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PREGNANCY AND PREVENTION OF NEURAL TUBE DEFECTS ASSOCIATION (PROSPECTIVE STUDY)

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Abstract:

Neural tube defects (NTDs) are the second most common congenital malformations of humans, characterized by impaired development of the central nervous system. Even though the etiology of most birth defects remains undetermined, genetic and environmental risk factors in the background of NTDs have been identified and extensively reported. On top of genetic and nutritional risks which include mutations in both coding and non-coding regions and maternal folate status, respectively, recent years have seen a rise in the identification of a variety of teratogens that could be implicated in NTD development. These include polycyclic aromatic hydrocarbons, arsenic, pesticides, maternal hyperthermia and antibiotics as well as pain and seizure medication. With an increase in understanding of teratogens leading to NTD formation, preventative and treatment approaches have witnessed great advances throughout the years. While the most common preventative approach includes folic acid food fortification as well as suggested inositol supplementation, treatment and management approaches differ greatly depending on the developmental stage and the site of the lesion and include prenatal surgery, stem cell transplantation and postnatal surgery. Because NTDs still represent a large health and financial burden for the patient and society as a whole, it is crucial to investigate potential risk factors and develop novel approaches in order to fully prevent this category
of disorders.

Keywords: neural tube development; neural tube defects; congenital malformations; spina bifida;anencephaly

AIM AND OBJECTIVES: To *study the* congenital malformation associated with neural tube deffect related to incidence, type, predisposing factors, fate of delivered neonates , sex 9 mothers manifestations during gestation

SETTING: **Department** of Gyanecology and Obstetric Teaching Hospital

INTRODUCTION

The nervous system is entirely ectodermal in origin. A neural groove forms in the antero-posterior midline of dorsal surface of the embryonic plate. The groove folds into neural tube , some of the ectodermal cells between neural tube and overlying ectoderm forms neural crest which migrate and become the cell bodies in the sensory or *autonomic ganglia. The* suprarenal medulla are derived from the neural crest. The cranial end of the neural tube form the cerebral hemispheres , brain stem and cerebellum. The caudal end of the *neural tube form the spinal cord.*

The common anomalies that might be identified are :

1. Head - Anencephaly, Hydrocephaly , Cephalocele , Holoprosencephaly , Microcephaly , Choroid plexus cysts , Hydranencephaly.
2. Cerebellum - Dandy walker malformation.
3. Face - Facial clefts.
4. Neck - Cystic hygroma.
5. Spine - Spina bifida.

Neural tube defects – an overview

Neural tube defects (NTDs) are major congenital anomalies that have a profound impact on families and

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the health services. NTDs threaten the survival of both the foetus and infant. People living with NTDs face significant challenges in terms of impacts on health and disability, social inclusion and quality of life (Yi, 2011; O'Connell, 2014). In population health terms, NTDs are highly significant as contributors to Ireland's national stillbirth, perinatal and infant mortality rates as well as childhood and adult disability (Manning, 2015, Healthcare Pricing Office, 2016).

Parent experiences of pregnancy, childbirth and parenting can be profoundly affected when a neural tube defect occurs in their offspring. Pregnancy loss and stillbirth, as well as loss of the infant in the early weeks of life, are life-changing experiences for mothers and fathers (Sjogren, 2017). Families of children with life-long disability and illness related to neural tube defects are significantly impacted emotionally, practically and financially (Governey, 2014; International Federation for Spina Bifida and Hydrocephalus, 2016). The lifetime cost to the health service of meeting the needs of a child with spina bifida has been estimated nationally at €500,000 (Yunni, 2011).

NTDs are the most common major malformation of the central nervous system in the developing foetus. They arise at an early stage of pregnancy between 21 and 28 days after conception, with the cranial (head) closure preceding the caudal. These defects occur at a time when many women do not yet realise they are pregnant, as they have not yet experienced a missed menstrual period.

There are several forms of NTD including anencephaly, encephalocele, hydraenancephaly, iniencephaly and spina bifida, as well as rarer forms.

Spina bifida, the most common form of NTD, is a condition in which there is incomplete closure of the spinal cord and vertebral column.

Anencephaly occurs when the head end of the neural tube fails to close, resulting in an absence of a significant portion of the brain and skull. Infants born with this condition are either stillborn or are usually born blind, deaf and unconscious. Infants usually die shortly after birth. Encephalocele is a defect where a sac-like portion of the brain is outside the skull. Hydranencephaly is a condition in which the two halves of the brain are missing and instead filled with sacs of cerebrospinal fluid. Iniencephaly is a rare NTD that results in extreme bending of the head to the spine.

