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The Effects of Perinatal Nutrition in Prevention of Postpartum Depression

Olivia Glasgow

Eleanor Mann School of Nursing

University of Arkansas

Dr. Hope Ballentine

Abstract

With the exponential rise in reported cases of postpartum depression, medical workers within the psychiatric and research communities seek to discover new methods to prevent its onset. The purpose of this study is to compile the available research that has been conducted to investigate the relationship between perinatal nutrition and the prevention of postpartum depression.

Nineteen peer-reviewed articles were gathered from medical databases based on their ability to report evidence on the increased consumption of omega-3 fatty acids or vitamin D and their prophylactic therapy against postpartum depression. Overall, many articles suggest a positive association as individuals' mental health screenings improved after following a diet high in the selected nutrients during their pregnancy. While further longitudinal research needs to be conducted to acquire more objective data on this topic, the findings among these articles are important to address for the progression of nursing and care for mothers.

Introduction

Perinatal depression is an umbrella term used to cover a wide range of symptom dimensions: depressed mood, anhedonia, anxiety – all of which require personalized corresponding therapy (Zhang et al., 2020). The most commonly observed symptoms in perinatal and postpartum depression are intense sadness, frequent crying, lack of motivation, lowered interest of eating, and lack of interest towards the newborn (da Rocha & Kac, 2012). It is reported that 12.5% of women experience postpartum depression (Centers for Disease Control and Prevention, 2020); however, these numbers are thought to be low due to under reporting. There are multiple theories to the onset of this condition including extreme efflux of hormones after delivery, previous or family history of mental health disorders, and social matters that create additional stress and concern about caring for a newborn. Due to the increased prevalence

of this condition and the impending neglect it could pose to the newborn, medical workers seek alternative methods of prophylactic treatment and health promotion. Nutritional insufficiency has recently been reviewed as a possible risk factor of postpartum depression. Nutrients such as omega-3 fatty acids and vitamin D are under investigation because of the role they play in mood regulation and the likelihood of their deficiency developing during pregnancy.

Low levels of vitamin D are being investigated as a potential risk factor of postpartum depression because of its function as a neuroactive hormone (Williams et al., 2016). The clinical importance of neuroactive hormones is their ability to act on the nervous system rather than the endocrine system. Their function is to establish a linkage between sensory stimuli and endocrine secretions to produce a hormonal response. Vitamin D carries out this function by regulating adrenaline, norepinephrine, dopamine, and serotonin. Alterations of these neurotransmitters and hormones have been associated with the onset of depressive symptomology (Williams et al., 2016). For example, the active form of vitamin D (calcitriol) protects against low levels of dopamine and serotonin – neurotransmitters involved in the reward center of the brain. Additionally, vitamin D has been shown to down-regulate inflammatory mediators that have been linked to psychosocial stress. Because of these connections, low levels of vitamin D have been associated with several mental disorders, with the most common diagnosis being depression (Accortt et al., 2016).

Vitamin D has one of the highest prevalence rates of nutritional deficiencies. Data collected from one of the included studies reported that as many as 31,424 adults found that their depression correlated to low levels of vitamin D (Williams et al., 2016). If this is true among the average population, pregnant women are at an increased risk due to the hemodilution that occurs during the early periods of gestation. Other factors contributing to vitamin D deficiency include

genetic variations regarding absorption and skin pigmentation (Neilsen et al., 2016). Individuals who have a darker complexion have skin that contains more melanin, decreasing the body's ability to produce vitamin D. Nonmodifiable risk factors such as pregnancy, genetics, and ethnicity place an increased importance on adequate vitamin D supplementation to carry out its intended antidepressant effects.

Omega-3 fatty acids have also been linked to postpartum depression. Docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) are both forms of omega-3 fatty acids found in their highest concentration in cold-water fish such as salmon and cod (U.S. Department of Health and Human Services, 2021). Although DHA and EPA are famously known for their benefits towards heart health, they also play a vital role in human brain development and neurotransmitter regulation. High levels of DHA and EPA are associated with the enhancement of serotonin receptor sensitivity by making the receptor cell membrane more fluid (DiNicolantonio & O'Keefe, 2020). In addition, omega-3 fatty acids are hypothesized to diminish neuroinflammatory processes which have a recently discovered association with the onset of depression (Hamazaki et al., 2018).

