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Effect of Family Empowerment Modified Model to a Family's Ability in Controlling Life Style and Physical Activity of Children with Overweight and Obesity

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Abstract: Overeating and physical inactivity has led to an increase in the prevalence of overweight and obese children in developing countries which lead to Non Communicable Disease (NCD). Family's role is important in controlling children lifestyle by developing and implementing a Family Empowerment Modified Model (FEMM) through the health promotion and family maintenance. This study aims to determine differences in the family's ability controlling the lifestyle and physical activity of obesity and overweight children at pre-post intervention of FEMM. The design was Quasy Experiment with pre-post test of control group design by using family's ability questionnaire, WHO's AntrhoPlus software, 2007 and Physical Activity Questionnaire for Older Children (PAQ-C) through home visits for 6 months to intervention and control group. Mann Whitney test result showed a difference of family's ability in pre-post test between intervention and control group, while Independent t-tests showed a difference of children's physical activity in pre-post test. This study has successfully formulated FEMM proving an increase of family's ability in controlling the lifestyle of children and bringing positive changes in family's ability and children's physical activity after intervention.

Key words: Family Empowerment Modified Model, family's ability, physical activity, children, overweight, obesity

INTRODUCTION

Overweight and obesity are in the fifth place as the cause of death. There are 44% of diabetic cases, 23% of ischemic heart disease and 7-41% of cancer caused by overweight and obesity. The estimated prevalence of overweight and obesity in children is 35 million in developing countries, higher compared to 8 million in developed countries (World Health Organization (WHO), 2010). Based on The National Youth Risk Behavior Survey (YRBS) from 1999 to 2011 in 9-12 year-old children, the prevalence of obesity increased from 10.6% to 13% while the overweight also increased from 14.2% to 15.2% (CDC, 2011b). Obesity is a problem that is happening in developing countries, including Indonesia. A group of Indonesian people, especially in large cities, experienced a major public health problem triggered by the presence of excess nutrients and less activity in childhood (Hamam, 2004; Wong *et al*., 2009; Mallongi *et al*., 2015).

Rapid lifestyle changes including diet and activity has led to an increase in the prevalence of obese children (5-19 years old) in developing countries. The prevalence of obesity in 5-19 year-old children has increased since 1999 until 2004 in Indonesia. The percentage of obes childre raised from 5.3 to 8.6%, while overweight children raised from 2.7 to 3.7% according to the CDC cut offs standard (Gupta *et al*., 2012). A study conducted by Sartika (2011) found that the prevalence of obesity (percentile > 95) children in age range 5-15 years old in Indonesia was 8.3%.

According to the National Youth Risk Behaviour Survey (YRBS) from 2005-2011 on children at elementary school (9-12 year-old) showed children using computer for 3 hours or more per day experienced an increase of obese prevalence, while those watching television for 3 hours or more per day did not experienced any change (CDC, 2011c). In addition, according to Riset Kesehatan (2007), the number of people aged >10 years old with lack physical activity was as much as 48.2% from the whole population while in the 10-14 years age group with lack physical activity was 66.9% (sedentary behavior that was 3-5, 9 h on aged ≥10 years old was 42%). Throughout the different days-segments, several majors of Physical Activity (PA) and Sedentary Behavior (SB) competed with each other, where screentime and homework were dominant compared to activity domains of sports and active leisure during the critical-early evening segment while the domain of active travel competed directly with motor travel during the morning and early-evening segment (Baere *et al*., 2015).

According to Health Department (2009), unhealthy lifestyles lead to cardiovascular diseases, cancer and other non-communicable diseases, giving obstacles to

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Law Number 17 Year of 2007 about the National Long Term Development Plan (Rencana Pembangunan Jangka Panjang Nasional/RPJPN). The percentage of South Sulawesi's lack of activity was 49.1% (<150 minutes per week), bigger than other provinces (Riset Kesehatan, 2007). The same thing happened to Riset Kesehatan (2013) that was lack active activities in ≥10 years age group by 31% over the average value of Indonesia that was 26.1%. Lack activity is an unhealthy lifestyle that lead to Non Communicable Disease (NCD). Mushtaq *et al*. (2011) showed that the lifestyle including watching television, working on the computer and playing video games was significantly associated with high BMI and the risk of being overweight.

