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Effect of Taking Virgin Coconut Oil to The Breast Milk Secretion and Inspection of Medium Chain Fatty Acids Contain

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Abstract: Virgin coconut oil (VCO) has been used by people in health care. This study aimed to determine the effect of VCO on the secretion of breast milk and it's impact on the physical growth of infants anthropometry (weight, body length and head circumference). Volume of breast milk measurements is done by comparing the baby's weight before and after feeding multiplied by the density of breast milk, the calculation result was converted as breast milk is sucked by baby. Anthropometric measurements of the baby is done by using a digital baby scales and length meter tool. Medium Chain fatty Acids (lauric, capric and caprilic acid) was analysis by using gas-chromatography (GC) method. As the data comparison also did observations of daily maternal diet during the study follow using *NutriClin* Program. The entire of observation is done every week for 35 days (5 weeks).
There is not signiffican (P>0,05) using independent t-test in volume breast milk during the first week, while in the second until the fifth week seen a signiffican (P<0,05). The volume of breast milk group B's is 10,62% higher than group A. Observation of the baby's physical growth, there is a signiffican (P<0,05) after the volunteer's women gorup B consuming VCO. Womens who taking VCO having a baby with antropometric greater growth. The measurements level of MCFA in human milk there are signiffican between both of the two study groups.
Keyword: VCO, Breast milk, Gas-chromatography, MCFA.

1. Introduction

Virgin coconut oil is safe for consumption by pregnant and lactating women. Consumption of VCO or coconuts products (such as milk, shredded coconut and coconut oil) by pregnant women and lactating women have a positive effect for the baby, as mentioned by Wibowo [1], that consuming VCO by pregnant and nursing mothers can expedite the process of birth in pregnant women and increase breast milk in nursing mothers. Breast milk it produces contains much MCFA, which can help the absorption of nutrients, digestive function, regulate blood sugar levels and protect the baby from microorganisms bullies [2].

In infants, the first 3-month period of weight gain is the fastest is 25-30 g/day, then decreased to 20, 15, and 10 g/day in each of the next 6 months[3]. According to research Michaelsen et al[4] if there is a positive correlation between weight infants with breast milk consumption. In infants solely breastfed ie exclusive breastfeeding period (0-6 months), the nutritional adequacy requirements for adequate weight gain can be met only on breast milk. So breastfeeding babies will produce satisfactory growth if enough milk production. Expressed enough milk production and milk composition, if the amount in accordance with the needs of the baby[3].

In order for the growth and development of infants who achieved optimal, breast milk is absolutely necessary good the quality and sufficient quantity. To achieve the quality and quantity of good breastfeeding mother should pay attention to health and to increase and improve the quality of the food they consume.

Based on the above consideration will be conducted research the effect of *VCO* to increase the amount of breast milk secretion, and then conducted an examination of the percentace of *MCFA* using *Gas Chromatography*, continued the observation of the physical growth of baby include: weight, body length and head circumference. For observation of the daily dietary intake level of mothers quantitative research carried out by using *Nutriclin program*.

2. Experimental

This study was carried out experimentally. Twenty people lactating mothers and their infants participated in this study, subjects were randomized into two groups: control group (A) and treatment group (B) was given VCO as one tablespoon (15 ml) three times a day. The study lasted for approximately 35 days, divided into three periods; i) Prior to the study (days 1-7 after birth) in group A and group B consumed daily food menu, ii) During the treatment (8-28 days after birth) A group consumed daily diet alone and group B consumed daily food menu plus daily administration of the VCO and iii) After treatment (29-35 days after birth) in group A and group B back consume daily diet as usual.

Observations were did on day 7 (1 st wk), day 14 (2 nd wk), day 21 (3 rd wk), day 28 (4 th wk) and day 35 (5 th wk) include: i) the measurement of the volume of milk , ii) Collection of breast milk samples of each mother about 5 ml to be analyzed fatty acids by using gas-chromatography, iii) Anthropometric measurements, iv) Recording diet mothers were observed daily consumption rate is the amount of nutrients in the mother consumed menu includes energy, fat, protein, calcium, phosphorus, iron, vitamin A and vitamin C.