In the United States, it is reported that many individuals have insufficient levels of omega-3 fatty acids due to inadequate dietary intake (Papanikolaou et al., 2014). The average diet of an American consists of fast-foods that lack nutrient density and do not meet the recommended nutritional requirements. As previously discussed, pregnant women are more likely to experience the negative effects of low omega-3 fatty acids due to hemodilution that naturally lowers the levels of DHA and EPA, as blood supply increases to account for fetal oxygen requirements. Additionally, the body will shunt blood and nutrients to the fetus to prioritize growth and development, leaving pregnant women at an increased risk of developing

nutritional deficiencies. Since there is scientific evidence supporting the association between omega-3 fatty acids and depression, researchers have utilized this foundation to explore whether increased supplementation during pregnancy can prevent the onset of postpartum depression.

The overall purpose of this literature review is to systematically summarize the evidence supporting or refuting the claim that vitamin D and/or omega-3 fatty acids are linked to postpartum depression. Research regarding this topic is important to provide evidence on the effectiveness of nutritional interventions during pregnancy and enforce extensive education on the physiological and psychological benefits of a balanced diet. Proper patient teaching is one of the fundamentals of nursing; therefore, nurses should be adequately informed on new evidence-based medical interventions, as well as complementary and alternative therapies related to combating this condition.

Nutrition is an individual's first line of defense against various health conditions, as the top leading causes of death in the United States can be attributed to diet. There continues to be an oversight regarding nutrition as a form of treatment due to patients' lack of motivation and decreased adherence. However, patients have been more responsive to vitamin supplementation as it presents an easy, low-cost, safe intervention that may benefit maternal and fetal health (Williams et al., 2016). With more knowledge and comprehensive education, supplementation could be the simple determinant in science's efforts to reduce the public health issue of postpartum depression. Further research needs to be conducted due to gaps in literature regarding adequate supplementation levels, the efficacy of nutrition for prevention versus treatment of postpartum depression, and the various biological factors that lead to different nutrient absorption rates among darker-skinned populations.

PICOT Research Question

In pregnant women, does a perinatal diet high in vitamin D and omega-3 fatty acids prevent postpartum depression when compared to a perinatal diet that lacks adequate amounts of vitamin D and omega-3 fatty acids?

Methods

Study design. A systematic review of existing scientific research was conducted. The aim of the search was to compile studies that evaluated pregnant women and whether dietary consumption or supplementation of vitamin D or omega-3 fatty acids played a role in postpartum depression. This review consists of articles collected from PubMed, CINHAL, and MEDLINE Complete.

Information sources. I independently searched the PubMed, CINHAL, and MEDLINE Complete databases. Key word searches were performed for vitamin D and omega-3 fatty acids and how they relate to the prevention of postpartum depression. Information sources were utilized in this way in order to produce credible, relevant articles that would provide supportive evidence to answer the PICOT question.

Search Strategy. In order to provide the most articles pertaining to the topic question, the search method was broken down into two categories using Boolean operators and key terms:

- (1) Identify the effects of **vitamin D** (“vitamin D” or “vitamin D supplementation” or “vitamin D deficiency” or “vitamin D insufficiency”) and its protective effects against **postpartum depression** (“postpartum depression” or “PPD” or “postnatal depression” or “postpartum psychosis” or “postpartum blues”).
- (2) Identify the effects of **omega-3 fatty acids** (“omega-3 fatty acids” or “omega-3” or “DHA” or “EPA” or “fish oil”) and its protective effects against **postpartum depression**

