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IN BRIEF

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Reproductive Infertility: Prevalence, Causes, Trends and Treatments

Introduction

Reproductive infertility is the inability of a couple to conceive or carry a baby to term. Measures of infertility, however, vary based on the definition used. A diagnosis of infertility may be made by some after a couple has been unable to conceive after as little as six months, while others may insist that a couple must show an inability to conceive for at least two years of frequent unprotected sex. Often, women are already aware of their infertility before waiting out this timeline due to a previously diagnosed condition.

Prevalence of Infertility

At the time of the Royal Commission for New Reproductive Technologies (RCNRT) in 1990, there were no measures of the prevalence of infertility in Canada. Work carried out by the Commission suggested that there is a 7% prevalence rate of infertility when measuring the inability to conceive after two years. A 12-month measure suggested the rate was 8.5%. These rates convert into over a quarter of a million couples in Canada.

Sterility and its Effect on the Reported Infertility Rate

A large number of men, and to a lesser extent women, choose surgical sterilization as their method of contraception. Surgical sterility may also be a factor for some men and women due to non-contraceptive medical intervention. Examples of this are medically necessitated hysterectomies and castration (both also called gonadectomies) for cancer treatment. Sterilized individuals are certainly infertile. However, many consider that infertility refers only to those who had considered themselves to be fertile until they were unable to conceive, or carry a baby to term.

When the sterilized population is included in the calculation of infertility rates, the prevalence is calculated to be between 7-8.5% (for periods of two years and one year, respectively), as measured by the RCNRT. If this subset of infertile couples is removed from the population, then the prevalence of infertility rises to between 13.2% and 15.4%, because the calculation is based on a significantly smaller population.

Trends in Infertility

No comprehensive measures of the prevalence of infertility in Canada have been carried out, nor have there been any reliable measurements of infertility trends. The perception in recent years, however, has been that the rate of infertility has been increasing. Statistics in the United States suggest that this perception is incorrect. The 1995 National Survey of Family Growth performed by the National Center for Health Statistics found the infertility rate to be 10.2%. According to a comparison of earlier surveys since 1965, the rate has not significantly changed.⁽¹⁾ Surgical sterilization as a contraceptive method, however, is now much more common.

The misperception that infertility rates are increasing has been attributed to several factors, including:

- an increase in the absolute number of infertile couples due to the baby boomers being of reproductive age;
- couples seeking infertility services more quickly after delaying reproducing until later in life and leaving less time to attain their desired family size;

(1) Anjani Chandra, Maternal and Child Health Monograph, in: *Reproductive Health of Women*, Atlanta, GA: Center for Disease Control, 1994, pp. 63-72.

- less secrecy about the issue of infertility, e.g., in the 1980s, more people spoke openly of their infertility status;
- media attention;
- more physicians trained in the area of infertility services;
- greater availability of fertility drugs and reproductive technologies; and
- fewer infants available for adoption, prompting couples to seek infertility services.

Causes of Infertility

A. Women

Women may experience fertility problems due to a variety of reasons, and these account for more than 40% of all fertility problems. Some disorders that result in infertility, or reduced fertility, are listed below.

- Ovulation disorder, which may be caused by hormonal problems.
- Pelvic inflammatory disease (PID): resulting in scarring and potential blockages caused by infections, most commonly sexually transmitted diseases, in the uterus, fallopian tubes or ovaries.
- Endometriosis: occurrence of endometrial tissue (similar to the uterine lining) aberrantly in various locations in the pelvic cavity causing fallopian tube blockage and cyst formation.
- Polycystic ovarian syndrome: related to elevated male hormone (androgens) levels accompanied by infrequent or absent ovulation (anovulation).
- Hormone imbalance responsible for repeated spontaneous miscarriages in some women.
- Congenital anomalies that affect the reproductive structures, such as absent or multiple uterus, uterus tilted towards the bladder, etc.
- Environmental and occupational exposure to chemicals, radiation and other factors, potentially hazardous to conception and gestation.

Other factors more amenable to personal control include:

- Age – Fertility decreases after the age of 30 for women, and the decline becomes more pronounced with time.
- Weight – Both under- and overweight women may experience compromised fertility due to menstrual cycle irregularities.
- Exercise – Excessive physical exercise (more than 60 minutes/day) is also associated with irregular

menstrual cycles and can produce reversible infertility.

- Stress and Psychological Factors – No direct correlation has been drawn between infertility and these risk factors, but evidence suggests that these factors may contribute to infertility in women via irregular menstrual cycles, vaginismus⁽²⁾ and infrequent intercourse.
- Tobacco, alcohol and substance use and abuse – Although it is unclear whether moderate alcohol use causes menstrual irregularities and fetal abnormalities associated with higher miscarriage rates, abuse of alcohol has repeatedly been linked to these. Smoking is also associated with reducing a woman's ability to conceive, as well the ability to carry a fetus to full term. Use and abuse of illicit drugs can also adversely affect fertility and the ability to successfully carry a fetus to term.

