

# Association between Exclusive Breastfeeding and Childhood Allergy in Pediatrics Outpatient Unit of Dr Soetomo General Academic Hospital

RM Aditya Wisnu Wardhana<sup>1\*</sup>, Azwin Mengindra Putra Lubis<sup>2</sup>, Djohar Nuswantoro<sup>3</sup>

<sup>1</sup>Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

<sup>2</sup>Department of Pediatrics, Faculty of Medicine, Universitas Airlangga – Dr Soetomo General Academic Hospital Surabaya, Indonesia

<sup>3</sup>Department of Public Health Sciences and Preventive Medicine, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

## ABSTRACT

**Introduction:** Allergy is one of the most common diseases for children in the world. The incidence of allergy has increased sharply in Indonesia in the last 20 years. At any time, 30% of people develop allergy manifestation, more than 40% of school-aged children have experienced an allergy manifestation, 20% have experienced asthma, and 6 million people have suffered atopic dermatitis. Considering the incidence number has kept increasing, a prevention effort has become a crucial aspect. One of the easiest methods is exclusively giving breast feeding. Experts have supported that exclusive breastfeeding can reduce children's allergy risk.

**Methods:** This study was analytical-observational research with a case-control study design. The subject of this research is patients in the pediatrics outpatient unit of Dr. Soetomo General Academic Hospital. They are suspected of suffering from allergies and have a familial atopic history. Data were collected by reviewing the patient's medical records as secondary data. After matching the subject, the data were analyzed using the chi-square test.

**Results:** From the total of 118 samples, it was found that in the case group, 13 children had been given exclusive breastfeeding, and 46 children had not been given exclusive breastfeeding. Meanwhile, in the control group, it was found that 31 children had been given exclusive breastfeeding, and 28 children had not been granted exclusive breastfeeding. A bivariate analysis found that exclusive breastfeeding can reduce the risk of allergy (p-value = 0.001; OR = 0.255 CI = 0.115 – 0.468).

**Conclusion:** This research concludes that children breastfed exclusively will have a risk of allergy 0.255 times more than those who had not been breastfed exclusively.

**Keywords:** Exclusive Breastfeeding, Allergy, Case Control

**Correspondence:** RM Aditya Wisnu Wardhana, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.

E-mail: aditya.wisnuw96@gmail.com

*Article history:* •Received 10 March 2022 •Revised 27 May 2022 •Accepted 2 June 2022 •Published 31 August 2022

## INTRODUCTION

An allergic reaction is a hypersensitivity reaction that IgE mediates. Allergic reactions occur when there is an interaction between an allergen and its specific IgE. This interaction causes a release of mediators, which will cause allergic manifestations. An allergen must pass the mucosal system first to make this reaction happen (Munasir, 2011). Meanwhile, the neonate period is a critical time against the pathogens because of the immaturity of the mucosa, which is shown by the low number of secretory IgA in a neonate. The breastmilk stimulates the production of sIgA in the neonates' mucosa. Colostrum is rich in immunosuppressive factors that prevent the overstimulation caused by the entrance of allergen in a huge amount (Sumadiono, 2011)

IgA is a class of immunoglobulin dominant in the mucosal immune system. There are two kinds of IgA molecules: IgA 1 and IgA 2. 80% of IgA found in the serum is IgA1, and IgA2 is mainly concentrated in the secretory, especially in the distal gastrointestinal tract. The secretory component is a protein produced by the mucosal epithel, which functions as a receptor for transporting IgA to the surface of the mucosa. This bond between IgA and

the secretory component causes the sIgA molecule to be more resistant to proteolytic enzymes (Matondang, 2011). The molecule of IgA1 is more easily broken by protease enzyme than the molecule of IgA2. The IgA system will not mature until the age of 4. Then at that age, there will be an increase in immune response toward antigens (Sumadiono, 2011).

The number of sIgA in breast milk ranged from 5.0 – 7.5 mg/dl. In the first four months of babies who receive exclusive breastfeeding, the baby will get 0.5 g of sIgA every day, or around 75 – 100 mg/kg BW every day. Since the breast milk is rich in Secretory IgA, breastmilk can give a passive immunization towards pathogens and become a barrier for neonates (Matondang, 2011).

The other factor which affects the susceptibility of allergy is microbiotas, through the modulation of the mucosal immune system. The smaller intestine is the organ that has the highest concentration of microbiotas. In the context of allergy, recent studies show signals from commensal. Microbiotas can suppress IgE production and basophil development (Hill et al., 2012).

