

Exploring Placentophagy in Humans: Problems and Recommendations

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Marisa E. Marraccini, PhD, Kathleen S. Gorman, PhD

Placentophagy, the practice of afterbirth ingestion among humans, has grown among middle-class, white women in Western societies. Although the reasons for placentophagy are varied, it is generally promoted as a means to help postpartum women stabilize mood, enhance recovery, and increase milk production. Virtually no studies have explored the effects of placentophagy on humans, and several researchers have called for studies examining the effects of human placentophagy. However, prior to examining the effects of placentophagy, a number of methodological issues need to be addressed. The present review explores research examining the effects of placentophagy in animals and humans and presents the theoretical assumptions behind placentophagy and its effects. Methodological issues related to placentophagy research are clarified, and existing research related to the nutritional and hormonal components of the placenta and their effects on milk production and postpartum depression are reviewed. Finally, implications and recommendations for future research are discussed.

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INTRODUCTION

Although placentophagy, or placentophagia, generally refers to the practice of afterbirth ingestion,¹ definitions have varied across studies of animals, ethnographic research of humans, and by proponents of human placentophagy.^{1–6} Based on the existing definitions displayed in Table 1, *placentophagy* is viewed herein as relating to placenta consumption by humans and *placentophagia* as relating to afterbirth (eg, placenta and amniotic fluid) consumption by animals.

Placentophagia is nearly ubiquitous among placental mammals.^{6,7} Although ethnographic reviews have revealed the absence of placentophagy among humans historically,^{2,6} during the past 2 decades the practice of placentophagy has grown among middle-class, white women in Western societies.^{3,8,9} The resurgence of placentophagy during the past decade is likely related to the availability of different placenta-encapsulation methods⁹ that make placentophagy more palatable. Indeed, the large number of people undergoing placenta encapsulation training, which involves 5 course modules completed online over 5 weeks,¹⁰ indicates the increased demand for these certified placenta specialists.⁹ A recent survey of women's placentophagy experiences suggests that the primary reasons that women reported having their placenta encapsulated were for mood stability, balancing of nutrients, milk production, and overall recovery, as well as because of recommendations from a placentophagy supporter.⁹ Additionally, more than a quarter of men and women surveyed on attitudes toward placentophagy reported that they would be willing to consume a placenta if it proffered health benefits.⁸

Research conducted with animals, however, points to several physiologic and behavioral benefits of placentophagia unrelated to mood stabilization or lactation. These effects include the facilitation of maternal and pup contact, as well as maternal behaviors and the enhancement of an opioid-mediated reduction in pain sensitivity (antinociception) in rats.¹ Yet, advocates for human placentophagy have argued that placentae are ideal for consumption by both humans and animals to help replenish and balance fats, proteins, iron, hormones, and other nutrients from childbirth.^{11,12} Whereas virtually no studies have examined the effects of placentophagy in humans, proponents of placentophagy have argued that the nutrients and hormones ingested from the placenta after childbirth may increase energy, decrease postnatal bleeding, increase milk production, facilitate shrinking of the uterus, and stabilize postpartum mood after childbirth in mothers.^{4,5}

Given the growing interest in placentophagy, several researchers^{6,9,13} have called for studies examining the effects of human placentophagy. Indeed, data collection is currently underway for a placebo-controlled study assessing the effects of placentophagy for postpartum recovery and health,¹⁴ which may help elucidate any positive or negative effects of placentophagy. Yet, a number of methodological issues related to the study of placentophagy among humans need to be addressed. Kristal et al¹ cautioned researchers of the future on the potential problems of studying placentophagy in humans, including the difficulty in controlling for the placebo effect, measuring effects of ingestion, and specifying consistent preparation of the afterbirth. In order to study placentophagy in humans, research would need to clarify the nutrition content of the placenta, carefully operationalize mediators between ingestion and outcomes such as postpartum depression and lactation, establish a model regarding the placenta and amniotic fluid as it relates to these mediators, and demonstrate a relationship between afterbirth ingestion

