Research Report

Effect of Spontaneous Delivery and Elective Caesarean Section on Number of Bifidobacterium Colony in Newborns

Pengaruh Persalinan Pervaginam dan Seksio Sesarea Elektif terhadap Jumlah Koloni Bifidobakterium pada Bayi Baru Lahir

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Abstract

Objective: To know the effect of vaginal delivery and elective caesarean section in total colony of bifidobacterium in newborn's faeces.

Method: All the research subject who has fulfilled the inclusion criteria, the newborn's faeces taken on the 3rd to 4th day after delivery. One cc of faeces diluted into 9 cc thioglycolate in a sterile tube and sent to the Microbiology Laboratory of Hospital of Dr. M. Djamil Padang for the examination of colony of bifidobacterium. Data was processed and analized statistically.

Result: The sample was taken from 41 research subject of vaginal delivery and 41 research subject of elective caesarean section. The average of total colony of bifidobacterium in newborn's faeces with vaginal delivery is 23,588,220 CFU/gram and the average of total colony of bifidobacterium in newborn's faeces with elective caesarean section is 4,151,829.3 CFU/gram.

Conclusion: Total colony of bifidobacterium in newborn's faeces with vaginal delivery is higher than elective caesarean section, and proved statistically significant ($p < 0.05$).

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Keywords: bifidobacterium, vaginal delivery, caesarean section

Abstrak

***Tujuan**: Mengetahui pengaruh persalinan pervaginam dan seksio sesarea elektif terhadap jumlah koloni bifidobacterium pada feses bayi baru lahir.*

***Metode**: Seluruh subjek penelitian yang memenuhi kriteria inklusi dilakukan pengambilan feses bayi baru lahir antara hari ke 3 sampai hari ke 4 setelah persalinan. Feses dengan jumlah 1 cc dilarutkan dalam cairan thio glikolat 9 cc pada tabung steril lalu dikirim ke Laboratorium Microbiology RSUP Dr. M. Djamil Padang untuk pemeriksaan jumlah koloni bifidobacterium. Data yang diperoleh diolah dan dianalisa secara statistik.*

***Hasil**: Penelitian dilakukan pada 41 orang bayi baru lahir secara pervaginam dan 41 orang bayi baru lahir secara seksio sesaria elektif. Rerata jumlah koloni Bifidobacterium pada feses bayi baru lahir secara pervaginam adalah 23.588.220 CFU/gram dan rerata jumlah koloni bifidobacterium pada feses bayi baru lahir secara seksio sesarea elektif adalah 4.151.829,3 CFU/gram.*

***Kesimpulan**: Jumlah koloni Bifidobacterium pada feses bayi baru lahir secara pervaginam lebih tinggi dibandingkan dengan jumlah koloni Bifidobacterium pada feses bayi baru lahir secara seksio sesarea elektif dan terbukti bermakna secara statistik ($p < 0,05$).*

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***Kata kunci**: bifidobacterium, persalinan pervaginam, seksio sesarea*

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INTRODUCTION

Bifidobacterium is a gram positive lactic acid producing microflora which is a normal microflora in human digestive tract and has a vital role for increasing body immune. Bifidobacterium occupy major spa-ce of human intestines, found in faeces several days after delivery and constantly increase in amount. The amount of this microflora within the colon is 10^{10} - 10^{11} CFU/gram (CFU: colony forming unit).

Bifidobacterium is rod-shape with varies in shape and size, non-motile, non-spore forming and mostly anaerobe.[1,2] This microflora responsible as a main of digestive tract immune system. Digestive tract of newborn primary inoculated by flora originated from mother's vagina, faeces, or environment.[3-6]

One of the factors which influence the composition of microflora species is type of delivery. Newborns delivered vaginally colonize by microflora originated from mother's passage of birth and environment.[4-6]

In caesaren section there is no contact with birth passage, eventually act as an early immunity for new-borns, therefore newborns delivered by caesarean section have higher risk to acquire infection and allergy.[6,7]

Newborns delivered by caesarean section have decrease colonization of bifidobacterium within intestines compared to newborns delivered vaginally, therefore newborns delivered by caesarean section have lower amount of Bifidobacterium within their intestines compared to the newborns delivered vaginally.[8]

Jean-Jacques Dugoua and colleagues reported in 2009, Bifidobacterium is insignificant in incident of caesarean section, birth weight, and gestational age.[9] Bifidobacterium colony prospectively studyed from twenty vaginally newborns and twenty newborns delivered by caesarean section. The colony of Bifidobac-

terium of the newborns calculated based on real-time Polymerase Chain Reaction (PCR) within first seven days after delivery.

Result shows mean level of Bifidobacterium colony increase in group of newborn delivered vaginally.

