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FERTILITY REGULATION

Reproductive healthcare systems should include accessible infertility diagnosis and treatment: An important challenge for resource-poor countries

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ABSTRACT

Infertility is a central issue in the lives of many couples who suffer from it. In resource-poor countries the problem of childlessness is even more pronounced compared with Western societies owing to different sociocultural circumstances. It often leads to severe psychological, social, and economic suffering, and access to infertility treatment is often limited to certain procedures and certain costumeres. The issue of infertility in resource-poor countries is underestimated and neglected, not only by local governments but also by the international nonprofit organizations. Simplification of the diagnostic and therapeutic procedures, minimizing the complication rate, and incorporating fertility centers into existing reproductive healthcare programs are essential measures to take in resource-poor countries if infertility treatment is to be accessible for a large part of the population. For reasons of social justice, a search for strategies to implement simplified methods of infertility diagnosis and treatment in resource-poor countries is urgently warranted.

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1. Introduction

The idea of treating childlessness in resource-poor countries often evokes discomfort and disbelief in Western countries. According to many, education, family planning, and maternal care programs are the only valuable options to improve reproductive health care, leaving little room for other initiatives. On the other hand, negative psychosocial, sociocultural, and economical consequences of childlessness are often more pronounced compared with Western societies. Childlessness in resource-poor countries may create broader problems in terms of stigmatization, social isolation, economic hardship, and even suicide, especially for women [1,2].

Tubal factor infertility is the main reason for infertility in resource-poor countries, mostly due to sexually transmitted diseases (STDs). STDs are also the major cause of male infertility. In both conditions, assisted reproductive technologies (ART) are needed. It is clear that many concerns become apparent when talking about the possible role of ART in resource-poor countries and the question remains whether expensive techniques with a low success rate per treatment cycle can be justified in countries where poverty is still an important issue and where healthcare systems still struggle with the immense problem of infectious diseases such as malaria, tuberculosis, gonorrhoea, and HIV.

Implementing ART centers in resource-poor countries will only be discussed if we can simplify these techniques substantially, searching for less expensive methods and materials so that in vitro fertilization

(IVF) and even intracytoplasmic sperm injection (ICSI) can be offered at a much lower cost. When we succeed to develop simplified methods of infertility management, we will face a unique opportunity to move beyond the current status, which tends to focus on infertility prevention and health education, toward offering effective treatment.

2. Prevalence and etiology factors for infertility in resource-poor countries

More data on the prevalence and etiologic factors of infertility are certainly required when thinking about transferring limited economic resources into sexual and reproductive health care. Most resource-poor countries, especially in Sub-Saharan Africa and Asia, have very little access to country- and time-specific data. A recent overview of population-based surveys estimated the current international prevalence of infertility to be 9% on average, with a range of 3.5% to 16.7% [3]. For Asia and Latin America, a World Health Organization (WHO) study indicated that the prevalence of infertility is between 8%–12% for couples of reproductive age [4]. Compared with Western countries there is a wider prevalence range in resource-poor countries, possibly due to different country-specific factors, such as the prevalence of STDs, age at delivery, and political factors.

Considering etiology, the diagnosis of tubal factor infertility is reported to be as high as 85% in Sub-Saharan Africa compared with 33% of infertile women worldwide [5,6]. Previous infections of the male genitourinary tract are also found in the majority of cases of male factor infertility [7]. Available data indicate that infection-related causes play a prominent role in non-African resource-poor countries as well [8].

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STDs are most commonly caused by *Chlamydia trachomatis* and *Neisseria gonorrhoeae*. Pelvic tuberculosis has been reported as a major cause of tubal infertility in India and Ethiopia [9].

The high incidence of tubal factor disease can be explained by a high rate of unprotected intercourse with infected partners at a very young age, unsafe abortions, and postpartum pelvic infections. Illegal abortions are commonly performed in unsafe and unsterile conditions by unqualified personnel [10]. Postpartum pelvic infections are also extremely common in resource-poor countries, especially in rural areas. In Sub-Saharan Africa only 40% of births are attended by trained personnel [11]. Trauma and sepsis due to obstructed or unassisted labor increase the risk of future infertility, especially in cases of home delivery performed by inadequately trained or equipped personnel in unhygienic circumstances. Obstetric fistulas due to obstructed labor can also compromise the future reproductive potential, as a result of chronic inflammation.