Address correspondence to Marisa E. Marraccini, MA, Psychology Department, University of Rhode Island, Chafee Hall, 142 Flagg Road, Kingston, RI 02881. E-mail: mmarraccini@my.uri.edu



Quick Points

- ◆ During the past 2 decades, the practice of placentophagy (ie, after birth ingestion among humans) has grown among middle-class, white women in Western societies.
- ◆ The primary reasons women have reported for ingesting their placentae include mood stability, balancing of nutrients, milk production, overall recovery, and recommendations by midwives and doulas.
- ◆ Research conducted with animals points to several physiologic and behavioral benefits of placentophagy completely unrelated to mood stabilization or lactation.
- ◆ Any effects from placentophagy on humans will be influenced by the preparation, timing of administration, and dose of the placenta.
- ◆ At present, there are no empirical data to support that placentophagy results in positive or negative effects.
- ◆ Patients considering placentophagy should be encouraged to consider potential side effects and the cost of placenta encapsulation prior to engaging in placentophagy.

and the mechanisms that mediate its effect on postpartum depression and lactation.¹

The present article outlines some of these issues, and reports on the existing literature related to placentophagy. First, research examining the effects of placentophagy in animals and humans, as well as the theoretical assumptions behind placentophagy and its effects, are discussed. Additionally, because methodological issues figure prominently in the current research, the article clarifies issues related to placenta preparation, timing and dosage, and participant selection. Next, we examine existing research related to the nutritional components of the placenta and the impact of the various hormones and nutrients on mood and milk production. The article concludes with clinical implications and recommendations for future research.

METHODS

A search-and-retrieval process using key words presented in Table 2 was conducted via the bibliographic databases PsycINFO and MEDLINE. Although we identified literature published at any time, for the sake of brevity only the most relevant citations were included in this review. In the case of high numbers of relevant citations, research published in the past 10 years was selected.

PLACENTOPHAGY BACKGROUND

Placentophagia Among Animals

Nearly all mammals engage in placentophagia,^{6,7} and there is consistent evidence that placentophagia is related to particular behavioral and physiologic outcomes in animals. As can be seen in Table 3, placentophagia has been linked to: 1) facilitation of maternal-foster pup contact and maternal behaviors in virgin, nonpregnant (nulligravida) adult rats housed with foster pups compared to nulligravida adult rats and foster pups without afterbirth on their skin,^{1,15-17} and 2) enhanced opioid-mediated neurochemical pain thresholds through ingestion of placental opioid-enhancing factor (POEF),

the active substances of placentae and amniotic fluid.¹⁶⁻¹⁹ Preliminary research also points to several other possible effects of placentophagia in rats, including the restoration of normative gut activity and the blocking of pseudopregnancy (ie, false pregnancy).^{18,20}

Although Melo and González-Mariscal described the evidence for lactation benefits from placentophagia to be “scanty and patchy,” they suggested that lactation should be explored as a potential outcome of placentophagia in animals.¹⁵ In particular, the researchers cited 2 studies. One demonstrated rats that ingested their placentae, compared to rats that did not, showed increased levels of prolactin in serum and lower levels of progesterone.²¹ The other found that rabbits removed from their pups and placentae demonstrated lower milk supplies than rabbits remaining with their placentae and pups.²² The latter finding may also stem from the reduction in nipple stimulation.

Finally, preliminary research also suggests that POEF may exist across species, given that human, dolphin, and bovine amniotic fluid ingestion has yielded enhancement of opioid antinociception (ie, reduced pain sensitivity) in rats.^{1,18} However, others concluded that the prolactin and progesterone effects from placenta ingestion in rats may be species-specific because human placenta ingestion in rats did not yield hormonal effects.²¹ Indeed, although the morphology and cell types across mammalian species’ placentae are generally comparable, placental hormones and their functions vary across species.²³ Furthermore, the timing of lactation differs across species (eg, milk production is stimulated immediately following the birth of the placenta in rats but delayed by 30-40 hours in humans). Therefore, readers are cautioned against generalizing placentophagia findings from animals to humans.