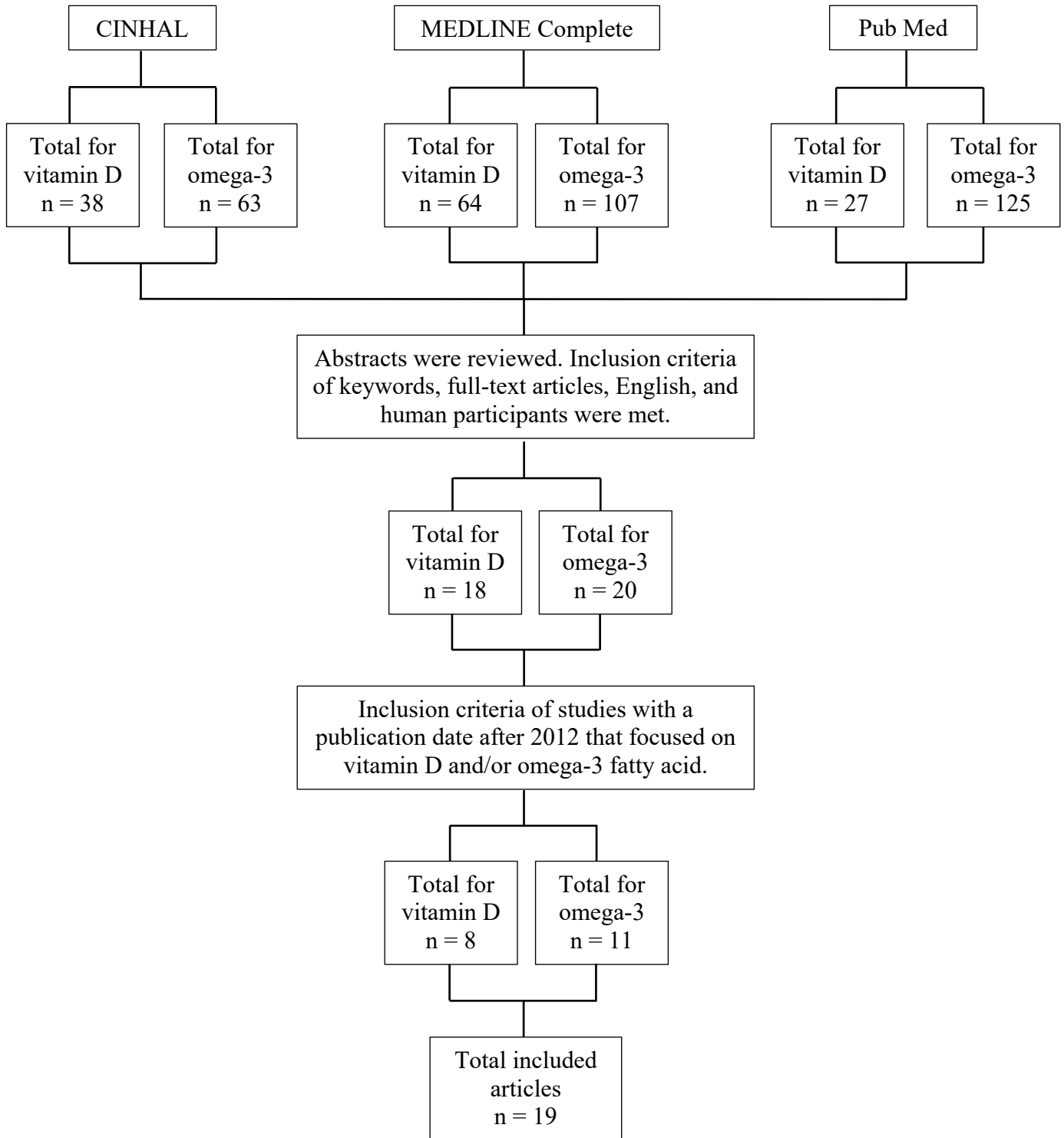
(“postpartum depression” or “PPD” or “postnatal depression” or “postpartum psychosis” or “postpartum blues”).

Inclusion and exclusion criteria. Exclusion criteria and limitations were placed on the initial search of PubMed, CINAHL, and MEDLINE Complete. Articles were excluded from the study if they were not conducted within the time frame of 2012 to present. Abstract-only articles were also excluded from this literature review because of their inability to supply sufficient data needed for analysis. The search required articles to be written (or translated) in English and involve human participants. The main foundation of inclusion criteria was not based on specific study type, but on the ability of the article to provide key information related to perinatal consumption of vitamin D and/or omega-3 fatty acids and their protective effects against postpartum depression. Different articles included in this literature review utilized different statistical analyses to measure nutritional levels and depressive symptoms and associations.

Data extraction. Information regarding authors, study design, sample size, data collection methods, nutrient under investigation, and results were taken from nineteen articles and analyzed. To ensure accuracy and confirm that the information extracted from each research article reflected evidence towards the PICOT question, I extracted the necessary data and compiled the significant findings. Additionally, I assessed the articles for inconsistencies and limitations of the studies to be included in discussion.

Search results. After a list of articles was produced from the Boolean operators and key terms, I examined each abstract. If the abstract was relevant to the research study, it was reserved for potential inclusion. After numerous potential articles were collected, the articles underwent a full text review. Nineteen articles were then yielded as the final articles to be analyzed for the literature review.

