

Issues of Regulation of Land Relations in Uzbekistan Study the Correlation between Anti - Mullerian Hormone and some trace elements (selenium, copper, zinc, and iron) in infertile women: A review

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Abstract: A clinical pregnancy cannot be achieved until at least 12 months have passed after the last unprotected, routine sexual activity. It usually has an impact on the reproductive system and is referred to as infertility. Infertility rates have increased in recent years. Cell differentiation and development are significantly influenced by the glycoprotein known as anti-Müllerian hormone, which is produced by the granulosa cells of preantral and microantral follicles. Cell differentiation and development are significantly influenced by the glycoprotein known as anti-Müllerian hormone, which is produced by the granulosa cells of preantral and microantral follicles. It affects the regulation of folliculogenesis. For the preservation of human health and the prevention of several health problems, trace elements are crucial. Numerous disorders are brought on by changes in the natural balance of trace elements, and biological systems may also be adversely affected. This study looked at the potential importance of abnormalities in selenium, copper, zinc, and iron levels as well as anti-Mullerian hormone levels in infertile women.

Keywords: Infertility disease, AMH, Trace elements, IVF and ART.

Introduction:

Infertility is a severe issue in today's culture that impacts many couples globally. Several factors, including heavy metals, have been causally associated to infertility [1]. Infertile couples are more prone than fertile couples to experience depression and anxiety, which has a significant emotional and financial toll. Assisted reproductive technologies (ART) are another option for treating infertility, although they are pricey. The identification of the numerous infertility risk factors could operate as a guide for the development of affordable and useful prophylactic drugs [2]. In order to treat sterility, assisted reproductive technologies (ART) are also available, although they are expensive. Iraq has revealed numerous instabilities crises during the past thirty years, which has aggravated various health issues. One of these issues was the country's many people's low fertility rates. Despite the psychological, social, and financial implications of this topic, few studies have been done on this health issue [3]. The global prevalence of infertility is 15%, however it varies widely by country, reaching > 30% in some underdeveloped countries and 17.28% in manufacturing nations [4]. Ant-Mullerian hormone (AMH), a glycoprotein hormone [5], It belongs to the TGF-growth factor superfamily, which includes additional peptides with a similar structural make-up, such as the BMPs, activins, and inhibins, totaling more than 35 peptides. The Müllerian Inhibiting Substance (MIS) is another name for it [6]. In the primordial preantral and tiny antral follicles of females, granulosa cells generate AMH, which is important in the regulation of folliculogenesis [7]. TGF-family ligands are translated into two polypeptide chains, or dimeric precursor proteins. Each of these polypeptide chains has a C-terminal mature domain that is significantly smaller than the N-terminal proregion. The two domains must be split at di- or mono-basic sites, as it was with AMH, in order to generate the mature protein. But there are also precursors for additional TGF-family ligands that are heterodimeric [8]. Figure (1).

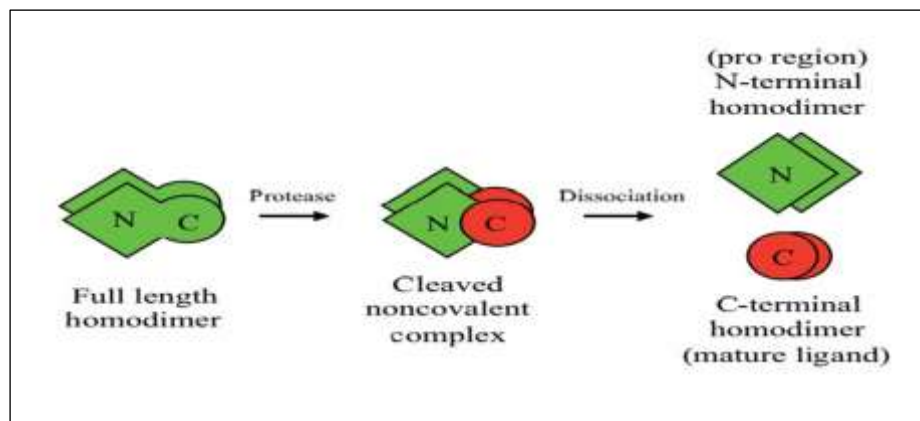


Figure. (1): a schematic representation of the TGF-family ligand processing [8].