Placentophagy Among Humans

Whereas there are several research studies examining perceptions of placentophagy,^{8,9} virtually no studies have explored the effects of placentophagy on humans. To date, the only

Table 1. Definitions of Placentophagy or Placentophagia

Term	Population	Source Type	Definition
Placentophagia	Animals	Animal research	Ingestion of afterbirth, which may include placenta, umbilicus, amniotic and chorionic membranes, and fluid ^{1,4}
Placentophagy	Humans	Opinion/commentary	Ingestion of placenta ^{5,11,12}
Placenta consumption	Humans	Ethnographic research	“The ingestion of a human placenta postpartum, at any time, by any person, either in unaltered, or altered (eg. cooked, dried, steeped in liquid) form.” ³

Table 2. Key Terms Used in Search and Retrieval Process

Topic	Key Terms
Placentophagy/placentophagia background, methodological issues, preliminary placentophagy research	Placentophagy, placentophagia, placenta consumption
Placental hormones and nutrients effects on mood and milk production	B vitamins, iron, placental corticotropin-releasing hormone or human placental lactogen and lactation, mood or postpartum depression

research study that examined the effects of human placentophagy was conducted in 1954. It reported that women who ingested nebulized placentae demonstrated increased milk production.²⁴ Unfortunately, the methodological limitations related to the study (eg, there was no control group, and timing and measurements of milk production were vague) preclude drawing any conclusions.

Perceptions of Placentophagy Effects

Despite a lack of empirical data on the effects of placentophagy in humans, a recent study examined a convenience sample of women's beliefs about their experiences of ingesting placentae and found that women perceived mostly positive outcomes.⁹ A total of 189 women completed the online questionnaire. Participants were predominantly white, married, middle class, and college educated, and likely to participate in home births. Data were analyzed quantitatively and qualitatively, and common themes related to both positive and negative perceptions of placenta consumption effects were reported. The most commonly perceived positive effects included improvements in mood, energy, lactation, and bleeding. The majority of women (69%) reported experiencing no negative effects from placentophagy; however, reported negative effects included an unpleasant taste/smell and headaches, as well as responses categorized as “other” (eg, increased uterine cramping, hot flashes, heartburn). It is important to note that this study was not a clinical trial allowing for comparison between baseline or control groups, and it did not take into account self-selection bias among the participants (ie, a predisposition to expect positive

outcomes). Therefore, findings do not provide insight on placentophagy effects beyond participant perceptions.

Rationale for Proposed Relationship

Conclusions drawn from placentophagia research on animals relate to maternal contact and pain thresholds, but proponents of placentophagy in humans focus mainly on its potential effects on postpartum recovery, mood instability, and milk production. One possibility regarding why placentophagy theories do not line up with placentophagia in animals is because they were developed before the outcomes of animal placentophagy were well understood. For example, Soyková-Pachnerová et al²⁴ proposed in 1954 that placentophagy may relate to postpartum recovery and increased milk production based on their theories of animal placentophagy. Unsatisfied with the typical hypotheses for animal placentophagy (eg, cleanliness, hiding the birth), the researchers concluded that placentophagy must have a generative process. Additionally, because animals rarely have milk production problems, placentophagy might explain their healthy lactation. Indeed, theories underlying modern placentophagy in humans relate to these proposed and undocumented hypotheses in animal research: animals engage in placentophagy to replenish nutrients and hormones lost in childbirth.¹

Modern proponents of human placentophagy also draw from traditional Chinese medicine (TCM) to justify the ingestion of placentae to boost milk production and stabilize mood. TCM has used dried encapsulated placenta to treat insufficient milk supplies,¹¹ as well as night sweats, malnutrition, and chronic depression.⁷ As a result, some proponents of