Figure 1: Synthesis Table



Results

Study type. There were a total of nineteen articles included in this literature review: eight of which investigate the perinatal supplementation of vitamin D and eleven of which investigate the supplementation and consumption of omega-3 fatty acids. The purpose of investigating these nutrients is to determine whether there is an association of protective effects against postpartum depression. Of the nineteen articles subjected to synthesis, six are randomized-controlled studies (Mozurkewich et al., 2011; Mozurkewich et al., 2013; Rouhi et al., 2018; Vaz et al., 2017; Vaziri et al., 2016; Williams et al., 2016), five are cohort studies (da Rocha & Kac, 2012; Hoge et al., 2019; Kobayashi et al., 2017; Markhus et al., 2013; Robinson et al., 2014), four are case-control studies (Abedi et al., 2018; Accortt et al., 2016; Hamazaki et al., 2018; Neilsen et al., 2013), two are longitudinal cohort studies (Lamb et al., 2018; Sallis et al., 2014), and two are cross-sectional studies (Lin et al., 2019; Urech et al., 2020).

Study population. Collectively, there was a total of 84,825 participants, all of which were women ranging from ages 18 to 44. 2,092 individuals participated in studies in which they consumed vitamin D supplements or where vitamin D levels were monitored throughout gestation and postpartum. 82,733 individuals participated in studies in which they consumed foods high in omega-3 fatty acids. Participants must have finished all required perinatal assessments and postpartum follow-ups. This factor was taken into consideration in order to provide complete data for analysis. Demographics of the population varied based on ethnicity, maternal age, education, marital status, pre-pregnancy and/or current weight, and annual income (Lamb et al., 2018).

Exposure measurement. Nutrient concentrations were measured at various points of gestation to ensure that the supplementation was reaching the studies' desired range for therapeutic effect. In the studies that investigated vitamin D, seven collected blood specimens

(Abedi et al., 2018; Accortt et al., 2016; Lamb et al., 2018; Neilsen et al., 2013; Robinson et al., 2014; Vaziri et al., 2016; Williams et al., 2016) and one utilized controlled supplementation to measure exposure and did not require serology (Rouhi et al., 2018). In the studies that investigated omega-3 fatty acids, eight collected blood specimens (Hoge et al., 2019; Lin et al., 2019; Markhus et al., 2013; Mozurkewich et al., 2011; Mozurkewich et al., 2013; Sallis et al., 2014; Urech et al., 2020; Vaz et al., 2017) and three used food frequency questionnaires and dietary intake journals of omega-3 polyunsaturated fatty acids (n-3 PUFAs) (da Rocha & Kac, 2012; Hamazaki et al., 2018; Kobayashi et al., 2017).

Outcome measurement. Prior to supplementation, each study utilized a depression scale to assess cognition and the affective components of depressive symptomology (Accortt et al., 2016). In order to produce the most accurate outcome measurements, these depression scales were utilized throughout gestation and into the postpartum period in order to monitor deviations from the participants' previously established baseline. Out of the nineteen studies, fourteen studies used the Edinburgh Postpartum Depression Scale (Accortt et al., 2016; da Rocha & Kac, 2012; Hamazaki et al., 2018; Kobayashi et al., 2017; Lamb et al., 2018; Lin et al., 2019; Markhus et al., 2013; Mozurkewich et al., 2013; Robinson et al., 2014; Rouhi et al., 2018; Sallis et al., 2014; Urech et al., 2020; Vaz et al., 2017; Vaziri et al., 2016), three studies used the Beck Depression Inventory (Abedi et al., 2018; Mozurkewich et al., 2011; Williams et al., 2016), one study used the Bromley Postnatal Depression Questionnaire (Hoge et al., 2019), and one study collected data on whether participants were prescribed antidepressants up to one year postpartum (Neilsen et al., 2013). Edinburgh Postpartum Depression Scale (EDPS) is most the commonly used tool due to its reliability and validation within the scientific community. EDPS has been

reported to provide an accurate assessment of depressive symptoms in pregnant and postpartum women (Accortt et al., 2016).

For the purpose of reporting efficacy of either nutrient in prevention of postpartum depression, the summary of studies will be broken down into two categories:

Vitamin D. Six studies included in the vitamin D review had results of a positive association (Abedi et al., 2018; Lamb et al., 2018; Robinson et al., 2014; Rouhi et al., 2018; Vaziri et al., 2016; Williams et al., 2016). This provides evidence that a high vitamin D concentration is associated with protective effects against postpartum depression. One study had results that were unremarkable (Accortt et al., 2016), and one study found no association between vitamin D and postpartum depression (Neilsen et al., 2013).

