

The Effectiveness Assessment of Short Term Nutrition Education (GENERATOR) as A Strategy to Reduce Diabetes Risk among Office Employees

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ABSTRACT— *Indonesia has the fifth largest number of diabetic case (9.1 million), and it is still predicted to grow in the future. Office employees are vulnerable population, especially in developing country due to lack of nutritional and health related knowledge, “obesogenic” environment, as well as another barriers to live healthy lifestyle. All of these are risk factors to develop non-communicable diseases such as diabetes among them. Several studies have shown promising association between nutrition education intervention and health related behavior improvement, not only in general health issue but also in diabetes risk prevention. GENERATOR (Fun and Healthy Movement in the Office) is a short term nutrition education program that conducted to inspire healthy lifestyle at Jakarta area, targeted to offices employee. This program was expected to act as the first intervention to increase nutrition and health related knowledge, assessed by perception and attitudes score toward healthy lifestyle among the target market, specifically related to diabetes risk prevention. The effectiveness of GENERATOR program was measured using pre- and post-test questionnaires. Another self-reported questionnaire also filled in to observe respondent characteristics such as sex, family history of diabetes, and perceived barrier to live healthy. There is a significant increase in perception and attitude score for all variables from pre to post test ($p < 0.05$). Around 44.3 % of the participants have diabetes family history. No time for exercise become the main barrier to live a healthy lifestyle (39.2%). This is the first pilot study to show the effectiveness of short term nutrition education to increase perception and awareness of healthy lifestyle among offices employee. In a company setting, this program may be adopted as the first strategy to increase employee health and wellness, focusing on awareness, perception, and attitudes, not only diabetes but also other non-communicable diseases. This will lead to an increase in employee productivity, resulted in the betterment of the company in the future.*

Keywords— nutrition education, diabetes prevention, offices employee, knowledge, perception, attitude

1. INTRODUCTION

With a population of 249.9 million people in 2013, Indonesia is the world's fourth most populated country. It also has the fifth largest number of diabetes case (9.1 million) and this number has increased from 7.6 million in 2013, and it is still predicted to grow in number [1].

Several studies have shown promising association between nutrition education intervention and health related behavior improvements not only in general health issue but also in diabetes risk prevention [2,5]. On the other hand, there are also some evidences showing that the level of nutrition knowledge particularly regarding diabetes and sugar intake is low in developing country, thus again, highlighted the importance of nutrition education specifically relating to diabetes and its risk factors in developing country, including Indonesia [2]. This fact is supported by one local study

which stated that around 77.8% of the governmental employees have a lack of knowledge about nutrition and weight management, although the organization is working within health sector [3].

Jakarta is Indonesia's capital city, thus the most populated area in the country. According to National Census conducted in 2010, the majority of Jakarta's population consists of office employee [4], while it is popularly known that most of the office environment is quite stressful, due to chronic job stress and lack of physical activity. These problems are strongly associated with being overweight and obese which are also the risk factors of type 2 diabetes [5].

To our knowledge, there is currently no research investigating the effectiveness of short time nutrition education, related to diabetes, emphasizing on sugar intake, weight management, and physical activity among office employees. This is considered as a strategy to reduce the risk of type 2 diabetes, among office employees in Indonesia, mainly in Jakarta.

GENERATOR (Gerakan Sehat Seru di Kantor, translated to "Fun and Healthy Movement in The Offices in English) is the program we conducted to inspire healthy lifestyle in the offices at Jakarta area, mainly consists of short-term nutrition education program regarding diabetes, sugar consumption, weight management, and physical activities among office employees. The main objective of the program is to increase awareness and nutritional knowledge among office employees regarding health factors that related with diabetes, thus it will contribute to the betterment of their health profile as a part of health promotion strategies.