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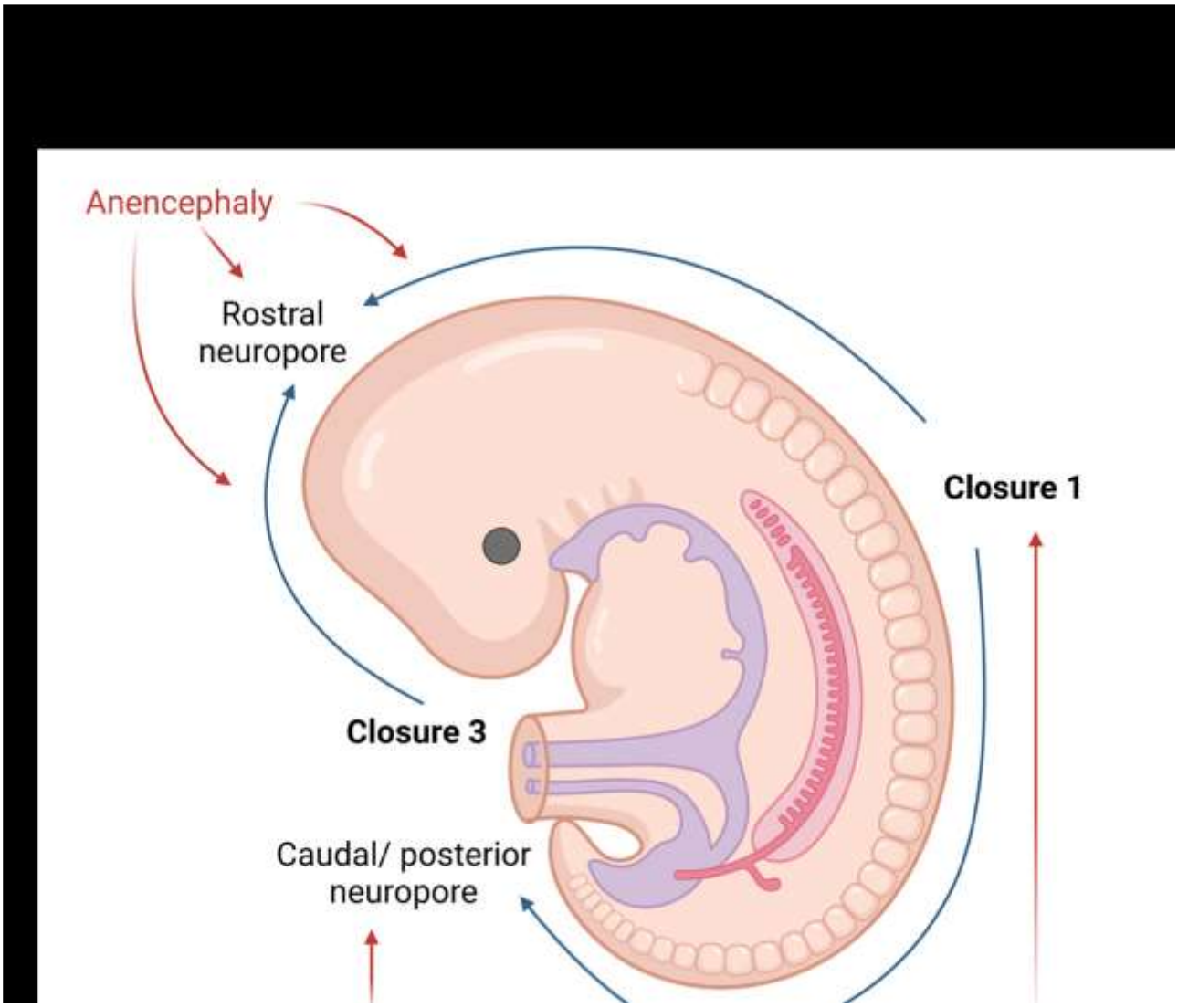

Figure 1. Diagram of neural tube closure and the origin of open NTDs in human embryos. Created with www.BioRender.com (accessed on 26 March 2022)

Etiology and Pathogenesis of Neural Tube Defects (NTDs)

Nutritional Risk Factors

Maternal folate deficiency before conception and during the first trimester of pregnancy is one of the main risk factors for neural tube defects. Folate (vitamin B9) is used as a generic term for a family of chemically and functionally related compounds, including folic acid, dihydrofolate (DHF), tetrahydrofolate (THF), 5, 10-methylenetetrahydrofolate (5, 10-MTHF) and 5-methyltetrahydrofolate (5-MTHF). [15]. The folates found in food are mainly in a polyglutamate form, while folic acid, the synthetic form of folate used in many supplements, is in a monoglutamate form. Although their metabolism is slightly different in some steps, most dietary folates and folic acid that are added to the diet share a common metabolic fate, as they are metabolized to L-5-methyltetrahydrofolate (L-5-MTHF) during their passage across the intestinal mucosa [15]. Folate coenzymes are required for the synthesis of some of the nucleic acid building blocks (thymidylate and purines), a synthesis of methionine from homocysteine, and the interconversion of serine and glycine [15]. Folate status might influence the methylation of DNA and histone modifications, thus altering the expression of some genes involved in neurodevelopment. For example,differential methylation in relation to folate from maternal plasma was found for some of the genes implicated in NTDs analyzed from cord blood [16]. In addition, data from clinical samples revealed the presence of aberrant DNA methylation in a GNAS

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imprinting cluster in NTD samples with low folate concentrations [17]. Folate deficiency conditions increased histone H2A monoubiquitination (H2AK119ub1) which downregulated expression of the neural tube closure-related genes Cdx2, Nes, Pax6 and Gata4 in mouse embryonic stem cells [18]. Although some of the mechanisms are being elucidated, further research is needed for a better understanding of the mechanisms behind the detrimental effect of folate deficiencies on the development of NTDs.

Genetic Risk Factors

Animal models are very important for a better understanding of neural tube development as they can point to several candidate processes for study in the human NTDs etiology [19]. There are 240 mouse mutants and strains with neural tube defects which identify the genes needed for embryonic neural tube closure (NTC) [19]. It is important to mention that having a mutation does not have to mean a certain development of NTDs because, in most cases, environmental factors play a crucial role alongside genes. For example, the prevention of NTDs by maternal folate supplementation has been tested in 13 mutants and, subsequently, led to a reduction in NTD frequency in six diverse mutants [19]. Examples of gene mutations that cause NTDs in mice, and also implicated in the minority of NTD cases observed in humans, are genes for low-density lipoprotein receptor-related protein 6 (Lrp6) and paired box 3 protein (Pax3) [20,21]. In some cases, an NTD can be secondary, caused by the malformation of other structures, such as the notochord [5].

Alongside animal models, important insights into genetic risk factors for NTDs are obtained using next-generation sequencing. This can include whole-genome sequencing (WGS), whole-exome sequencing (WES) or targeted panel sequencing. Using WES, Singh et al. identified a homozygous missense mutation in the TRIM36 gene as the cause of

autosomal recessive anencephaly in an Indian family [22]. TRIM36 is expressed in the developing human brain, suggesting a role in neurogenesis [22]. WES also revealed that de novo damaging variants could be the main culprit for the majority of anencephalic cases [23]. The targeted exome sequencing of 191 NTD candidate genes of 90 patients with cranial NTDs identified 397 rare variants, 21 of which were previously unreported and predicted to be damaging [24]. Mutations can also be found in non-coding regions. For that reason, whole-genome sequencing (WGS) is an important tool for discovering potential mutations contributing to NTDs risk, as shown by Aguiar-Pulido et al., who found mutations in the regulatory regions of several transcription factors critical to embryonic development [25].