3. Burden of infertility in resource-poor countries

Having children in resource-poor countries has an important influence not only on the personal well-being of a couple, but also and even more pronounced on the woman's status within the couple, and within the extended family and community at large [12]. Different religious customs and moral and legal rules influence and explain the way a community regards childlessness. Children are highly valued for sociocultural and economic reasons and childlessness often leads to psychological, social, and economic burdens [13,14]. In many cultures childless couples are blamed for it and can be ostracized and assaulted by their families, which may lead to isolation and abandonment, neglect, economic hardship, domestic violence, and even suicide [12–15].

4. Common perceptions surrounding the issue of infertility in resource-poor countries

According to the population growth perception, the problem of overpopulation can only be solved by well organized educational and family planning programs leaving little or no room for other initiatives such as infertility diagnosis and treatment. Another well-known argument against the implementation of infertility services in resource-poor countries is that of limited resources. Considering this argument, most healthcare providers in low- and high-income countries seriously question whether infertility diagnosis and treatment are an appropriate use of a country's resources.

Because overpopulation has been regarded correctly as one of the most important health concerns in resource-poor countries, it is not surprising that governments only invest in prevention of infertility rather than putting money into expensive technologies that are unlikely to be cost-effective. Therefore, talking about infertility problems in resource-poor countries seems contradictory to common sense, although the infertility problem is a major one for more than 70 million couples [15]. Management of infertility in resource-poor countries is frequently hindered by lack of knowledge of the impact, importance, and prevalence of infertility and lack of knowledge of the attitudes, practices, and beliefs of different populations regarding infertility. Political commitment is usually not available because of a shortage of initiatives to integrate infertility services in existing reproductive healthcare centers.

Instead of ignoring the problem of infertility in terms of the population growth argument, a better strategy would be to increase the efforts for family planning, with the aim of decreasing fertility rates substantially. At the same time, subfertility needs to be taken seriously and cost-effective techniques of diagnosis and treatment should be implemented. The problem of overpopulation in resource-poor countries cannot be used as a reason to disguise the problems of millions of infertile couples.

Another factor contributing to the expected population growth in resource-poor countries is caused by improved life expectancy [16]. Because of a rapid decline in mortality, even in the least developed countries, life expectancy is set to rise from an average of 54 years currently to 67 years in 2045–2050. It seems that the overpopulation issue is strongly associated with a better life expectancy and not only with high fertility rates, even for resource-poor countries.

5. Prevention and education

Prevention of STDs and pregnancy-related sepsis should be regarded as the most important and cost-effective strategy to decrease infertility rates. Consequently, most available resources should be directed toward prevention programs not only because they are less expensive and more effective in eliminating the social consequences of infertility, but also because they will improve the health status of women in many other ways.

One study has reported that infertile women with tubal disease were younger at first coitus, were more likely to have had first coitus pre-menarche, had more sexual partners, more abortions before marriage, more induced abortions, and had fewer years of schooling compared with fertile controls [17]. These data demonstrate that reproductive and sexual events during teenage years determine the future prospects of fertility, highlighting once again the importance of reproductive healthcare education programs. Governments should be aware of this important observation.

6. Accessibility of ART in resource-poor countries: Present situation

Most cases of infertility in resource-poor countries are caused by STDs, which lead to tubal factor infertility and severe male infertility. Consequently, the majority of infertility cases can only be treated by the most sophisticated methods, namely ART. Although the number of IVF centers increases every year, most of these are private centers and are only available to wealthy couples who can afford it. In many resource-poor countries about 10% of all visits to doctors are related to childlessness [18]. The problem is mostly underestimated or neglected by healthcare providers, most of the time because they do not know how to deal with it. Prevention and management of STDs and infections related to childbirth and abortion are frequently considered the only priority for service delivery, not only by local governments but also by international nonprofit organizations such as the WHO, the Population Council, and Family Health International [15]. It is striking that although most cultures value motherhood, infertility treatment comes low down on the agendas of health authorities. Most women consider infertility treatment of utmost importance, even more important than the treatment of morbidity generated by their own illnesses [18]. Because of a lack of interest by healthcare providers many infertile patients are prone to exploitation and potentially damaging practices [12].

Although the United Nations International Conference on Population and Development (ICPD) held in Cairo in 1994 clearly highlighted “prevention and appropriate treatment of infertility where feasible” and despite the recommendations of the WHO meeting on “Medical, Ethical and Social Aspects of Assisted Reproduction,” held in 2001 [19], almost no progress has been made in education and reproductive healthcare services in South Asia and Sub-Saharan Africa because of a lack of guidelines or concrete actions and programs [20].

7. The solution: Accessible ART

The integration of infertility management into sexual and reproductive healthcare programs and a reduction of costs are considered prerequisites for implementing “new reproductive technologies” in resource-poor countries. An urgent need for simplifying

ART procedures and minimizing the complication rates will be necessary to make new reproductive technologies available and accessible for a substantial portion of the population.