This is the first study to evaluate the effectiveness of short-term nutrition education which is embedded in GENERATOR program using perception and attitudes score among offices employee, specifically related to diabetes and healthy lifestyle. Program effectiveness is assessed using pre- and post- test, hence this will be beneficial as a pilot study to develop more comprehensive nutrition and health education program in the future among the target market. The secondary objective of this study is also to assess offices employee family history of diabetes and their barriers to live a healthy lifestyle.

2. MATERIAL AND METHODS

GENERATOR program consists of short-term nutrition education program about diabetes, weight management, sugar consumption, and physical activity among office employees in Jakarta. This program was conducted by Nutrition and Health Education Department under Nutrifood Research Centre Division. It was conducted in a one-way presentation where the selected educator taught nutrition related materials to all participants using a power-point slides presentation. The presentation consists of 4 main parts, which are the health effect of too much sugar consumption (including the sugar content of local food products, socialization of sugar consumption limit), the benefits of low-calorie sweeteners consumption (including the safety and regulatory aspects), the benefits of physical activities, and weight management (including the BMI-Body Mass Index calculation). There was also games and "Questions and Answers" session within this 1 hour program. Therefore, although it was still considered as a short-term type of nutrition education, GENERATOR already contains all the essential part of nutrition education, thus reached its objectives.

Due to the short-term education type of this program, then the perception score were measured as the effectiveness parameter for the evaluation. This is in accordance with theory-based nutrition education proposed by Contento (2014) which stated that perception and attitude can be measured as an effectiveness indicator for short-term nutrition education evaluation [6]. These were measured using pre- and post-test on 5 variables consist of the following, which are perception of sugar consumption, low calorie sweetener, the importance of physical activities, awareness of checking blood glucose, and weight management. These variables are developed in a question form to measure their perception and knowledge before and after the program. Each variable scored from 1-4 to measure respondent's agreeableness. The questions used within the questionnaires are shown in Table 1.

Table 1. Statement in the pre- and post perception questionnaires

Statements	1 (Strongly disagree)	2 (Disagree)	3 (Agree)	4 (Strongly agree)
The habit of too much sugar consumption is not good for health				
Consuming approved low calorie sweeteners or no-calorie sweeteners is better than sugar consumption				
Light-type of exercise performed 30 minutes per day will impact your health, significantly				
As long as I feel healthy, I do not need to check my blood glucose level				
Although my BMI is not in an ideal range, it is still okay as long as I feel healthy.				

Furthermore, another self-reported questionnaire also filled in to assess their characteristics such as sex, family history of diabetes, and perceived barrier to live a healthy lifestyle. Mean value of pre- and post- test questionnaires were

calculated using *paired t-test* mean comparison with 95% *confidence interval* and 5% alpha. Data was analyzed using SPSS version 21.

3. RESULTS AND DISCUSSION

GENERATOR program provides a list of 215 participants from several offices in Jakarta area, who filled up the questionnaires completely and the respondent characteristics is shown in Table 2. The response rate was 36.7% response, equal to 79 participants in the end of measurement.

Table 2. Respondent characteristics in GENERATOR program

Characteristics		No. of respondents	Percent (%)
Sex	Male	29	36.7
	Female	50	63.3
Total		79	100
Age	<35 years old	49	62
	≥35 years old	30	38
Total		79	100
History of diabetes	Yes	35	44.3
	No	30	38
	Don't know	14	17.7
Total		79	100
Obstacle of living healthy	Lack of health information	10	12.7
	No access to healthy food	8	10.1
	No time for exercise	31	39.2
	Other reason	30	38
Total		79	100

Despite of the respondent's small numbers involved in this study, results of descriptive analysis may be used as the preliminary data. As shown in Table 1, up to 44.3 % of the participants, meaning 4 out of 10 office employees in Jakarta have diabetes family history. Research has shown that having history of diabetes among family members will increase the risk of diabetes development 6 times higher compare with the counterpart [7]. Furthermore, no time for exercise become the main barrier to pursue a healthy lifestyle among the respondents. This limitation also believed to increase their risk of diabetes even higher in the future. Meta-analysis that includes 16 different studies has identified a strong association between sedentary behavior and diabetes. Within this study, it is reported that high level of sedentary behavior is associated with a higher relative risk of diabetes (around 112%) [8]. Accordingly, these results reinforce the reasons on why office employees should be the main target of GENERATOR program, which are to improve their health conditions and willingness to reduce their risk of having diabetes in the future.