## METHODS

This research is analytical-observational research with a case-control study design. The subject of this research is patients in the pediatrics outpatient unit of RSUD Dr. Soetomo is suspected of suffering from allergies and having a familial atopic history. Data were collected by reviewing the patient's medical records as secondary data. This research was done using a total sampling method, then the subject of this research was matched according to the age and sex of the issue. After checking the subject, the data were analyzed using the chi-square test.

## RESULTS

Table 1 Characteristics of Research Data

Breastfeeding Status	Case	Control	Total
	Allergic n (%)	Non Allergic n (%)	
Exclusively breastfed	13 (22%)	31 (52.5%)	44
Non-exclusively breastfed	46 (78%)	28 (47.5%)	74
Total			118

p value = 0.001; contingency coefficient = 0.301; OR = 0.255; 95% CI = 0.115-0.568

Table 2 Age and Gender Distribution

Subject Characteristic	Case	Control
	Allergic n (%)	Non Allergic n (%)
<b>Child Age (Years)</b>		
0	11 (18.64)	11 (18.64)
1	12 (20.34)	12 (20.34)
2	5 (8.47)	5 (8.47)
3	7 (11.86)	7 (11.86)
4	6 (10.17)	6 (10.17)
5	9 (15.25)	9 (15.25)
6	4 (6.78)	4 (6.78)
7	1 (1.69)	1 (1.69)
9	2 (3.39)	2 (3.39)
10	1 (1.69)	1 (1.69)
11	1 (1.69)	1 (1.69)
<b>Gender</b>		
Male	31	31
Female	28	28
<b>Total</b>	<b>59</b>	<b>59</b>

From Table 1, it can be interpreted that 78% of the children who suffered allergies were not exclusively breastfed, and only 22% of children who sustained allergies had been exclusively breastfed. Meanwhile, in the non-allergic group, 52.5% of the children were exclusively breastfed, and 47.5% were not exclusively breastfed. This data was analyzed using chi-square test, which resulted in a p-value of 0.001 and OR of 0.255, meaning statistically exclusive breastfeeding is significantly associated with allergy. Exclusive breastfeeding reduces the risk of allergy. The OR value of 0.255 means that the children who had been exclusively breastfed are less likely to develop allergies with the probability of 0.255 than those who had not exclusively breastfed.

From the total of 118 patients, which are children aged six months until 18 years old, which are suspected of allergy and have a familial atopic history, the medical records have been reviewed. The average age of the case and control group is three years old, with the most significant number of children having allergies at one year old. Meanwhile, according to the gender of the subject, there were 62 male subjects and 56 female subjects in the case and control groups combined. The distribution of age and gender of the subjects can be viewed in table 2.

Table 3 Association between Duration of Breastfeeding and Allergy

Duration of breastfeed (month)	Allergic	Non Allergic	Risk
<1	22	8	73.3%
1-2	8	3	72.7%
2-3	9	4	69.2%
3-4	4	2	66.7%
4-5	2	3	40%
5-6	2	4	33.3%
>6	12	35	25.5%

p value = 0.0000

Table 3 shows the distribution of the duration of breastfeeding of the children. In the table above, it can be seen that there is a significant difference in allergy risk along with the increasing duration of breastfeeding. Children who had been breastfed for less than one month had a chance of developing an allergy at 73.3%, and meanwhile, in the group of children who had been breastfed for more than six months, the risk declined to only 25.5%. The data above has been analyzed using the Fisher exact test, which results in the p-value of 0.000, which means the longer the breastfeeding duration is, the lower the risk of allergy.

## DISCUSSION

From 118 total samples of pediatrics outpatient units' medical records, it was found that the majority age

distribution frequency of the children who were suspected of allergy is at the age of 1-year-old with 12 patients (20.34%), followed by the age group of below one-year-old with 11 patients (18.64%). The least is between 10 and 11 years old with one patient (1.69%). Meanwhile, for the gender distribution, the highest gender distribution of allergy patients in the pediatrics outpatient unit RSUD Dr. Soetomo between June 2014-June 2016 are primarily male, with 31 patients (52.5%). Meanwhile, the female allergy patients only comprised 28 patients (47.5%).