Table 3. Research Exploring Placentophagia Among Animals			
Outcomes	Description	Procedures	Research Findings
Facilitation of maternal–pup contact and maternal behaviors	Presence of amniotic fluids from placentae have been shown to facilitate maternal behaviors across several mammal species, ¹³ including dogs, sheep, primates, and rabbits.	Research studies typically use concaveation procedures, which are sensitization procedures that cohoused virgin, nonpregnant females with foster pups and lead to the development of maternal care-taking behaviors. ¹	Afterbirth on a pup's skin was shown to incite licking from virgin, nonpregnant adult rat, reducing latency of onset of adult rat's maternal behaviors. ¹ Ingestion of placentae and amniotic fluid were found to enhance opioid effects (eg, morphine injections), facilitating onset of maternal behaviors among virgin, nonpregnant rats. ^{1,14,15}
Enhancement of opioid-mediated reduced pain sensitivity	Afterbirth ingestion enhances opioid-mediated (eg, morphine injections) antinociception (ie, reduced pain sensitivity) in rats. ^{14,16–17}	These studies have typically assessed effects of ingesting placentae, amniotic fluid, and/or POEF (active component of afterbirth tissue) compared to placebo, on morphine-mediated pain relief, measured by tail-flicking in rats. ¹⁶	Although findings have consistently revealed that ingestion of these substances alone, without morphine or other forms of analgesia, does not result in pain threshold alterations, afterbirth ingestion does appear to enhance pain-tolerance effects of opioids. ^{1,16} Effects of POEF may enhance or attenuate antinociception, varying across opioid receptor systems, which may allow for facilitation of enhanced pain relief while allowing for intact maternal care. ¹⁷

Abbreviation: POEF, placental opioid-enhancing factor.

placentophagy cite TCM as evidence for the placenta's nourishing properties.²⁵

Finally, placentophagy supporters point to the shift in hormones associated with the placenta in prenatal and postpartum women as a reason that placentophagy may be beneficial. The underlying theory is that the sudden loss of the placenta is associated with a dramatic shift in hormone production in the body, and the best way to remedy this change is by ingesting that which was lost: the placenta. Therefore, it is believed that the unique properties of each woman's placenta are tailored to each woman's nutritional needs and thus facilitate recovery and stabilize mood.²⁵

METHODOLOGICAL ISSUES FOR THE STUDY OF PLACENTOPHAGY AMONG HUMANS

In order to establish an association between placenta nutrients and behavioral outcomes, characteristics of the nutrients need to be defined. For example, in rats there are specific parameters (eg, dose, temperature for storing, temperature for

heating) that are necessary for optimal effects of placentophagia.¹ Thus, this section explores the influence of placenta preparation, including the recommended dose, on placenta nutrients and placentophagy effects. These variables need to be accounted for within a double-blind, randomized clinical trial (RCT) in order to assess a causal relation between placentophagy and behavioral effects.

The nutrient content of the placenta and any nutritional effects from placentophagy will be greatly influenced by placenta preparation, including dose and timing of administration. Although the most popular process for preparing placentae for ingestion involves steaming, slicing, dehydrating, and encapsulating the placenta into pill form,⁹ placentae may also be eaten raw immediately after its delivery (eg, sliced up or blended in a smoothie) or cooked and eaten as a meal.⁴ The process of placenta encapsulation takes a minimum of 2 days, with placenta capsules available 2 to 3 days postpartum. Because placentae vary in size, the number of capsules available to postpartum mothers varies accordingly. Based on TCM, placenta specialists recommend a general dose of

2 550-mg “00” capsules up to 3 times daily.²⁶ Once placenta pills are packaged, they may be stored in the refrigerator for months or in the freezer indefinitely, but they are described to be most potent the first 2 weeks postpartum.

Although the rationale regarding the positive effects of placentophagy is partly based on animal models, the most common ways of consuming placenta are not comparable to those of other species. These differences add to the limitations of generalizing from animal research to humans. Furthermore, research examining the nutritional properties of the placenta and the impact of preparation methods on these properties is needed given that the effects will vary accordingly. Additional considerations include the potentially negative effect of delayed cord clamping and smoking during pregnancy²⁶ on the nutritional properties of the placenta.

A final methodological difficulty relates to self-selection bias; participants recruited for a study examining placentophagy are likely to believe in its effects. Any assessment of placentophagy effects will require a double-blind RCT, with careful monitoring and descriptions of the preparation, method and timing of consumption, and dose administered.