The best method for dealing with overweight and obesity is behavior therapy in childhood diet and exercise, combined with behavior modification through health promotion related to motivation, attitudes, habits and cultural potential (South Sulawesi Provincial Health Office, 2010). This strategy provided a long-term benefit in accordance with the strategy of diet and WHO global physical activity through the family's ability in controlling the lifestyle of the children (WHO, 2010).

The impact of overweight and obesity is harmful for children, demanding the increase in role of nurses in nutrition education collaborating with teachers, parents and children to plan and implement guidelines for nutrition and physical activity. A better understanding and knowledge of family involvement in children weight management care will help to improve existing health service in managing pediatric obesity (Ball *et al*., 2012). Strategy that can be used is family empowerment in controlling lifestyle of obese children with Family Empowerment Modified (Model FEMM), which is a modification of Transcultural Nursing (TCN) related to the culture of the family caring for children (Leininger, 2002), Child Healthcare Model (CHM) as a health promotion and maintenance in all aspects of care for children (Ball and Bindler, 2007; Ball *et al*., 2010) and the Transtheoretical Model (TTM) as a behavioral change that helps children and parents in implementing a healthy lifestyle (Prochaska *et al*., 2008; Noia and Prochaska, 2010) which focused on the ability of the family. Application of FEMM by family in controlling the lifestyle of the children is consistent with the goals of Healthy People 2020, the CDC (2011a) where a healthy food intake and physical activity in children and adolescents was a comprehensive plan for health promotion and disease prevention. Thus this study was conducted to see the difference in family's ability to control lifestyle and physical activity of overweight and obesity children in pre and post intervention of FEMM.

MATERIALS AND METHODS

The design used was Quasy Experiment with pre-test and post-test of control group design. The research was conducted from August 2013 to March 2014, located in Biringkanaya and Tamalanrea districts, Makassar. Application of Family Empowerment Modified Model used two groups: the treatment group was given a health education for 6 months by providing guidebooks of healthy lifestyle, healthy living behaviors application and leaflets to overweight children, whereas the control group was only given the form of leaflets. This study assessed the difference before and after the intervention includes: families' ability to control the lifestyle and children's physical activity. This research was conducted families' at Elementary school of Tamalanrea 1, 2, 3, 4 and 5 sampled 64 parents and overweight or obese children in grade 4,5 and 6, consisting of 31in treatment group and 33 in control group. It was conducted through home visits every month to monitor the ability of family and children's physical activity.

Family Empowerment Modified Model (FEMM) is a modification of Transcultural Nursing (TCN), Child Healthcare Model (CHM) dan Transtheoretical Model (TTM), which focuses on the empowerment of the family in controlling healthy lifestyle in children with overweight and obesity. The role of nurses and practice in daily life are very important in improving the family's ability to control a healthy lifestyle in children. There are four things that are important and interrelated in carrying out the role of the nurse that families will be able to control the healthy lifestyle in children (Fig. 1), namely (1) the dimensions of the culture and social structure, (2) community, (3) the role of nurses and practice in the promotion and health care, (4) decision balance and self efficacy of family that need action in the process of change keeping the child healthy lifestyle.

The independent variable is FEMM, while the dependent variables are a family's ability and children's physical activity. This study was approved by the Ethics Committee of the Medicine Faculty of Hasanuddin University. The questionnaires were filled by direct interview conducted by a trained team. After screening, all selected samples through screening were measured by a trained team of 4 people. The measurement included measurement of weight and height, then the determination of the category of overweight and obesity with children's BMI using WHO AntrhoPlus software (2007) for children aged 5-18 years and children's nutrient status evaluation book (Kementerian Kesehatan Republik Indonesia, 2011). Before and after the intervention, the family's ability was measured by a questionnaire whose validity has been tested and theassessment of children's physical activity was measured by Physical Activity Questionnaire for Older Children (PAQ-C) suitable for children in elementary school (in grades 4-8, around the age of 8-14 years). The analysis of this study used Mann Whitney test and Independent t-test.

RESULTS

The results showed that between the intervention and the control group, there was homogeneity. Homogeneity test results between the intervention and the control group according to children's gender obtained p = 0.313, father's education obtained p-value = 0856, mother's education obtained p-value = 0453, family income obtained p-value = 0329, parent's overweight history obtained p-value = 0694, family health history obtained p value = 306 and family status obtained p value = 0112.

These results indicate that there is no difference for the children's gender, father's education, mother's education, family income, parent's overweight history, family medical history and family status between the intervention and the control group (Table 1).

