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Folic Acid Deficiency with Inadequate Antenatal Care as Risk Factor of Spina Bifida: A Case Report

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ABSTRACT

INTRODUCTION: Folate (vitamin B9) is a type of essential nutrient which recommended supplementation for all women, particularly those planning to conceive, because, periconceptional use decreases the occurrence and recurrence of fetal neural tube defects (NTDs). NTDs develop when a portion of the neural tube fails to close normally during the third and fourth weeks after conception. With Myelomeningocele (spina bifida) is the most common neural tube defect.

CASE PRESENTATION: A 20 years old pregnant female came to Emergency Departement with complaint of abdominal pain with history of improper knowledge of folic acid consumption in pregnancy and unroutine Ante Natal Care (ANC) then her newborn with 3100 gram body weight noticed with Spina Bifida.

DISCUSSION: Folic acid deficiency was a common risk factors which trigger NTDs upon newborn, the importance of folic acid during fetal development become a recommendation, for about 400 µg of folic acid has been recommended in the first month before conception and throughout the first trimester, other also suggest 400 µg of folic acid as a daily dose for five to six months before pregnancy as it take approximately 20 weeks to maintain the level needed to decrease the risk of NTDs

CONCLUSION: Spina Bifida is the most common Neural Tube Defects that happens on newborn baby, among all the risk factors which could triggers the NTDs, folic acid deficiency is the highest.

Keywords: *Folic Acid Deficiency, Antenatal Care, Spina Bifida*

INTRODUCTION

Folate (vitamin B9) is a type of essential nutrient, which plays important role in Deoxyribonucleic Acid (DNA) and Ribonucleic Acid (RNA) synthesis, DNA methylation, hematopoiesis and possibly normal neural function. Folic acid also a recommended supplementation for all women, particulary those planning to conceive, because, in addition to its other physiologic functions, periconceptional use decreases the occurrence and recurrence of fetal neural tube defects (NTDs). [1.2]

NTDs develop when a portion of the neural tube fails to close normally during the third and fourth weeks after conception (the fifth- and fourth-weeks gestation) which commonly involve spinal cord called Myelomeningocele (spina bifida). Few condition that directly related to NTDs such as folic acid fortification of commonly consumed foods and Sonographic and serum screening program through prenatal screening. [3]

Folate deficiency is one of NTDs risk factors, likely in combination with genetic or

environmental risk factors. Folate deficiency may be related to inadequate oral intake, inadequate intestinal absorption, use of folic acid antagonist, or genetic factors and medications which caused abnormal folate metabolism. [1.4]

Myelomeningocele (spina bifida) is the most common neural tube defect. Characterized by a cleft in newborn vertebral column, with corresponding defect in skin so that the meninges and spinal cord exposed. The patient may have weakness and loss of sensation affecting the lower extremities and have bowel/bladder dysfunction, depend on level of spinal lesion. In order to have early diagnose on spina bifida, prenatal counseling and ante natal care will be recommended. [4]

During prenatal counseling, discussion with both parent includes the natural history of myelomeningocele and the prenatal management decision, including termination of the pregnancy, pursuit of additional prenatal testing, choice of delivery setting, and, when applicable, the possibility of fetal surgery. Serial ultrasounds for fetal growth, head size, and ventricular size can provide useful information to inform prenatal counseling and delivery planning. [4,8] In this case report, we showed a case of pregnant women with suspected folic acid deficiency and inadequate prenatal screening and antenatal care with spina bifida newborn.

CASE PRESENTATION

A 20 years old pregnant female came to Emergency Department with complaint of abdominal pain. Pregnancy was unplanned and had inadequate knowledge of routine prenatal counseling and screening especially on first trimester. She's not consuming folic acid supplement properly and had not acknowledge of its importance to prevent NTDs and also she had not done routine Antenatal Care (ANC).

Her first time visit to health facility on 16 weeks of gestational age for ANC on nearest Community Health Centre with midwife consultation. During ANC, it was found that the patient is not consume folic acid supplement and not having proper knowledge of nutritional intake during pregnancy. During visitation, patient was prescribed with folic acid supplement and vitamins and reffered to Obstetrician in order to get Ultrasound examination.

Sometime later, patient again present in Emergency Department with abdominal pain accompanied with slimy-bloody discharge. Patient was not doing routine prenatal care and not consume the prescribed supplements, she also not visiting Obstetrician for Ultrasound as recommended. This leads into more improper ANC screening with delayed screening of possible pregnancy problems.

On 36 to 37 weeks of gestational age, she came to health facility again with abdominal pain now included labour sign such as slimy-bloody discharge with amniotic fluid, felt nausea and had vomit a couple times, denies any other complaint.

From physical examination, notice routine uterine contraction for about 45 seconds in 10 minutes, from vaginal examination notice mucous mixed with blood, cervical opening about 5 cm at 22.00, with ruptured amniotic fluid. Vital sign showed blood pressure of 120/90 mmHg, pulses 84 times per minute, temperature 36.2 degree Celsius, respiratory rate of 18 times per minute. General appearances is good and could done normal labour. Fetal heart rate was 152 times per minute with Doppler Ultrasound and calculated estimated fetal weight was 3720 gram. Additional status from prenatal screening was never been done, thus routine ANC also not properly administered

From delivery status, it was male newborn with fetal weight of 3100 gram, body length of 49 cm, head circumference of 34 cm, APGAR score 0, which notice newborn defect of Spina Bifida meningocele type. The given treatment was initial treatment of newborn and referred to hospital for further treatment and evaluation.