Omega-3 Fatty Acids. Five studies included in the omega-3 fatty acid review had results of a positive association (da Rocha & Kac, 2012; Hoge et al., 2019; Lin et al., 2019; Markhus et al., 2013; Vaz et al., 2017). Collectively, researchers found that a dietary intake high in omega-3 fatty acids (or fish oils) prevented the onset of postpartum depression. Three studies had results that were unremarkable (Mozurkewich et al., 2011; Sallis et al., 2014; Urech et al., 2020), and three studies found no association between omega-3 fatty acids and postpartum depression (Hamazaki et al., 2018; Kobayashi et al., 2017; Mozurkewich et al., 2013). More substantial, conclusive evidence has been found for omega-3 fatty acids as treatment rather than prevention of postpartum depression.

Table 1 includes an outline of the studies that were reviewed. Most studies included in the review were randomized-control studies. This was done to measure the effects of a nutrient against a placebo without bias from the participant. Researchers were then able to provide a comparison against the nutrient under investigation and its safety and efficacy.

Table 1: Synthesis

Authors	Year of Publication	Population	Study Type	Findings Summary	Evidence
Abedi P., Bovayri M., Fakhri A., & Jahanfar S.	2018	Iran	Case-Control Study	The number of women with moderate to severe deficiency of vitamin D was significantly higher in the postpartum depression group than the women who reported no depressive symptoms.	Level 4 Evidence
Accortt, E. E., Schetter, C. D., Peters, R. M., & Cassidy-Bushrow, A. E.	2016	United States	Case-Control Study	Higher levels of vitamin D during pregnancy may contribute to fewer postpartum depressive symptoms related to the association of vitamin D levels and EDPS scores.	Level 4 Evidence
da Rocha, C. M., & Kac, G.	2012	Brazil	Cohort Study	The prevalence of postpartum depression in Brazilian women was greater in those with an unbalanced dietary intake of omega-3 fatty acids in the first trimester of pregnancy.	Level 4 Evidence
Hamazaki, K., Takamori, A., Tsuchida, A., Kigawa, M., Tanaka, T., Ito, M., Adachi, Y., Saito, S., Origasa, H., Inadera, H., & Japan Environment and Children's Study (JECS) Group	2018	Japan	Case-Control Study	There was no association between the intake of omega-3 fatty acids during early pregnancy and risk of the development of maternal psychological distress or postpartum depression.	Level 4 Evidence
Hoge, A., Tabar, V., Donneau, A. F., Dardenne, N., Degée, S., Timmermans, M., Nisolle, M., Guillaume, M., & Castronovo, V.	2019	Belgium	Cohort Study	Found a significant association between omega-3 fatty acids and maternal mental health, the results were not altered after adjusting based on parity, professional occupation, and adverse	Level 4 Evidence

				life events during or after pregnancy.	
Kobayashi, M., Ogawa, K., Morisaki, N., Tani, Y., Horikawa, R., & Fujiwara, T.	2017	Japan	Cohort Study	There was no association between the intake of omega-3 fatty acids during pregnancy and the risk of postpartum depression following 1 and 6 months after delivery.	Level 4 Evidence
Lamb, A. R., Lutenbacher, M., Wallston, K. A., Pepkowitz, S. H., Holmquist, B., & Hobel, C. J.	2018	United States	Longitudinal Cohort Study	Women that experienced elevated depressive symptoms postpartum had significantly lower levels of vitamin D than women who did not have depressive symptoms.	Level 4 Evidence
Lin, Y. H., Chen, C. M., Su, H. M., Mu, S. C., Chang, M. L., Chu, P. Y., & Li, S. C.	2019	Taiwan	Cross-Sectional Study	The results of this study suggests that the moderate consumption of omega-3 fatty acids can have protective effects against postpartum depression.	Level 5 Evidence
Markhus, M. W., Skotheim, S., Graff, I. E., Frøyland, L., Braarud, H. C., Stormark, K. M., & Malde, M. K.	2013	Norway	Cohort study	Results from this study indicate that pregnant women could benefit from increasing their intake of omega-3 fatty acids through seafood, especially those at risk for developing postpartum depression.	Level 4 Evidence
Mozurkewich, E., Chilimigras, J., Klemens, C., Keeton, K., Allbaugh, L., Hamilton, S., Berman, D., Vazquez, D., Marcus, S., Djuric, Z., & Vahratian, A.	2011	United States	Randomized-Control Study	Dietary supplementation of omega-3 fatty acids may provide a safe, protective measure against the development of postpartum depression.	Level 1 Evidence
Mozurkewich, E. L., Clinton, C. M., Chilimigras, J. L., Hamilton, S. E., Allbaugh, L. J., Berman, D. R., Marcus, S. M.,	2013	United States	Randomized-Control Study	This study found no benefit of omega-3 fatty acid supplementation for the prevention of depressive symptoms during pregnancy and postpartum.	Level 1 Evidence

