**Title- Artificial Intelligence in Obstetrics & Gynecology- Era of Recent Technology**

**Introduction-**

Artificial intelligence (AI) refers to the digitalized computer system that imitates brain function. The brain's neuron is aligned with several neural nodes, which are known as neural networks, and this intelligence system is similarly systematized [1]. The use of AI in healthcare systems has significantly increased during the last few decades. It is clear from data records that by 2025, investments in AI for healthcare systems are expected to increase by a factor of 18 times.

Computer-aided fetal evaluators (CAFEs), cardiotocography (CTG), and other AI applications are used in healthcare. Technology called System 8000 is used to track episodic variations in fetal heart rate (FHR). On the other side, neural networks have made it possible to find ovarian cancer early. The electro hysterography (uterine electrical signals) has also been used in trials to predict preterm labor [4]. In the middle of all of these, the use of AI in vitro fertilization (IVF) is a fruitful procedure in clinics today.

AI provides extremely certain decisions to assist practitioners and physicians in making decisions. The deaths caused by inaccurate prediction and diagnosis are by far and away the main reason AI has become so pervasive in clinical diagnosis and decision-making [5]. Therefore, by improving predictive accuracy, AI can aid in reducing such errors.

**The necessity of an AI connection in obstetrics and gynecology**

The disputable specialties that account for indemnity payments due to negligence claims include obstetrics and gynecology. Due to intrapartum fetal misunderstanding, which is partially preventable, hypoxia-induced encephalopathy has emerged as the most frequent disputable event. Gynecological oncology, where failed identification and prognosis of cancer have been a major worry, is another area where multiple poor results and obstacles have been reported [7,8]. Treatment for infertility has remained a significant problem using traditional methods. Therefore, AI-assisted IVFs are examples of the increasing demands for AI in obstetrics and gynecology for improved treatment success rates [9].

The rapid growth of genetic engineering in IVF practice has also increased the demand for AI to improve precision. This is due to the development of precision techniques, which has made it possible to make precise predictions in the health care sector. AI-based algorithms help to address difficulties in diagnostics like performance and efficiency in clinical services. Additionally, these algorithms enhance clinical vigilance in the detection and management of complex disorders, infection prevention, etc.

**Clinical advantages of AI in obstetrics and gynecology --**

It is discussed how AI is currently used in obstetrics and gynecology to interpret CTG and FHR, help identify pregnancy problems and preterm labor, and analyses interpretational differences between physicians.

**Applications of AI in obstetrics and gynecology:** These applications are exceptional because they address persistent issues with diagnosis and treatment.

**Using ultrasound to diagnose different phases of pregnancy:**

Medical ultrasound has the potential to be used more frequently and in a variety of clinical situations with the help of AI-powered ultrasonography. Therefore, the AI use in pregnancy ultrasonography could aid doctors in classifying and diagnosing pregnant women's bodies.

Wu et al. investigated the reliability of ultrasonic diagnosis using AI algorithms for patients with complex brain tumors during pregnancy [16]. AI-based diagnosis had a 94.50% accuracy rate, and the K-value was 0.99.

**AI's Importance in the First Trimester of Pregnancy:**

If hypertension is present, individuals' placental pictures during pregnancy differ from those of people who do not have it. Since it is a noninvasive, economical method to advance future directions, the inferences have been proven as a marker to anticipate hypertensive disorders of pregnancy (HDP). In light of this, the study explains how AI can be used to evaluate differences in the texture of the placental ultrasound image in expectant mothers with hypertension and normal outcomes. This opens the door to developing a textural feature extractor module that could predict unfavorable pregnancy outcomes before moving on to clinical manifestation of the disease [18].

**AI's importance during the second and third trimesters:**

A higher level of performance has been shown by diagnostic support tools that use AI in specific medical areas. In order to support fetal cardiac ultrasound screening, Sakai et al. used the novel DL-based explainable graph chart diagram representation. Because the technique is challenging to master, fetal cardiac ultrasound screening typically has a low rate of detecting congenital heart disease in its second-trimester stages [20]. The screening performance for detecting pregnant women using AI in the second and third trimesters improves as a result, going from 96% to 97.50% for specialists to 82% to 89% for peers [21].

The fetal ultrasound plane also changes quickly because fetal mobility necessitates an algorithm that can evaluate changing images in real-time. Prenatal ultrasound diagnosis AI conduct system (PAICS) is proposed to determine various fetal intracranial abnormality patterns in standardized sonographic reference planes to screen for any congenital central nervous system (CNS) malformations in order to develop and validate the AI system [22].

**Preterm Birth:**

Research focuses on developing an effective PTB prediction model that relies on ANNs. Numerous studies suggested that PTB in the first trimester of pregnancy might be predicted using CL sonographic measures. However, additional research is required to outline the CL's capacity to screen PTB. The advantages of DL and ML over the logistic-regression approach are their capacity to process highly dimensional patient data and their capacity for self-learning [23].

**Postpartum:**

Another typical gynecological condition is pelvic floor dysfunction (PFD). Pelvic organ prolapse, sexual dysfunction, urine loss, and faecal incontinence are the main clinical symptoms. From this angle, a study investigates the benefits of applying ultrasound technology and rehabilitation training based on an AI algorithm in the recovery of postpartum pelvic organ prolapse [25]. As a result, AI systems have positive effects while processing ultrasonic pictures.

Additionally, a variety of consumer-grade wearable gadgets, such as smart rings and watches, might capture semi continuous physiological measurements like blood pressure, oxygen saturation, body temperature, heart rate variability, and normal heart rate count. They also keep tabs on other behavior indicators like sleep duration, quality, and position in relation to other patients as well as activity levels. The monitoring of these physiological factors was clearly beneficial for accurately diagnosing early pregnancy-related disorders such gestational hypertension and preeclampsia.

**Role of AI in Artificial Reproductive Techniques:**

According to this application of AI, the key difficulty in other medical IVF streams was still choosing a viable embryo. This appears to be crucial in estimating the outcomes that would result in a shorter pregnancy period and a live birth of a healthier child.

The effectiveness of therapy and diagnosis of problems in the reproductive system will be improved by the extensive use of AI to evaluate patient variables such as ovarian reserve, endocrine status, diagnosis test, endocrine status, and age [24]. These criteria support the anticipated outcomes of successful IVF through AI support and tools. To develop the ANN model effectively and maximize its prediction power, larger datasets, including computer vision, were used. Only a few other prior attempts using AI techniques to evaluate human oocytes, forecast typical fertilization, and examine the embryo's development through blastocyst (BL) stages have been made. The techniques even evaluate the implantation potential in the pre- and post-pregnancy periods using static oocyte pictures [24].

**Others application in Gynecology:**

The use of AI in gynecology has significantly increased in the modern period due to the rise in diseases and the necessity to improve the diagnosis procedure. In that respect, a number of researchers have made use of AI's potential for disease prediction. The most recent applications of AI-based models in gynecology include the creation of an anticancer medication and the identification of cervical intraepithelial neoplasia, uterine sarcoma, IVF, and endometrial malignancy.

**Conclusion-**

The primary definition of AI is that it is the study of algorithms. Machines are already capable of carrying out and using cognitive thinking for a variety of purposes thanks to this frequent and extensive exploration. Machines are therefore capable of object recognition, decision-making, and problem solving. Obstetrics and gynecology is one of the medical fields where AI has achieved performance on par with that of human specialists. Therefore, AI could offer much more in obstetrics and gynecology with technology advancement and interdisciplinary inclusion.

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