Further examination showed pouch-like membrane contained fluid which came out from spine with intact spinal cord. This indicated that nerve function might still be maintained, thus there's a chance of mild neurologic deficit.

DISCUSSION

Folate deficiency in pregnancy known as the common triggers of NTDs case in newborn. There are two types of NTDs case, either its open or close. Open NTDs (defect is only covered by a membrane) comprise 80 percent of NTDs; the most common type is myelomeningocele, myelocele and anenchepaly. Open spinal NTDs can be associated with cerebral ventriculomegaly. Closed NTDs (defect covered by skin) on the other hand, include lipomyelomeningocele and lipomeningocele. Although covered in skin, closed NTDs may be associated with a tuft of hair, dimple, birthmark, palpable mass or other skin abnormality at the site of defect. [3,4]

NTDs prevalence is highly variable worldwide. A systematic review study showed NTD prevalences were: Eastern Mediterranean (21.9 per 10.000 births); Southeast Asia (15.8 per 10.000 births); Africa (11.7 per 10.000 births); Americas (11.5 per 10.000 births), Europe (9.0 per 10.0000 births) and Western Pacific (6.9 per 10.000 births). [5]

From study which conducted at Dr. Soetomo Hospital from 2013 until 2018, the study found that from 232 samples which diagnosed with NTDs, 122 were female and the rest is male newborn, with spina bifida as the dominant diagnosis (almost 32.78%).[9] From our case report, showed that it was male newborn with fetal weight of 3100 gram, body length of 49 cm, head circumference of 34 cm, APGAR score 0, which notice newborn defect of Spina Bifida meningocele type, further examination showed pouch-like membrane contained fluid which came out from spine with intact spinal cord.

Folic acid administration has been studied and discussed throughout literatures. On an international level, at least 400 µg of folic acid has been recommended in the first month before conception and throughout the first trimester, other also suggest 400 µg of folic

acid as a daily dose for five to six months before pregnancy as it take approximately 20 weeks to maintain the level needed to decrease the risk of NTDs.[6,7,8] From our case, A 20 years old pregnant female came to Emergency Department with complaint of abdominal pain, pregnancy were unplanned. She's not consuming folic acid supplement properly and had not acknowledge of its importance to prevent NTDs. During Antenatal Care, it was found that the patient is not consume folic acid supplement and not having proper knowledge of nutritional intake during pregnancy.

With all the evidence continues to support the supplementation of folic acid in pregnancy, general population must be educated on its effectiveness in preventing not only spina bifida but other form of NTDs. Around 2020 and 2021, United States Preventive Task Force surveyed family medicine residents from 39 residency programs and questioned them regarding their folic acid knowledge. The Study found that 6.6% of the female resident physicians reported they "know a little" or "do not know" about folic acid recommendation. [7]

In another study, there was a positive relationship between counseling about folic acid before conception and increased use of folic acid, however it was noted that most of women did not receiving proper counseling. [7,9]

In our case report, this 20 years old pregnant women came twice to Emergency Department, which on first visit it was known that she had not consuming folic acid supplement, on second visit, during her first Antenatal Care, she also had no proper knowledge of folic acid consumption and its effect during pregnancy.

In 2016, World Health Organization already given newest recommendation regarding ANC which replace previous four-visit focused ANC (FANC) model into the new model. Newest model recommends a minimum of eight contact, with first contact take place in first trimester (up to 12 weeks of gestation), two contact in second trimester (at 20 to 26 weeks of gestation) and five contact in third trimester (at 30, 34, 36, 38 and 40 weeks), in this contacts outcome of antenatal disturbance screening (including NTDs) become more specific with approach by professional Obstetrician. [10]

NTDs continue to be a problem with significant public health impact in low-income and middle-income countries. Ultrasonographic diagnosis of NTDs typically during the second trimester of pregnancy. The diagnostic sensitivity of prenatal ultrasonography (USG) for NTDs screening is 97-98% with its specificity of 100%. Determining the site and extent of a spinal lesion correlates well with neurological outcome; with more severe dysfunction associated with higher and larger lesions. [6,7]

In a study which related with USG during ANC and presence of NTDs, it showed 30 total case of NTD which the most prevalence diagnosis is Spina Bifida (56.6%) with prevalence of 0.33 per 1000 birth.[7] In this case report, the young female, due to lack of knowledge, had not yet done ANC prior first visit to Emergency Department, and after second visit to Emergency, she also had not done proper ANC schedule as referred and not consume the prescribed folic acid, therefore there's delayed screening of possible pregnancy problems.

In other study showed proper scheduled Antenatal Ultrasound by professional Obstetrician is increasing early diagnoses of NTDs in pregnant women in India up until 70% which conducted in hospital clinic which none of them detected before 24 weeks.[7]

CONCLUSION

Spina Bifida is the most common Neural Tube Defects that happens on newborn baby, among all the risk factors which could triggers the NTDs, folic acid deficiency is the highest. Low and improper knowledge of its consumption became the factors that increased chance of NTDs. Improper Antenatal Care screening and counseling also making delayed diagnosis of

NTD among pregnant women below 24 weeks of gestation, this could delayed early treatment during antenatal period.

Declaration by Authors

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