2.1 Subject

Selected breastfeeding mothers from 0-35 days with consideration to the age of the baby generally not given extra food other than breast milk. If the baby has started on solid foods or food additives, there is a tendency of decrease in the consumption of breast milk[5]. This study was approved by the Ethics Committee of the Faculty of Medicine, University of North Sumatra.

2.1.1 Women's Inclusion Criteria

The women as subject were selected to avoid as much as possible of the factors that will affect the results of the study, with the following criteria: a) women aged between 20-35 years (age), b) a new baby and breastfeed from the beginning (exclusive breastfeeding), c) a normal delivery or *section-Cesaria* regional anesthesia and the baby is born crying, d) healthy mother (with the clinical examination of the hospital), e) have the same activity (housewife) or get maternity leave, f) are not using contraception which may affect to milk production, g) women with normal nutritional status and h) may be invited to work for this research be success.

2.1.2 Infant's Inclusion Criteria

To avoid the various factors that may affect breast milk consumption and physical growth of infants baby then determined following criteria: a) infants born weighing >2.5 kg, b) infants were not given any extra food in addition to breastfeeding as food and c) healthy infants (with the clinical examination of the hospital).

2.2 Equipment and Materials

Test material used *virgin* coconut oil is a registered VCO by BPOM and obtained from a pharmacy in the city of Pekanbaru. Indonesia. The chemicals used in this study if not otherwise stated, pro-quality production analyst E. Merck (Germany) is sodium hydroxide, sodium chloride and organic solvents: methanol, boron trifluoride and isooktan. Reference standard mixture of fatty acids.

2.3. Measuring Volume of breast milk Generated Over 4 Hours

The volume of milk is measured by weighing the baby before and after feedings every morning. The difference between the baby's weight before or after feeding divided by the density of breast milk is the milk volume issued[6]. To avoid urine and stools, at the time of feeding infants given base fabric is thick enough, so that urine and feces can join weighed.

In cases where breastfed babies do not spend all of that time, then the milk is pumped out of the breast. The magnitude of the volume of milk is determined using a measuring cup. So the volume of milk for 4 hours obtained from the volume of breast milk to the baby sucked add residual volume of milk that remains to be pumped out. All infants in this study will be fed at any time he wants *(feeding on demand)*.

2.4. Analysis lauric, capric and caprylic acid Percentace in Breast Milk

2.4.1 Collection of Breast Milk

Breast milk samples were collected before mothers breastfeed their babies on the morning of the scheduled (8:00 am) on the right breast, the same for all subjects[7]. Before the baby nursing mothers, assistance was sought to set aside 5 ml of the milk samples to be analyzed, immediately after collection, Milk samples were placed upright in *the freezer* and brought to the Oil Palm Research Center in Medan, Indonesia with packaging and kept in a frozen condition. Samples were stored at *coller box* filled with *dry ice* so that when samples got in the Oil Palm Research Center, samples remain in freezing conditions. Samples were stored at -80ºC until the analysis is done by gas-chromatography. The data obtained is calculated as a percentage of total fatty acids.

2.5 Analysis of lauric acid, capric and caprylic by Gas Chromatography

2.5.1 Fatty Acid Sample Preparation

Analysis of lauric, capric and caprylic acid using gas chromatography was follow of procedures in the American Oil Chemist's Society[8] (AOCS Official Method Ce 1b-89). The fatty acid composition was determined as *fatty acid methyl ester* (FAME) by gas chromatography. FAME formation of breast milk and preceded by saponification followed by methylation. A total of 0.05 g of sample was added 1.5 mL of 0.5 N methanolic NaOH (2.9 g of NaOH dissolved in 500 ml of methanol pa), then mixture for 1-2 min. Heated at 100 $^{\circ}$ C for 5 minutes. Then the tube was cooled to room's temperature, add 2 ml of BF_3 and mixture for 1-2 min and heated at 100 $^{\circ}$C for 30 min. Cool the tube at room's temperature and add 2 ml isooktan and mixture for 1 min. Furthermore added 5 ml of saturated NaCl and mixture. The top layer is taken and injected into the gas- chromatograph.

