ANALYSIS OF MOTHERS WHO GAVE BIRTH TO INFANTS WITH CONGENITAL ANOMALIES THAT WERE ADMITTED TO H. ADAM MALIK GENERAL HOSPITAL IN JANUARY 2012 - AUGUST 2018

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Abstract : This descriptive analytic study has been undertaken to find out the characteristic of mothers that gave birth to babies with congenital anomalies and what maternal factors that affect which type of congenital anomalies that were developed, by interviewing 60 mothers who had given birth to babies with congenital anomalies and were admitted to H. Adam Malik General Hospital and by using their offsprings medical record data from January 2012 to August 2018. The data were then analyzed with IBM SPSS version 22. Women aged 21-30 years old at conception (50%), housewife (60%), multigravida (38.3%), low socioeconomic level (55%), elementary school education level (28.3%), first prenatal visit in the first trimester (38.3%), antenatal frequency ≥ 4 times (45%) , first obstetric ultrasonography at the third trimester of gestational age (31.7%), use of pregnancy vitamin in first trimester (63.3%), no family history of congenital anomalies (96.7%), husband's age at conception 31-40 years old (46.7%), and smoker husband (68.3%) were the most findings in this study. Congenital anomalies that are commonly found are gastroschisis, hydrocephalus, omphalocele, spinabifida and hirschprung. Male babies (54.7%) have more congenital anomalies in this study. Multinomial logistic regression analysis we found that adjusted to other factors such as mother's age at conception; use of pregnancy vitamin in first trimester; family income; parity; timing of first antenatal care; and smoker husband, husband's age at conception has a significant effect to which type of congenital anomalies developed. As the other anomalies as refference group (palatoschisis, labiopalatoschisis, craniopagus, LUTO, TRAP sequence, Collodion Baby, Hygroma Coli), every one year increase the age of the father, incidence of gastrointestinal system disorder, central nervous system disorder, and multiple congenital anomalies will increase with adjusted OR (AOR) and 95% CI: 2.328 (1.010-5.367); 2.389 (1.032-5.532); 2.955 (1.257-6.943) respectively.

Keywords: congenital anomalies, birth defects, maternal factors

I. INTRODUCTION

Congenital anomalies is one of the causes of high mortality and disability in infants under the age of five years.[1] In Indonesia, 9 babies from 1000 live births die from birth defects. Based on the 2010 *Riset Kesehatan Dasar* (Riskesdas), congenital anomalies contributed to 1.4% of infant deaths at 0-6 days of age and 18.1% of infant deaths at 7-28 days. The Ministry of Health of the Republic of Indonesia has conducted a survey of 13 hospitals from 9 provinces from September 2014 to June 2016. Of the 40,862 births, 283 birth defects were found with a prevalence of 6.9 per 1000 live births. Most cases of disability were Congenital Talipes Equinovarus (CTEV) (20.9%) and orofacial cleft (20.9%), followed by neural tube defects (19.6%) and abdominal wall defects (17.2%).[2]

The cause of congenital anomalies is multifactorial, in the form of a combination of genetic factors and environmental factors. About 5-10% are caused by environmental factors including nutritional deficiencies, infectious diseases, maternal medical conditions, use of teratogenic drugs, alcohol, illegal drugs and teratogenic pollutants.[3] These factors can be prevented by providing education to mothers and husbands and new married couples who want to have offspring. That risk factors can be avoided or reduced by integrated antenatal care, encouraged routinely and on schedule.

II. METHODS

This study was conducted in a descriptive-analytic retrospective design to analyze the characteristic of mothers who gave birth to babies with congenital anomalies that were admitted to H. Adam Malik General Hospital Medan in January 2012-August 2018. The study population was mothers who gave birth to babies with birth defects who was admitted to H. Adam Malik Hospital in January 2012 until August 2018. The research subjects were all populations that met the research criteria and baby datas were taken from medical records. Inclusion criteria were mothers who gave birth to babies with congenital anomalies either isolated or multiple and were admitted to H. Adam Malik General Hospital Medan in January 2012 to August 2018 , who were willingly interviewed. Exclusion criteria is medical record data of the infants that were incomplete or damaged. The number of samples is 60 women.

The variables were mother's age at conception, parity, husband's age at conception, mother's education level, mother's occupation, family income, history of family congenital anomalies, time of first prenatal visit, frequency of prenatal visits, timing of first ultrasound examination, use of pregnancy vitamin in first trimester, maternal medical condition, type of birth defects and sex of the offsprings. The collected data were analyzed by univariate statistics and multinomial logistic regression to find which risk factors that influence what type of congenital disorder that occur. Values were considered significant if P <0.05 with a 95% confidence interval.