GENERATOR program showed statistically significant changes in participants perceptions to live a healthy lifestyle (*p-value*<0.05) in all variables as shown in Table 3. These results provided another evidences showing the effectiveness of short-term nutrition education to increase nutritional knowledge and awareness among Jakarta's offices employee, specifically regarding diabetes, sugar consumption, and weight management, assessed through perception and attitudes score. Several studies have shown promising association between nutrition education and health related behavior, for instance, in Korea, it appears that nutrition education program for aged diabetes mellitus patients might effectively increase nutrition knowledge, dietary behavior, and diet quality [9].

Table 3. Perception and attitude toward diabetes risk factors after GENERATOR Program

Parameters	Means		Range (CI 95%)	t-test
	Before Program	After Program		
Perception toward the health effect of too much sugar consumption	3.078	3.355	-0.414- -0.139	0.0001*
Perception towards low calorie sweetener as a healthier alternative	2.882	3.079	-0.327- -0.068	0.003*
Perception towards the importance of physical activity	3.500	3.737	-0.376- -0.979	0.001*
Perception towards the importance of monitoring blood glucose	2.829	3.013	-0.327- -0.041	0.012*
Perception towards the importance of having ideal body weight	2.855	3.039	-0.337- -0.032	0.019*

(*with alpha 5%, statistically significant (p <0.05))

Perception towards the health effect of too much sugar consumption increased significantly with *p-value* 0.0001 as shown in Table 3. This variable needs to be improved because of the health effect of it, not only within office employees as the respondents but also for other parts of society. Sugar consumption has been traditionally accepted as the main sweeteners among Jakarta's people. Nationally, sugar consumption is increasing from year to year. In 2014, it is reported that sugar demand was estimated around 5.7 million tonnes in which half of it individually consumed [10]. On the other hand, Indonesian Ministry of Health has provided recommendation on limiting sugar consumption per day which is 50 g, equal to 12 teaspoon [11]. This shows a great concern of government on nation sugar consumption, again due to the health effect of consuming too much sugar. Meta-analysis studies show that intake of high- sugar drinks in the highest quintile increases a person's risk of developing diabetes until 26%, and this risk was positively correlated with the increase in the amount of consumed sugar [12].

In line with the significant increase in perception score of too much sugar consumption, the score of perception towards low calorie sweetener has also increased significantly ($p < 0.05$). This shows the increasing acceptance of respondent towards the usage of non-nutritive sweeteners or low calorie sweeteners as the alternative to sugar. The evidences reviewed suggests that when used responsibly, non-nutritive sweeteners (NNS) and low calorie sweeteners could facilitate reductions in added sugars intake, thereby resulting in decreased total energy and weight loss/weight control [13]. Another recent study published in 2015 has also found the promising beneficial effect of sugar-sweetened beverage substitution with non-nutritive sweeteners, which is reducing the risk of type-2 diabetes development around 5-7% [14].

The other challenge that needs to be addressed within this program was the respondent's barriers to live a healthy lifestyle, such as lack of time to perform physical activity as shown in Table 2. Evidently, Indonesian tends to be physically inactive. Unpublished report stated that in average, Indonesian only spend 2 hours per week for doing exercise, less than scientific recommendation, which has suggested to do exercise at least around 3 hours per week [15]. Nonetheless, this might be difficult to be applied to office employees due to their sedentary office activity, chronic job stress, and busy schedule. Therefore, higher efforts is needed in the future to embrace the importance of physical activity among office employees.

