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PROSPECTIVE LOSS OF HUMAN REPRODUCTIVE FUNCTIONALITY: AN IMPLICATION OF ARTIFICIAL MEDICAL INTELLIGENCE, ITS INVENTION OF SEX ROBOT MACHINES AND ASSISTED REPRODUCTIVE TECHNOLOGY

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Abstract: *The positive impact of artificial medical intelligence includes invention of sex robot machines and assisted reproductive technology to enhance sexual pleasure and help combat issues associated with rape, high sex drive, sexual incompatibility, infertility and reproductive alterations. It was hypothesized that the inventions of artificial medical intelligence such as sex robot machines and assisted reproductive technology may potentiate depletion of human reproductive functionality and the prospective predicts extinction of certain human reproductive ability. Thus, the study explored the potential adverse impact of sex robot machines and assisted reproductive technology on human reproduction using various scientific literatures. This review did not undermine or discourage the stated inventions as its significance cannot be overemphasized; but it provided evidence that showed certain adverse role of these inventions on human reproductive system, thus forming basis for development of preventions and/or measures that will aid reduce the prospective adverse impacts suggested.*

INTRODUCTION

Improvement in modern medicine and health care services is the advent of artificial medical intelligence which involves the use of learning models/machines to explore medical data and reveal insights that will help improve health care facilities (Ganesh et al., 2018; Ramesh et al., 2004). Inventions of artificial medical intelligence include medical equipment and machines, e.g. electrocardiogram, electroencephalogram, ultrasound scan, X-ray and others that play roles in medical diagnosis as well as treatments (de Bruin et al., 2022; Verma 2018). In recent times, there is increased invention and commercialization of sex robot machines, sex toys as well as assisted reproductive technology which plays vital roles in biomedical and socioeconomics (Belk, 2022; Fernandez et al., 2020). Sex toys and sex robot machines are artificial companions with artificial emotions and love; Thus offer sex services which aid with issues associated with emotions and sexual satisfactions (Belk, 2022).Whereas, assisted reproductive technology is an advent of

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artificial medical intelligence that mimics the human reproductive functionality; hence aids in solving reproductive issues such as infertility and other reproductive alterations (Fernandez et al., 2020; Siristatidis et al., 2021).

Despite the positive impact of the inventions of artificial medical intelligence to biomedical and health sciences (Rong et al., 2020; Lorkowski 2021), certain adversaries have been associated with these inventions; measures are also developed continually to combat these issues. For instance, X-ray machine which is an advent of artificial medical intelligence that aid in imaging diagnosis was reported to be associated with cancer (Jaglan et al., 2019; Prevedello *et al.,* 2019), habitual use of facemask invented to prevent diseases was reported to be associated with some physiological alterations (Onwuka 2021), likewise other inventions. This study explored various scientific literatures based on the hypothesis that the invention of sex robot machines, sex toys and assisted reproductive technology may cause depletion of human reproduction thereby leading to loss of human reproductive ability. This hypothesis considered the fact that sex robot machines and assisted reproductive technology are involved in coitus, fertilization, implantation, conception, parturition which are basis of reproductive physiology (Belk, 2022; Fernandez et al., 2020; Siristatidis et al., 2021). Thus, the study tend to provide evidence on the adverse role of the mentioned inventions of medical intelligence on human reproduction thereby providing insight and forming basis for development of measures that will help deal with the suggested adversaries.

IMPLICATION OF SEX ROBOT MACHINES AND ASSISTED REPRODUCTIVE TECHNOLOGY ON HUMAN REPRODUCTION

Sex robot machines

Sex robot machines (sexbots) are advanced sex toys; unlike dildo (artificial penis and vagina vibrator stimulant), they are anthropomorphic robotic sex dolls (Figure 1) that are in human form with human-like attribute resulting from some degree of artificial intelligence programed in the toy (Cox-George and Bewley, 2018; Zhang, 2021).

Figure 1: Female sex robot machine (González-González and Gil-Iranzo, 2020)

The sex robot machines evolved from sex doll precursors, dated far back to 16th century when French and Spanish sailors created hand-sewn masturbation puppets. In 1970s, latex and silicone were widely used in the production of sex dolls to enhance its durability and resemblance to human. In 2009, McMullen switched to using platinum-cured material to further advance the durability and humanlike nature of the doll. Other sex toy manufacturers followed suit believing that companionship is a

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critical part of the sex robot dynamic, hence incorporating artificial intelligence (AI) into them. New models of sex robot machines were invented in 2018 to hold conversations, remember important facts, and express various emotions. McMullen created Harmony; a sex robot machine which is customizable by using a mobile app to make companionship more satisfactory and permits users to choose from "thousands of possible combinations of looks, clothes, personalities and voices (Beck 2014; Cheok and Zhang, 2019; Ferguson, 2010).