EXAMINATION OF THE EVIDENCE FOR EFFECTS OF PLACENTOPHAGY ON HUMAN BEHAVIOR

Although the benefits are largely theoretical, proponents of placentophagy in humans cite research examining the impact of nutrients believed to be found in the placenta on mood and milk production in postpartum women. Web sites and articles promoting placenta encapsulation explain that the placenta contains vitamins, hormones, and minerals that women are lacking postpartum,¹³ such as vitamin B₆, placental corticotropin-releasing hormone (pCRH), and iron.^{4,11,13,27} These vitamins and hormones are believed to stabilize mood.¹³ Additionally, it has been argued that hormones in the placenta related to milk production, such as human placental lactogen (hPL) hormone and prolactin, may help stimulate milk production when ingested after birth.^{11,28,29} Although proponents cite a number of other nutrients and hormones in the placenta that may play a role in recovery from birth, an exhaustive review of all of these nutrients is beyond the scope of the present article. Therefore, the following section describes what is actually known about the specific properties of the placenta and then examines the evidence for particular nutrients in relation to mood (depression) and lactation, specifically B vitamins, iron, pCRH, hPL, and prolactin.

Placenta Properties

Very little is known about the nutritional properties of the human placenta,³ precluding conclusions regarding the linkage of its properties to human behavior. However, research has demonstrated myriad nutrients and hormones that cross the placenta during pregnancy,¹³ including B vitamins,³⁰ iron,³¹ pCRH,^{32,33} hPL,³⁴ and prolactin.³⁵

Research involving animals has found that nutrients transported via the placenta during pregnancy may be retained after its delivery.^{3,16,19,21} One study³⁴ has examined the nutritional properties (ie, protein, fiber, fat, moisture, minerals, hormones) of human placentae that have been

heat-dried and puréed into a powder. Findings indicate that human placenta contain varying levels of minerals (sodium, potassium, phosphorus, calcium, iron, zinc, copper, and manganese), hormones (estradiol, progesterone, and testosterone, as well as growth hormone within female births only), and a variety of amino acids.²⁴ Note that the researchers did not assess potential vitamins in placenta. Although overall mineral levels found in the placenta were relatively low, the levels of iron found within the placenta approached the recommended daily allowance of 18 mg for women and 9 mg for lactating women.³⁶ Specifically, an average of 1010 parts per million of iron were found within 30 placentae, which equates to approximately 0.67 mg of iron in an 1100-mg pill (allowing for up to 4.02 mg iron/day based on the recommended dose).

Hormone and Nutrient Effects on Postpartum Depression

Placentophagy has been promoted for mood instability, which may include baby blues, depressive symptoms, and postpartum depression (PPD). There is a large body of literature examining nutrients in relation to PPD specifically; and among the properties within the placenta, pCRH, B vitamins, and iron have been suggested as contributing factors to PPD.¹³

Placental Corticotropin-Releasing Hormone

Found in placental extracts,³² pCRH is considered an important modulator of pregnancy and labor-related activities such as the stimulation of labor; transporting glucose to the fetus and placenta; and regulating the psychological mood of the mother,³⁷ including stress reduction and regulation.¹³ Placentophagy supporters have suggested that pCRH may help prevent PPD because of suggested associations between hormone deficiencies and PPD.¹³ Specifically, researchers have argued that pCRH secretion is suppressed postpartum, which could explain the vulnerability that postpartum women have to mood problems.^{33,38}

Most research examining pCRH levels and PPD, however, has consistently reported no relationship between pCRH levels and PPD.^{39,40} Only one study⁴¹ reported that high levels of pCRH during midpregnancy were shown to predict PPD, but the sample size was relatively small (N = 100). Other studies examining pCRH levels at midpregnancy have reported no association between high pCRH levels and PPD,^{39,40} although one study⁴⁰ did report a relationship between high levels of pCRH at midpregnancy and prenatal depression. Based on the existing research, there appears to be little to no evidence for associations of pCRH levels and PPD.