Romero, V. C., Treadwell, M. C., Keeton, K. L., Vahratian, A. M., Schrader, R. M., Ren, J., & Djuric, Z.					
Nielsen, N. O., Strøm, M., Boyd, H. A., Andersen, E. W., Wohlfahrt, J., Lundqvist, M., Cohen, A., Hougaard, D. M., & Melbye, M.	2013	Denmark	Case-Control Study	There was no supportive evidence found between low maternal vitamin D concentration during pregnancy and the increased risk of developing postpartum depressive symptoms.	Level 4 Evidence
Robinson, M., Whitehouse, A. J., Newnham, J. P., Gorman, S., Jacoby, P., Holt, B. J., Serralha, M., Tearne, J. E., Holt, P. G., Hart, P. H., & Kusel, M. M.	2014	Australia	Cohort Study	A positive association was found between women who reported postpartum depressive symptoms and lower levels of vitamin D concentration during the second trimester of pregnancy.	Level 4 Evidence
Rouhi, M., Rouhi, N., Mohamadpour, S., & Tajrishi, H. P.-R.	2018	Iran	Randomized- Control Study	Vitamin D supplementation may be a useful strategy in the prevention of fatigue and depression in postpartum women based on supporting evidence that an increased vitamin D intake improved the depression scores among postpartum women.	Level 1 Evidence
Sallis H, Steer C, Paternoster L, Davey Smith G, Evans J.	2014	England	Longitudinal Cohort Study	There was no substantial evidence between postpartum depression and the intake of omega-3 fatty acids, inferences were unable to be made around causality due to limitations within the study.	Level 4 Evidence
Urech, C., Eussen, S., Alder, J., Stahl, B., Boehm, G., Bitzer, J., Bartke, N., & Hoesli, I.	2020	Switzerland	Cross- Sectional Study	There was a positive association between the increased intake of omega- 3 fatty acids and the onset of postpartum depression,	Level 5 Evidence

				but findings lost statistical significance when controlling for antenatal depression.	
Vaz, J., Farias, D. R., Adegboye, A., Nardi, A. E., & Kac, G.	2017	Brazil	Randomized-Control Study	Found unremarkable evidence between omega-3 supplementation and prevention of postpartum depression. Results may differ based on supplementation levels and participant's previous history of postpartum depression.	Level 1 Evidence
Vaziri, F., Nasiri, S., Tavana, Z., Dabbaghmanesh, M. H., Sharif, F., & Jafari, P.	2016	Iran	Randomized-Control Study	Results showed that supplementation of 2000 IU of vitamin D during late pregnancy is effective in decreasing perinatal and postpartum depressive symptoms.	Level 1 Evidence
Williams, J. A., Romero, V. C., Clinton, C. M., Vazquez, D. M., Marcus, S. M., Chilimigras, J. L., Hamilton, S. E., Allbaugh, L. J., Vahratian, A. M., Schrader, R. M., & Mozurkewich, E. L.	2016	United States	Randomized-Control Study	During enrollment, women that reported depressive symptoms and scored high on the BDI assessment tool had significantly lower vitamin D levels. However, vitamin D levels were not associated with a higher risk for postpartum depressive symptoms based on regression analysis.	Level 1 Evidence

Discussion

Overview. There are inconsistent findings regarding the prevention of postpartum depression by prophylactic supplementation of vitamin D and omega-3 fatty acids. To strengthen associations, robust longitudinal studies need to be performed with large sample populations (Sparling et al., 2017). The results of the included studies differed, with eleven studies confirming that nutrients led to decreasing scores on their associative depression screening tools,

four studies showing unremarkable evidence, and four studies denying the claim. Overall, there is strong evidence to argue that vitamin D and omega-3 fatty acids did have a therapeutic effect for mothers at risk for developing postpartum depression.