These results showed that the intervention group experienced an increase of 100% families in family's ability to control the life style of children in the sixth month while the control group was only 18.2% families (Fig. 2).

Table 2 showed the mean rank value in family's ability in the intervention group pre-test was 1.55 and post-test was 3.48, while the mean rank value of change was 1.93; the mean rank value of the control group was 1.73 at pre-test and 2.24 at the sixth month, while the mean rank value of change was 0.51. It showed that the mean rank of change in family's ability was more in the intervention group than the control group. This shows the mean rank changes in the ability of families aregreater in the treatment group. Mann Whitney test results after the intervention in both groups obtained p-value = 0.00, indicating that there was a difference of family's ability among both groups at the sixth month.

Table 3 showed the mean rank of physical activity of children in the treatment group in the pre test was 21.97 and post test was 31.61, while the mean of change was 9.64. In the control group the mean rank obtained in the measurement of pre rank is 19.03 and at the sixth month was 22.33, while the mean of change is 3.30. It shows the mean changes in children's physical activity was greater in the treatment group. Mann Whitney test results after the intervention in both groups, p-value = 0.00, mean that there was a difference in children's physical activity among the two groups at the sixth month.

DISCUSSION

TCN approach, Leininger (2002, 2007) in Alligood (2010) focused on the culture, beliefs and health practices in promoting health to help others facing unfavorable conditions or diseases. Health promotion of lifestyle in children can change behavior based on the knowledge of the family. According to Rogers in Notoadmojo (2003) that the acceptance of new behaviors through knowledge, awareness and positive attitude, will last in a long time with the process of awareness, interest, evaluation, trial and adoption. In this study, families were given health education of a healthy lifestyle and nutritious food intake for children, so that parents can be a role model for children and able to control the lifestyle of overweight and obesity. This is in line with the CHM, Ball and Bindler (2007), who saw the influence of family, culture and society is seen as an integral part of the strategy of health promotion and maintenance.

Family is the most influential factor to change children's behavior. In this case, the parents play an important role in taking care ofthe children in a long-term period until they reach adulthood. This is consistent with the function of the family according to Friedman (1998), which stated that a function of treatment or maintenance of the family's ability to provide health care affect the health status of the children and families.

According to Prochaska *et al*. (2008), TTM approach was a good strategy that can be used to change children's behaviou help parents and children make decisions more effective in reducing the risk of health problems of the children with overweight and obesity and improve healthy behaviors. Health promotion, according to Health Department (2006), was an effort to empower individuals, groups and communities to maintain, improve and protect health by increasing knowledge, willingness and ability according to local cultural factors. Lifestyle is one of the priorities of healthy behaviors, thus changing the lifestyle of obese children into healthy behavior is an attempt to empower families with health education using Family Empowerment Modified Model.

The graphic of ability change in intervention group clearly showed a rapid increase family's ability starting in the second month from 19.4% to into 100% in the sixth month with a mean rank of change was 1.93; whereas the control group tend to be static from the first to fourth month and increased to 18.2% in the fifth and sixth month. In the control group, there was also a difference of ability increase before and after 6 months with a mean rank of change was 0.51. This was due to a leaflet given in the control group once at the beginning of the visit and the level of education was also high on fathers (66.7%) and mothers (54.5%).

The results of this study were consistent with Davison *et al*. (2013) who conducted pilot test a family-centered intervention for low-income families with preschool-aged children enrolled in Head Start, reported that there was significantly greater self-efficacy in promoting healthy eating in children and increased encouragement for children's physical activity to parents after giving a childhood obesity intervention. Empowering parents having important role in implementation and intervention design is a promising approach to family-centered obesity prevention and rigorous empirical testing (Davison *et al*., 2013).