III. RESULT

From January 2012 until August 2018, 60 women who has been delivered babies with anomalies and met the inclusion criteria was included to this study. Of 460 infants who have congenital anomalies, 64 among are born from the samples (4 infants born twin) and only 11 mothers gave birth in this study hospital (H. Adam Malik General Hospital is tertier health care facilities in North Sumatra).

From table 1 we can see that among 60 women who were included in this study, 30 women were aged 21-30 years old at conception (50%), 23 women were multigravid (38,3%), 17 women were on primary school education level (28,3%), 36 women are a housewife (60%), family income between 1,1-2 million rupiah (31,7%) (below the North Sumatra provincial minimum wage), 58 women with no family history of congenital anomalies (96,7%), 23 women went to first antenatal care at the first trimester (38,3%), 27 women (45%) visit their prenatal care ≥ 4 times, 19 women (31,7%) undergone her first ultrasonography examination at third trimester, husbands's age at conception of 28 women (46,7%) is 31-40 years old, and 41 women (68,3%) are passive smoker from their husbands.

Table 2 shows the congenital anomalies profile with the total of birth defects that occur is 79 cases from 60 samples (few women gave birth to multiple congenital anomalies infants). The most common anomalies that we found is gastroschisis (9 cases), hydrocephalus (9 cases), omphalocele (6 cases), meningocele (5 cases), hirschprung (5 cases), and spinabifida (5 cases). Thirty four male babies (54,7%) are found to have birth defects in this study.

Table 1 Characteristics of mothers

Characteristics	n (%)
Mother's age at conception	
≤ 20 years old	2(3,4)
21–30 years old	30 (50)
31-40 years old	26 (43,2)
>40 years old	2 (3,4)
Parity	
Primigravid	20 (33,3)
Secondarygravid	17 (28,3)
Multigravid	23 (38,3)
Mother's education level	
Primary School	17 (28,3)
Junior High School	12 (20)
Senior High School	16 (26,7)
Bachelor	15 (25)
Mother's occupation	
Housewife	36 (60)
Medical Personnel	5 (8,3)
Teacher	4 (6,7)
Employee	3 (0,5)
Merchant	7 (11,7)
Factory Workers	4 (6,7)
Family Income	
≤ Rp 1.000.000	14 (23,3)
Rp 1.100.000-2.000.000	19 (31,7)
Rp 2.100.000-3.000.000	14 (23,3)
Rp 3.100.000-4.000.000	7 (11,7)
Rp 4.100.000-5.000.000	2 (3,3)
Rp 5.100.000-6.000.000	3 (5,0)
> Rp 6.000.000	1 (1,7)
Family History of Congenital Anomalies	
Yes	2 (3,3)
None	58 (96,7)
Timing of first prenatal care	
1st trimester	23 (38,3)

2nd trimester	18 (30,0)
3rd trimester	10 (16,7*)
Never	9 (15,0)
Frequency of prenatal care	
Once	1 (1,7)
Twice	13 (21,7)
Three times	10 (16,7)
≥ Four times	27 (45,0)
Never	9 (15,0)
Timing of first USG examination	
1st trimester	11 (18,3)
2nd trimester	16 (26,7)
3rd trimester	19 (31,7)
Never	14 (23,3)
Use of pregnancy vitamin in first trimester	
Yes	38 (63,3)
No	22 (36,7)
Husband's age at conception	
21–30 years old	21 (35)
31-40 years old	28 (46,7)
>40 years old	11 (18,3)
Husband's smoking status	
Yes	41 (68,3)
No	19 (31,7)
Sex of the offsprings	
Male	35 (54,7)
Female	29 (45,3)

Table 2 Congenital Anomalies Profiles

Type of Congenital Anomalies	n
Anencephali	4
Anal atresia	4
Billier atresia	1
Esophagal atresia	2
Ileum atresia	2
Jejenum atresia	1
Cojoint twin: Craniopagus	1
Collodion Baby	1
CTEV	3
Ectopic bladder	1
Gastroschisis	9
Hirschprung	5
Hydrocephalus	9
Hygroma Coli	1
Hypotelorism	1
Holoprocencephaly	1
Labiopalatoschisis	3
LUTO	1
Meningocele	5
Omphalocele	6
Palatoschisis	3
Spinabifida	5
PDA	4
TRAP Sequence Gemelli	1
Twin Joint Abdomen	1
Undescend Testis	1
Unilateral Kidney	1
VSD	2
Total	79*

* Some infants have more than one congenital anomalies (multiple congenital anomalies)

