EDITORIAL

Does it really matter if sperm counts are decreasing?
Simon McDowell, Andrew Murray

The article published in this journal by Valiapan et al raises an interesting issue. Are men becoming less fertile? Are the various hazards in our current environment (pesticides, endocrine disruptors, cellphones, tight-fitting underpants) making men produce less sperm of poorer quality? This has certainly been topical in recent times, and we commend the authors for searching for answers within their own database.

But does it really matter? If sperm counts and quality are truly decreasing, does this mean that men are becoming less fertile? Fertility is defined as the ability to conceive children. In a way, a man who has not conceived a child is ‘infertile until proven otherwise’.

A semen analysis is only a surrogate measure of a man’s fertility. The World Health Organization (WHO) publishes manuals that guide clinics in how to perform standardised semen analyses. They provide references ranges for use in interpretation. The current manual (WHO 2010) is actually the fifth edition, the first having been published in 1980.¹

It is commonly thought that men with semen parameters (concentration, motility, morphology) below the lower limit of the reference range are infertile. This is in fact incorrect. The cut-offs are completely arbitrary. The lower limit of the reference range represents the 5th centile of a healthy fertile population of men. These limits were collated by approximately 1,900 men who had conceived a child within 12 months. All men had a solitary semen analysis, the results pooled and the distribution plotted. Succinctly put, 5% of the 1,900 men had sperm parameters less than currently accepted lower limits, and still achieved pregnancy within 12 months.

There are several controversies with regards to the WHO 2010 routine semen analyses criteria. The current cut-offs are markedly lower than those previously reported. They were obtained from a healthy fertile population, and not an infertile population. Of the 1,900 men involved, almost all were from large cities in North America. A small amount came from Australia and none from Asia, Africa, Latin America and the Middle East. It may be that racial and geographical factors affect semen analysis parameters and the ‘fertility’ of men in those areas.

Perhaps we should look at other factors to assess a man’s fertility? Or use a multitude of things in combination. Tests of sperm quality and functioning may better reflect ‘fertility’ as opposed to a simple semen analysis.

Several tests have been developed, such as hypo-osmotic swelling, induced acrosome reaction, zona pellucia binding and sperm DNA fragmentation. Unfortunately these tests have inherent limitations, namely how do we determine ‘cut-offs’ to measure fertility or infertility. Most of these tests, such as DNA fragmentation, are expensive and may not be readily available. Men with high DNA fragmentation have been shown to have a higher rate of miscarriage, and ‘therapies’ to correct those issues have been described.²³ There is emerging technology, such as Hyaluronic Acid Binding Assays and Intracytoplasmic Morphologically Selected Insemination (IMSI), which may improve sperm selection when high DNA fragmentation is a factor. Whether these techniques actually improve live-birth rates is still debated.⁴ It may be that functional sperm issues are contributory, not causative.
For woman, age remains the best prognostic indicator of a woman's ability to conceive. A woman at age 25 years has a 25% chance of conceiving per month, at age 35 years this falls to 16%, and at age 40 years it is down to 6%. Emerging data shows that paternal age affects standard semen parameters. Seminal volume, sperm motility and morphology all decline with advancing paternal age. Time to pregnancy increases, miscarriage risk increases and chance of success with IVF decreases.

Advancing paternal age also represents risks for biological offspring. The occurrence of autosomal dominant conditions increase, as do birth defects, such as cardiac malformations, neural tube and limb defects, schizophrenia and autism spectrum disorders.

We propose male fertility should be assessed via a ‘fertility algorithm’. This could examine a triad of factors, including standard semen parameter analysis, sperm functioning and age. This leads us back to our original question. Even if sperm counts and other semen parameters are truly decreasing, does it really matter? Semen analysis is at best a surrogate marker of a man's fertility, and this may not decrease fertility at all. A man's ability to conceive is really measured by the time taken to achieve pregnancy. What would be interesting is to find out if the time to conceive is increasing now compared to decades ago, when controlled for female factors, such as advanced maternal age.

What is important is that both women and men attempt to start producing children at a younger age. For those that then have difficulty conceiving, rapid assessment and treatment can take place when ART success rates are reassuringly high. While we should strive to learn more about the impact of the environment on male and female fertility, we should continue to encourage couples to start trying for families earlier than they currently are.

Competing interests:
Drs Murray and McDowell are both colleagues of Drs Birdsall and Peek, co-authors of the Valipan et al paper.

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REFERENCES:


3. Pascual Sánchez-Martín1 , Fernando Sánchez-Martín1 , Mercedes González-Martínez , and Jaime Gosálvez. Increased pregnancy after reduced male abstinence Systems Biology in Reproductive Medicine, 2013, Early Online: 1-5