Major assessment findings. A major finding in many of the studies indicated that women in the supplementation groups reported through EPDS, or other subsequent screening tools, that their mood levels were similar if not unchanged from pregnancy to postpartum. Lamb et al. (2018) suggests that increased vitamin D levels reduce postpartum depressive symptoms based on the bivariate correlation between serum 25-OH-D levels and EPDS scores. Similarly, da Rocha & Kac (2012) reported that an unbalanced diet of PUFAs in the first trimester of pregnancy correlated with more PPD diagnoses. On the other hand, Williams et al. (2016) conducted a regression analysis that found no correlation between vitamin D and postpartum depression. As is evident, the findings among studies conflict but many researchers do agree that there is a relationship between dietary and supplemental intake and depressive symptoms (Williams et al., 2016). In addition, there are more contributing factors to postpartum depression than the hormonal and emotional shifts following delivery. The development of postpartum depression can be related to obstetric history, social factors, family history of mental illnesses, and biological predispositions (Ghaedrahmati et al., 2017). For example, when referring to vitamin D, individuals with darker complexions are at an increased risk for developing vitamin D deficiency because darker skin limits synthesis of vitamin D (Accortt et al., 2016). Based on the conclusion of this review, women with darker complexions are potentially at an increased risk of postpartum depression due to their inherent lack of neuroactive hormones (vitamin D) which aids in regulation of serotonin levels (Williams et al., 2016). Although factors such as these have been

linked to the onset and severity of postpartum depression, they were not controlled or measured in the included studies.

Exposure measurement: technique and limitations. The most common method used to measure the participants' exposure to vitamin D and omega-3 fatty acids was through serum blood draws. When reviewing studies investigating vitamin D, exposure was most accurately measured by calculating the level of 25-OH-D circulating in the blood (Williams et al., 2016). 25-OH-D, also known as calcifediol, is an inactive hormone in circulation that is the precursor to vitamin D. This serum level illustrates the most accurate depiction of a human's vitamin D level. Aside from blood draws, vitamin D was also measured by consuming foods high in vitamin D or a tablet of 2,000 IU daily (Williams et al., 2016; Rouhi et al., 2018). Overall, it is difficult to set parameters on absorption as our main vitamin D resource comes from the sun. UVB, latitude of residency, season, ethnicity, and nutritional status are all confounding variables that would impact a participant's vitamin D level (Aghajafari et al., 2018). When reviewing studies investigating omega-3 fatty acids, aside from serum levels, exposure measurements were obtained through dietary journals. Participants were encouraged to meet a goal through consumption of food sources high in omega-3 fatty acids. This includes fish, nuts, seeds, and plant oils.

Screening tools and limitations. The purpose was to determine whether perinatal nutrition could prevent postpartum depression. The outcome was measured by using various reliable screening tools. The majority of studies utilized self-reporting screening tools, the most common one being the Edinburgh Postpartum Depression Scale. This is a 10-item scale used perinatally and postnatally to assess for postpartum depression symptoms such as anxiety, sadness, teariness, sleep disturbances, and appetite changes that are unrelated to pregnancy and childcare

(Robinson et al., 2014). Other screening tools used in the included studies are the Beck Depression Inventory and Bromley Postnatal Depression Questionnaire. Discrepancies in findings may exist based on the type of screening tool used to measure depressive symptoms and the cut-offs used to categorize severity. For example, Lin et al. (2019) defined postpartum depression with an EDPS score of greater than or equal to 10, Vaziri et al. required a score less than 13, and Robinson et al. (2014) required a score of 6 and above. Without uniformity of cut-off scores, the results within this review will be skewed. Women scoring lower may only experience mild mood disturbances that would not indicate a diagnosis for postpartum depression. Women scoring higher may experience a greater severity of symptoms that nutritional supplementation alone would be an ineffective form of therapy. Overall, the studies analyzed in this review were only able to identify individuals at risk for postpartum depression. Screening tools provide probable theories based on subjective information. The “gold standard” and only way to positively identify postpartum depression is through clinical diagnosis (Rouhi et al., 2018). Studies were unable to provide outcome measurements based on postpartum depression diagnosis due to time constraint, resource limitations, and the requirement of a licensed clinician (Sparling et al., 2017).

Limitations of included studies. The predominant limitation with each included study is the amount of nutritional supplementation. There is no proven guideline or FDA recommendation for how much DHA, EPA, or vitamin D pregnant women should consume for psychological health benefits. Therefore, the amount of nutritional supplementation within each study was an educated guess made by the principal researcher (Vaz et al., 2017). This impacts the overall research because these nutrients could potentially have an immense impact on women’s health perinatally and postnatally. However, current scientific studies could delay the

