Plasma Tocopherol (Vitamin E) Level In Normal Pregnant Egyptian Women and in Newborns

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BY

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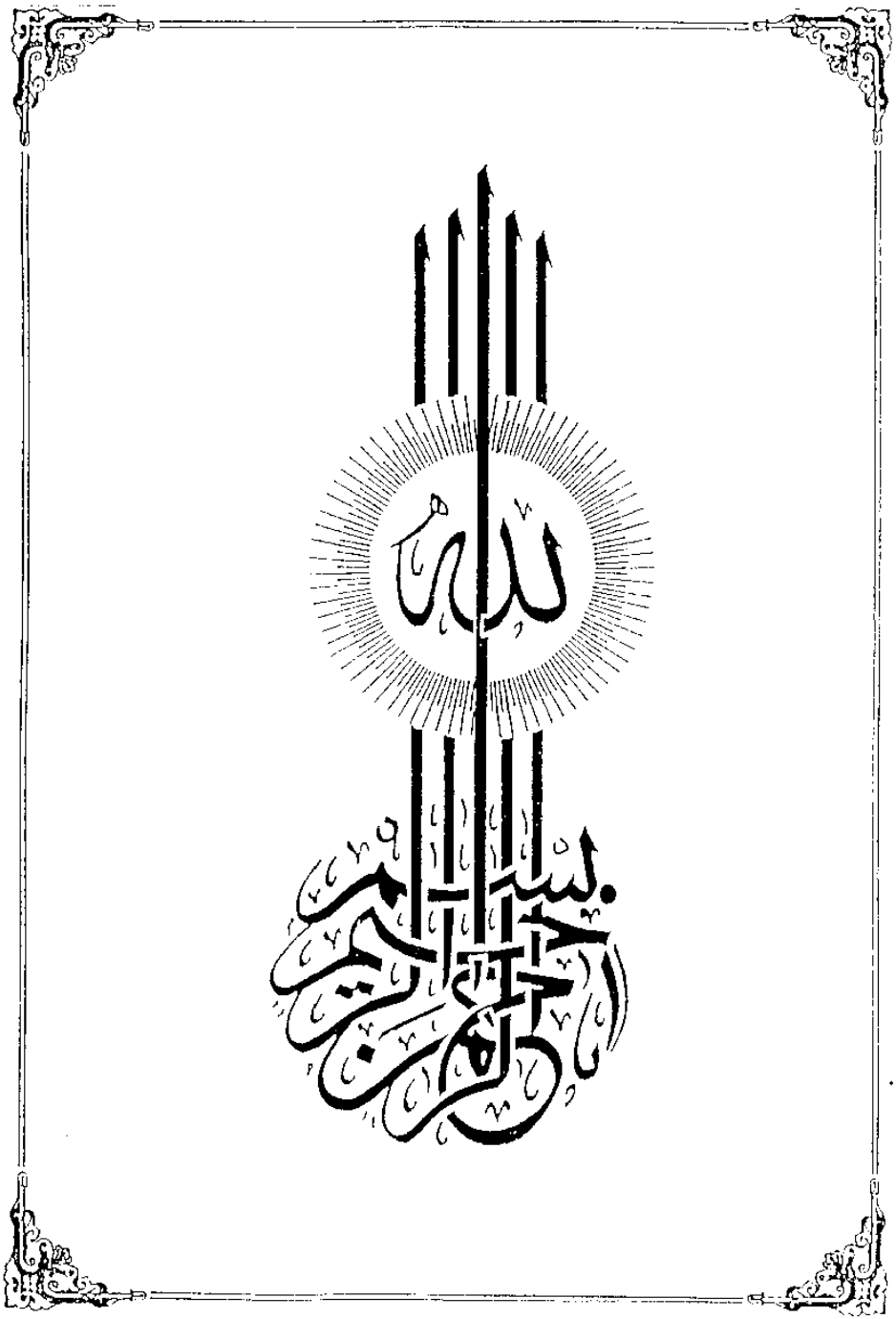

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Although the influence of maternal nutrition on the course and outcome of pregnancy has long been acknowledged only recently the full significance of this concept has begun to be accepted. The study of nutrition in pregnancy has also been concerned with the neonate. High perinatal and infant mortality rates are the scourge of the poorer nations of the world, and constitute a major health problem in the lower social groups. Perinatal mortality is known to be particulary high in infants of low birth weight, and in those who survive, a higher frequency of congenital anomalies, mental retardation and subnormal growth is evident (Naismith, 1983) .