Impact of sex robot machine on human reproduction

Invention of sex robots has been beneficial as it helps to reduce sexual crimes with future prediction of extinction of sex trafficking, sex tourism or sex trade; as well as prevention of the spread of sexually transmitted diseases and infections. This is because some of the sexbots are made of bacteria-resistant fiber and flush for human fluids after use (Cox-George and Bewley, 2018; Yeoman and Mars, 2012).

The usefulness of sex robots cannot be overemphasized; but exposition and moderation of certain adverse impact could aid the build of advanced sex dolls with little or no adversaries. Human reproductive organs (penis, vagina etc.) are directly involved in the use of sex robots; it could be the first line of attack of sex robots adversaries which probably will in turn affect the human reproduction. Thus, this report summarized adverse impact of sex robot machine on human reproduction (Table 1) considering its input on physiological variables that could be linked to human reproduction.

Table 1: Adverse impact of sex robot machine on human reproduction

S/No.	Physiological variables and reproductive roles	Adverse impact of sex robot
1.	Psychosexual aspect of reproduction involves the neurophysiological system (limbic system, autonomic nervous system etc.); their relationship with the reproductive organ to bring about sexual responses which play a role in coitus. Coitus causes ejaculation of semen which is one of the major factors of reproduction. Intimacy, emotions, sex drives are involved in sexual response and coitus (Diamond, 1965; Schober and Pfaff, 2007; Vosper et al., 2021).	It is suggested that sex robots could decrease human relationship and intimacy which could in turn reduce emotion, sex drives and sexual response to human as a result of increased sexual relationship and satisfaction built with the sex toys. Hence, it depletes coitus, an essential aspect of human reproduction (Levin, 2005; Carvalheira and Leal, 2013; Cheok, 2016; Cox-George and Bewley, 2018)
2.	Reproductive organs such as penis and vagina are sex organs that play vital role in semen ejaculation which is essential for human reproduction (Levin, 2005).	Malfunctioning of sex robot machine could lead to injury or lesion to penis and vagina (vital organs of reproduction), thus resulting to sexual dysfunction and impaired reproduction (Podnar and Vodušek, 2015; Cox-George and Bewley, 2018).
3.	Penis and vagina has sensory receptors and nerves, which when stimulated causes dilation of the penile muscles and lubrication of the vagina during coitus leading to sexual pleasure and ejaculation	Sexbots could increase the intensity of the stimulations of the sensory receptors; Hence, the individual could lose sensation to human stimulation leading to decreased libido and sex drive as

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	of semen (Giuliano, 2011).	well as impotency and infertility (Zasler, 1991; Petersen 2017; Danaher and & McArthur; 2017; Cox-George and Bewley, 2018)
4.	Potency: the ability to achieve or maintain an erection to reach orgasm; is an essential characteristic of coitus which plays vital role in ejaculation of semen an aspect of human reproduction (Levin, 2005; Raina et al., 2011).	Sexbots might be used to assist couples with mismatched libido or to help treat erectile dysfunction, but potential adverse consequences includes decreased potency towards human partner leading to decreased attraction and rejection to human partner (Döring and Pöschl, 2018; Cox-George and Bewley, 2018).
5.	Sex hormones, semen quality, ova, ovulation, menstrual cycle and some other reproductive parameters are associated with maintaining normal reproductive functionality which includes sex drive, sexual responses, coitus, fertility and parturition (Spira, 1986; Levine, 1994; Martin, 2003)	Since reports suggest that sex robot could affect emotion and sexual responses (Carvalheira and Leal, 2013; Cheok, 2016; Cox-George and Bewley, 2018; Döring and Pöschl, 2018), it is recommended that further studies should be carried out to investigates its impact on reproductive parameters such as sex hormones, gonads, ova, semen etc.; although reports showed increased oxytocin level with respect to continues use of sex toys which accounts for the bonding between humans and sex robots (Cheok, 2016; Mackenzie, 2018).

