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Review Article

Preconception health behaviours: A scoping review

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ABSTRACT

Preconception health refers to the health of males and females at any point in time prior to a potential pregnancy. A goal of preconception health research is to use preventive behaviour and healthcare to optimize the health of future offspring that result from both planned and unplanned pregnancies. This paper briefly reviews evidence of the importance of various preconception health behaviours, and examines the extent to which specific preconception health behaviours have been included in recent studies of such knowledge, behaviours, and intentions. To describe this recent research in highly developed countries, a scoping review of the literature was completed of studies published within the past seven years. A total of 94 studies on preconception health were identified and reviewed: (a) 15 examined knowledge and attitudes, (b) 68 studied behaviours, (c) 18 examined interventions designed to improve knowledge or behaviour, and (d) no studies examined intentions to engage in preconception health behaviours. Over 40% of studies examining preconception health behaviour focussed exclusively on folic acid. Overall, folic acid, alcohol, and cigarettes have consistently been topics of focus, while exposure to harmful environmental substances, stress, and sleep have been largely neglected. Despite strong evidence for the importance of men's health during the preconception period, only 11% of all studies included male participants. Based on existing gaps in the research, recommendations are provided, such as including men in future research, assessing a wider variety of behaviours, consideration of behavioural intentions, and consideration of the relationships between preconception health knowledge, intentions, and behaviour.

Contents

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1. Introduction

Broadly, preconception health (PCH) refers to health across the entire lifespan of any man or woman prior to a potential pregnancy. While some may wait until pregnancy to make health changes, four reasons justify incorporating health changes much earlier. First, PCH behaviours of women and men have the potential to directly affect offspring health through epigenetic mechanisms (see review by Hochberg et al., 2011). Second, confirmation of pregnancy may be delayed even in planned pregnancies, rendering people unaware of their pregnancy in its earliest stage. Third, many behaviours (e.g., cigarette smoking) or behavioural outcomes (e.g., high body mass index) are extremely difficult to change immediately. Thus, behavioural change should occur well in advance of pregnancy to prevent any adverse effects on offspring. Finally, some PCH behaviours increase conception likelihood by improving fertility. Both this rationale and the research reviewed below suggest that there is a need to ensure that the public is adequately educated about positive PCH behaviours early in life.

2. Evidence for the importance of preconception health behaviours

2.1. Cessation of alcohol, cigarettes, and drugs

Substance use should cease well before pregnancy as immediate cessation of addictive substances is difficult. For example, Mendelsohn et al. (2014) indicate that over half of women who smoke before conception are unable to quit once pregnant. Additionally, male and female fertility can be adversely affected by: cigarettes (e.g., Horne et al., 2014; Windham et al., 2005; Zhang et al., 2013); alcohol (see review by La Vignera et al., 2013); drugs including steroid hormones, marijuana, cocaine, methamphetamine, and opioids (Fronczak et al., 2012); and even high doses of caffeine (Jensen et al., 2010; see review by Sharma et al., 2013). Drug use can also exert epigenetic changes (e.g., cocaine use in rats has resulted in transgenerational effects on dopamine receptors; Sasaki et al., 2014). Emerging evidence suggests even pharmaceutical drugs can exert epigenetic changes (see review by Csoka and Szyf, 2009). Thus, individuals should consult their health care provider during the preconception period regarding risks and benefits of medication.

2.2. Folic acid and multivitamin supplementation

Folic acid reduces the likelihood of neural tube defects (NTDs), which result from the failure of the neural tube to close 21 to 28 days following conception (Blencowe et al., 2010). Health Canada (2013) recommends daily intake of 0.4 mg of folic acid supplements, at least three months before pregnancy and through the first trimester, as most women do not consume the recommended dose through diet alone (French et al., 2003). Women with certain chronic illnesses (e.g., obesity, diabetes or impaired glucose metabolism) or family history of NTDs may require higher doses of folic acid in consultation with their health care provider (Health Canada, 2010).

2.3. Immunizations and sexually transmitted infection (STI) testing

Men and women should be up-to-date with all immunizations (e.g., chicken pox; measles, mumps and rubella) several months prior to conception in order to prevent contraction of illness during pregnancy, prevent transmission of diseases to offspring, and because the maternal immune response becomes altered during pregnancy (Robinson and Klein, 2012). Prenatal influenza exposure has led to altered neurodevelopment in controlled animal studies (e.g., Miller et al., 2013; Short et al., 2010), and has been associated with increased risk for schizophrenia and other mental illness (Limosin et al., 2003), though this finding is controversial. As human immunodeficiency virus (HIV) and many other STIs are asymptomatic, routine testing should occur prior to pregnancy to prevent adverse effects of STIs on fertility and offspring health (see review by Gottileb et al., 2014).

2.4. Minimizing exposure to bisphenol-A (BPA), toxic personal care products, and other environmental toxins

Individuals should avoid harmful substances, and keep living spaces clean and well-ventilated before conception. BPA is a substance found in many products (e.g., plastic compounds, lining of food cans, dental sealants, food storage containers). BPA has been linked to adverse effects on human reproductive health (e.g., reduced sperm and embryo quality, altered sex hormone concentrations, and increased risk of miscarriage; see meta-analysis by Rochester, 2013), and has caused epigenetic alterations in rat offspring, such as spatial memory deficits (Fan et al., 2013) and altered sex ratios (Li et al., 2015). Other chemicals such as parabens and phthalates are linked to adverse developmental outcomes including asthma, allergies, and cognitive and behavioural problems following prenatal exposure (see review by Mitro et al., 2015); and lower birth weight following preconception exposure (Smarr et al., 2015). Personal care products such as lotions, cosmetics, and perfumes often contain potential endocrine-disrupting chemicals, and greater numbers of paraben and phthalate metabolites exist in women who use more personal care products (Braun et al., 2014). Environmental pollutants (e.g., air fresheners, cleaners, paints, pesticides, deodorants, household dust) can also disrupt the endocrine system and harm reproductive health (e.g., review by Jurewicz and Hanke, 2011; review by Lara et al., 2012; Louis et al., 2014). Occupational exposure to carcinogens has been associated with increased risk for leukemia in offspring, and the risk is even higher with preconception parental smoking (Castro-Jimenez and Orozco-Vargas, 2011). Other types of exposures to avoid include litter boxes (to prevent illness related to feces exposure) and fish high in mercury (e.g., shark, swordfish, tuna) given that mercury has been associated with reduced fertility in both sexes (see review by Rice et al., 2014).

2.5. Reducing stress/getting enough sleep

A recent review of the epigenetic effects of stress led Babenko et al. (2015) to conclude that prenatal stress exposure can be one of the most powerful influences on mental health and can even affect generations of offspring. Preconception stress in mothers has also predicted sleep disturbance in infants, independent of postnatal depression (Baird, Hill, Kendrick, Inskip, and the SWS Study Group, 2009). In order to reduce stress, efforts should be made to establish a sleep routine prior to pregnancy so sufficient sleep can be achieved during pregnancy. Sleep deprivation can increase cortisol and even influence normal reactivity of the bodily stress systems (see review in Maggio et al., 2013).

2.6. Eating a healthy diet/staying at a healthy weight

Both maternal and paternal preconception diets can exert long-lasting effects on offspring health (see review by Vanhees et al., 2014). For example, Wylie et al. (2015) have linked preconception obesity to