B Vitamins

Specific B vitamin binding sites have been demonstrated within human placenta.³⁰ Deficiencies in both folate (one of the 8 B vitamins) and B₁₂ have been linked to mood in general.^{42,43} Although one study suggested that women suffering from PPD had lower levels of folate,⁴⁴ most research has failed to uncover a relationship between B vitamins and PPD. Research examining the effects of vitamin B intake (including folate, B₆, and B₁₂) before and during pregnancy did

not reveal an association with PPD,⁴⁵ and research comparing women with and without PPD found no differences in vitamin B₆ status.⁴⁶ Similarly, another study reported no association between folate, B₆, or B₁₂ levels and PPD status, but did find a relationship between B₂ supplementation in the third trimester and a reduced risk for PPD.⁴⁷ Finally, a recent review including 2 studies reported no link between vitamin B status and PPD.⁴⁸ Similar to pCRH, the extant research does not suggest a link between B vitamins and PPD.

Iron

During pregnancy, iron is transported across the placenta to the fetus, often depleting the mother's iron stores.³¹ Iron deficiencies are among the most common of nutritional issues within pregnant women⁴⁹; they have been demonstrated to relate to mood,⁴³ possibly leading to fatigue, irritability, apathy, and difficulty with concentration.^{42,50} Preliminary research also suggests that poor iron levels worsen the relationship between mood problems and problematic parenting.⁵¹

Researchers have concluded that PPD not only might relate to iron deficiency anemia, but also might respond to iron therapy.⁵² Specifically, a significant association between PPD and iron has been demonstrated, and iron treatment has been shown to significantly improve depression scores.⁵² Further, lower levels of hemoglobin have been shown to associate with higher scores of depressive symptomatology, indicating that women with anemia postpartum may be at an increased risk for PDD.⁵³ Finally, a prospective study concluded that iron deficiencies may play a role in the cause of PPD.⁴⁹

Two studies reported no relationship between iron status and PPD.^{54,55} Low levels of hemoglobin were demonstrated to be associated with other postpartum symptoms such as reduced energy and faintness/dizziness, but no associations were demonstrated between hemoglobin levels and PPD in one study.^{54,55} According to a second study, there was no relationship between iron status and PPD at 6 weeks postpartum, and women with and without PPD were shown to have comparable levels of iron.⁵⁵ The researchers hypothesized that their conflicting findings may relate to the homogeneity of their sample compared to the relative heterogeneity of other samples.^{54,55} In sum, research studies exploring the link between iron status and PPD have yielded mixed findings; further exploration into why results vary is needed before a link between iron and PPD may be concluded.

Summary of Hormone and Nutrient Effects on Postpartum Depression

There is a dearth of high-quality research assessing the effects of these hormones and nutrients on PPD⁵⁶; at present, evidence is mixed for associations between pCRH, B vitamins, iron, and PPD. Furthermore, the levels and bioavailability via ingestion of these hormones and nutrients within the human placenta remain unknown.

Hormone Effects on Lactation

Proponents of placentophagy have argued that hormones found in the placenta, including hPL and prolactin, may facilitate increased milk production.^{11,30,31} Therefore, the following

section addresses what is known about these hormones in relation to milk production.

Human Placental Lactogen

Pituitary hormone hPL is primarily responsible for fetal growth, metabolism, and lactation stimulation.⁵⁷ In vitro placentae have been shown to secrete hPL,³⁴ and increases in hPL have been demonstrated in animals during the end of pregnancy.⁵⁸ Although research has demonstrated that hPL injections in animals have resulted in increased milk production and synthesis, its effects on humans are less well understood.⁵⁷ One study explored hPL plasma levels (collected by finger prick) in a sample of 8 lactating women; hPL levels were related to change in breast size and the cross-sectional area of the areola but not to lactation production.⁵⁹

Prolactin

It is well established that human placentae produce prolactin,⁶⁰ a peptide hormone that is synthesized and secreted in the anterior pituitary gland and regulated by hypothalamic-releasing hormones.^{61,62} Initially named after its role in stimulating lactation in animals, prolactin is now understood to play a myriad of roles in addition to lactation, including reproduction and homeostasis.⁶¹ One study reported a significant relation between lactation production and prolactin among a small sample of women.⁵⁹ However, a second study reported that, although concentration of prolactin in milk related to breast fullness in a sample of 11 women, prolactin in plasma demonstrated no relationship with milk synthesis.⁶³ It will be important to uncover the effects of consuming prolactin in humans as a supplemental hormone as opposed to the effects of naturally occurring prolactin that have been documented.

