INTERNATIONAL JOURNAL IN PHARMACEUTICAL SCIENCES

Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Review Article

Ectolife – The Artificial Womb Facility

S. S. Daud*, S. B. Dube, S. R. Faruki, T. A. Rajput

Nandkumar Shinde College of Pharmacy, Aghur, Vaijapur 423701 Dist. - Aurangabad, Maharashtra.

ARTICLE INFO

Received: 18 Oct 2023
Accepted: 19 Oct 2023
Published: 22 Oct 2023

Keywords:
Artificial Wombs, Medical Research, Neonatal Intensive Care, Partial Ectogenesis, Research Ethics, Ectolife

DOI:
10.5281/zenodo.10031107

ABSTRACT

In the developed world, extreme prematurity is the leading cause of neonatal mortality and morbidity due to a combination of organ immaturity and iatrogenic injury. Due C-Section mother go through risk like blood loss, increase infection and major risk occurs due to anesthesia given during delivery. Now AWF or artificial uterus is technique used to develop foetus outside the body. This paper elaborate detail information about technique. Artificial wombs are expensive to develop and use, meaning they may only be accessible to those who can afford it. AWF may increase existing inequalities in society. This risk may overcome due to AWF technique. AWF include various component like nutrient, oxygen supplier, uterine wall, artificial placenta (Interface), Amniotic tank and Umbilical cord. The availability of computer-controlled artificial hearts, kidneys, and lungs, as well as the possibility of implanting human embryos in ex vivo uterus models or an artificial endometrium, presents new perspectives for creating an artificial uterus. Third, I demonstrate that clinical trials will be a necessary part of the clinical translation of AWF because of requirements laid out by regulators. I consider the justification for clinical trials and highlight some of the crucial ethical questions about the conditions under which they should proceed.

INTRODUCTION

Introducing the AWF the world's first artificial womb facility powered entirely by the renewable energy AWF allow infertile couple by conceive a baby, and become a true biological parents of their own offspring it's a perfect solution for women who had their uterus surgically removed due to cancer or other complications [1]. With AWF premature birth and c-section will be thing of the past. AWF has design to help countries that are suffering from the severe population decline. the countries are like Japan, South Korea, Bulgaria and many others. The facility features 75 highly equipped labs. Each state of the art lab are accommodate up to 400n growth pods or artificial wombs. Every pod is designed to replicate the exact conditions that exist inside the mother's uterus [2]. A single building can incubate up to 30000 lab grown babies per year. AWF allows your baby to develop in an infection free

***Corresponding Author:** S. S. Daud
Address: *Nandkumar Shinde College of Pharmacy, Aghur, Vaijapur 423701 Dist. - Aurangabad, Maharashtra*
Email : sanketdaud2020@gmail. com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

environment. The pods are made of the material that prevent the germs from sticking to their surfaces. every growth pods Features sensors that can monitor your babies vital signs including heartbeat, temperature, breathing rate and oxygen saturation[3]. The artificial intelligence based system also monitor the physical features of your baby and reports any potential genetic abnormalities. the pods are equipped with a screen that displays real time data on the developmental progress of your baby. These data are sent directly to your phone so you can track your baby's health from your comfort zone. The app also provide you with a high revolution live view of your baby's development[4]. A special section in the app allows you to watch a time-lapse and share directly with the loved ones. because baby's can recognize language and learn new words while in the womb. AWF growth pods feature internal speakers that play a wide range of words and music to your baby. Through the app, you can choose the playlist that your baby listen to. You can directly sing for your baby and make them familiar with your voice before birth [1, 4]. AWF have a goal to provide you an intelligent offspring that truly reflect your smart choices. AWF improves your bonding experience with your baby. 360 degrees camera are fitted inside your baby's growth pod. You can use your headset for virtual reality to explore what it is like to be in your baby's place. See what they see and hear what they hear. Using a wireless haptic suit connected your baby's growth pod, you will able to see and sense their kicks in the wombs and share their experience with your friends and your family members [5].

OBJECTIVES

AWF growth pods feature internal speakers that play a wide range of words and music to your baby. Through Artificial-womb technology aims to improve outcomes for preterm babies who are born in the period between 22 and 28 weeks, for whom survival has improved, but long-term health issues are frequent [6].

For oxygenation of the embryo or fetus, and removal of carbon dioxide, extracorporeal membrane oxygenation (ECMO) is a functioning technique, having successfully kept goat fetuses alive for up to 237 hours in amniotic tanks [7].

Ectolife able to conceive a baby to infertile couple. And they become a biological parent of their own child. Ectolife allows you to customize your baby's eye color, hair color, skin tone, physical strength, height and level of intelligence [1, 8].

It allows you to fix any inherited genetic diseases that are part of your family history so that your baby and their offspring will live a healthy, comfortable life free of genetic diseases. Say goodbye to the pain of childbirth and birth related muscle contraction [9].

Ectolife provides you a safe pain free alternative that helps you to deliver your baby without stress [9, 10].

