ABSTRACT

MAYA PURWANTI. The Safety of Recovery Food for Children Below Five Years According to Microbiological Analysis of *Bacillus cereus* and *Clostridium perfringens* in Bogor District. Under the direction of MIRNAWATI SUDARWANTO, WINIATI PUJI RAHAYU, and AGATHA WINNY SANJAYA.

Through a nutritional improvement project, Bogor District had donated powdered milk formula (PMF) for severe malnutrition children below five years. Powdered milk formula was assumed as an unsterilized product, because it might contain microbes. To evaluate the bacterial contaminant, forty eight samples of donated PMF were taken proportional from ten Puskesmas in Kabupaten Bogor. To evaluate the home prepared milk formula, 50 samples of PMF, reconstitution formula, drinking water, drinking equipment, and hand swabs, was taken from the mothers. To evaluate the knowledge, attitude and behavior of the safety of reconstituted and home storage of PMF, 50 questioners were given to the mothers. Microbe samples were analyzed for total aerobic plate counts, *Bacillus cereus* and *Clostridium perfringens*. The median counts for total aerobic count were $4.7 \times 10^2$ CFU/g. The value of total aerobic count less than $1 \times 10^4$ CFU/g is used as a basic standard for baby food (SNI 01-7111.1-2005). Approximately 30.6% products were contaminated by *B. cereus* with a median count $1.4 \times 10^2$ CFU/g. The presences of *C. perfringens* in all samples were not detected. Australian and New Zealand Food Standard (Standard 1.6.1-Microbiological Limit for Food 2001) for follow-on milk formula were used as a basic standard for of *B. cereus* and *C. perfringens* and the acceptance number of *B. cereus* were $10^2$ CFU/g and *C. perfringens* $<1$ CFU/g. All of the follow-on milk formulas were safe to be distributed and consumed. Attention must be taken, because 4 samples (26.7%) contained *B. cereus* was able to produce enterotoxin. Improper home storage could promote the growth of aerobic microbe and *B. cereus*. Improper preparation would promote the growth of *B. cereus* which present initially at low level (mean $7.8 \times 10^3$ CFU/g) and became $1.6 \times 10^3$ CFU/ml after the reconstitution had done. *C. perfringens* emerge at 4 samples (mean $1.5 \times 10$ CFU/ml) after the reconstitution. Several isolate of *B. cereus* (4 from PMF, 13 from opened PMF, and 2 from reconstitution formula) showed a possibility to produce diarrheagenic enterotoxin while the isolate of *C. perfringens* did not show it. The spore of *B. cereus* and *C. perfringens* could survive in different preparation temperature (25, 35 and 70°C for *B. cereus* and 25, 47, 70°C for *C. perfringens*) and storage abuse (with <50 and >70% humidity; opened, closed and opened twice a day in observation). Bacteria population increased $\geq 1$ log within 3 hours at room temperature (28-29°C). The microorganism could survive from dry condition, especially when $a_w$ of the formulas increased cause of storage abuse. The result from questioners and microbe samples shown, that mothers knowledge of milk safety were correlated to the number of their children ($r=-0.34$). The carefullness attitude of mothers were correlated to the knowledge of milk safety ($r=0.51$), the family income ($r=0.28$) and the number of their children ($r=-0.40$). The healthy behaviour of mothers were correlated to knowledge of milk safety ($r=0.31$), the family income ($r=0.37$), and carefulness attitude ($r=0.30$). It is suggested, that changing mothers knowledge of milk safety are necessary.

Key word: Powdered milk formula, storage and preparation, *B. cereus*, *C. perfringens*. 