implementation of nutrition-based therapy into the clinical setting due to insufficient supplementation of these nutrients in their trials. Another methodological limitation that would produce discrepancies among the included studies is “late initiation of supplementation” or the placebo effect in randomized-control studies (Vaz et al., 2017). Late supplementation may result in an inadequate amount of time for vitamin D, DHA and EPA to work in the body. It is stated that vitamin D takes up to 3 to 4 months to produce therapeutic effects to battle against depression for the average adult (Unity Point Health, 2021). The placebo effect is a phenomenon that produces the therapeutic effect of a treatment but cannot be attributed to the placebo itself as it is made of an inactive substance (usually sugar). This psychological factor skews the results of the study by reason of a participant’s expectations of therapeutic effect instead of the physiological changes in the body. Lastly, throughout the studies there were variations in the time and season when researchers assessed vitamin D levels and depressive symptoms (Nielsen et al., 2013). There is less absorption of vitamin D during winter due to individuals staying indoors, heavy clothing, and shorter periods of sunlight. During winter in the United States, 5% of adults suffer every year from seasonal affective disorder (SAD) (American Psychiatric Association, 2020). This has been attributed to lower levels of vitamin D as seasonal depressive symptoms last only 40% of the year, alleviating after daylight savings time (American Psychiatric Association, 2020). If data was collected during the months of November – March, depending on location, there is a likelihood of confounding variables such as natural decrease of vitamin D and SAD without adequate compensation of increased vitamin D, DHA and EPA supplementation.

Limitations of this review. This review was restricted to the research articles available to the University of Arkansas. Conclusive articles pertaining to the subject are limited, as there is

more substantial evidence regarding the treatment of postpartum depression through vitamin D, DHA and EPA rather than prevention.

Gaps and controversies. As previously discussed, only a few articles listed how much supplementation they used. In addition, measuring the amount of vitamin D absorbed is difficult because the sun is the primary means of vitamin D production in the body. For vitamin D, EPA and DHA, there are only theories regarding how much is therapeutic for pregnant women to consume for protective effects against postpartum depression. Rouhi et al. (2018) supplemented 2,000 IU of vitamin D, as that amount is safe to consume to produce an effect, as seen in blood levels. However, according to National Institutes of Health, only 600 IU is required for pregnant and breastfeeding women. This illustrates the controversy researchers face in attempts to make definitive recommendations of nutrient consumption. In regard to higher supplementation levels, many authors did not address consequences of too much supplementation. Vitamin D aids in absorption of calcium; because of this direct relationship, vitamin D toxicity causes symptoms of hypercalcemia including nausea, vomiting, weakness, frequent urination, bone pain, and nephroliths (Zeratsky, 2020). For omega-3 fatty acids, although this nutrient is an essential part of a well-balanced diet, excessive intake can take a toll on the immune and cardiovascular systems. There is research that suggests excessive levels of omega-3 fatty acids can result in decreased immune function (Oregon State University, 2013). In addition, high blood sugar and increased risk for bleeding has been linked to immoderate intake of fish oil (Fray & Rollins, 2014). When conducting research about the importance of nutrient consumption, it is equally important to provide education on moderation. Excessive intake of either nutrient investigated in this review poses a risk to mother and child.

Bias assessment. This review is subject to biased reporting based on inclusion of articles that fit my PICOT question. Any articles that provided a general evaluation of the topic were included. Exclusion was not based on specificity towards the study's exclusive purpose. A few of the included articles investigated other nutrients that aid in antidepressant effects, in addition to the nutrients under investigation in this review. For example, Urech et al. (2020) investigated omega-6 fatty acids in addition to omega-3 fatty acids. Moreover, the included articles also expanded their research to account for other mood disorders. For example, Williams et al. (2016) measured maternal anxiety as well as maternal depression. For the sake of coherent reporting, only data pertaining to depression, as assessed by screening tools specified to measure postpartum depression, were extracted from the articles.

Implications for nursing. There is an increasing population of patients that are seeking low intervention, holistic forms of therapy. It is the job of medical providers to remain educated on pharmacological and nonpharmacological interventions that are safe to the public and evidence-based. Supplemental nutrition is a noninvasive, simple way to combat the global health issue of postpartum depression. Nurses should prioritize health promotion and patient education about these nutrients and their associative antidepressant effects. This research has the potential to impact clinical care for pregnant and postpartum women and relieve them of the emotional burden of postpartum depression.

Conclusion

Postpartum depression is a major public health issue that not only impacts thousands of women each year, but the families that rely on them. More and more research is being conducted in order to find ways to support these women, and the best way to treat postpartum depression is to prevent its onset. Based on the data analyzed in this literature review, nutritional

supplementation of omega-3 fatty acids and vitamin D in the perinatal period is a promising therapy for combatting postpartum depression and other mental health disorders. Although many studies found a positive association, more extensive longitudinal research needs to be conducted to build a stronger case for implementing omega-3 fatty acids and vitamin D as a front-line resource in the primary prevention of postpartum depression in the clinical setting.

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