C-SECTION DISADVANTAGES:

For babies:

A. Breathing problems –babies born by scheduled c-section are more likely to develop a breathing issue that causes them to breadth too fast for few days. [11]
B. Surgical injury: - although the rare accidental risks to the babies skin during surgery [12].

RISK TO MOTHER:

A. Infection: - there might be risk chances for the mother in uterus and urinary tract [13].
B. Blood loss: C-section can cause heavy bleeding during the delivery or after the delivery [14].
C. Reaction of Anesthesia – Reactions to any type of anesthesia are possible. Blood clots. A C-section might increase the risk of developing a blood clot inside a deep vein, especially in the legs or pelvis (deep vein thrombosis). If a blood clot travels to the lungs and blocks blood

flow (pulmonary embolism), the damage can be life-threatening [15].

D. Blood clots –the clot specially are occur in pelvis, legs and other back area. Blood clots can cause the severe infection in the abdomen [16]. Surgical injury-Although rare, surgical injuries to the bladder or bowel can occur during a C-section [17].
E. Increased risks during future pregnancies - Having a C-section increases the risk of complications in a later pregnancy and in other surgeries. The more C-sections, the higher the risks of placenta prevail and a condition in which the placenta becomes attached to the wall of the uterus (placenta accrete) [18].

Impact on population:

Ectolife can help countries that are suffering from a decline in population giving the example of Japan, Bulgaria, and South Korea Al-Ghaili came up with the idea of an EctoLife Artificial Womb Facility [19]. Additionally, the video also shows how the "world's first artificial womb facility" which is still just a concept, allows parents to produce a customised baby which could be "reinventing evolution" by growing up to 30,000 babies in a year Artificial wombs can solve this problem by providing a safe and healthy environment for the fetus to grow In the future, an artificial womb will work by artificially creating the conditions necessary for fetal development in an external environment similar to that of a woman's uterus It an attractive option for those looking for cost-effective solutions addressing population issues faced by certain nations around the world today[20].

Impact of recycle waste from umbilical cords:

Artificial wombs, sometimes referred to as ectogenesis or in vitro gestation, are research tools designed to give developing embryos or foetuses a place to develop outside of the female body. An artificial womb is an experimental medical device intended to provide a womblike environment for extremely premature infants. In most of the technologies, the infant would float in a clear "biobag," surrounded by fluid. The first bioreactor contains amniotic fluid, which provides essential growth factors for the baby's development and also protect form harmful disease [21]. The second bioreactor is used to eliminate the waste product of baby during in the artificial womb. The artificial umbilical cord where the premature infants to release their waste product into the second chamber. Further it passes through to the engineered enzyme, where the waste is recycle into useful nutrients like glucose, amino acids, and fatty acids [22]. Similar to what happens inside our own bodies when we digest the food. This recycling process make sure that all the necessary nutrients needed to fetus for growing healthy inside the system, Without hurting the mother or people nature. However, this is a modern technology that, with the potential of saving the many lives of the upcoming generation by providing the premature infants with safe living condition to being naturally at full term, it is helpful in such condition that traditional method cannot handle. Ground breaking innovation have great implication for neonatal care in the future, this technique opens a new possibilities such as a women which condition to access the pregnancy further was not able, but with the use of this technique it is possible.

Ectolife disadvantages:

There are ethical concerns regarding the use of artificial wombs. It is God's role to create life outside the human body, it can also be called a system working against nature.

Birth through artificial womb can affect the psychological health of the child. The absence of a natural connection with the mother during the pregnancy period can cause the baby to become isolated from the world.

Babies born through artificial wombs are more likely to be born prematurely. Premature birth can

cause various health problems for the baby, including respiratory distress, brain damage, and developmental delays [23].

Artificial wombs are expensive to develop and use, meaning they may only be accessible to those who can afford it. EctoLife may increase existing inequalities in society.

This technology may work to lower the status of women in the society because in such a patriarchal society, women get respect and status only when they become mothers. If the right to become a mother is also taken away from them, then all the battles that women have fought for their rights for so many years will be in vain.

CONCLUSION

An artificial womb or artificial uterus is a device that would allow for extracorporeal pregnancy by growing a fetus outside the body of an organism that would normally carry the fetus to term. An artificial womb could find the solution for reducing reduce high-risk pregnancies and premature births. It may also help to countries with low population number, with the use of this technology they can quickly finding solution to their low population by lab babies instead of natural childbirth. The AI (Artificial Intelligence is becoming very important in modern world and in the field of medicine and health care in today's life, so it will be no surprise role of it's in the artificial womb technology related developments. With the use of AI algorithms like machine learning, natural language processing, deep learning the medical professional can use this gather data from the patients, which make it helpful for making decision about treatment while dealing with pregnancy complication while artificial wombs. The development of fetuses can tract with the help of AI, within this device which was not possible before in much larger scale. This also allow the doctors to fix the problem related to baby's health, inside the devise there is no need to wait until the baby is born, the problem can be fix inside the devise. Overall, the artificial womb technology not only offer huge potential benefits medically but also providing opportunities socially and medically unprecedented before and now available and also have environmental benefits. Artificial womb technology will be the game changing medical development from science fiction to making it happen in real life. Will be able to produce the super babies by constant monitoring and supplying vitamins nutrients on the regular basis.