Gene–Environment Interactions

Polycyclic Aromatic Hydrocarbons Polycyclic Aromatic Hydrocarbons (PAHs) are environmental pollutants shown to

have an adverse effect on human health, one of which is an increased risk of NTDs.Most PAHs are generated from anthropogenic activities, primarily during the incomplete combustion of organic materials such as coal, oil, petrol and wood [26]. A study conducted in the rural population in Shanxi Province (China) showed that women with any exposure at all to indoor air pollution from coal combustion (IAPCC) had a 60% increased risk of having a child with an NTD, compared to women with no IAPCC exposure [27]. Additionally, a study by Langlois et al. suggests that maternal occupational exposure to PAHs may be associated with an increased risk of spina bifida in offspring among women who are normal weight or underweight [28]. One study showed that PAH concentrations in the placenta of cases with NTDs were significantly higher than in the controls .An increased concentration of PAHs in maternal serum was also associated with an elevated risk for NTDs . Although the exact mechanisms underlying the association between PAHs and NTDs remain largely unknown, decreased global DNA hydromethylation could be one of them . Considering the PAHs negative influence on overall human health, increased risk of NTDs included, it is important that remediation approaches for these contaminants are being developed .

Maternal Hyperthermia

Many studies reported the influence of hyperthermia on the development of congenital diseases, such as NTDs. Because the brain is extremely sensitive to hyperthermia during the early gestational period, animal studies and case reports indicated its teratogenic and mutagenic effects . As such, an increase in maternal core temperature by the effect of some internal (viruses) or external sources (sauna, warm bath, hot tub and electric blanket) to 40 _C is considered potentially damaging for the fetus and can, as such, cause developmental and genetic abnormalities.

Antibiotics, Seizure and Pain Medication Nowadays, it is known that drugs and other medication could act as teratogens, substances which cause physical or functional defects in the human embryo or fetus. Therefore, it is crucial to research which drugs and other substances fall under this category and, even more importantly, which of these are being taken as chronic therapy during pregnancy. As such, to ensure the health

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of the pregnant woman and her child, the FDA has divided drugs into five categories, depending on their teratogenous effect.

Preventative, Management and Treatment Approaches

In Utero

Historically, the management of NTDs was usually conducted after birth. As such, it was of crucial importance to recognize the defect during pregnancy so that a safe delivery with a multidisciplinary team could be planned in advance. Even though cesarean sections are a controversial topic when talking about the delivery of children with NTDs, a variety of studies have shown better long-term motor function in children born via cesareandelivery .

Consequently, other approaches in the management of NTDs appeared. Because mostNTDs could be diagnosed with an ultrasound in utero, it is important to examine the effects of prenatal surgery. Even though its benefits were questioned, results obtained through the randomized multicenter Management of Myelomeningocele Study (MOMS trial) were promising . The MOMS trial has shown that performing prenatal surgery before the 26th week of gestation, in cases of myelomeningocele, decreased the risk of the neonate's death or even the need for shunting by the age of 12 months. Furthermore, the mental and motor functioning score measurements indicated significant improvements at 30 months of age. On top of this, a variety of secondary outcomes which were improved with prenatal surgery were noticed: reduced degree of hindbrain herniation (Chiari II malformation), improved motor function and increased likelihood of being able to walk when compared to postnatal surgery . With the discovery of many restorative effects of stem cells (SC), they have emerged as a potential therapeutic modality for NTDs in recent years. This is supported by a multitude of studies performed on animal models of NTDs, most of which included the induction of spinal open neural tube defects. As such, Sim et al. demonstrated significant changesin the NT re-closure capacity in chick embryos following stem cell transplantation Furthermore, Lee et al. reported that intra-amniotic transplantation of human embryonic stem cells into chick embryos following an NT incision enhanced its re-closure capacity, with a significantly shorter mean length of the ONTD observed in the treatment group Similar experiments were performed on fetal lambs with experimental myelomeningocele (MMC). Following prenatal neural stem cell (NSC) transplantation to the spinal cord, the results have shown a higher survival rate and an improvement in the walking ability of the treatment group Although clinical application of stem cells has shown a multitude of beneficial effects, the potential adverse effects as well as ethical issues related to their use still raises concerns in the field of regenerative medicine. These have been extensively covered by Volarevic et al. Due to their potential for unwanted differentiation, theability to suppress the anti-tumor immune response and generate new blood vessels, mesenchymal

stem cells (MSCs) could potentially promote tumor growth and metastasis. On the other hand, the use of human embryonic stem cells (hESCs) brings forth a multitude of ethical challenges, mainly related to the dilemma involving the destruction of a human embryo. On top of this, as hESCs are pluripotent cells, they are difficult to control after in vivo transplantation, potentially facilitating the development of teratomas Even though they are still seen as "morally superior" to hESCs, ethical issues regarding the use of induced pluripotent stem cells (iPSCs) stem from their unlimited differentiation potential This brings forth concerns regarding their use in human cloning, as well as the generation of human embryos and human–animal chimeras. Even though stem cell therapies show great promise, the ethical challenges they pose warrant further consideration of the ethical implications and adaptation of the existing approach in order to facilitate their broad application.

Infant Care

Besides prenatal intervention and surgery, the treatment and management of NTDs can also be achieved postnatally. However, following the aforementioned MOMS trial, which has shown that in utero operations achieve better postoperative results, postnatal surgery no longer represents the most viable option. As such, more research is being conducted on alternatives, or novel combinations with postnatal surgery, that could yield more promising results. One such study is the one performed on 17 patients with myelomeningocele, aged between 1 month and 4 years, by Gupta et al. It included performing autologous stem cell transplantation into the spinal cord and the caudal space during or after postnatal surgery. Even though the results obtained are promising, more research is needed to confirm the significance and longevity of the observed benefits. Additionally, because induced pluripotent stem cells (iPSCs) are reprogrammed somatic cells which become pluripotent, they can restore or reconstruct an entire organ or tissue, including its function. As such, an ongoing hypothesis in the field exists that neural crest cells could be reprogramed and transplanted in order to assist in the

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proper closure of the neural tube Positive effects of stem cells might even be improved by genetic modification or by innovative ways of transplantation .