Colonization of Bifidobacterium in six samples within group of newborn delivered by caesarean section lower than threshold on the second day. Mean level of Bifidobacterium colony in group of newborn delivered vaginally significantly higher than group of newborn delivered by caesarean section ($p < 0.05$)[10] Enck P and colleagues reported in 2009 based on conventional microbiology analysis with faeces culture in commercial laboratory with GLP certificate (Good Laboratory Practices) during one year, shown that the most influent microflora within newborn digestive tract for activation of body immunity is the Bifidobacterium group which acquired since delivery from mother's microflora and environment.[7]

Based on those descriptions, writer has interest conducting study regarding the effect of vaginal delivery and elective caesarean section toward Bifidobacterium colony within faeces of newborn based on conventional microbiology analysis with culture of faeces.

Finally, the purpose of this study is to compare the bifidobacterium colony within the feaces in newborn with vaginal delivery and elective ceasarean section and the main advantage of this study so that the clinician can make a wise consideration types of delivery based on clear indication.

METHOD

This analysis study with cross sectional design to evaluated the total of amount of colony within faeces of newborns delivered vaginally and elective caesarean section then analyzed the relation between both. The study was conducted in delivery room and obstetrics nursery room in Hospital and microbiology laboratory of Dr. M. Djamil Padang. The study begin at March 2010 until samples quantity acquired. The variables consist of dependent variable: amount of bifidobacterium colony and free variable: vaginal delivery and elective caesarean section delivery. The inclusion criteria are: available to participate in study, newborn delivered vaginally and newborn delivered by elective caesarean section who only on breastfeeding. The exclusion criteria: infection, newborn with major congenital and caesarean section after inpartu. The method of sampling is consecutive sampling.

The study started with subject selection. On this stage, the subjects of study were selected consecutively that fulfill inclusion and exclusion criteria until 41 subjects acquired with vaginal delivery and 41 subjects with elective caesarean section delivery. All the subjects signed the informed consent. The next stage was acquiring faeces samples from newborns. Faeces was acquired from newborns vaginally delivered and elective caesarean section in newborn age of 3 to 4 days. Acquisition of the faeces of the newborn delivered vaginally was performed at the subject's resident and acquisition of feaces from newborn with elective caesarean section was performed in obstetric nursery room at Hospital Dr. M. Djamil Padang.

MATERIAL AND METHOD

One cc of faeces diluted in 9 cc thioglyconate in provided sterile tube and label then sent to the mi-crobiology laboratory of Hospital Dr. M. Djamil Padang. The sample cultured on the agar glass. Then inserted into packed box containing CO_2 reagent for incubation for 24 hours with 37°C. Then calculation of Bifidobacterium microflora then enumerated on the selective media, MRS agar using colony counter. All the expenses for the examination on amount of Bifidobacterium colony on the newborn faeces for both vaginally and caesarean section delivery is bill by the writer.

RESULT

Evaluation of subject characteristic on the Table 1. Distribution of subject characteristic based on age, parity and birth weight of the newborns.

Table 1. Distribution of subject characteristic

Variable	Mean	SD	Min	Max
Age (year)	30.33	5.53	20	42
Parity	2.18	1.34	1	8
Birth weight of newborns (gram)	3232.51	400.56	2584	4574

Table 1 shown average rate of subjects (mother) 30.33, year with deviation standard of 5.53 year and range of age between 20 to 42 year. Average of parity 2.18 with deviation standard of 1.34. The lowest is 1 and highest is 8. Average birth weight of newborn from 82 subjects (mother) is 3232.51 gram with davia-tion standard 400.56 gram and range of birth weight between 2584 to 4574 gram.

Figure 1 discribes amount of Bifidobacterium colony in faeces of newborn with vaginal delivery and elective ceaseran section.

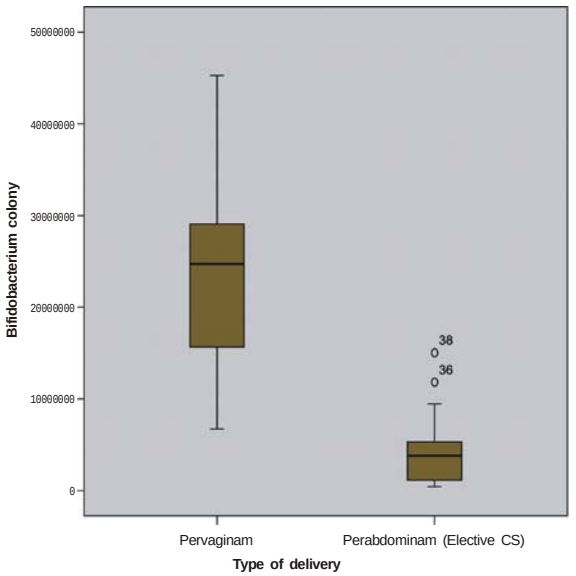

Figure 1. Bifidobacterium colony in faeces of newborn with vaginal delivery and elective caesarean section.

The table shows number of 36 and 38 with type of delivery of caeserean section, which means subject number of 36 and 38 have the extreme values. Both subject have the amount of Bifidobacterium colony within the faeces of newborn with caesarean section delivery which far higher than average of group.

Comparison of amount of Bifidobacterium within faeces of newborn between vaginal and elective caesarean section delivery shown at Table 2.