In addition, The Nutrition And Physical Activity Self Assessment for Child Care (NAP SACC) intervention included educational workshops on nutrition and

Table 1: Analysis of respondents characteristics between the intervention and control group

	Groups				
	Intervention		Control		
Responden characteristics	n (31)	%	n (33)	%	P
Gender					
Male	18	58.1	15	45.5	0.313
Female	13	41.9	18	54.5	
Father's education					
High	20	64.5	22	66.7	0.856
Low	11	35.5	11	33.3	
Mother's education					
High	14	45.2	18	54.5	0.453
Low	17	54.8	15	45.5	
Family's income					
High	31	100	32	97	0.329
Low	0	0	1	3	
Parent's overweight history					
Have history	29	93.5	30	90.9	0.694
Have no history	2	6.5	3	9.1	
Health history					
Have risk	22	71	27	81.8	0.306
Have no risk	9	29	6	18.2	
Structure of family					
Core family	26	83.9	22	66.7	0.112
Big family	5	16.1	11	33.3	

Table 2: Differences of the mean rank of family's ability at pre and post intervention between intervention and control group

		Score of family's ability					
Observation time	Group	Mean/mean rank	Min	Max	Med	p-value	Statistic test
Pret test	Intervention	1.55	1.00	2.00	2.00	0.139	Mann whitney
	Control	1.73	1.00	2.00	2.00		
Post test	Intervention	3.48	3.00	4.00	3.00	0.00	Mann whitney
	Control	2.24	2.00	4.00	2.00		
Change	Intervention	1.93	1.00	3.00	2.00	0.00	Mann whitney
(Post-pre)	Control	0.51	0.00	2.00	0.00		

Table 3: Differences of the mean rank of Physical Activity of Children at pre and post intervention between intervention and control group

		Score of physical activity of children						
Observation time	Group	Mean/mean rank	Min	Max	Med	SD	p-value	Statistic test
Pret test	Intervention	21.97	17.00	29.00	22.00	3.14	0.63	Independen t-test
	Control	19.03	13.00	29.00	19.00	4.91		
	Intervention	31.61	24.00	40.00	32.00		0.00	Mann whitney
	Control	22.33	14.00	32.00	22.00			
Perubahan	Intervention	9.64	-5.00	21.00	9.00	5.71	0.00	Independen t-test
(Post-pre)	Control	3.30	-8.00	10.00	4.00	5.04		

physical activity and consultation visit provided by trained nurse child care health consultant for parents and child care provider showed significant increases in parent's and provider's knowledge of nutrition and physical activity, center-level improvements in policies and child-level changes in children's BMI based on 209 children in the intervention and control centers at both pre- and post-intervention (Alkon *et al*., 2014). Overweight and obese children showed greater reductions in obesity-related traits, which were related to changes in physical activity and healthy eating dietary post interventions included dietary talk delivered to children abd their parents in addition to 45 min of daily physical activity modules (Martinez *et al*., 2015). Primary care physicians should support parents, health educators and policy makers to consider the use of intervention programs to prevent childhood obesity (Saguil and Stephens, 2012).

Application of promotion model of individual empowerment, Health Behavior Change Model, to provide information, guidance and monitoring through ICT (Information and Communication Technologies) gave more insight in the process of improving the e-health in order to complete the individual needs and be a part of health care (Hoyo-Barbolla *et al*., 2006). Henderson, 1966 said that nurses as health care providers (Marriner-Tomey, 1994), helps client and family to regain independence quickly (Potter and Perry, 2005). The importance of health care at home according to the ANA (2001) in Efendi and Makhfudli (2009) was a form of comprehensive health