Adult Care

Because the management of a majority of NTDs occurs during the perinatal period, this means that the persistence of such lesions into adulthood is very uncommon. Moreover, it can be concluded that only the undiagnosed NTDs, which presented without obviousor with minimal symptoms, as well as the NTDs that could not be treated adequately at the time of the diagnosis, may be present in adults. Because the symptoms of untreated NTDs could worsen with time, especially after trauma, it is important to emphasize the options vailable for adult care with respect to their symptoms. As such, the symptoms that may be present since birth, and throughout adulthood, are lower extremity weakness as well as bowel and urinary overflow incontinence due to urinary retention. Despite the lack of treatment at an early age, there is a significant number of patients who underwent the operation as adults in order to manage their symptoms.

Godzik et al. published a case report about the treatment of an older (62 years old) patient who, after her symptoms worsened, underwent surgery . Here, myelomeningocele presented with ulcerated lesions and CSF leakage, leading to an increase in the size of her ventricles. In order to stop the CSF leakage, which was present for 8 years prior to the surgery, the operation included the placement of an external ventricular drain. The whole procedure was successful, backpain symptoms were alleviated and the CSF fluid leakage was stopped.

The role of folate and folic acid in prevention of NTDs

It is now known that the majority of NTDs can be prevented through consumption of FA via oral supplements and through fortification of the food supply. Two landmark studies in the early 1990s estimated the effectiveness of pre-natal and early antenatal supplementation in preventing neural tube defects. These studies examined primary prevention as well as prevention of re-occurrence in women who had already conceived an infant with a NTD. Several studies also compared the level of protection offered by non-, partial or full compliance with pre-natal supplementation and at different doses of FA. These included studies in the context of planned pregnancies (Czeizel & Dudas, 1992) and observational studies on recurrence which provided a primer for subsequent randomised controlled trials (Smithells,1981; Smithells, 1983; Mulinare,1988; Medical Research Council, 1991).

A number of recent reviews reinforce the role of folate in the prevention of NTDs and in supporting the development of the foetus in utero, as well as in supporting maternal health during pregnancy and lactation (Molloy, 2008; Burke, 2009; Boilson, 2012; Lassi, 2013;World Health Organization, 2015; McDonnell, 2018). In addition, the importance of sufficient folate both before and during pregnancy in preventing maternal anaemia is becoming increasingly apparent (O'Malley, 2018) with co-existent iron deficiency an additional consideration (Molloy, 2014).

What are folate and folic acid?

Folate is a B vitamin found naturally in many foods.

Folic acid is a form of folate. It's used in vitamin supplements and fortified foods. Fortified foods, also called enriched foods, are foods that have specific nutrients added to them.

Why is folate important?

Your body uses folate during your pregnancy to make red and white blood cells and to help your baby grow.

Folate also lowers the risk of your unborn baby having a neural tube defect (NTD). NTDs are a group of serious birth defects that affect a baby's spinal cord, brain and skull. Spina bifida and anencephaly are the most common NTDs. Some babies with severe NTDs are stillborn or do not survive long after birth.

NTDs happen when the tissues and bone around the brain and spine do not grow well. NTDs can happen in the third and fourth week after conception (the first or second week after your first missed period). This could be before you know that you are pregnant.

How can I reduce my baby's risk of being born with an NTD?

If you are planning on becoming pregnant, take a multivitamin with 400 mcg (0.4 mg) of folic acid and eat foods high in folate every day for 3 months before you become pregnant.

If you become pregnant, continue taking a multivitamin with folic acid every day during your pregnancy and for 4 to 6 weeks after, or for as long as you are breastfeeding.

Since many pregnancies are unplanned, it is important for all women who could become pregnant to consider taking a daily multivitamin with folic acid. A multivitamin with folic acid also gives you other nutrients important for a healthy pregnancy. When you choose a multivitamin, pick one that also has vitamin B12. Vitamin B12 works with folate to make DNA.

Some multivitamins contain more than 400mcg (0.4mg) of folic acid. A slightly larger dose of folic acid is not dangerous, but too much folic acid can cause health problems. Do not take more than 1000 mcg (1 mg) of

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folic acid from fortified foods and supplements each day unless your health care provider has told you to.

How can I get more folate from my diet?

Food sources of folate include:

• dried beans, peas, lentils and edamame (green soybeans)
• dark green vegetables such as asparagus, avocado, spinach, broccoli, romaine lettuce, beets, Brussels sprouts, green peas, gai-lan, and bok choy
• oranges and papaya
• wheat germ, sunflower seeds and peanuts
• enriched grain products, such as enriched pasta and enriched cornmeal. Other foods that may contain added folic acid include breads, crackers and ready-to- eat cereals. The amount of folic acid in enriched foods varies

What increases my risk of having a baby with a neural tube defect?

You are at higher risk of having a baby with an NTD when:

• You or your male partner already had a baby with an NTD or a pregnancy affected by an NTD
• You have a family member with an NTD
• You have diabetes, obesity, gastrointestinal conditions such as Crohn's or Celiac disease, gastric bypass surgery, advanced liver disease or receive kidney dialysis
• You struggle with drug or alcohol use
• You are taking anti-epilepsy medications or medications that interfere with your body's use of folic acid (e.g., anticonvulsants, methotrexate, sulfasalazine, triamterene or trimethoprim - as found in cotrimoxazole) A health care provider might suggest a larger dose of folic acid if you are at higher risk of having a baby with an NTD. If you are at a higher risk, talk to your health care provider about what amount of folic acid is right for you