Table 2. Corelation analysis statistic test, T-test.

	Mean	SD	Min	Max
Pervaginam	23,588,220	10,584,071	6,725,000	45,300,000
Elective SC	4,151,829.3	3,262,142.7	450,000	15,050,000

P = 0.000

Table 2 shown average Bifidobacterium colony for the newborns of vaginal delivery is 23,588,220 CFU/gram with standard daviation of 10,584,071 CFU/gram, Minimal amount of 6,725,000 CFU/gram and maximal amount 45,300,000 CFU/gram. Average amount Bifidobacterium colony on the newborns with caeserean section is 4,151,829.3 CFU/gram with daviation standard of 3,262,142.7 CFU/gram, minimal amount 450,000 CFU/gram and maximal amount 15,050,000 CFU/gram.

DISCUSSIONS

During period of study (March 2010 to December 2010) there were 153 vaginal deliveries with gestational age ≥ 37 week and 294 caeserean section deliveries with gestational age ≥ 37 week (87 with elective caesarean section). Study was conducted on 41 newborns with vaginal delivery and 41 newborns with elective caesarean section which fulfilled inclusion criteria. None of the subject droped out during the study. Characteristic of subject distribution (mother) were age, parity dan birthweight. Average of age of the subject (mother) is 30.33 year, average of parity of subject is 2.18 and average of birthwieght of newborn from 82 subjects (mother) is 3232.51 gram.

Based on amount of Bifidobacterium colony within faeces of newborn with vaginal and elective caeserean section deliver shown that average amount of Bifidobacterium colony is 23,588,220 CFU/gram with minimal value 6,725,220 CFU/gram and maximal value 45,300,000 CFU/gram. Amount of Bifidobacterium colony within the faeces of newborn with vaginal deliveries was very different compared to elective caeserean section whereas average amount of Bifidobacterium within newborn with caeserean section delivery was 4,151,829.3 CFU/gram with minimal value 450,000 CFU/gram and maximal value is 15,050,000 CFU/gram.

Both subjects that delivered from elective ceaserean section (number 36 and 38) had amount of Bifidobacterium colony much higher than average amount of Bifidobacterium colony in newborns with caesarean section delivery as in Figure 1, but etiologic factor has not yet been proven by the writer.

The result acquired showed that amount of Bifidobacterium colony within the faeces of newborns with vaginal delivery much more higher compared to amount of Bifidobacterium colony within faeces of newborns with elective ceaserean section and proven significant statistically ($p < 0.05$) which suit the hypothesis of the study.

This condition match with the theory of formation of microflora in intestine of newborns which triggered by microflora from mother's vagina. Microflora on vagina other than as micrflora in reproductive organ also contaminated from microflora of mother's intestinal tract especially the anus. Amount of microflora in vagina and anus cause high exposure to the newborn with vaginal delivery.

Amnion fluid which is swallowed by the fetus also becomes strong factor in formation of microflora in newborn intestines including Bifidobacterium. Other than that microflora originated from environment complement the exposure to the newborns that accelarate formation of high colonization of microflora within intestine of newborns.[11]

This does not occur maximally in newborns with caesarean section. The process of fetal expulsion via caesarean section does not allowing the newborn exposed to the microflora from the vagina so the formation of microflora Bifidobacterium is very low.

Other than that, on early stage of delivery, newborn often exposed to antibiotics. Minimal exposure of microflora causing growth of colonization of microflora including Bifidobacterium becomes very slow until amount of Bifidobacterium found far lower than newborn with vaginal delivery.

This explaination is in concordance with the study that conducted by United States Patent and Trademark Office (USPTO), reported that percentage of Bifidobacterium in newborn with caesarean section delivery was 4.3% (n = 44) meanwhile newborns with vaginal delivery was 19.8% (n = 28). Bifidobacterium colony studied prospectively from 20 newborns that delivered vaginally and 20 newborns delivered with caesarean section. Bifidobcaterium colony from newborns calculated within first seven days after delivery.

Result showed average level of Bifidobacterium colony increasing in group of newborn with vaginal delivery and decreasing in group with caesarean section delivery. Bifidobacterium colonization in six samples in group of newborn with caesarean section delivery was lower than threshold in the second day. Average level of Bifidobacterium colony in group of newborns with vaginal delivery was significantly higher than group of newborn with caesarean section ($p < 0.05$).[10] Enck P et al. in 2009 reported study based on conventional microbiology analysis with faecal culture in certified commercial laboratory with GLP (Good Laboratory Practices) during period of 1 year concluded that most influence microflora within newborn digestive tract in activation of immune body is group of Bifidobacterium which acquired since birth from mother's microflora and environment.[7] Bifidobacterium plays main role in activation the immune system of the newborn. This explain why newborn with caesarean section delivery have higher risk of infection and allergy.

CONCLUSION

The amount of Bifidobacterium colony within the faeces of newborn with vaginal delivery was much higher compared to the newborns with elective caesarean section and proven statistically significant ($p < 0.05$).

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