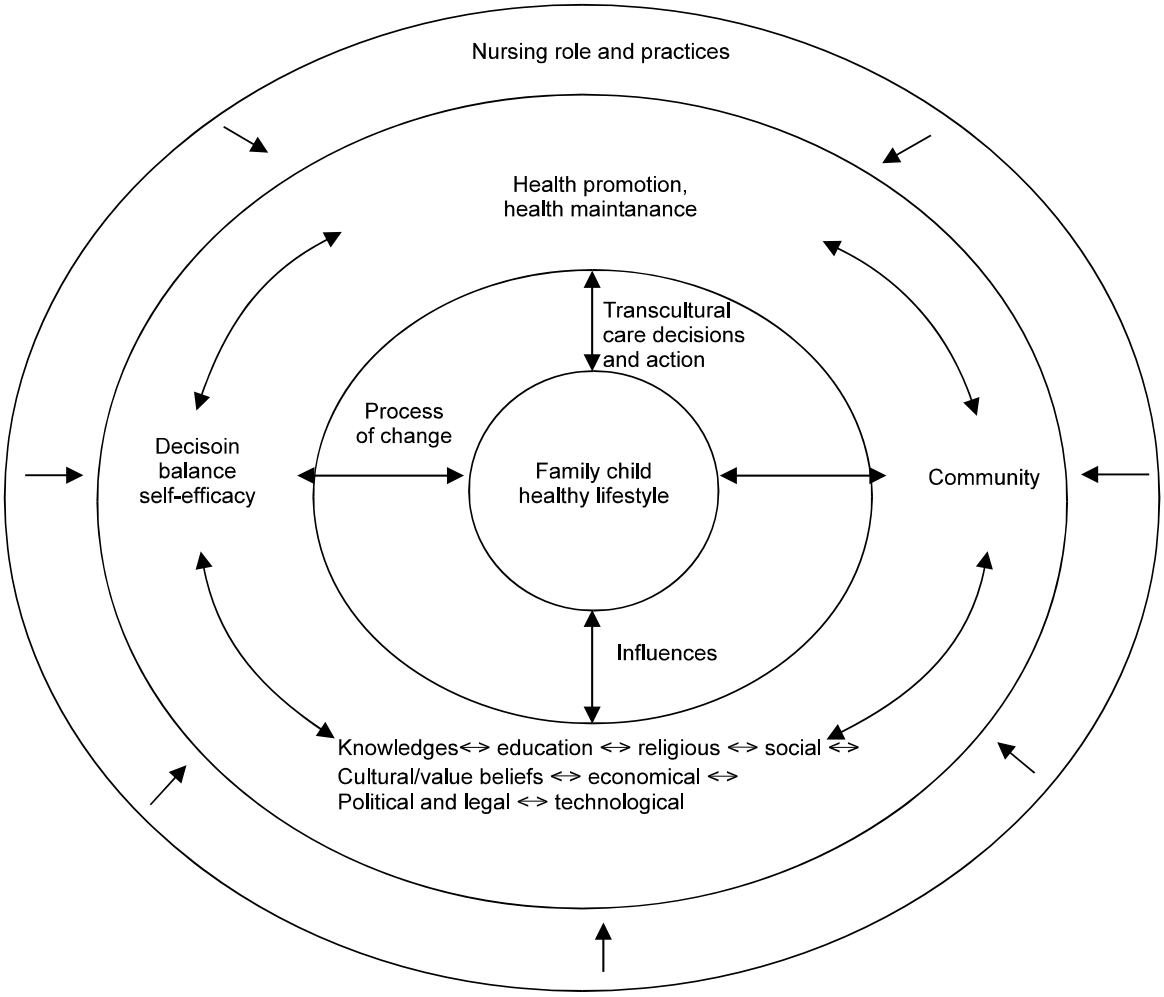

Fig. 1: Family empowerment modified model. Sources: Leininger (2002); Ball and Bindler (2007); Ball *et al*. (2010); Prochaska and Velicer (1997); Prochaska *et al*. (2008); Noia and Prochaska (2010)

service, aimed to make clients including children and families became independent. This was consistent with health development goals towards Healthy Indonesia 2025 RPJPN that is increasing awareness, willingness and ability to live a healthy life for everyone in order to improve community health status as high can be realized (Health Department, 2009).

Johnson *et al*. (2008) stated that in overweight and obese adults (BMI 25-39.9; n = 1277) with multiple behavior interventions showed the ability of TTM was effective in improving healthy diet, exercise, managing emotional distress and weight. The impact of multiple behavior intervention was three times better than single behavior intervention. Health promotion or prevention programs of overweight and obesity by mentor was effective in preventing an increase of BMI and reducing snacks or desserts (Black *et al*., 2010). Saguil and Stephens (2012) in a study of meta-analysis said that 37 studies on 27,946 children showed that the intervention program was effective for reducing adipocyte targeting children aged 6-12 years, where the interventions or strategies to prevent child obesity included the school curriculum on healthy diet, physical activity and positive body image; increased physical activity in schools, developed the nutritional quality of school meals; environmental and cultural practices that support children's healthy diet and active every day; recommended teachers and other staff to implement health promotion strategies and activities; as well as support from family at home for the children to be more active, consumed the nutritious foods and reduced or limited the time in front of screens such as a television, computer or game. Jones *et al*. (2013) stated that the effectiveness of health information technology (IT) program, health literacy (HL) to raise awareness about the health risks of obesity among African-American students were very useful.

