Effect of egg avoidance diet by nursing mothers on the incidence of atopic dermatitis in infants

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Abstract

Background The prevalence of allergic and atopic diseases has increased rapidly and remains a social as well as an economic problem for the patients on account of its chronic nature. In order to decrease the atopic diseases, especially atopic dermatitis in infants, nursing mothers should avoid allergenic foods as a preventive sensitization. Egg allergy is the most common cause of food allergy, and is closely related to atopic dermatitis in children.

Objective To determine whether egg avoidance diet by nursing mothers could decrease the incidence of atopic dermatitis in infants.

Method We conducted a parallel randomized-controlled trial. Seventy-nine subjects eligible for the study were divided into two groups: egg avoidance and non-egg avoidance group. Block randomization is used for random allocation. Intervention started since mothers had had delivery until their children were 4 months old. The primary outcomes were clinical atopic dermatitis.

Result Atopic dermatitis incidence in maternal egg avoidance group was significantly lower than non-avoidance group. Non-avoidance, family history of asthma, and maternal allergy are the factors significantly influencing atopic dermatitis incidence (OR 6.17; OR 4.73; OR 0.14), respectively.

Conclusion Egg avoidance by nursing mothers could decrease the incidence of atopic dermatitis in infants. Non-egg avoidance and asthma in the families are factors significantly inducing the incidence of atopic dermatitis. [Paediatr Indones 2008;48:71-5].

Keyword: atopic dermatitis, allergy, maternal avoidance diet, clinical trial, sensitization
breastfeeding period, in which the immune system of
new born is affected by maternal immunity through both
placenta and breast milk. Exposure to food allergens
found in breast milk, which are originated from
maternal diet, is thought to be an important factor in
the hidden sensitization. A number of food antigens
existing in breast milk can be controlled by managing
the diet modified for mothers during breast feeding
period. Food antigen diet by nursing mothers with
high risks of allergy may substantially decrease risk of
atopic eczema in their children. The objective of the
study was to identify the effect of egg diet in the nursing
mothers on the risk of atopic dermatitis in their babies.

Methods

Sample and experimental design

We conducted a randomized controlled clinical trial,
single blinded by comparing the mothers with and
without egg diet and the incidence of atopic dermatitis
in their infants. We collected subjects respectively
from three health facilities in Yogyakarta Municipality:
Bhakti Ibu Hospital, Dr. Sardjito Hospital, and
Mergangsan Primary Health Center from January 1,
2004 until January 31, 2005. We calculated the
samples size using hypothetical test formula in two
proportions, with $\alpha=5\%$ and $\beta=20\%$, therefore 79
pairs of mothers and infants were included in the study.

Subjects were mothers and their babies with
atopic risks (one or both parents or sibling with the
atopic disease such as asthma, rhinitis allergy, and
atopic dermatitis). The inclusion criteria of the babies
were those with risk of atopy/ allergy and healthy
babies. The inclusion criteria of the mothers were
living in Yogyakarta, signing the informed consent,
and willing as well as being able to breastfeed their
babies for at least four months. The babies were
excluded from the study when they had defects or
congenital anomalies which made them unable to
breastfeed, for example cleft lips (labiopalatoschisis)
and asphyxia requiring mechanical ventilator. Mothers
with severe diseases and a pathological disorder such as
depression were excluded.

Nursing mothers were randomized into two
groups of study: egg diet or non-egg diet. Mothers in
egg diet group avoided foods containing egg, and a
list of foods were given to the mothers as guidance.
The food records were performed daily using a
standard food list to collect data about food intake of
the mothers in the two groups. Therefore, we could
monitor the compliance of mothers to diet protocol.
Mothers then were classified into fully compliant, less
compliant, and non-compliant. Mothers were
classified into fully compliant when they obeyed all
recommended rules and noted all kinds of food they
and their babies consumed. Less compliant if the
mother’s daily record is not complete for several days
(less than two weeks) and the mother has (less than
five times) broke the recommended rules. Non-
compliant if the mother’s daily record is not complete
over than two weeks and the mother has more than
five times broke the recommended rules.

There were 79 subjects in the study during the
period of January 1, 2004 - January 31, 2005, 39 of
whom were in the egg diet group, and 40 were in the
non-egg diet group.