With the exception of age, infertility caused by these factors is considered to be reversible.

B. Men

Male infertility is considerably less complicated than female infertility but can account for 30-40% of infertility. The primary reasons for male infertility are as follows:

- Sexual dysfunction, including the inability to achieve or maintain an erection (impotence), and premature or retarded ejaculation.
- Inadequate semen or sperm quality where the production of sperm may be absent or deficient, or the semen may be inadequate to maintain and transport the sperm.

Male infertility may also be due to factors amenable to personal control, including:

- Smoking, which has been shown to reduce quality and quantity of sperm.
- Exercise, or other activity which results in a prolonged increase in scrotal temperature, can result in inadequate sperm production.
- Stress and other psychological factors may lead to sexual dysfunction.
- Alcohol and substance use and abuse may result in either sexual dysfunction or inadequate sperm quality and quantity.

(2) A painful, spasmodic contraction of the vagina often rendering intercourse impossible.

C. Couples

Frequently, infertility can be attributed to more than one cause, often affecting both partners. On occasion, when considered separately, neither partner may have a fertility problem, but together their physiology is incompatible.

D. Unexplained

It is estimated that 10-20% cases of infertility are not assigned to any particular cause. One possibility for unexplained reproductive infertility is environmental pollutants and occupational hazards that have yet to be fully researched.

Treatments for Infertility

The following paragraphs will very briefly describe some of the infertility treatments that are currently available. They range from relatively simple hormone treatments to highly complex and invasive procedures. The success rates of these procedures varies, but few have encouragingly high ones.

A large proportion, 20%,⁽³⁾ of women seeking infertility services have an ovulation problem and may be candidates for hormonal treatments to induce ovulation. Frequently irregular ovulation will make it very difficult for a woman to conceive. Hormonal stimulation of ovulation, in the absence of any other infertility problems, is very effective in restoring fertility.

RCNRT estimated that approximately one-third of women experience infertility due to blocked or damaged fallopian tubes, which can be caused by PID and endometriosis. Surgery is sometimes able to reverse the damage and permanently restore fertility.

Artificial insemination is another frequently used infertility treatment. This procedure involves injecting sperm (from the woman's partner or a donor) into the cervix. This procedure may be used to overcome causes of infertility such as premature or delayed ejaculation and impotence in men, or thickening of the mucus membrane in women.

In vitro fertilization (IVF) is a well-known reproductive technology. First, the woman overproduces eggs through hormonal treatments. The eggs are removed and then mixed with the partner's, or donor's, sperm. Fertilization occurs in the culture dish and the embryos are allowed to grow for a few days so that any that are not viable can be removed. Remaining embryos can then be inserted into the uterus where implantation may or may not occur. The success rate in terms of pregnancies achieved is approximately 22%.⁽⁴⁾ IVF is used when there is tubal damage, endometriosis, mucus membrane enlargement or unexplained fertility in women. It may also be used if the male partner has a low sperm count.

A process called gamete intra fallopian transfer (GIFT) is sometimes used in cases of unidentified female infertility and rarely when there is poor sperm quality with respect to motility. In this procedure, gametes (both eggs and sperm) are procured from the donors and physically mixed together. The mixture is then inserted into the woman's fallopian tube. This procedure eliminates the need for sperm to travel the length of the fallopian tubes before encountering an egg and has a success rate of about 28-30%. In cases where the male partner has a very low sperm count, intra cytoplasmic sperm injection (ICSI) may be used. It is a variation of IVF in which a single sperm is injected into an egg but its success rate (approximately 28% pregnancy rate) is higher than that of IVF.

Finally, sperm may sometimes be recovered surgically. Blockage, or absence, of the vas deferens results in the inability of the sperm to be transported into the semen. The sperm may be surgically extracted and then used in an ICSI procedure.

Conclusion

Despite the perception of rising infertility rates, infertility continues to affect an estimated 7-8.5% of the population. Medical science has produced many advances insofar as the types of procedures that can be offered as infertility services. These in turn contribute to the misperception that infertility now affects a greater number of individuals than in past years.

(3) Statistic of the Human Fertilisation and Embryology Authority of the U.K., 1999. Available at www.hfea.gov.uk/patgde99/infert/range.htm

(4) Statistics may also be given in terms of live birth rates; however, these are usually significantly lower than pregnancy rates.

Selected References

1. Royal Commission on New Reproductive Technologies. *Proceed With Care*. Final Report. Ottawa: Minister of Government Services Canada, 1993.
2. American Infertility Association Internet site; www.americaninfertility.org
3. Human Fertilisation and Embryology Authority Internet site; www.hfea.gov.uk