Summary of Hormone Effects on Lactation

Although naturally occurring hPL and prolactin are implicated as facilitators of milk production in animals and humans, the effects as supplements for human lactation have not been explored. Further research is needed in order to clarify these hormones' effects as supplements and shed light on the levels, if any, found in birthed placentae.

DISCUSSION

Future Research

At least 4 issues should be resolved to support RCTs examining the effects of encapsulated dried placenta on mood issues and milk production in postpartum mothers. These issues also create important implications for clinicians working with patients interested in placentophagy. First, the exact properties of the human placenta after birth must be identified—as well as the impact that cooking, drying, and storing has on the nutritional properties. In particular, any properties of the placenta that might have negative effects need to be explored and ruled out before research can be conducted on placentophagy in humans.

Before examining the associations of these properties, further justification for why placentae may be more beneficial than the isolated nutrients and hormones on mood and lactation needs to be established. Because the main reasoning behind placentophagy is that each placenta is unique and matched to each mother, the second issue involves research exploring the properties of placentae in relation to the nutrient levels of mothers. Theoretically, a nutrient supplement would be beneficial to women who may have a nutrient deficiency. An identification of an inverse relationship between maternal nutrient status and placentae properties could provide justification for future examination. Further, research studies examining the effects of placentophagy on humans should extend beyond its theoretical effects and also address outcomes documented among other mammals (eg, facilitation of maternal behaviors and enhancement of pain tolerance).

Third, the links relating to placentae nutrients and hormones and outcome variables must be explicitly examined. To date, there is no evidence to support associations between PPD and high levels of B vitamins and pCRH. Research exploring associations between iron and PPD has yielded mixed results, and further research should address the variability in study findings. If further evidence supports associations between hPL and prolactin and milk production, RCTs assessing these hormonal supplements on lactation should be conducted. It is well recognized that nutrients work alongside many other factors and cannot be attributed to treatments without taking into account how they transact with other nutrients and processes.⁴³ Studies related to nutrition in general and placentophagy specifically will need to move beyond demonstrating associations to understanding the role that vitamins play and how they transact with other processes. Therefore, although some types of supplementation hold promise as a prevention and intervention method, patients who are seriously concerned about their risk for mood or lactation difficulties postpartum should be referred to mental health and lactation specialists.

As presented previously, the fourth issue relates to the standardization of participant selection, placentae preparation, administration timing, and dose. However, many other issues will plague research related to placentophagy. First, assessing changes in both milk production and PPD/mood instability will require careful data collection and monitoring, and studies examining the effects of placentophagy on lactation must take into consideration a number of confounding variables. For example, mothers will differ in the length of nursing that they engage in with their infant, which will influence the amount of milk produced. Therefore, it will be important for studies assessing the effects of placentophagy on milk production to take into account the time pumping begins and ends, whether one or 2 breasts are pumped, and any nursing outside of pumping.

Assessing mood instability will also require careful considerations. In order to generate diagnostic criteria for PPD, scales measuring mood instability should be used in combination with a standard observer-rated depression symptoms scale with a diagnostic scheme such as the *Diagnostic and Statistical Manual of Mental Disorders-V*.⁵⁶ It is also critical that studies assessing PPD take into account the timing and length of the symptoms to differentiate between PPD and baby

blues, which appear to be a normal phenomenon affecting the majority (70%) of postpartum mothers.⁶⁴ Furthermore, a variety of cutoff scores for PPD has been suggested in the literature, but RCTs evaluating the effects of interventions on PPD should report data that clearly identify PPD as a dichotomous variable.⁵⁶ Finally, future research will need to account for a number of other known factors influencing PPD, including history of depression, history of PPD, prenatal depression, life stressors and lack of social support, marital dissatisfaction, personal vulnerability, substance abuse, family violence, and poverty.^{43,65,66}