Outcome variables

The evaluation on the two groups was carried monthly
out for four months, which included the presence or
absence of atopic dermatitis, other allergic mani-
festations, and the mothers’ compliance. The diagnosis
of atopic dermatitis was established by criteria of
Hanifin Rajka and was performed by a dermatologist
(Table 1).

Statistical analyses

The results of the study were analyzed by chi-square
test, or Fischer’s exact absolute test based on the kinds
of data with computer software. To measure the other
independent variables which might affect the result
of the study, a logistic regression analysis was
performed.

Results

Basic characteristics of subjects

The characteristic of subjects in both groups were
comparable (Table 2). The incidence of atopic derma-
titis in the egg diet group was significantly lower,
affecting two babies (17%), than that in the non-egg diet group, affecting 10 babies (83%). The risk of atopic dermatitis in the non-egg diet group was 25%, whereas in the egg diet group was 5%. The risk difference in both groups was 20%.

Factors affecting atopic dermatitis

Table 3 showed three significant predictor variables towards the incidence of atopic dermatitis, among others were non-egg avoidance with OR=6.17, maternal allergy with OR=0.14, and asthma in the families with OR=4.73.

Table 4 (multiple regression) showed non egg avoidance, asthma in the families and maternal allergy increased the risk of atopic dermatitis 14.76 times.

Other allergic manifestations

Other allergic manifestations found in eight subjects were respiratory manifestations (63%), gastrointestinal manifestations (25%), and other skin manifestations such as seborrhoic dermatitis and urticaria (13%).

Compliance degree to the diet protocol

Twenty-eight subjects (72%) were fully compliant, seven subjects (18%) were less compliant and four subjects (10%) failed to comply.

Discussion

We found no significant difference associated with sociodemographic characteristics, risk factors of atopic dermatitis, and environment between both groups. The incidence rate of atopic dermatitis in this study was 15% with the risk difference of 19% in both groups, showing a significant incidence of atopic dermatitis. It is similar to the results of the former studies which was 14-20%. The length of gestational age would increase the risk of atopic dermatitis due to (1) transplacental allergen exposure or maternal factors of nutrition during late critical period of pregnancy. Early antigen exposure in premature babies post delivery may increase the tolerance or sensitization; (2) babies with heavier birth weight and post term babies are associated
with increased IgE total serum, meanwhile post maturity was also associated with decreased weight and thymus size, which could change the balance of Th1 and Th2. It is consistent with this study, where atopic dermatitis occurs more frequently in the babies with normal birth weight (91.7%) and in those who are post-term (≥42 weeks), whose result is 83.3%. It is also consistent with former studies which reported the longer the gestational age, the higher the risk of atopic dermatitis.

The mothers with allergy had OR<1, showing it was not the risk factor of atopic dermatitis. It was inconsistent with the results of the previous studies. It might be due invalidity of allergic diagnosis in those mothers.

Asthma in the families gave an adequate and significant influence to the incidence of atopic dermatitis. It increased the risk of atopic dermatitis by 4.73 times, which was consistent with other study.18

Respiratory manifestations are the most common other allergic manifestation (62.5%) in all subjects, which are consistent with the study by Sicherer.19 The mother’s compliance on egg avoidance diet is not influenced by social-economic, level of education, and age factors.

Multiple regression analysis reveals variables significantly affecting the incidence of atopic dermatitis, which include non-egg avoidance, asthma in the families, and allergic mothers. The risk of atopic dermatitis would increase by 14.76 times if non-egg avoidance factor, familial asthmatic factor, and allergic mothers are found. If non-egg avoidance and familial asthmatic factors are found, on the other hand, it would increase the risk of atopic dermatitis by 10.4 times.

The estimated rate of treatment effect in the study was NNT=5, which means if there are five mothers on an egg diet during breastfeeding period, it would prevent the incidence of atopic dermatitis in one baby.

Some constraints of this study include short follow-up (four months), inaccurate food record of mothers, other allergic manifestations which are not confirmed by supportive laboratory examination, the possible compliance’s bias, and the small number of subjects. A study with a longer and complete follow-up needs to be conducted and the diagnosis of atopic dermatitis should be confirmed by IgE examination, a supportive laboratory examination.

We conclude that egg avoidance in breastfeeding mothers may decrease the risk of atopic dermatitis in babies. Non-egg avoidance and asthma in the families are two factors significantly inducing the incidence of atopic dermatitis.

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