FORUM IPIMA 2013
Ikatan Profesor Indonesia-Malaysia
Bogor, Indonesia 18-20 November 2013

P-03

PREDICTION MODEL OF DIARRHEA INCIDENCE AMONG UNDERWEIGHT CHILDREN (age of 2-5 years) SUPPLEMENTED WITH PROBIOTIC (Enterococcus faecium IS 27526) FUNCTIONAL BISCUITS

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BACKGROUND

Undernutrition is the common cause of immune deficiency in developing countries. Protein deficiency causes immunity impairment which characterized by weaken systemic and mucosa immunity [1]. Body requires immune system to avoid hazards due to microbes and virus. Underfive children commonly more susceptible to infections rather than adults in terms of their immature immune systems [1; 2].

Among several traditional fermented foods in Indonesia, which contain probiotics, is *dadih*. *Dadih* not only contain probiotics, but also high in protein (around 38%) which contains almost all of essential amino acids required for well growth. *Dadih* also produce vitamin B-complex and vitamin K [3]. Health benefits from probiotic-containing food products not only resulted from the nutrient contents, but also due to influential factors of probiotics to the gastrointestinal environment. Microbiota in the digestion tract of healthy persons are different from those in unhealthy person's [4]. Composition of microbiota in the faeces may indicating person's health condition [5].

Protein Energy Malnutrition and infections among underfive children are serious problems which required urgent efforts to overcome, since they may give serious impact to the quality of human resources in the future. Therefore, intervention in the form of providing nutritious supplementary foods in combination with strengthening the immune system would be essentials in order to prevent underfive children from getting underweight and disease. Functional biscuits enriched in fish and soy protein isolate with cream containing probiotic *E. faecium* IS-27526 at a dose of 10^8cfu/day might be an alternative solution. It is essential to study the efficacy of this functional biscuits on improving the profile of "good bacteria" in underweight underfive children. The biscuits may improve the children's energy and protein intake. Functional properties of the probiotics in this biscuits also give benefit to the integrity of intestinal mucosa and improve the children's immunity, hence may lower their susceptibility to disease, for specially diarrhea [6].

This study aimed to assess diarrhea incidence among underweight children (age of 2-5 years) by giving 90 days supplementation of functional biscuits made

from fish and soy protein isolate combined with cream containing probiotic *E. faecium* IS-27526 at a dose of 10^8cfu/day.

EXPERIMENTAL METHODS

ETHICAL CLEARANCE

Ethical clearance of this study was obtained from the Research and Development Board, Ministry of Health, R.I. code LB.03.04/KE/1008/2009. And written informed consent was obtained from all participated subjects.

SUBJECTS

Subjects composed of underweight children age of 2-5 years belong to WAZ ≤ 2, at 4 areas in Sukabumi sub-district i.e Kadudampit, Warungkiara, Bantargadung and Cikakak.

EXCLUSION CRITERIA

Subjects were excluded when achieved such as criterias: 1) Have congenital defects; 2) consume antibiotics and/or laxative substances (4 weeks prior to the study); 3) receive similar supplementary foods from other studies; 4) no available informed consent; and 5) participate in other studies

METHODS

Study Design and Intervention

The study was used pre and post Randomized Double Blind Placebo Controlled Trial. There were 5 groups namely: P0 = control biscuit with control cream; P1 = fish and soy protein isolate biscuit with control cream; P2 = control biscuit with probiotic cream ; P3 = fish and soy protein isolate biscuit with probiotic cream (everyday) and P4 = fish and soy protein isolate biscuit with probiotic cream (every two days). Each group consist of 18 children. At the end of intervention, 7 children were drop out, hence a total of 83 children were continued participated in this study. Diarrhea episode counted up incidence of illness (frequency and duration) during the intervention gave 90 days supplementation of functional biscuits made from fish and soy protein isolate combined with cream containing probiotic *E. faecium* IS-27526 at a dose of 10^8cfu/day.

RESULTS

The study showed that the type of treatment and adherence on consuming the biscuits remains as the prediction variables in the model of diarrhea morbidity. The probability of underweight children age of 2-5 years treated with high protein biscuits *(fish and soy protein isolate)* and had high adherence on consuming the biscuits, experience shorter episode of diarrhea (<1.64/ month) was 51.62%. Whereas, the probability of underweight children age of 2-5 years treated with probiotic biscuits (using probiotic *E. faecium IS-27526 at a dose of 10^8cfu/day)* and had high adherence on consuming the biscuits, experience shorter episode of diarrhea *(<1.64/ month)* was 63.48%. The model may predict 74.7% of diarrhea morbidity, and the rest (25.3%) are predicted by the other factors which could not be observed.

CONCLUSION

The type of treatment and adherence on consuming the biscuits remains as the prediction variables in the model of diarrhea morbidity. Supplementation of functional biscuits with probiotic *E. faecium* IS-27526 at a dose of 10^8cfu/day (P2,P3,P4) to underweight children age of 2-5 years was proven in reducing the episode of diarrhea as compare to high protein biscuit.

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