One important area of inquiry, addressed by Kristal et al¹ is why humans do not engage in placentophagy (as opposed to exploring why humans should engage in placentophagy). Kristal et al offered a number of hypotheses, including that humans may need to experience more pain to gain social assistance in the birthing process; the effects may be related to amniotic fluid, and humans would have naturally swallowed some fluid after birth when kissing and embracing the infant; or that the placenta and amniotic fluid are harmful to humans. Further ethnographic research exploring why humans have not engaged in placentophagy (eg, modern medicine, sanitation) could shed light on the potential impact of placentophagy more generally.

Although examples of RCTs to examine the effects of vitamins, hormones, and nutrients on PPD and lactation are important to consider in the understanding of placenta ingestion on these outcomes, one aspect unique to the placentophagy debate is that placentae are believed to benefit mothers because of their individualized properties relating to and targeting each mother's particular needs. The goal of most RCTs assessing drug impacts, however, typically involves the development of a universal drug, for which properties are clearly specified for the treatment of all or most people. In order to account for the unique properties of each placenta and nutritional needs of each mother, an RCT would need to critically analyze both. Such a study will be costly and complex but important to address the basic theory underlying placentophagy. It is necessary to first uncover the exact nutritional components of the placenta and uncover which, if any, have the potential to prevent or treat mood disorders and milk production problems, among the other claimed benefits.

Implications for Clinicians

While the number of women seeking placenta encapsulation grows, so will the number of women seeking advice and expertise from clinicians. Indeed, many women have reported that they chose to have their placentae encapsulated because it was recommended by a midwife or doula.⁹ Therefore, clinicians need to be prepared to counsel women interested in placentophagy. Although patients considering placentophagy should be made aware that there is no empirical support for the effects of placentophagy among humans, there are a number of other issues that clinicians may discuss with patients. Because there have been no clinical trials examining the effects of placentophagy, potential side effects remain unknown. Further, specific contraindications for placentophagy may exist, and both practitioners and researchers should consider the potential negative effects of issues such as meconium

stained placenta, chorioamnionitis, delayed cord clamping, and smoking. Another important question for patients relates to their motivation for placenta consumption. Patients should be made aware of any available research-based interventions that are relevant. For example, patients concerned about serious mood problems may be encouraged to consult with a mental health specialist. Additionally, given the low levels of minerals and unknown levels of vitamins found in heat-dried placentae, patients seeking additional nutrients for postpartum recovery should consider a daily multivitamin as an alternative or supplement to placentophagy. Finally, patients should also consider the cost of placenta encapsulation, which may cost between \$200 and \$300, prior to hiring a placenta specialist.

CONCLUSION

Placentophagy, common among mammals, is a growing trend in Western societies among middle-class, white, married women. Although research involving animals has consistently demonstrated placentophagy to have opioid-mediated analgesic effects and positive influences on maternal behaviors, advocates of placentophagy for humans describe its benefits to include improved and stabilized mood, increased lactation, and faster recovery. This belief is based on the theory that women who consume their own placenta will replenish the important nutrients and hormones they are lacking postpartum and that these nutrients and hormones are important for recovery. At present, however, there is no empirical support for this claim. Before research is conducted to explore the effects of placentophagy among humans, a better understanding of the properties of the human placenta, the effects of encapsulation on placentae, and the potential benefits—as well as any harmful side effects—of the hormones and nutrients found in the placenta on mood and lactation need to be established. In the meantime, clinicians may be called on to advise their patients about placentophagy and should encourage them to consider any potential negative side effects and supplemental or alternative research-based treatments.

AUTHORS

Marisa E. Marraccini, MA, is a doctoral candidate in the school psychology program at the University of Rhode Island.

Kathleen S. Gorman, PhD, is the director of the Feinstein Center for a Hunger Free America and a professor of psychology at the University of Rhode Island.

CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

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