2.5.2 Analysis of Gas Chromatography

A total of 1 mL was injected into a gas chromatograph with a DB-23 column. Helium was used as *carrier gas* with a *flow rate* of 1.04 mL / min and the total flow of 54.1 mL / min. The temperature program is set 90 $^{\circ}$C for 5 min and then increased by 7 $^{\circ}$C every minute until terminated by 208 $^{\circ}$C for 6 minutes with a total time program is 27.86 min

2.6. Statistical Analysis

All data were analyzed using independent t-test using SPSS 20. Determination of daily dietary intake quantitatively performed using *NutriClin program. (2010).*

3. Result and Discussion

3.1 Effect of *Virgin* Coconut Oil In Breastfeeding Mothers Against Breast Milk Secretion

From the measurement data is known that the increase in the total volume of milk 4 hours mothers group B was higher by 10.62% compared to group A as control (graph in figure 3.1). Its was due to the ability of VCO as an *anti-analgesic* that gives a sence of relaxation so increased secretion of breast milk[9].

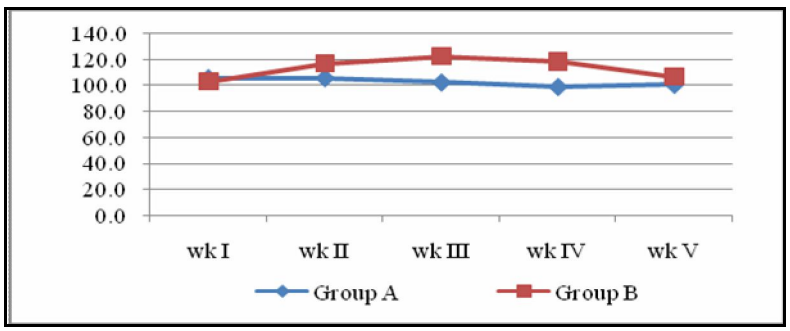

Figure 3.1 Graph measuring the volume of milk for 4 hours of the two study groups during 5 weeks

3.2. Effect of Virgin Coconut Oil In Breastfeeding Mothers Against Medium Chain Fatty Acid Content of The Milk.

By observing the graph in Figure 3.2, 3.3, and 3.4, it is known that an increase in real lauric, capric and caprylic acid content of breastfeeding mothers in group B than group A. lauric acid increase after 12 hour compsumtion VCO, and The real increase of lauric, capric and caprylic has occurred in the fourth week was amounted to 253.60%, while in the fifth week decrease fatty acids contain because the women did not consume VCO again. According to research conducted by Franscois et al[10]. if ingestion of the formula containing 40g coconut oil increased the milk conten of lauric acid over time. Lauric acid increased from 3.9% of fatty acids at baseline to 9.2% at 10 h and 9.6% at 14 h. the breast milk contain of capric and caprilyc acid also increased significantly over time but not at any time point.

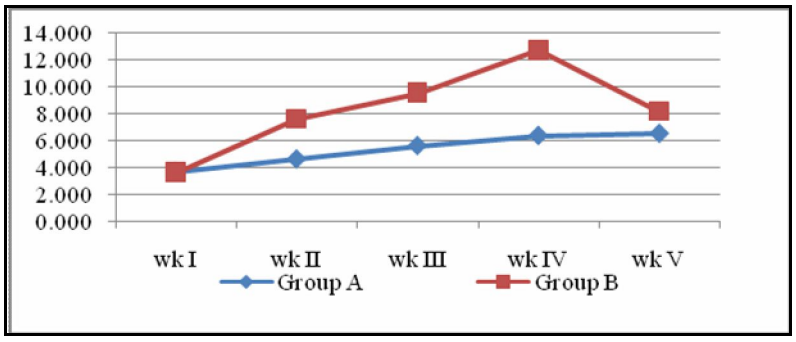

Figure 3.2 Graph lauric acid content from breast milk of two study groups during 5 weeks