The results of this study found that among the 118 subjects, the patients in the pediatrics outpatient unit, there were 59 children in each of the case and control groups. In the case group, 46 children were not exclusively breastfed, and only 13 were exclusively breastfed. Meanwhile, in the control group, 31 children were exclusively breastfed, and 28 were not exclusively breastfed. The result of bivariate analysis using chi-square test results is exclusive breastfeeding reduces the risk of allergy with a p-value of 0.001. This finding is supported by the research from Safri (2012), which stated that babies who were not exclusively breastfed are more susceptible to early allergic manifestation. This study is also supported by Wardhani's (2013) research, which stated that exclusive breastfeeding affects allergy development in children. But this finding is not supported by the research from Halim (2014), which stated that exclusive breastfeeding has not yet been proven to give an advantage in allergy prevention in children. This study is also not supported by the research of Putri (2013), in which there is no significant association between breastfeeding and allergy development.

The duration of breastfeeding is also being analyzed in this study; among the 118 subjects, the highest number of children diagnosed with allergy is in the group of children who were only breastfed for less than one month. Meanwhile, the highest number of children not diagnosed with allergy is in the group of children who were breastfed for more than six months. The number of risks in each group also shows a declining trend. The highest risk number is found in the group of children who were breastfed for less than one month, 73.3%. A minor risk is found in the group of children breastfed for more than six months by only 25.5%. This finding is contrary to the research from Goldsmith (2016), which stated that the duration of breastfeeding does not have an association with allergy in children.

These findings are believed to be caused by the high number of sIgA in breastmilk. The number of sIgA in breast milk ranged from 5.0 – 7.5 mg/dl. In the first four months of babies who receive exclusive breastfeeding, the baby will get 0.5 g of sIgA every day, or around 75 – 100 mg/kg BW every day. Since breast milk is rich in Secretory IgA, breastmilk can give a passive immunization towards pathogens and become a barrier for neonates (Matondang, 2011). The other factor which affects the susceptibility of allergy is microbiotas from the breastmilk through the modulation of the mucosal immune system. The breastmilk contains a significant number of bifidobacteria. The high number of bifidobacteria in breastmilk increases the number of microbiota in the smaller intestine (Gronlund et al., 2007). The smaller intestine is the organ that has the highest concentration of microbiotas. In the context of allergy, recent studies show that signals from commensal microbiotas can suppress the production of IgE and basophil development (Hill et al., 2012).

## CONCLUSION

This research concludes that children breastfed exclusively will have a risk of allergy 0.255 times more than those who had not been breastfed exclusively.

## ACKNOWLEDGEMENT

The author thanks the parties involved in completing this study:

## CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

## ETHICS CONSIDERATION

This research was ethically cleared and approved by Ethical Committee for Health Research of Dr Soetomo General Academic Hospital certificate.

## FUNDING DISCLOSURE

This research was self funded.

## AUTHOR CONTRIBUTION

All authors have contributed to all process in this research, including preparation, data gathering and analysis, drafting and approval for publication of this manuscript.

## REFERENCES

- Goldsmith AJ, Koplin JJ, Lowe AJ, et al. 2016. Formula and breast feeding in infant food allergy: A population based study. *Journal of Pediatrics and Child Health* 52:377–384. <https://doi.org/10.1111/jpc.13109>.
- Grönlund MM, Gueimonde M, Laitinen K, et al. 2007. Maternal breast-milk and intestinal bifidobacteria guide the compositional development of the Bifidobacterium microbiota in infants at risk of allergic disease. *Clinical & Experimental Allergy* 37:1764–1772. <https://doi.org/10.1111/j.1365-2222.2007.02849.x>.
- Halim A, Munasir Z, Rohsiswatmo, et al. 2014. Manfaat pemberian ASI eksklusif dalam pencegahan kejadian dermatitis atopi pada anak. *Sari Pediatri* 15:345-352.
- Hill DA, Siracusa MC, AbtMC, et al. 2012. Commensal bacteria-derived signals regulate basophil hematopoiesis and allergic inflammation. *Nat Med* 18:538–546. doi: 10.1038/nm.2657.
- Matondang CS, Sumadiono, Munasir Z. 2011. *Buku Ajar Alergi-Imunologi Anak*. Jakarta, Ikatan Dokter Anak Indonesia.
- Putri DMW. 2013. Hubungan erilaku ibu dan pemberian air susu ibu (ASI) terhadap aergi pada anak. Yogyakarta, Universitas Gajah Mada.
- Safri M. 2012. Pengaruh pemberian air susu ibu (ASI) eksklusif terhadap timbulnya gejala awal alergi (Allergic march) pada bayi atopik usia 0-6 bulan. *JKS* 3:143-148.
- Wardhani A. 2013. Hubungan pemberian asi eksklusif dengan kejadian penyakit alergi pada anak Kedokteran. Surakarta, Universitas Sebelas Maret.