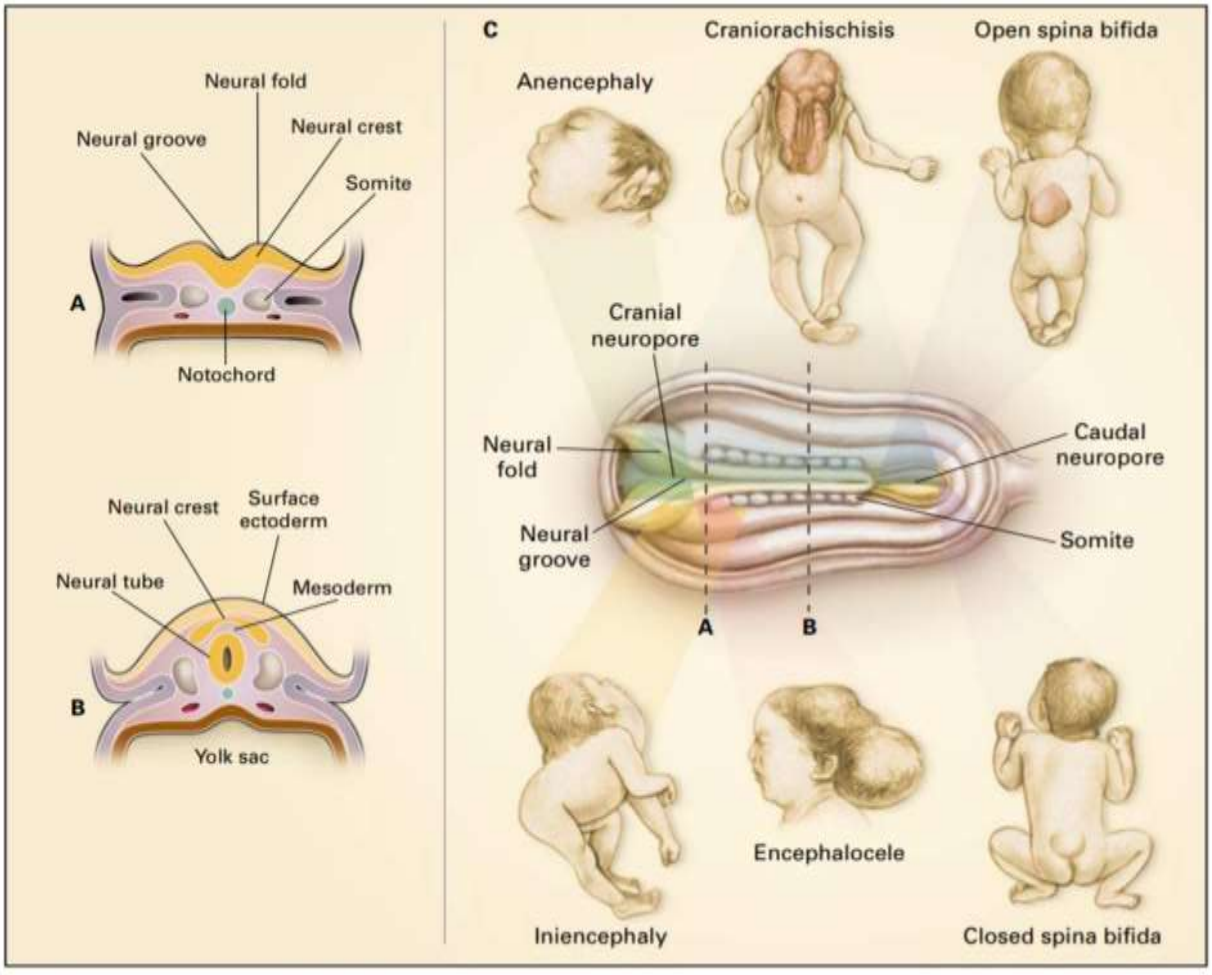

Figure 1. Features of Neural-Tube Development and Neural-Tube Defects.

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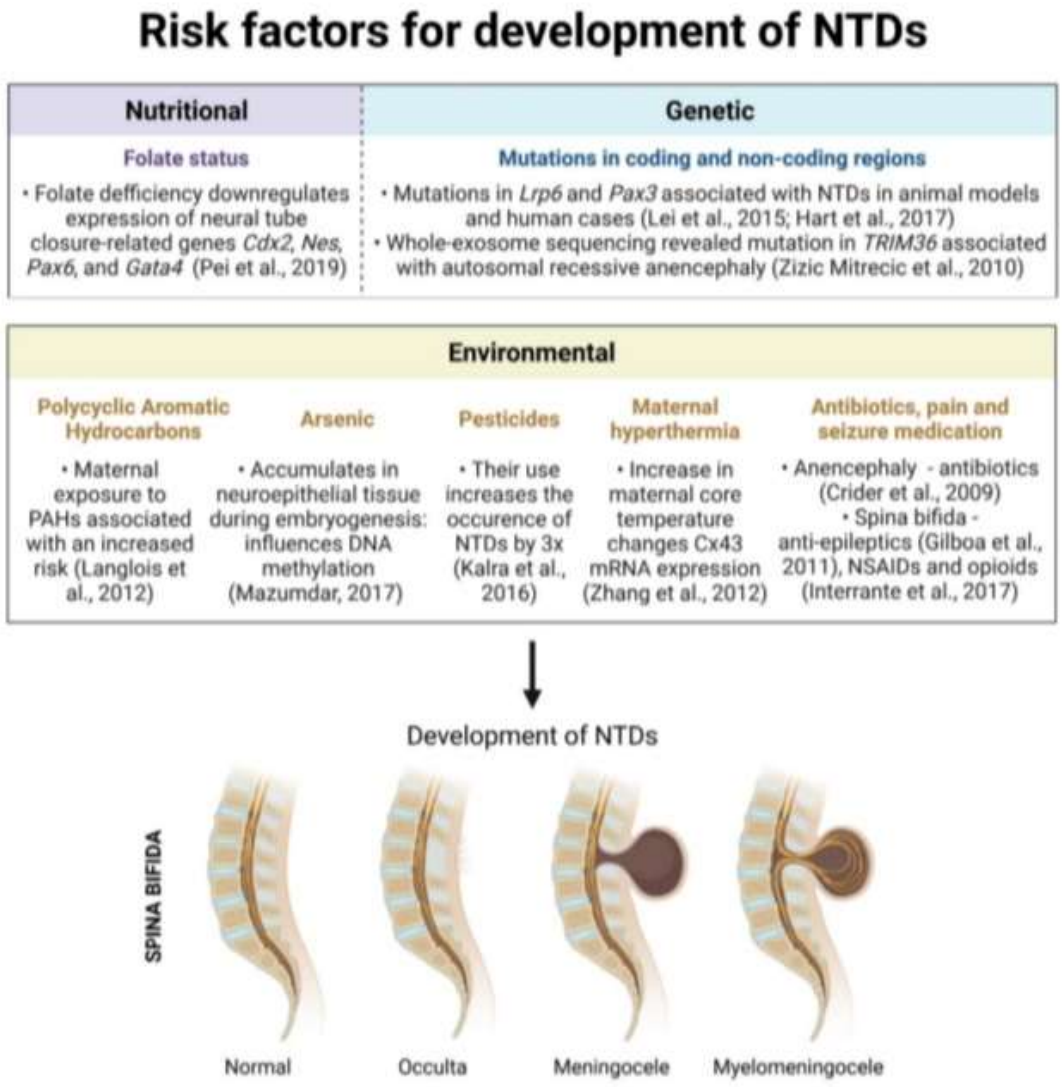