In most studies concerned with fetal health, maternal weight gain during pregnancy has shown a positive correlation with birth weight.(Hytten,and Leitch,1971) This strongly suggests a causal relationship between inadequate maternal nutrition and poor reproductive performance.

It is important,therefore,to identify the nutrient deficiencies that are responsible for impaired fetal health. Undernutrition in the latter part of pregnancy may retard the growth of the fetus,while in early pregnancy,it affects its capacity for survival and development (Naismith,1983).

The relatively small amounts of iron in the standard diet,coupled with low iron storage in many pregnant women, are simply inadequate to meet the greatly increased requirements for this element for the synthesis of maternal and fetal hemoglobin. Thus iron deficiency during pregnancy is largely a preventable problem by giving iron supplements (Pritchard,1970). On the other hand, folic acid deficiency,notearly as common as iron deficiency anemia results in megaloblastic anemia (Pritchard,1970). Initial studies suggested an association between nonanemic folate deficiency and several different types of pregnancy wastage, particularly abruptio placentae,other causes of bleeding in late pregnancy,abortion and fetal malformations (Pitkin et al.,1972). Increased calcium intake during pregnancy for fetal bone development was recommended by Goss (1963). An increase in caloric intake of approximately 10% over non-pregnant requirements is needed in normal pregnancy to permit the necessary adjustments in maternal physiology and provide for fetal development(Alexander and Downs,1953). To the basic protein needs of the non pregnant women for repair of tissues are added the demands for growth and repair of the fetus, placenta,uterus and breasts, and increased maternal blood volume(Hytten and Leitch, 1971).

Tocopherol (Vitamin E) is an antioxidant essential for the protection of cellular lipids,lipoproteins, and enzyme susceptible to lipid peroxidation (Dam,1957).

Although tocopherol deficiency is rare in adults even among the poorest sectors of some populations, it does occur in the newborns(Gyorgy et al.,1952; Nitowsky et al.,1956;Goldbroom,1963).

Tocopherol deficiency in the newborn is a known cause for certain disorders such as increased red blood cells susceptibility to hemolysis and increased platlets count, especially in preterm and low birth weight infants.

The possible role of the mother in the aetiology of deficiency could be investigated by determining the relationship of the plasma tocopherol level in the infants at birth and in the mothers.

Maternal and neonatal normal level of plasma tocopherol is not well studied among the Egyptian women.

The mean plasma tocopherol level in the maternal blood at different durations of pregnancy will be estimated.

Mean plasma tocopherol level in cord blood from neontates will be estimated .Plasma tocopherol in the non pregnant women will be determined to calculate the range of the values in Egyptians.

The degree of correlation between the tocopherol levels in the neonates and with that of the mother will be estimated.

The relationship of the tocopherol in the maternal blood to parity,age and any other variables will be determined as well as the effect of these factors on the infant's plasma tocopherol level.

The birth weight will be compared to the level of tocopherol in maternal & cord blood.

Plasma tocopherol level in the infant will be studied in relation to the sex of the infant.

The obtained results will be compared with that previously investigated from the different races.

REVIEW OF LITERATURE

History:

In 1922, Evans and Bishop demonstrated the existence of a fat soluble dietary factor that was required for reproduction in rats. Animals deficient in this factor, which was designated tocopherol (Sure,1924),ovulated and conceived normally,but fetal death and resorption occurred at sometimes during gestation(Evans and Bishop,1922).Evans and his associates(1936)isolated the vitamin from wheat germ oil in 1936 and proposed the name "α-tocopherol" from the Greek tokos,a noun meaning childbirth,and phero,a verb meaning to bear.The suffix,-ol,was added to indicate that the substance was an alcohol .

Herold et al.(1979)found no effect of tocopherol on human sexual function.