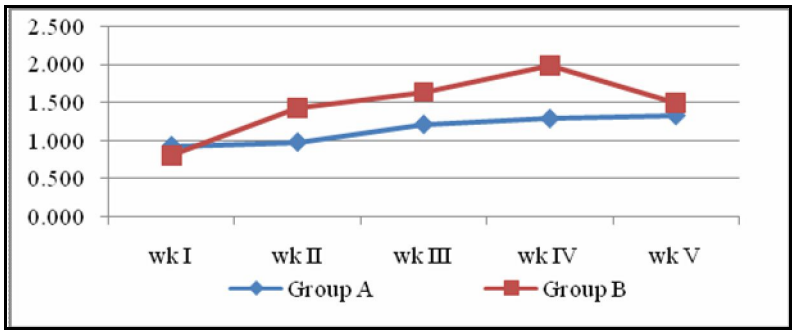

Figure 3.3 Graph capric acid content from breast milk of two study groups during 5 weeks

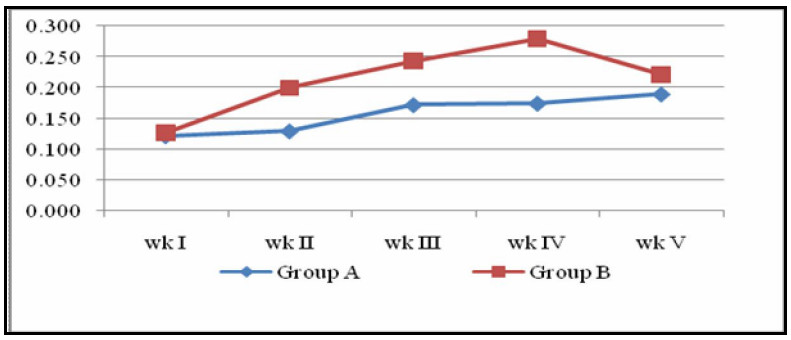

Figure 3.4 Graph caprylic acid content from breast milk of two study groups during 5 weeks

Examination of the fatty acid composition of breast milk is done in order to determine the percentage content of MCFA) contained in the breast milk of mothers research group B. It is known that MCFA allegedly contained in breast milk could stimulate the growth of the baby rapidly. This new first performed, therefore the data obtained by the preliminary data and are expected to fulfill the research objectives.

3.3. Effect of *Virgin* Coconut Oil In Breastfeeding Mothers Against Weight, length and circumference Agency baby's head.

From the result of study if women who intake VCO has baby with increase of weight, length body and circumference head (Figure 3.5, 3.6 and 3.7). Observation of the graph in Figure 4.5 is the line shows the

weight gain of infants in group B intersects the line of infant weight gain of group A. This means that the weight gain of infants in group B is greater than group A. Although statistically The research data were not significantly different between the weight infants groups A and B, but when compared with the increase in infant weight every week, then the babies of group A had an increase in weight of the larger 22.85% and group B 30.52%. according to research conducted by Tantibhedyangkul to 34 premature infants fed infant formula with 80% MCFA formula were known to be able to absorb calcium and magnesium is more apparent when compared with the group of infants with the usual formula[11].

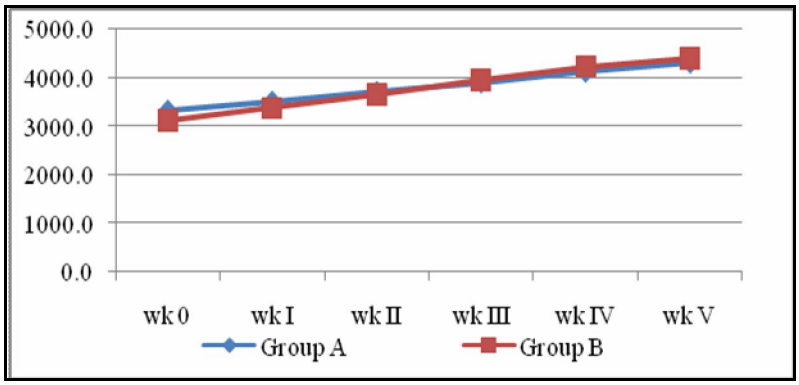

Figure 3.5 Graph growth's rate of the infant's weight from both of study groups during 5 weeks