A multinomial logistic regression has been done to analyse what maternal factor that give the most significant influence which type of anomalies developed. The seventy nine cases of congenital disorders divided into 4 categories which are gastrointestinal system disorder (gastroschisis, omphalocele, hirschprung, anal atresia, billier atresia, esophagal atresia, illeum atresia, jejenum atresia); central nervous system disorder (hydrocephalus, meningocele, spinabifida, anencephali); multiple congenital anomalies (twin joint abdomen and one of the baby has PDA, CTEV with palatoschisis, anal atresia with PDA, omphalocele with labiopalatoschisis, VSD with hirschprung, meningocele with hydrocephalus, ectopic bladder with unilateral kidney, anal atresia with illeum atresia, hypotelorism with holoprosencephaly, VSD with omphalocele, spinabifida with PDA and CTEV, spinabifida with PDA, anal atresia with undescent testis, meningocele with hydrocephalus, gastroschisis with labiopalatoschisis, spinabifida with hydrocephalus, jejenum atresiawith palatoschisis, and hydrocephalus with CTEV); and other anomalies (labiopalatoschisis, palatoschisis, craniopagus, LUTO, TRAP sequence, Collodion baby, Hygroma Coli).

From table 3 we can see that from multinomial logistic regression analysis we found that adjusted to other factors such as mother's age at conception; use of pregnancy vitamin in first trimester; family income; parity; timing of first antenatal care; and smoker husband, husband's age at conception has a significant effect to which type of congenital anomalies developed. As the other anomalies as refference group, every one year increase the age of the father, incidence of gastrointestinal system disorder, central nervous system disorder, and multiple congenital anomalies will increase with adjusted OR (AOR) and 95% CI 2.328 (1.010-5.367), 2.389 (1.032-5.532), 2.955 (1.257-6.943) respectively.

Table 3 Multinomial Logistic Regression Analysis

Type of congenital anomalies[a]	Factor[b]	AOR[c]	p Value	95% CI
Gastrointestinal System Disorder	Husband's age at conception	2.328	0.047	1.010-5.367
Central Nervous System Disorder	Husband's age at conception	2.389	0.042	1.032-5.532
Multiple Congenital Anomalies	Husband's age at conception	2.955	0.013	1.257-6.943

[a] Other anomalies is refference group
[b] Factor that shows significant value
[c] adjusted for mother's age at conception, use of folic acid in first trimester, family income, parity, timing of first antenatal care, and smoker husband

IV. DISCUSSION

In this study, from 60 women, 30 women (50%) is 21-30 years old. Same range of age found in previous studies.[4,5] Majority of mothers are multigravid (38,3% or 23 of 60 women), on the other hand Green et al found there is no significant difference between the primigravid mothers (49%) with multigravid mothers (51%).[5] In this study there was no mother with specific medical condition that are known to be risk factors to congenital anomalies, such as diabetes mellitus. But one mother is known to get infection during her pregnancy carrying birth defect baby when her TORCH serology found to be positive.

Of the 60 samples 64 baby was born with birth defects (4 infants born twin). Thirty five babies were male (54,7%) and the rest was female, no babies were genitalia ambigu. Same as the other studies, from 911 babies 554 infants are male 338 are baby girl and 19 are genitalia ambigu.[4] About 60,3% are male, 39.1% are female and 1 baby (0.7%) is genitalia ambigu.[5] On the other hand there was no significant difference between male and female babies with birth defects in one study.[6]

A third of samples have their booking visit in first trimester. Same as other study in a low economic country 35.4% of 407 women have their booking visit at first trimester. The mean time was 4.5 months (17.7 weeks) of pregnancy. Multivariate logistic regression analysis showed that: [(AOR (95% CI)) maternal age ≤ 25 (1.85 (1.10, 3.09)), age at marriage ≥ 20 years (2.21 (1.33, 3.68)), pregnancy recognition by urine test (2.29 (1.42, 3.71)), mothers who perceived the right time to start antenatal care within first trimester (3.93 (2.29, 6.75)) and having decision power to use antenatal care (2.43 (1.18, 4.99))] were significantly associated with timely commencement to antenatal care.[7]

About 38 women (63,3%) use the pregnancy vitamins in first trimester. Majority of the women do not know what pregnancy vitamins contain which were they consumed, whether it contains folic acid or not, nor the function of the folic acid itself for neural tube development. It shows that lack of mothers' knowledge reflected by low level of education. Only 15 women (25%) goes to university and get their degree. From 60 samples only three of them (0.05%) know what is the benefits of folic acid for neural tube development because of experiencing giving birth to congenital anomalies infant in prior pregnancy. Other study in Ethiopia found that only 1,92% of 417 mothers consume folic acid at protection time of neural tube defects.[8]

More than half of the samples (55%) have low family income which is below the North Sumatera provincal minimum wage (Rp 2,132,188). This will reflect the capability for the mother buy nutricious food for the fetus during their organogenesis, eventhough folic acid supplementation which is very important for neural tube development is free from the government at primary care facilities (Puskesmas). We do not know is the mothers are obedience or not to consume folic acid daily during her first trimester.

