts ($p>0.05$). However, this results have yet to illustrate the media effectiveness used due to the difference of the baseline, thus the score changes were observed.

ANOVA test results based on changes in the intake and nutrients contribution of subjects' breakfasts at the baseline and end line showed that there were significant differences in the intake and contribution of energy, proteins, iron and phosphorus of subjects' breakfasts in the L (leaflet) group ($p<0.05$). Nutrition education interventions on leaflet media have a positive effect on the intake and nutrients contribution of subjects' breakfasts. An increase in nutrient intakes of subjects' breakfasts at the end line was not only dominated by the staple food or carbohydrate source, but also followed by the proteins, vitamins and minerals sources. Overall, the contribution of energy, proteins, iron, vitamin A and vitamin B1 of the subjects' breakfasts was in accordance with the nutritional adequacy of a good breakfast (15-25% of Energy Intake Adequacy (EIA) (Table 6).

DISCUSSION

Subjects' preference levels from the aspects of images and colors were significantly different. The children's world is full of imagination and creativity, that is why most of the children prefer an interesting image and color (Hamida *et al*., 2012). The higher score of subjects' preference levels on the leaflet media was happened because in this group, the leaflets were distributed to each subject so that the subject could see and judge the component contents in details (Ewles and Simnett, 1994). While the subjects in M (multimedia) group and P (poster) group could not bring the presented materials as the L (leaflet) group, thus the subjects could not see and judge the component contents in details.

The differences in subjects' breakfast knowledge scores at the baseline were due to differences in the socio-economic statuses of subjects in the treatment group in which the subjects in the WM and L groups were at the low-middle income families, while the P and M groups were in the upper-middle income families. The subjects' breakfast knowledge in this study was associated with the education levels of parents, particularly mothers'. Most of the WM and L groups subjects' mothers were high schools educated, the P and M groups subjects'

mothers have bachelors/graduate schools degrees. The education levels of parents, particularly mothers, will affect the eating habits and food choices for their children, as well as a better knowledge and attitudes about the benefits of healthy foods (Cribb *et al*., 2011; Yabanci *et al*., 2014).

The results of this study suggests that to improve the nutrition knowledge, someone can use the media or without the education media, in which it depends on the characteristics of the target. The use of lecture and discussion techniques in this study were found to increase the participation and student satisfaction in receiving information. This is in accordance with the results of research in the US which shows that there were significant differences in the groups' nutrition knowledge with the intervention techniques of lecture and interactive discussion (Katz *et al*., 2011). The presence of nutrition education media can help to facilitate the delivery of health and nutritional messages (Fitriani, 2011). The delivery of nutrition counseling is strongly influenced by human resources, which means that the counseling will be successful if the speaker or instructor masters the material delivered (Yuliyanti, 2010). This is supported by Sharrif's statement that the success of nutrition education interventions should also include materials and teaching strategies which are in accordance with the stages of children's development and changes in the environment (Sharrif *et al*., 2008).

The highest score increase in the subjects' breakfast attitudes was in the L (leaflet) group. This is presumably due to the increase on subjects' breakfast knowledge in the L group that influenced the increase in subjects' breakfast attitudes. Nutritional attitudes often closely related with the nutrition knowledge that if someone has the good knowledge of nutrition, someone tends to have good attitude of nutrition too (Koerniawati, 2013). This is supported by the study conducted in the elementary school children in Taiwan which shows that children who have a good knowledge of nutrition also expressed a positive nutrition attitude, in which they care about the nutrition behavior and understand a good food quality (Lin *et al*., 2007). In the L (leaflet) group, each subject received a leaflet which can be carried easily and read anytime, thus made it easier for the subject to read and understand the message conveyed in the leaflet in details. Nutrition counseling will be more successful if it is accompanied with the counseling media. The material would be better if prepared in the forms of schemes and attractive images in a counseling media (Yuliyanti, 2010).

Attitude is not an innate nature, but rather formed and studied throughout human development in relation to its object. Something that has been and is being experienced will help shaping and influencing the appreciation of the stimulus. Response becomes one of the basic formations of attitude (Azwar, 2007). In this study, leaflet was the stimulus or object that affecting the subject to be in accordance with the message or the content of the leaflet. Nutrition knowledge alone is not enough to make a change in the students' nutrition attitudes, internal (individual) and external (parents and teachers) motivations are needed to encourage and guide the students to the positive attitudes (Nyapera, 2012).

Nutrition education interventions in this study can increase the frequency of subjects' breakfasts. This is presumably influenced by the increase in subjects' breakfast knowledge scores obtained from the nutrition education. Knowledge or cognitive is very important domain for the formation of practices or actions (overt behavior) (Sherman and Muehlhoff, 2007). This study is in accordance with the results of a cluster randomized control study in 111 elementary schools in the UK which showed that a healthy breakfast intervention could significantly increased the frequency of children's breakfast (from 1 times/week to 5 times/week (Murphy *et al*., 2010).