Chemistry of tocopherol:

Tocopherol includes eight forms that occur naturally in foods and that differ in chemical structure and degree of vitamin activity. These forms are:Alpha,beta, gamma and delta tocopherol and the four corresponding tocotrienols (McLaughlin and Weihrauch,1979).Alpha tocopherol is considered to be the most important, since it possesses the greatest biological activity and comprises about 90% of the total tocopherols present in the animal tissues (Cohn,1975).

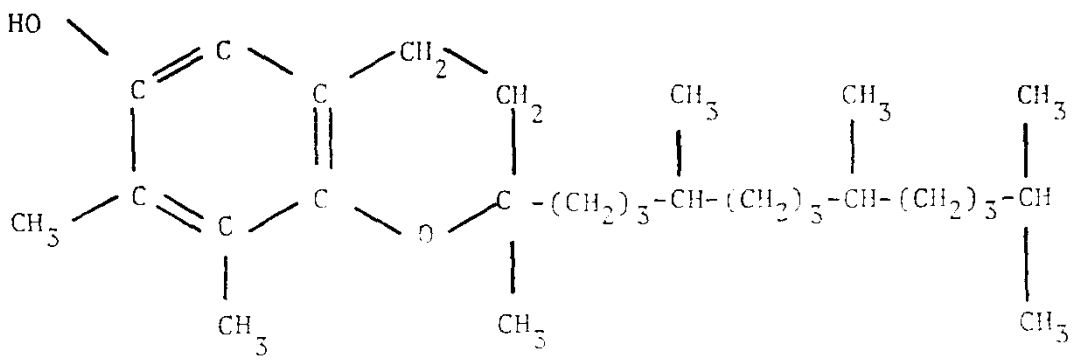

Fig:(1) Chemical structurre of ∝-tocopherol.

The standard unit of tocopherol activity is Dl-∝-tocopherolyl acetate, lmg being equal to 1 IU.

Forms of Tocopherols	Content mg/IU
Dl - ∝ tocopherol	0.91
Dl - ∝ tocopherylacid	1.12
D - ∝ tocoherylacetate	0.74
D - ∝ tocopherol	0.67
D - ∝ tocopheryl acid succinate.	0.83

The above table (1) shows the activity of tocopherol compounds(Cohn,1975).

* Biologic activity:

Alpha-tocopherol is the most active form,followed consecutively by beta,gamma,delta tocopherols then tocotrienols(Cohn,1975).

Sources of tocopherol:

Harris and Quaife(1950) & Harris et al.(1952)had found that the richest dietary sources of tocopherol were vegetable oils like those obtained from corn, soya been,peanut,coconut or cottonseed,with cereal products and eggs next in order of nutritional importance. Other vegetables supply little of the daily intake of tocopherol, both because of their low concentration of total tocopherols and because only a small proportion may be alpha-tocopherol with its relatively greater biologic activity.Animal products have a low content of total tocopherol, but a high proportion is the alpha form. The value of cereal products as a source depends on the extent of the milling process.

I) Tocopherol in animal products(Mchaughlin and Weihrauch,1979):

In raw muscle, fat, and organs from mammals and birds tocopherol is all or nearly all in the form alpha-tocopherol Meats don't contain large amounts of tocopherol because animals don't manufacture the vitamin but acquire it from their food.Canning and preserving of meats causes loss of some tocopherol. Also frying and boiling causes the same(Thomas and Calloway,1961).Meat fried in vegetable oil may gain tocopherol from the oil.

In eggs, all of the tocopherol is in the yolk, one-third of the tocopherol is in the gammatocopherol form.

In cow's milk,nearly all the tocopherol is alpha tocopheral and is associated with the lipid storage of butter causes looses of 10-30% of tocopherol in six months.

Most common fats and oils from animals have less than 4 mg.tocopherol per 100 gm.

II) Tocopherol in plant products(McLaughlin and Weihrauch, 1979):

Tocopherol in beans and peas ranges from low to moderate with the highest levels in dry lima beans (7.68mg/100 gm)and dry soyabeans (20.45 mg/100 mg) Gamma-tocopherol is the most prevalent form.Canning of peas causes looses of tocopherol.

Most fruits contain low amounts of tocopherol (0.1-2.0mg/100 gm).Wild black berries have high tocopherol (13 mg/100 mg).Apples and pears have a greater concentration of tocopherol in the skin than in the flesh.