Figure 2. Summary of risk factors leading to development of NTDs. Created with www.BioRender.com (accessed on 26 March 2022).

METHOD AND MATERIAL

Prospective study of 17 patients , admitted to the department from city or referred from territories in one year time March , 2018 February , 2019 .The accuracy drop significantly prior to 15 weeks. Other centers demonstrated that 98 % of Open NTD (s) had an A F A FP which exceeded their defined cut-off , increasing from 2. 5 times the medianat 13 – 15 weeks gestation to 4 times the median at 22 - 24 weeks. Other countries including the U.S.A. and Germany , reported a favorable experience with MS A F P screening in large pilot or regional projects. Factors whichh influence MS A F P concentration, blacks have 10 % higher MS A F P levels do causations and a lower incidence of NTD (s) , Insulin

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dependent diabetic patients have Lower MS A F P level but four times the incidence of NTD than nondiabetic patients, maternalweight< 52 kilos or>80 kilos , women with twin gestation have an average , twice the level of A F P found In women with single pregnancies A CHE (Acetylecholinesterase) is a neural tissue specific enzyme which has proven helpful in distinguishing Open NTD (s) from most other causes of elevated A F A F P. Although A CHE is present In high concentration in fetal serum , It is not detectable by gel electrophoresis in amniotic fluid of normal gestations. Other approach to the NTD detection is a targeted screening reasonable attempts can be made to specifically study those pregnancies at highest risk by ultrasound or combination of ultrasound and MSAFP The question is whether NTD detection would be better served by routine ultrasound. The cause of ultrasound Is many countries is very high , further , it Is not practical because there are insufficienttrendpersonnel to carry out the task. One potential advantage of MS A F P screening is that an elevation MS A FP distinguished group of pregnancies at greater risk for a numerous adverse outcome including structural malformation discussed

RESULTS

Genders			MEDIEN	MSAFP
	MALE	10		
	FEMALE	7		
Totale numbers of parients		17		
GESTATINAL AGE				
	13 .15 WEEKS		2.5 TIMES AFAFP	
	22.24 WEEKS		4 TIMES AFAFP	
diabetic mathers				4 time Non.diabetic mathers
maternal weight	up than 52 KG	less to 80 KG		
twine to single AFP			twice up single	

AFAFP.aminiotic fluid alpha fetoprotein ,MSAFP. maternal serum alpha fetoprotein,AFP,alpha fetoprotein

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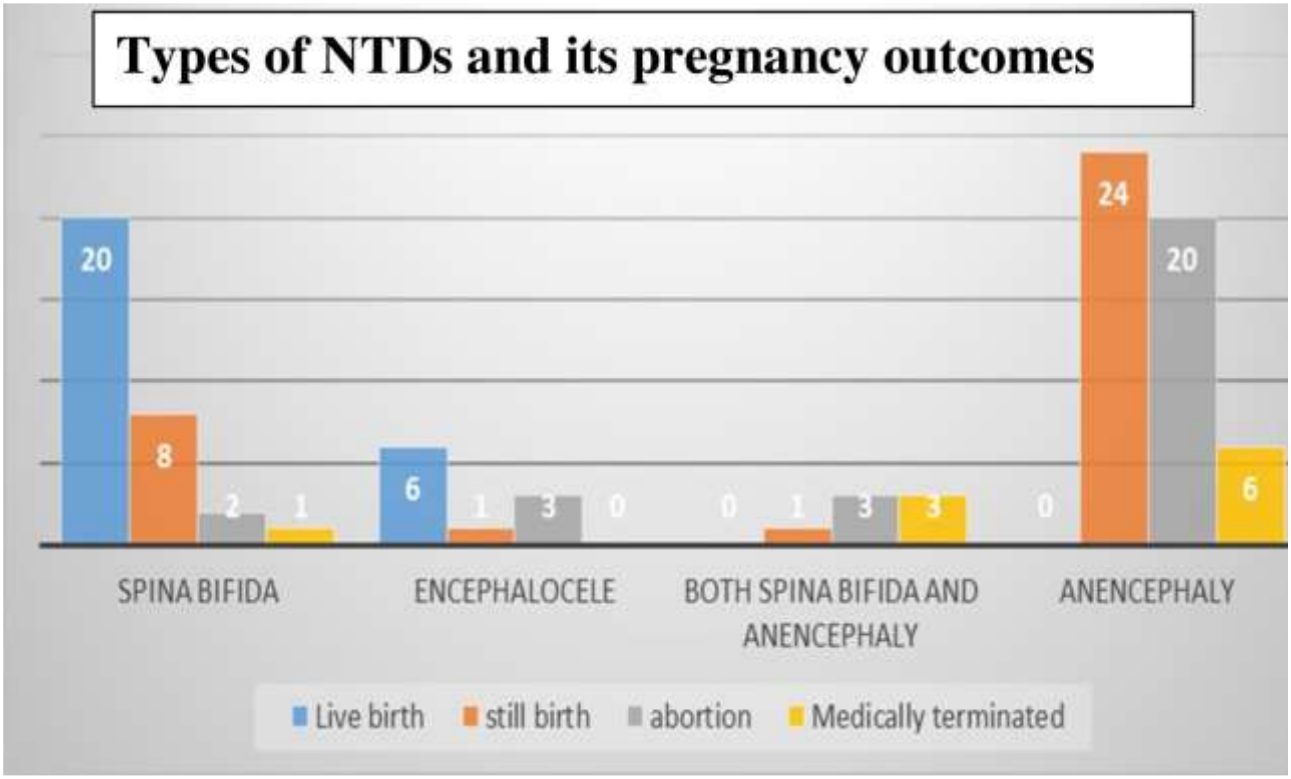