REFERENCES

1. Youtube. com, Ectolife Hashem-AL-Ghalli.
2. Youtube. com, Artificial womb, medical dialogues.
3. Jeff Wang and Mark V Sauer, In vitro fertilization (IVF): a review of 3 decades of clinical innovation and technological advancement, doi: 10. 2147/ tcrm. 2006. 2. 4. 355[Google Scholar]
4. Edwards RG, Steptoe PC. Current status of in-vitro fertilization and implantation of human embryos. Lancet. 1983; 2:1265–9. [PubMed] [Google Scholar]
5. Victoria S Jiang, Charles L Bormann, Artificial intelligence in the in vitro fertilization laboratory: a review of advancements over the last decade DOI: 10. 1016/j. fertnstert. 2023. 05. 149
6. Technologyreview. com
7. Kinga Skoracka, Alicja Ewa Ratajjczak, anna Maria Rychter, Agnieszka Dobrowolska, Female Fertility and the Nutritional Approach: The Most Essential Aspects, doi: 10. 1093/advances/nmab068
8. www. ucsfhealth. org/treatments/extracorporeal-membrane-oxygenation, University of California San Francisco
9. Berghella V, Baxter JK, Chauhan SP. Evidence-based surgery for cesarean delivery.

Am J Obstet Gynecol. 2005 Nov; 193(5):1607-17. [PubMed]

10. Artificial Wombs: The Future of Painless Childbirth. ” Nation, 4 Jan. 2022, nation. africa/kenya/healthy-nation/artificial-wombs-the-future-of-painless-childbirth-3671144
11. Sathish Rajaa, Akkilangunta Sujiv, Sitanshu Sekar Kar, Risk factors for cesarean section in women of urban Puducherry, India: A matched case–control study
12. Ahmmed, F. , Manik, M. M. R. , & Hossain, M. J. (2021). Caesarian section (CS) delivery in Bangladesh: A nationally representative cross-sectional study. PLoS One, 16(7), e0254777. https://doi. org/10. 1371/journal. pone. 0254777
13. Arjun, G. (2008). Caesarean section: Evaluation, guidelines and recommendations. Indian Journal of Medical Ethics, 5(3), 117-120. https://doi. org/10. 20529/IJME. 2008. 043
14. Abbey J Hardy-Fairbanks 1, Michele R Lauria, Todd Mackenzie, Martin McCarthy Jr, Intensity and unpleasantness of pain following vaginal and cesarean delivery: a prospective evaluation, DOI: 10. 1111/birt. 12039
15. Sean Brian Yeoh, Sng Ban Leong, and Alex Sia Tiong Heng, Anaesthesia for lower-segment caesarean section: Changing perspectives, doi: 10. 4103/0019-5049. 71037
16. Amy Norton, C-Section Raises Risk of Blood Clots After Childbirth[Article]
17. Dr. A. SHAJI GEORGE. (2020). LAB-GROWN BREAST MILK: THE FORESEEABLE FUTURE OF INFANT NUTRITION. JASC: Journal of Applied Science and Computations, VII(VIII), 20–34
18. E Hemminki, Impact of caesarean section on future pregnancy--a review of cohort studies, PMID: 8931052 DOI: 10. 1111/j. 1365-3016. 1996. tb00062. x
19. A. S. Hovan George, Aakifa Shahul, & Dr. A. Shaji George. (2022). an Overview of Medical Care and the Paternalism Approach: An Evaluation of Current Ethical Theories and Principles of Bioethics in the Light of Physician-Patient Relationships. Partners Universal International Research Journal (PUIRJ) ISSN: 2583-5602, 01(04),https://doi. org/10. 5281/zenodo. 7419781
20. Timothy C. Bonebrake, Jon Christensen, Carol L. Boggs, Paul R. Ehrlich, Population decline assessment, historical baselines, and conservation
21. A. Shaji George, Artificial Womb Technology: Analyzing the Impact of Lab-Grown Infants on Global Society, DOI:10. 5281/zenodo. 7673490
22. Patricia S. Coffey and Siobhan C. Brown, Umbilical cord-care practices in low- and middle-income countries: a systematic review. doi: 10. 1186/s12884-017-1250-7
23. Elizabeth Chloe Romanis, Artificial womb technology and clinical translation: Innovative treatment or medical research?, doi: 10. 1111/bioe. 12701
24. Artificial Wombs: The Future of Painless Childbirth.” Nation, 4 Jan. 2022, nation. africa/kenya/healthy-nation/artificial-wombs-the-future-of-painless-childbirth-3671144.

HOW TO CITE: S. S. Daud*, S. B. Dube, S. R. Faruki, T. A. Rajput, Ectolife –The Artificial Womb Facility, Int. J. in Pharm. Sci., 2023, Vol 1, Issue 10, 200-204. https://doi.org/10.5281/zenodo.10031107