Assisted reproductive technology

Assisted reproductive technology (ART) is an invention of artificial medical intelligence with the aim of inducing fertility, thus treating infertility. It is the manipulation of ova, sperm, or embryos via removing ova from the ovaries and mixing them with sperm to make embryos in order to increase the possibility of successful pregnancy, and avoidance of transfer of infections/diseases like genetic disorders, HIV/AIDS etc. Common types of assisted reproductive technology include; in vitro fertilization (IVF), intrafallopian transfer, frozen embryo transfer, intracytoplasmic sperm injection and Third-party assisted reproductive technology (Huang and Rosenwaks, 2014; Zaninovic et al., 2019; Dalal et al., 2020; Raimundo and Cabrita, 2021).

IVF is the most effective form of assisted reproductive technology; it involves retrieval of mature eggs from ovaries and then fertilized with sperm in a lab, the fertilized egg (embryo) or eggs (embryos) are implanted into a uterus. The ova and sperm used are gotten from couples, it also involves donation of ova, sperm or embryo from a known or anonymous donor; some cases may include a gestational carrier i.e. someone who will carry implanted embryo in the uterus (Barnhart et al., 2002; Coughlan and Ledger, 2008).

Intrafallopian transfer involves the delivery of gametes (Gamete intrafallopian transfer, GIFT), zygotes (Zygote Intrafallopian Transfer, ZIFT) and fertilized ova (Pronuclear stage tubal

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transfer, PROST) into the fallopian tube via laparoscopic surgery. GIFT does not involve IVF whereas ZIFT involves IVF and GIFT. PROST is a form of ZIFT which involves the transfer of fertilized ova to the fallopian tube before cell division occurs (Seibel, 2004; Weissman et al., 2004; Jones, 2020).

Frozen embryo transfer (FET) involves dissolving and using previously IVF frozen embryos, inserting them into uterus for further development. It was reported that frozen embryo transfer is as safe as using fresh embryos with increased risk of preterm birth and possibility of some frozen embryo not surviving the melting or thawing process. Although reports indicated that frozen embryo transfers provide a higher pregnancy success rate than using fresh embryos in assisted reproductive technology (Frederick et al., 1994; Roque et al., 2013).

Intracytoplasmic sperm injection is an aspect of assisted reproductive technology that involves using a tiny needle (micropipette) to inject a single sperm directly into the cytoplasm of an ovum in order to induce fertilization (Palermo et al., 2017). An aspect of ART that involves donation of eggs, sperm, or embryos, as well as surrogate and gestational carriers is referred to as third-party ART. Third-party ART is beneficial when the infertility issue is associated with one or both couples, as well as in avoidance of transmission of diseases, infection and genetic disorders to offspring (Asch and Marmor, 2008).

Human reproductive physiology and assisted reproductive technology

Human reproductive physiology involves fertilization of ova (released as a result of ovulation) by sperm ejaculated during coitus (Saint-Dizier et al., 2020). The fusion of male and female gametes to form zygotes as well as it development (embryogenesis), parturition and breast feeding are features of the human reproductive physiology (Miller, 2020; Al-Suhaimi et al., 2022). Alteration of human reproductive physiology could lead to infertility (Wang et al., 2018; Nwosu et al., 2022; Onwuka et al., 2022); assisted reproductive technology tend to provide solution by considering and mimicking the human reproductive physiology. Assisted reproductive technology makes use of human reproductive physiology by engaging sperm, ova, embryos and gestational carrier in its procedures. Hence assisted reproductive technology provides solution to infertility resulting from partial or complete alteration of the human reproductive physiology by considering its underlying physiological principles. For instance; infertility associated with alteration of physiological fertilization makes use of in vitro fertilization as aid, difficulty producing an ovum or sperm could make use of third-party ART etc. (Asch and Marmor, 2008; Roque et al., 2013; Bhandari et al., 2018; Sharma et al., 2018; Jones, 2020).

Adverse impact of assisted reproductive technology (ART) on human reproduction

Despites the importance of assisted reproductive technology, there is possibility of its adversaries on human reproduction. Although, most common stumbling block associated with it, is a multifetal gestations (multiple pregnancy) which can be minimized or prevented by restricting the number of embryos that are admitted into the carrier's body and preterm birth that is mostly associated with frozen embryo transfer (FET) (Bollen et al., 1991; Roque et al., 2013).

Prematurity, small for gestational age, low birth weight, perinatal mortality, cesarean delivery,

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placenta previa, preeclampsia, abruptio placentae and birth defects has been regarded as perinatal risks associated with assisted reproductive technology (American College of Obstetricians and Gynecologists, 2016).