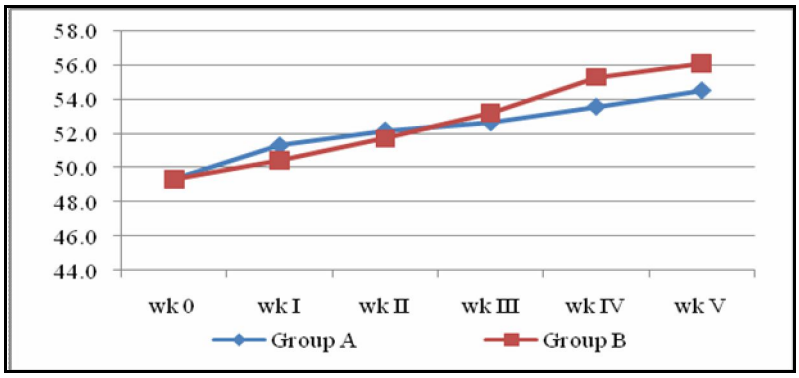

Figure 3.6 Graphs growth's rate of the infant's body length both study groups during 5 weeks

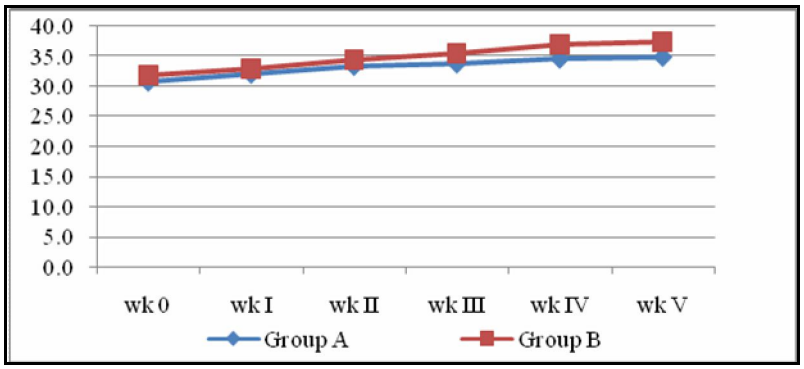

Figure 3.7 graphs the growth's rate of infant's head circumference both groups of women during the 5 week study

3.4. Nutritional Status of Mothers Volunteer Research

Category baseline nutritional status based on the calculation of body mass index (BMI) as follows: BMI 18.5 to 24.9 kg / m^2 including normal category, 25 to 29.9 kg / m^2 categories of overweight *(overweight)*, ≥ 30 kg / m^2 categories of fat *(obesity)* [12].

Table 3.1 Data of level energy consumption and nutrient daily average of mothers Volunteer Research

Code volunteers	Energy (%)	Protein (%)	Fat (%)	Calcium (%)	Phosphorus (%)	Iron (%)	Vit. A (%)	Vit. C (%)
A1	58	96	66	37	95	28	119	233
A2	59	103	43	37	64	33	102	337
A3	87	192	116	149	135	80	201	351
A4	70	183	103	199	159	65	72	101
A5	59	77	61	55	96	34	114	288
A6	59	68	62	45	92	30	112	289
A7	73	170	96	204	168	69	91	61
A8	69	107	66	43	72	35	104	340
A9	94	256	96	148	223	74	24	169
A10	48	101	26	159	47	81	171	159
B1	54	88	59	45	83	33	123	365
B2	78	265	95	302	209	93	328	298
B3	111	210	133	259	200	91	307	126
B4	78	169	94	146	120	69	131	157
B5	78	157	92	141	109	81	206	131
B6	72	162	90	106	110	74	157	275
B7	107	263	124	264	203	76	239	165
B8	60	94	68	69	98	42	122	341
B9	59	89	63	53	91	34	114	332
B10	79	237	95	149	145	60	38	100

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