A meta analysis from 3,343 refference, 31 case control and 2 cohort studies shows that education level, family income and mother occupation negatively related to congenital heart defects 11% (pooled RR = 1,11, 95% CI: 1,03-1,21), 5% (pooled RR = 1,05, 95% CI:1,01-1,09) dan 51% (pooled RR = 1,51, 95% CI: 1,02- 2,24) respectively.[9]

Ultrasound scan is very important in early screening of congenital anomalies. National Institute of Child Health and Human Development in USG workshop at 2012, recommend that Ultrasound scan should be performed at 18-20 weeks gestational age.[10] In this study less than a third (31.7%) undergone ultrasound scan at third trimester, only 11 women (18.3%) at first trimester, 16 (26,7%) women in second trimester, even 14 women (23.3%) have not undergone this examination all the way through her pregnancy. The reason of reluctancy of the mothers to go to obstetricians to have her prenatal ultrasound scan is because of money, more than half of the samples are in low economic state.

Of 60 women that gave birth to 64 infants with birth defects, there was 79 case of congenital anomalies that been found, either it was isolated or in multiple forms. The most common defects that has been found is gastroschisis, hydrocephalus, omphalocele, spinabifida and hirschprung. In this study we found that a mother gave birth to a Collodion baby which is known an autosomal ressesive ichtyosis disorder. She has three children, the oldest is normal but the second and the third have this disease.

Almost half of the husbands are in range of 31-40 years old (46,7%) and about 18,3% (11 husbands) are more than 40 years old at the time of conception. From multinomial logistic regression we found that adjusted to other factors such as mother's age at conception, use of folic acid in first trimester, family income, parity, timing of first antenatal care, and smoker husband, husband's age at conception has a significant effect of the type of congenital anomalies developed and every 1 year advance in paternal age will increase the incidence of gastrointestinal system disorders, central nervous system disorders, and mutiple congenital anomalies with other anomalies as refference group.

Data from National Birth Defects Prevention Study at 1997-2004, shows that every 1 year increase the age of the father, will increase the incidence risk of palatocschisis (OR = 1.02, 95% CI: 1.00, 1.04), diaphragmatic hernia (OR = 1.04, 95% CI: 1.02, 1.06), right ventricular outflow tract obstruction (OR = 1.03, 95% CI: 1.01, 1.04), and pulmonary valve stenosis (OR = 1.02, 95% CI: 1.01, 1.04). In younger father, every year advance in age will increase the chance of babies born with encephalocele, cataract, esophagal atresia, pulmonal vein anomalies and aorta coarctatio but this anomalies cannot be found in older father (refference age group is 30 years old).[11] The neural tube defects risk 1.3 times bigger with the paternal age at conception 20-24 years old compare to 25-29 years old (95% CI: 1,1–1,5).[12] The other study get the central nervous system disorder which is major anomalies have odds ratio 1.51 times bigger in they who ere born from fathers's age at conception < 30 years old with p value < 0.001.[13] There is a relation between the age of paternal at conception with frequency of genetic mutation de novo in all of the baby's gene as study sample which is autism disorder.[14] In study that was performed by Su XJ et al in Denmark from 1,893,899 singleton birth, 69% fathers who aged above 45 years old have risk for having babies with PDA (HR45+ = 1.69, 95%CI:1.17–2.43).[15]

A case control study shows that all type of extremities abnormalities related with mother exposure to cigarrette smoke. *Odds ratio* of these anomalies increase in active smoker (1,24 [95% CI 1,01-1,53]), passive smoker (home) (1,28 [95% CI 1,03-1,59]), and "active and passive smoker" (1,34 [95% CI 1,05-1,70]). Statistic shows that passive smoker mother with no folic acid consumption have 0.59 higher risk in any extremities anomalies.[16] In this study there was no mother who actively smoke, but majority of them are passive smoker (41 women or 68,3%).

V.CONCLUSION

Paternal age at conception is found to have impact to the type of birth defect that developed adjusted to other maternal factors. Eventhough with almost adequate prenatal care in this study, there were still infants born with congenital anomalies and majority of the offsprings were reffered from rural area or primary health care facilities. Only 11 mothers gave birth in this study hospital (H. Adam Malik General Hospital is tertier health care facilities in North Sumatra). Education about basic obstetric ultrasound examination for early screening of congenital anomalies could reduce birth defect rate especially for preventable and corectable disorders. Correct management such as delivery at the tertier health care facilities with competent physician will reduce mortality and morbidity rate infants under 5 years old. Future studies will be required especially with larger number of sample to reducing the bias of this study.

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