Based on the grouping of breakfast intake types, it showed that the quality of the children's breakfast menu was good enough because mostly contained carbohydrates and proteins, but still less-varied in fruits and vegetables consumption. There was an increase in the subjects who consumed nutritious breakfasts. This is presumably due to an increase in the breakfast knowledge obtained by the subjects during nutrition education. Nutrition education interventions provided positive change in the subjects' breakfast intake types. The study conducted on the 5th-grade elementary school students in Korea showed that there were significant changes in the types of student breakfast and a selection of healthier snacks after nutrition education interventions (Lim *et al*., 2012).

The highest improvement of nutritional quality of breakfast intake, intake and nutrients contribution on subjects' breakfasts was in L (leaflet) group. This is presumably due to an increase in subjects' breakfast knowledge and attitudes in L (leaflet) group. Knowledge and attitudes are factors that facilitate or predisposing factors of someone's behavior (Hermina *et al*., 2009). The images on the leaflet can generate children's motivations or interests to help interpreting and rmemorizing the messages related to the images (Fitriani, 2011). Breakfast adequacy level between 15-25% of Energy Intake Adequacy (EIA) is categorized as a moderate level of adequate breakfast (Preziosi *et al*., 1999; Yeoh *et al*., 2009). However, adequacy levels of calcium, phosphorus and vitamin C in the subjects' breakfasts were tend to be deficit. This is presumably due to the small number of subjects who consume nutritious breakfast. Healthy breakfast contains enough energy (15-25%) of daily energy requirements, adequate dietary fiber, low fat, no trans fat, low glucose and beverages (Hardinsyah, 2012).

In this study, nutrient intakes of subjects' break-fasts were still low suspectedly due to the frequency of nutrition education interventions which were only conducted two times and one month of intervention period that was not enough to change the overall subjects' breakfast practices. Individual practices will decrease over time due to the decrease in the intellectual stimulation accepted (Hayati, 2009). The knowledge delivered after three to four weeks of interventions can only remains 15-20% in the brain, thus to make the information lasts longer in a long-term memory, the interventions can be conducted at least in two-week interval after the intervention (Al-Shara and Ibrahim, 2007; Custers, 2010). Therefore, nutrition education interventions must be conducted regularly to be able to influence the attitudes and practices of the subjects' breakfasts. 2 weeks to 1.5 months intervention duration is considered as a short-term period which is unable to strongly influence the behavior change (Fairclough *et al*., 2013).

Subjects' breakfast practices were still low due to lack of factors that supported or facilitated the someone's attitude/behavior (enabling factors), namely the lack of infrastructure to support a healthy breakfast in which the school canteens only provided low-nutrient snacks. In addition, it is necessary to have factors that encourage or reinforce the attitudes/behaviors (reinforcing factors), the support of the family (parents), teachers, peers and community leaders to improve subjects' breakfast practices (Hermina *et al*., 2009).

Nutrition education interventions that delivered in this study have not been able to change the subjects' breakfast practices because the change in health-related attitude/behavior requires a two-phase process, namely motivation phase and action phase. Nutrition education interventions conducted in this study were in the level of motivation phase aimed to influence the attitude along with the social norm and self-efficacy which will determine the intention for change. The combination of self-efficacy and intention will determine the action plan alongside with the environment, as well as the skills and the ability that will become one of the phases towards the nutritional behavior wanted (Contento, 2008). As a result, the process and the role of other factors are necessary to increase knowledge and attitudes impacted on behavior change.

Conclusion and recommendation: Subjects' breakfast knowledge and attitudes were increased during the end line in the all groups, but the change of subjects' breakfast knowledge scores at the baseline and end line did not significantly different, while the change in subjects' breakfast attitude scores were significantly different between media. An increased in subjects' breakfast attitudes scores were highest on the leaflet group. Subjects' breakfast practices showed an increase at the end line, but still categorized as less and have yet to meet the overall nutritional adequacy. The highest increased in nutritional quality of breakfast intake, intake and nutrient contribution of subjects' breakfasts showed in the leaflet group. This means that nutrition education interventions using media particularly leaflet, was effective to improve subjects' breakfast attitudes and practices.

The nutrition educators and health professionals are expected to conduct nutrition education interventions with or without the media depending on the characteristics of the target. The lack of breakfast practices in children are happened because the change in breakfast habits in children is not only determined by the understanding of good nutrition, but also takes the supports from the family (parents), school (teachers) and the environment to improve it, thus the provision of nutrition education interventions needs to be conducted periodically and integrated to improve the practice of children's breakfasts.

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