Fig 4. Types of NTDs and its pregnancy outcomes

DISCUSSION

NTD (s) are common major birth defect second In frequency only to congenital heart disease. The birth prevalence of NTD (s) varies In the by U.S.A. geographic the prevalence local , race In caucasions and certain Is maternal 0. 15 % but conditions.varies four-fold from regions of lowest to highest prevalence. In some part of U.K. , the rate Is about three times greater than the overall rate In U.S.A. Blacks have about one half the incidence of caucation

Maternal risk factors Include

Positive family history , first to third degree relation that increase the risk of NTD (s) , for countries with a birth prevalence of 1 – 2 per 1,000 , if a couple has a previously had a child with NTD (s) Or if oneor other parent Is affected ,the riskis 1 - 3 % , for two affected children the risk rises to 6 Maternal insulin dependent diabetes mellitus Maternal valporic acid therapy Maternal gastric bypass surgery Prior birth of child with hydrocephalus or multiple vertebral defects Most of the NTD (s) are isolated and presumed multifactorial In causations , about half are defects in spinal closure and half anencephaly. 10 % of spinal NTD (s) are skin covered and hence do not leak A F P. Encephalocele represent 5 – 7% of NTD (s) and greater than 50 % of these are closed. NTD (s) can be component of chromosome abnormalities such as 13 , 18 and triploidy and of a single gene disorder such as Meckel – Gruber syndrome "isautosomal recessive whichhis form 1/ 40,000 of alive birth characterized by NTD post axial hexadactyly and polycystic kidney At least 90 % of Infant with NTD are born to couple with a negative family history. Pre-natal A F P testing begun In U.K. in the early 1970 (s). A large collaborative study demonstrated that screening could detected the majority of Open NTD (s) . Screening was found to be most accurate between 16 and 18 weeks.."

CONCLUSION

The study showed high incidence of NTD(s) In comparison with That in U.S.A. and U.K Two age groups revealed the highest incidence between 25 - 34, and 35 – 44 Regarding parity Para 1 - Para 5 showed highest incidence Vast majority of the women affected were Cases belong to regions showed highest the incidence Most of the cases did'nt show any relation to previous abortion (s), history of previous NTD (s) babies or positive family history Most Unfortunately of victims 70 affected % of cases are the were product followed of first regularly class marriage.in MCH care unit without identifying the abnormalities The data did'nt show any specific drugs intake during pregnancy The majority of cases includeincludeed in this study reached full term Hydrocephalus and Anencephaly are most common

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anomalies recognized among study Most of the mothers affected have Polyhydramnia during gestation Slight difference in sex specificity Half of the babies were delivered still birth , other half either died soon after delivery and only few still survive.

RECOMMENDATION

Development of population guidelines for folate in pregnancy including at risk groups

The following text should be accepted as standard guidelines for the prevention of NTDs -

1. All women who may possibly become pregnant within the next three months, whether intentionally or not, are advised to take oral Folic Acid (FA) 400 micrograms daily to prevent Neural Tube Defects (NTDs)
2. Women who intend to become pregnant are advised to start FA at least 6 weeks before they start trying to conceive so that their folate levels are optimised before closure of the neural tube
3. Women who are at increased risk of a pregnancy complicated by a NTD should arrange to see their doctor, because they may need a prescription-only higher dose of FA 5.0mg daily. Women who are prescribed 5.0 mg before pregnancy should continue on the same dose for the first trimester
4. After the first trimester and during breastfeeding, all women are advised to take oral Folic Acid 400 micrograms to meet the World Health Organization's recommended daily intake for pregnancy and breastfeeding. This promotes fetal and neonatal development as well as reducing the risk of anaemia in the mother.
5. Women who are considered at increased risk include women who: (a) experienced a previous pregnancy complicated by a NTD (b) have pregestational Type 1 or 2 diabetes mellitus (c) have a first degree relative diagnosed with a NTD (d) are on certain medications (as listed in Appendix 4) (e) have moderate or severe obesity (BMI > 34.9 kg/m2).
6. All women should follow the National Healthy Eating Guidelines, but they should be aware that increasing their dietary intake of folate alone is unlikely, in the absence of mandatory food fortification or FA supplementation, to achieve optimal maternal folate levels.

The Healthy Eating Guidelines should be reviewed regularly to consider

(a) the optimum dosage of supplementation
(b) the optimum duration of supplementation prior to conception, during pregnancy and during lactation
(c) identification of high-risk groups whose risk is demonstrated to be modifiable by use of FA supplementation at higher dose.

Opportunities for joint North/South communication on FA messages should be considered

REFERENCES

MRC Vitamin Study Research Group. Prevention of neural tube defects: results ofthe Medical Research Council Vitamin Study. Lancet 1991;338:131–7.

Mathews TJ. Trends in spina bifida and anencephalus in the United States, 1991–2006. http://www.cdc.gov/nchs/products/pubs/pubd/hestats /spine_anen.htm
(accessed 27 Nov 2014).