In addition, people tend to associate physical activity with heavy exercise that required a lot of time [16]. However, within this program, it is also explained the beneficial of performing light-type physical activity only 30 minutes per day, regularly such as car washing, jogging, yoga, or house cleaning that may be used as an alternative to heavy exercise or activity that require a lot of time. After the program, there was a significant increase score of perception toward the important of physical activity. Epidemiological studies suggest that individuals who are physically active have a 30-50% lower risk of developing type 2 diabetes rather than sedentary persons. Risk reductions are observed with as little as 30 min of moderate intensity activity per day [17].

Surprisingly, this program also resulted in significant increase for another variables including the importance of routine blood glucose check and the importance of body weight management ($p < 0.05$). Evidence has found that routine periodically blood glucose monitoring may help identify and prevent unwanted periods of hypo- and hyperglycemia which may lead to the risk of diabetes or making the diabetes status even worse [18]. Based on IDF (2014), it is reported that 2 out of 3 diabetics people in Indonesia do not realize their diabetes status [19], hence highlighted the importance of routine blood glucose check among Indonesian people and this issue needs to be addressed and communicated through education.

Another important variable that can prevent diabetes risk is having an ideal or maintaining healthy body weight. The perception toward this variable's score has increased significantly after the program ($p < 0.05$). Previous research reported that 48.3% of governmental employees sector are obese [3], although the organizational itself engaged in health sector. Therefore, it may also be a concern for private sector to develop healthier behavior to prevent obesity. Many studies have shown that an increase in body weight were associated to have hypertension, diabetes, dyslipidemia, and metabolic syndrome compared with those with normal body weight [20].

Studies have also shown the beneficial effect of nutrition education in developing countries, for example, KAP (Knowledge, Attitude, and Practice) Study from South India have shown that educated diabetics type II individuals gain longer term control [21]. Attitude and perception change by health intervention also can lead to the better job performance among employee in future, according to the meta-analysis from 1969 through 2007 that some workplace physical activity interventions can improve both health and important worksite outcomes [22].

There are several limitation of this study. Firstly, the number of respondents are quite small and the response rate of the study was low. However, this study might describe the real condition of office employees in Jakarta due to the randomness of respondents followed the program. Secondly, this study was concentrated in Jakarta area, thus it might be difficult to generalize this result to other region or national. Therefore, in the future, it is suggested to perform a more comprehensive study involving bigger number of respondents and another region in the country to compare the effect of nutrition education. The results might be different due to local wisdom or differences in ethnic, culture, etc.

For the strengths, short-term nutrition education as performed by GENERATOR program is proven to be an effective option to increase awareness, perception, and knowledge about healthy lifestyle, specifically diabetes, weight management, and physical activity. This serves as a good start of health intervention related with diabetes among offices employee in Jakarta [23]. Although, there have been another nutrition education program performed by other

stakeholders such as universities, government, or other companies, still these are still very scattered, both regionally or nationally. Therefore, it is suggested to build and develop a more holistic yet comprehensive education program, not only in diabetes but also addressing other non-communicable diseases among office employees.

4. CONCLUSIONS

From this study, it is found that office employees are vulnerable population to develop non-communicable diseases, such as diabetes due to their family history of diabetes and their barriers to live a healthy lifestyle, such as lack of time to exercise. Short term nutrition education program such as GENERATOR is significantly proven to be an effective way to increase nutrition knowledge, evaluated through perception and attitudes score. Improved perception and attitude are expected to be a trigger for the beginning of a better healthy behavior among office employees.

Accordingly, authors expected that GENERATOR program may be further developed, with in-depth, and more sustained program that will be escalated in the future, supported by all the related stakeholders, namely from the government, another industrial partners, and the society itself. Furthermore, in a company setting, this program may be adopted as a the initial program to increase employees health and wellness, focusing on awareness, perception, and attitudes not only in diabetes related issue, but also addressing other non-communicable diseases such as cardiovascular disease, bone and joint health, etc. This will lead to an increase in employee productivity which at the end, contributes to the betterment of the company itself.

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