7.1. Affordable infertility diagnosis

Standardized investigation of the couple at minimal cost will enhance the likelihood that infertile couples will come to the center. The best option would be to develop specific primary healthcare facilities located near tertiary healthcare hospitals, where women can obtain sexual and reproductive health care (prevention of cancer, STDs, diagnostic procedures for infertility, etc.). Concerning infertility diagnosis, the concept of primary health care should include trained personnel capable of using a microscope and ultrasound equipment (incorporated in existing reproductive health care centers, if they exist at all). Reproductive healthcare centers are located mostly in big hospitals with long waiting lists and far from villages. The advantage of a specialized primary healthcare facility is that it can become a place for medical and educational activities and a place where women can discuss their problems. Since tubal obstruction associated with previous pelvic infections is the most important reason for infertility in some low-income regions, hysterosalpingography and/or hysterosalpingo-contrast sonography are simple and accessible techniques to detect this problem without major costs. Combining these techniques with an accurate history will identify the majority of women's infertility causes, such as ovulatory disorders and tubal infertility. Male factor infertility can be evaluated easily by a simple semen analysis. Semen analyses can also be performed by well-trained paramedics, another important advantage for low-resource countries.

Office mini-hysteroscopy to investigate intrauterine abnormalities has been simplified in its instrumentation and technique so that it can become an inexpensive diagnostic technique accessible to every gynecologist [15]. To investigate the value of these specialized primary healthcare facilities for the diagnosis of infertility at minimal cost, well-organized studies have to be performed in different resource-poor countries.

7.2. Affordable infertility treatment

Provided tubal patency has been proven, intrauterine insemination (IUI) with the husband's semen can be promoted as a first-line treatment in most cases of unexplained and moderate male infertility, without major costs and without very expensive infrastructure. Satisfying results are obtained when clomiphene citrate stimulation is used [21].

IUI programs can be run easily by well-trained paramedics, another advantage for resource-poor countries. In cases of resistance to clomiphene citrate (20% to 30% of patients), a minimal stimulation protocol using urinary gonadotropins or recombinant follicle-stimulating hormone aimed at monofollicular growth should be recommended. If couples fail to get pregnant after 3–6 trials, they may be referred for IVF.

Concerning accessible IVF, gonadotropins and/or follicle stimulating hormones, GnRH agonists and GnRH antagonists are presently too expensive to be used routinely in resource-poor countries. Natural cycle IVF could be an option, but the results are disappointing owing to the high cancellation rates due to premature luteinizing hormone rise and premature ovulations [15].

Probably more promising is the use of a clomiphene citrate regimen. More acceptable results compared with natural cycle and minimal stimulation IVF are described for clomiphene citrate IVF, with minimal complication rates [22].

Monitoring of follicular development as well as the timing of hCG administration can be done easily using sonographic criteria with basic inexpensive ultrasound equipment.

Considering laboratory procedures, it is possible to use a converted humidicrib—a plastic box commonly used for keeping newborns warm—instead of an expensive laminar flow hood [23]. With this method the handling of eggs and embryos can be done for a tenth of the price. Rather than using an expensive cylinder with carbon dioxide to incubate the embryos, a plastic bag containing the Petri dish with the embryos can be used. By dropping this bag into a warm bath, culturing can be done effectively without the need for an expensive incubator. This technique has been used successfully for more than 10 years in veterinary IVF [24].

More research is also needed on the value of intravaginal or intrauterine fertilization and culturing. Compared with conventional IVF, comparable success rates were reported and therefore this technique might be promising for resource-poor countries [25].

8. Conclusion

The negative consequences of childlessness are more pronounced in resource-poor countries compared with high-income countries. Bilateral tubal occlusion due to STDs and pregnancy-related infections is the most common cause of infertility, especially in Sub-Saharan Africa. Male infertility is common, also due to STDs. Both conditions can be treated by ART, but most infertile couples in resource-poor countries cannot afford this treatment because the techniques are too expensive and limited mostly to private centers.

Ideally, infertility management comprising both prevention and intervention should be integrated into existing sexual and reproductive healthcare programs that focus on family planning, health education, maternity and child care, and prevention and treatment of STDs and HIV. Family planning is not only about prevention of unwanted pregnancies, it also includes promoting the chance of pregnancy in case of involuntary childlessness. ART units in resource-poor countries should be safe, effective, and affordable. Identifying the right couples for treatment will be crucial and support from the community will be important. It is vital that the right message is given to the local authorities and to the international community: avoid too many children for couples with a high fertility potential, and offer children for childless couples.

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