Placental vascular defects, impaired placental nutrient transfer and intrauterine growth restriction resulting from assisted reproductive technology is associated with declined embryo development; this accounts for low birth weight and births defects linked to ART. Low birth weight has been associated with obesity, hypertension, type 2 diabetes and other metabolic health diseases later in life (Moisse, 2010; Reynolds et al., 2014; Heber and Ptak, 2021). Cognitive functions including cerebral palsy, behavioral problems, and autism were also identified in children resulting from ART (Gorgui and Bérard, 2018).

SUMMARY OF FINDINGS AND PERSPECTIVES

Adverse impact of sex robot machine and assisted reproductive technology on human reproduction

This study explored literatures to elucidate the prospective loss of human reproductive functionality which may lead to extinction of certain human reproductive ability as a result of combined adverse impact of sex robot machines and assisted reproductive technology on human reproduction. The findings presented is based on theoretical assumptions, available data and perspective on adverse impact of sex robot machine on human reproduction (Table 1) as well as adverse impact of assisted reproductive technology on human reproduction.

Considering the adverse impact of sex robot machine highlighted (Table 1), it is suggested that sex robot machine could cause prospective loss of human reproductive functionality as it could decrease human intimacy, emotion, sex drive, libido which could predispose to impotency resulting to infertility. Its malfunction could induce injury to sex organs leading to depletion of its reproductive ability. It is also recommended that further research be conducted to look out for more potential physiological alterations, diseases and infections that could result from continues use of sex toys and sex robot machines.

Certain adverse impact of assisted reproductive technology on human reproduction ranging from maternal to intrauterine and postnatal defects were reported in this study as evidence-based risk factors of assisted reproductive technology that could affect human reproduction (Roque et al., 2013; American College of Obstetricians and Gynecologists, 2016; Gorgui and Bérard, 2018; Heber and Ptak, 2021). Preterm birth, multifetal gestations, multiple pregnancies, placenta defects and other adverse effects resulting from maternal body suggests that ART may have altered the normal functionality of the reproductive system which includes the reproductive hormones, gametes, uterus and other reproductive organs. Although there is paucity of information on the impact of ART on the reproductive system, study has reported implication of redox in reproductive function associated with assisted reproduction (Agarwal et al., 2008). Increased multiple sclerosis activity has been linked to assisted reproduction technology (Correale et al., 2012); which can contribute to impairment of the functions of the reproductive system resulting from damaged nervous system as a result of multiple sclerosis, affecting sexual sensations, ability to orgasm or ejaculate due to nerve

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damage and increased difficulty in achieving an erection or become lubricated. Male and female infertility as well as pregnancy issues has also been associated with multiple sclerosis (Lamaita et al., 2021; Massarotti et al., 2021). ART has also been reported to be associated with male reproductive tract abnormalities (Funke et al., 2010). All stated literature-based evidence of the adverse impact of assisted reproductive technology needs to be in check and necessary modification made to avoid the prospective loss of human reproductive functionality as a result of its impact in the future.

Incorporation of assisted reproductive technology into a sex robot machine in future advancement of artificial medical intelligence would potentially encourage human-robot marriage as well as encouraging individuals with human-human marriage to employ the services of reproductive sexbot (a sex robot machine with reproductive ability) to aid in reproduction, this will in turn lead to prospective extinction of human reproductive ability as a result of mental fatigue of humans towards carrying baby in the womb, since there is an option of robotic aid. Hence, robotic reproduction becomes viral and consequence depletes human reproductive ability.

CONCLUSION

Based on literature evidence gathered in this report; De novo prospective loss of human reproductive functionality and extinction of human reproduction which may arise from advancement of artificial medical intelligence resulting from invention of sex robot machine, assisted reproductive technology and assisted reproductive robot machine (especially the ones with both sex and reproductive function) was proposed to be possible, hence creating an insight to enable inventions and ethics that will help prevent the proposed adversaries in future.

Probable recommendations

Ethics of use that could aid to avoid loss of reproductive functionality should be established. Sex robot machine should be used at centers where its use could be regulated. Only individual with conditions that requires the use of sex robot and assisted reproductive technology should be allowed to use them. Further studies on the impact of short-term and long-term use of sex robot and assisted reproductive technology should be carried out to investigate and ascertain its impact on reproductive system and other body systems; precautions that will enable avoidance of its potential adversaries should be included in its manual. It is also recommended that modification of the inventions of artificial medical intelligence (sex robot machines and assisted reproductive technology) be made such that its adversaries on human reproductive system and other systems of the body can be reduced.

CONFLICT OF INTEREST

Author declare no conflict of interest

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