Selenium (Se), copper (Cu), zinc (Zn), and iron (Fe) are inorganic trace metals that are required for life and must be consumed in modest amounts everyday (usually less than 100 mg/day) [9]. Human health and biology are dependent on the trace element (Se). In areas with significant soil shortages, supplementation is currently advised as part of public health policy since accumulating evidence indicates that this element is essential for healthy animal and human growth and reproduction [10]. (Se) has a noticeable impact on oocyte growth, maturation, and replication, even if the precise mechanisms are still not entirely understood [11]. Women with unexplained infertility also showed lower levels of (Se) in their follicular fluid, the environment that supports and envelops the egg, in comparison to those with male factor infertility and tubal infertility [12]. Because it is involved in redox reactions and is a necessary cofactor for more than 100 enzymes, including those involved in vital biological activities including respiration, photosynthesis, and the scavenging of reactive oxidative species, copper plays a fundamental role in many biological processes (ROS) [13].

Because it is a component of more than a dozen different copper proteins required for the synthesis of collagen and hemoglobin, copper is essential for human life and health [14]. A recent study found that women who took iron supplements had around a 50% lower chance of developing ovulatory infertility than those who did not [15]. According to a recent study, women who took iron supplements had an approximately 50% lower risk of developing ovulatory infertility than those who did not [16]. Although essential for reproductive health, little is known about the potential connections between trace minerals like selenium, copper, and zinc and human fertility [17]. The minerals (Fe), (Cu), and (Mn) have a substantial impact on female reproductive and fetal development. Additionally, high metal concentrations may be harmful. Likewise, it was shown that a deficiency or excess of essential trace elements was associated with female infertility [18].

Role of Trace elements and Anti - Mullerian Hormone (AMH):

Human sperm contain trace minerals (Se), (Cu), (Zn), (Mg), (Mn), and (Ca) that are essential for healthy spermatogenesis, sperm maturation, motility, and capacitation as well as for optimal sperm function [19]. Metal ions that are co-factors of the antioxidant enzymes, including as selenium, copper, zinc, and iron, are crucial to maintaining the pro/antioxidant balance. However, due to their prooxidant properties, iron and copper have the potential to damage spermatozoa through oxidative reactions [20]. Deficits in trace elements have been shown to have a significant impact on how a pregnancy develops. According to reports, pregnant women in poor countries eat diets that are lower in vitamin and mineral density. Congenital abnormalities, pregnancy loss, infertility, pregnancy-induced hypertension, placental abruption, early membrane rupture, stillbirths, and low birth weight, to name a few, have all been connected to a deficiency of trace elements in the body [21]. AMH may be able to predict future reproductive longevity because it appears to be the best endocrine marker for evaluating the age-related reduction in the ovarian pool in healthy women. Since AMH tests are able to predict ovarian response, including poor and hyper-responses, they are most frequently

employed before the beginning of in vitro fertilization [22]. Serum (AMH) levels have been shown to be a reliable indication of ovarian function over the past ten years. AMH levels are positively connected with the number of growing follicles with a diameter up to 8 mm, which suggests that they could be used as a barometer for the size of the follicular pool [23].

The deficiency of Trace elements and Anti-Müllerian hormone (AMH):

Minerals like selenium, cobalt, copper, manganese, iodine, zinc, and iron can all have an effect on ruminant reproduction. Lack of any one or more trace elements, together with imbalances, might result in infertility [24]. People are exposed to large levels of trace elements from many background sources, many of which are regarded to constitute reproductive poisons. Before examining links between trace elements and human reproductive health, it is important to identify potential biomarkers of exposure from sources of variation in the population at risk [25].

Serum (AMH) concentration and IVF therapy are two static markers that are increasingly utilized to estimate ovarian reserve prior to antral follicle count (AFC). It has been shown that they are excellent predictors of oocyte production during ovarian stimulation, but it is not yet known if they are also useful as indicators of oocyte quality and pregnancy rates [26]. AMH is an intriguing alternative because, despite this information, there are still no established biomarkers that would enable the personalized assessment of each woman's fertility [27]. For instance, the absence of detectable serum levels of AMH and testosterone indicates the absence of functional testicular tissue in patients with anorchia or severe Klinefelter syndrome who have poor spermatogenesis [28].

The conclusion:

Couples trying to get pregnant are affected by the growing issue of infertility. Growing data suggests a connection between food and female fertility. Numerous disorders are brought on by changes in the natural balance of trace elements, which can also have a negative effect on biological systems. Because a mineral deficiency can affect fertility, women should pay attention to their intake of minerals and take supplements for any nutrients that may be lacking. One study revealed that many women fall short of their nutritional requirements, especially when it comes to trace minerals like selenium, copper, zinc, and iron, which are crucial for fertility.

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