FEMM interventions given in the form of a healthy balanced menu based on age, physical activity for one

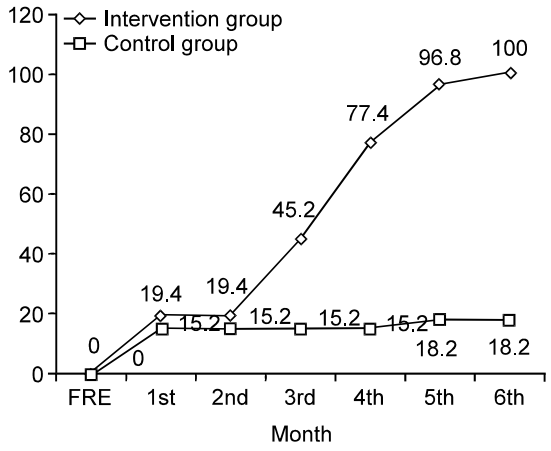

Fig. 2: Proportion of family's ability at good level

hour every day and healthy behaviors of children, were monitored every month according to Barlow (2007) who recommended the children and families to maintain food intake, physical activity and relaxing habits (sedentary behavior). Mushtaq *et al.* (2011) showed that physical activity and lifestyle of children at school in Pakistan are independent predictors of overweight and obesity. Lifestyle including watching television, working on the computer and playing video games showed a significant relation to high BMI.

The role of parents in the family is very important to maintain children's health, including overweight and obesity. One of the strategic efforts to improve children's health is to improve the ability of families and communities in maintaining and caring the health of overweight and obese children. It can be proven that after giving health education as the intervention of the FEMM, the family's ability to in intervention group was 100% good. This was strongly supported by the increase of family's self-efficacy, where the family had a high confidence to change for being better in controlling healthy lifestyle to the children. This good ability was also in line with the knowledge and culture of the family that had increased from the first to the sixth month. This was in line with Gupta *te al.* (2005) who stated that through health education in children care using the handout that parents believed. It was very useful to deliver health information that can improve parental knowledge. The ability of the family is very important in treating and controlling lifestyle of obese children, so that would have an impact on weight loss and the increase of children's activities.

According to the test results, there was a relation between physical activity of the children and family's ability. Children who had a good physical activity had a good family's ability to control the lifestyle of obese children. The behavior of physical activity and food intake in overweight and obese children were a lifestyle that can become children daily habits, influenced by the culture of the family in taking care of obese children. The study of FEMM application aimed to improve the family's independence in controlling the children's lifestyle as consistent with the goals of Healthy People 2020, CDC (2011a) that a healthy food intake and physical activity among children and adolescents covered a comprehensive plan for health promotion and disease prevention. Transtheoretical theory could be used to overcome the habit of unhealthy lifestyle to change the behavior (Peterson, 2009).

According to Health Minister (2009), people's behavior expected in the Healthy Indonesia 2025 was a proactive behavior to maintain and improve health and prevent the risk of disease by supporting the independence of people to live healthy. This corresponded to the role of nurses in preventing the impact of child obesity by increasing physical activity both at school and at home. The family is closely involved in the physical and physiological well-being of the children and plays an important role in health promotion and health care for the children. Respecting the role of the family, strength and experience in healthcare, nurses had the opportunity to develop effective partnerships between children and families making health decisions that promote the children health (Lewandowski and Tesler, 2003; Ball and Bindler, 2007).

Guidelines for the family in the care of school-age children consist of preparing healthy food choices, emphasizing the need to encourage children to move or exercise properly, supporting children's independence for discipline, advising parents to teach and emulate the practices of health including diet, rest, activity and exercise. Ball *et al.* (2010) stated that children care focus on protecting children from diseases and accidents, promotion, assisting children to achieve optimal levels of health, optimizing the capabilities, overcoming the health problems and rehabilitation in the care of children, families and communities.

Conclusion: This study has already successfully formulated FEMM which proved an increase of family's ability in controlling the lifestyle of children and bringing positive changes in the ability of family and children's physical activity after the intervention. It was proven by positive changes of family's ability in controlling the life style and physical activity of the children post intervention.

Suggestion: Family Empowerment Model Modified (FEMM) needs a socialization as an effort to prevent the increase of overweight and obesity in children by giving health education to the family, school and society. It also can be a reference for teachers and learning materials as and additional of knowledge.

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1: FEMM is a modification of Transcultural Nursing, Child Healthcare Model and Transtheoretical Model
2: FEMM is used by family to control lifestyle of overweight and obese children
3: FEMM proved positive changes in family's ability and children's physical activity
4: Socialization of FEMM prevents an increase in overweight and obesity in children