Honein MA, Paulozzi LJ, Mathews TJ, et al. Impact of folic acid fortification of theUS food supply on the occurrence of neural tube defects. JAMA 2001;285:2981–6.

Williams LJ, Mai CT, Edmonds LD, et al. Prevalence of spina bifida and anencephalyduring the transition to mandatory folic acid fortification in the United States.Teratology 2002;66:33–9.

Flour Fortification Initiative. Global Progress. http://www.ffinetwork.org/global_progress/. (accessed 18 Dec 2014).

Lopez-Camelo JS, Orioli IM, de Graca Dutra M, et al. Reduction of birth prevalencerates of neural tube defects after folic acid fortification in Chile. Am J Med Genet A2005;135:120–5.

De Wals P, Tairou F, Van Allen MI, et al. Reduction in neural tube defects after folicacid fortification in Canada. New Engl J Med 2007;357:135–42.

Sayed AR, Bourne D, Pattinson R, et al. Decline in the prevalence of neural tube
defects following folic acid fortification and its cost-benefit in South Africa. Birth
Def Res A Clin Mol Teratol 2008;82:211–16.

Collins JS, Atkinson KK, Dean JH, et al. Long term maintenance of neural tube
defects prevention in a high prevalence state. J Pediatr 2011;159:143–9.

10. Expert Advisory Group. Folic acid and the prevention of neural tube defects.
London: Department of Health, 1992.

11. Boyd PA, Armstrong B, Dolk H, et al. Congenital anomaly surveillance in England—ascertainment deficiencies in the national system. BMJ 2005;330:27.

12. http://www.binocar.org (accessed 18 Dec 2014).

13 .Dolk H. EUROCAT: 25 years of European surveillance of congenital anomalies. ArchDis Child Fetal Neonatal Ed 2005;90:F355–8.

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
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ISSN: 2749-3644

14. Prevention of neural tube defects in the UK:a missed opportunityJK Morris,1 J Rankin,2 ES Draper,3 JJ Kurinczuk,4,5 A Springett,1,5 D Tucker,6
D Wellesley,7 B Wreyford,5,8 NJ Wald.
15. Folic Acid Supplementa_on Report by the Department of Health Folic Acid Policy Commi_ee, 2019. gov.ie/health.
16. Review Overview of Neural Tube Defects: Gene–Environment
Interactions, Preventative Approaches and Future Perspectives
Jasmina Isakovi´c 1,2,* , Iva Šimuni´c 3 , Denis Jage˘ci´c 2,3, Valentina Hribljan 2,3 and Dinko Mitre˘ci´c 2,3.
17. Corsello, G.; Giuffrè, M. Congenital Malformations. J. Matern. Fetal Neonatal. Med. 2012, 25 (Suppl. S1), 25–29. [CrossRef]
18. Abbafati, C.; Abbas, K.M.; Abbasi-Kangevari, M.; Abd-Allah, F.; Abdelalim, A.; Abdollahi, M.; Abdollahpour, I.; Abegaz, K.H.;
Abolhassani, H.; Aboyans, V.; et al. Global Burden of 369 Diseases and Injuries in 204 Countries and Territories, 1990–2019: A
Systematic Analysis for the Global Burden of Disease Study 2019. Lancet 2020, 396, 1204. [CrossRef]
19.. Yacob, A.; Carr, C.J.; Foote, J.; Scullen, T.;Werner, C.; Mathkour, M.; Bui, C.J.; Dumont, A.S. The Global Burden of Neural Tube
Defects and Disparities in Neurosurgical Care. World Neurosurg. 2021, 149, e803–e820. [CrossRef] [PubMed]
20. Catala, M. Overview of Secondary Neurulation. J. Korean Neurosurg. Soc. 2021, 64, 346. [CrossRef] [PubMed]
21. Zizic Mitrecic, M.; Mitrecic, D.; Pochet, R.; Kostovic-Knezevic, L.; Gajovic, S. The Mouse Gene Noto Is Expressed in the Tail Bud
and Essential for Its Morphogenesis. Cells Tissues Organs 2010, 192, 85–92. [CrossRef]
22.. Juriloff, D.M.; Harris, M.J. Insights into the Etiology of Mammalian Neural Tube Closure Defects from Developmental, Genetic
and Evolutionary Studies. J. Dev. Biol. 2018, 6, 22. [CrossRef]
23. Avagliano, L.; Massa, V.; George, T.M.; Qureshy, S.; Bulfamante, G.P.; Finnell, R.H. Overview on Neural Tube Defects: From
Development to Physical Characteristics. Birth Defects Res. 2019, 111, 1455–1467. [CrossRef]
24. Finnell, R.H.; Caiaffa, C.D.; Kim, S.E.; Lei, Y.; Steele, J.; Cao, X.; Tukeman, G.; Lin, Y.L.; Cabrera, R.M.; Wlodarczyk, B.J. Gene
Environment Interactions in the Etiology of Neural Tube Defects. Front. Genet. 2021, 12, 608. [CrossRef]
25. Krantz, D.A.; Hallahan, T.W.; Sherwin, J.E. Screening for Open Neural Tube Defects. Clin. Lab. Med. 2010, 30, 721–725. [CrossRef]
10. Goldstein, R.B.; Filly, R.A. Prenatal Diagnosis of Anencephaly: Spectrum of Sonographic Appearances and Distinction from the
Amniotic Band Syndrome. AJR Am. J. Roentgenol. 1988, 151, 547–550. [CrossRef]
26. The Infant with Anencephaly. N. Engl. J. Med. 1990, 322, 669–674
27. Pregnancy and Nutrition: Folate and Preventing Neural Tube Defects, For more HealthLinkBC File topics, visit www.HealthLinkBC.ca/healthfiles or your local public health unit. For non-emergency health information and advice in B.C. visit www.HealthLinkBC.ca or call 8-1-1 (toll-free).
28. RESEARCH ARTICLE Prevalence of neural tube defects at Debre
Berhan Referral Hospital, North Shewa, Ethiopia. A hospital based retrospective crosssection study Zerihun Kindie1☯, Abay MuluID
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