

Research report

# Fish consumption in pregnancy and omega-3 status after birth are not associated with postnatal depression

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## Abstract

**Background:** Research to date suggests a relationship between fish consumption, omega-3 polyunsaturated fatty acids, and depression. However, interpretation of this research is difficult due to methodological limitations. Postpartum women provide an excellent opportunity to examine these relationships because omega-3s are transferred from mother to fetus during pregnancy and from mother to child after birth through breast milk. Hence new mothers are more likely to be depleted in omega-3s. Our aim was to determine whether prenatal fish consumption and omega-3 status after birth were associated with postnatal depression. **Methods:** Eighty first-time mothers were recruited; 41 who scored on or over the cut-off on one of two depression-screening instruments, and 39 in the control group. Depression was diagnosed using the Composite International Diagnostic Interview. Fish consumption was measured during pregnancy, and depression and omega-3 status were determined postnatally. Logistic regression and *t*-tests were used to examine relationships between fish consumption, omega-3 status, and postnatal depression, while controlling for known covariates.

**Results:** Prenatal fish consumption was not predictive of postnatal depression, and postnatal omega-3 status was not associated with postnatal depression. However, prenatal fish consumption did predict omega-3 status after birth.

**Limitations:** Prenatal fish consumption was measured using only a food frequency questionnaire, and no participants consumed oily fish (rich in omega-3s) regularly.

**Conclusions:** There was no association between postnatal depression and either fish consumption in early pregnancy, or omega-3 status after birth. Our findings make it difficult to justify trials of omega-3 polyunsaturated fatty acids in the treatment of postnatal depression.

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**Keywords:** Postnatal depression; Postpartum; Depression; Fish consumption; Omega-3 fatty acids

## 1. Introduction

Studies assessing the prevalence of postnatal depression (PND) have concluded that between 5% and 20%

of women giving birth will be affected (Miller, 2002; Newport et al., 2002; Righetti-Veltema et al., 2002; Yonkers et al., 2001). PND can have a debilitating effect on a new mother, and has been shown to adversely affect the mother–child relationship, infant development and well-being (Righetti-Veltema et al., 2002; McMahon et al., 2001). Consequently, finding effective preventions and treatments has become a

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focus of recent research. Despite this recognition and an extensive line of enquiry into its pathogenesis, PND remains an enigmatic syndrome (Newport et al., 2002) and is not currently conceptualised as distinct from major depression. As a result, research directed at either PND or depression can be considered useful in terms of the other.

As with many other mental illnesses it has been proposed that the causes of depression are, in most cases, a combination of both biological and environmental factors (Barlow and Durand, 2002). Prior to 1910, the prevalence of major depression may have been 100-fold less than current rates (Klerman and Weissman, 1985). The increasing rate of affective disorders has been well documented among birth cohorts during the past century in the United States (Klerman and Weissman, 1985; Burke et al., 1990; Robins et al., 1984), and other industrialised nations, including Germany, Taiwan, Canada and New Zealand (Klerman and Weissman, 1985; Cross National Collaborative Group, 1992). The argument that this cohort effect arose from changes in gene frequency over these few decades seems unlikely and other potential explanations have been offered, including nutritional, environmental and social (Hibbeln and Salem, 2001). Indeed, it has been hypothesised that the low intakes of omega-3 polyunsaturated fatty acids ( $\omega$ -3 PUFAs) that characterise post-industrialised diets are at odds with the nutritional milieu in which our genetic patterns evolved, and may have contributed to the increased prevalence of depression (Hibbeln and Salem, 1995).

$\omega$ -3 PUFAs are essential for the function of the brain, nervous, endocrine and immune systems (Simopoulos, 1991). They are available in a few plant sources, but are most abundant in seafood, oily fish in particular. Human beings are thought to have evolved in a dietary environment rich in directly available long-chain  $\omega$ -3 PUFAs (Eaton et al., 1998). However, the diets of industrialised societies have changed significantly, now containing less  $\omega$ -3 PUFAs and high levels of omega-6 polyunsaturated fatty acids ( $\omega$ -6 PUFAs; Eaton et al., 1998), which compete with  $\omega$ -3 functions (Hibbeln and Salem, 2001).

Research to date has established that there are strong correlations between low consumption of fish (rich in  $\omega$ -3 PUFAs) and high prevalence of depressive disorders or low mood scores (Hibbeln and Salem, 2001; Hibbeln, 1998; Tanskanen et al., 2001). Silvers and Scott (2002) also found a significant association between fish consumption and self-reported mental health in New Zealand. In addition, low levels of  $\omega$ -3 PUFAs have been found in the blood of currently depressed

individuals (Adams et al., 1996; Maes et al., 1996; Peet et al., 1998; Edwards et al., 1998). However, several of these studies suffered from methodological limitations. Some included very small sample sizes and lacked control groups (Adams et al., 1996); others did not measure fish consumption (Peet et al., 1998; De Vriese et al., 2003), or only assessed intakes over the previous 7 days (Edwards et al., 1998); some did not control for possible confounders (Peet et al., 1998), and others used only a depression-screening tool to measure depression (Otto et al., 2003; Adams et al., 1996). Results of studies that specifically focused on PND have so far been mixed and inconclusive (Otto et al., 2003; De Vriese et al., 2003), suggesting that further research is required to clarify the relationships between  $\omega$ -3 PUFA levels and depressive disorders.

Treatment with  $\omega$ -3 PUFAs has been shown to reduce depressive symptoms in patients who had remained depressed despite receiving standard therapy (Peet and Horrobin, 2002; Nemets et al., 2002; Su et al., 2003). However, other studies have not found an effect of treatment with  $\omega$ -3 PUFAs in people with depression (Marangell et al., 2003; Silvers et al., 2005), or PND (Marangell et al., 2004; Llorente et al., 2003).

Mothers who have recently given birth provide an excellent opportunity to examine the relationship between  $\omega$ -3 PUFAs and depression, as the developing fetus and newborn require  $\omega$ -3 PUFAs. Although relatively little is known about their origin, these  $\omega$ -3 PUFAs are transferred to the developing fetus and via breast milk to the newborn (Holman et al., 1991). The baby's ability to import and incorporate  $\omega$ -3 PUFAs appears to outweigh the mother's ability to retain these compounds (Locke and Stoll, 2001). Without sufficient dietary intake, mothers may become depleted of  $\omega$ -3 PUFAs during pregnancy and postpartum, which may increase their risk of suffering depressive symptoms (Hibbeln, 2002).

The aim of the current study was to address the limitations of previous research by measuring fish intake during pregnancy and  $\omega$ -3 PUFA status after birth, and determining whether these were associated with postnatal depression. The relationship between fish consumption and  $\omega$ -3 PUFA status was also investigated.

## 2. Method

### 2.1. Participants and procedure

First-time mothers who had previously taken part in studies conducted by Victoria University and the University of Otago, New Zealand ( $n=421$ ) were sent an

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