Placenta 67 (2018) 8–14

Contents lists available at ScienceDirect

Placenta

journal homepage: www.elsevier.com/locate/placenta

Human placentophagy: Effects of dehydration and steaming on hormones, metals and bacteria in placental tissue

Sophia K. Johnson[a], Tanja Groten[a], Jana Pastuschek[a], Jürgen Rödel[b], Ulrike Sammer[c], Udo R. Markert[a,*]

[a] Placenta-Lab, Department of Obstetrics, Jena University Hospital, Am Klinikum 1, 07747 Jena, Germany
[b] Institute of Medical Microbiology, Jena University Hospital, Am Klinikum 1, 07747 Jena, Germany
[c] Food GmbH Jena Analytik & Consulting, Orlaweg 2, 07743 Jena, Germany

A B S T R A C T

Introduction: Human maternal placentophagy, the behavior of ingesting the own raw or processed placenta postpartum, is a growing trend by women of western societies. This study aims to identify the impact of dehydration and steaming on hormone and trace element concentration as well as microbial contamination of placental tissue.

Methods: A total of nine placentas have been processed: six were studied for hormone and trace element concentrations; eight were studied for microbial contamination.

The concentrations of CRH, hPL, oxytocin and ACTH in samples of raw, steamed dehydrated and raw dehydrated placental tissue were detected using ELISA. A yeast bioassay was performed in order to detect estrogen equivalent (EEQ) and gestagen equivalent (PEQ) active substances. Elements (As, Cd, Fe, Pb, Se, Hg) were analyzed using ICP-MS. Isolated colonies from tissue and placenta swab samples were identified using Vitek MS.

Results: Following mean hormone concentrations were detected in raw placental tissue:

CRH (177.88 ng/g), hPL (17.99 mg/g), oxytocin (85.10 pg/g), ACTH (2.07 ng/g), estrogen equivalent active substances (46.95 ng/g) and gestagen equivalent active substances (2.12 µg/g). All hormones were sensitive to processing with a significant concentration reduction through steaming and dehydration.

Microorganisms mainly from the vaginal flora were detected on placenta swab samples and samples from raw, steamed, dehydrated and steamed dehydrated tissue and mostly disappeared after dehydration. According to regulations of the European Union the concentrations of potentially toxic elements (As, Cd, Hg, Pb) were below the toxicity threshold for foodstuffs.

Conclusion: The commonly used protocols for preparation of placenta for its individual oral ingestion reduce hormone concentrations and bacterial contamination.

1. Introduction

A growing trend of women in Western societies consuming their own placenta after delivery, referred to as human maternal placentophagy, has developed during the last decades [1]. Purported benefits such as enhanced lactation, improved mood in puerperium, accelerated recovery after birth and the subjective feeling of having more energy are claimed from placentophagy supporters [2,3].

A common method of ingesting placenta today is through encapsulation of dehydrated, pulverized placental tissue [3]. This encapsulation method originates from traditional practices and resembles the most practical procedure of remedy preparation in a home-based environment.

Placental tissue at term shows intensive endocrine activity [4–7]. Human placental lactogen (hPL) has a potent lactogenic effect and is produced by placental tissue with an extremely high secretion rate of about 1–3 g per day at the end of pregnancy [7]. Oxytocin (OT) initiates and sustains milk ejection in response to suckling during lactation [8], reduces postpartum bleeding through myometrial contraction [9] and is a key mediator of complex emotional and social behavior such as pair bond formation and maternal behavior [10,11]. Oxytocin is produced by several organs including the placenta [12] and its gene expression can be found in in the decidua, the amnion and the chorion [6,13]. Ambiguous data exists on the role of placental corticotropin-releasing

* Corresponding author. .
E-mail address: markert@med.uni-jena.de (U.R. Markert).
URL: http://www.placenta-labor.de (U.R. Markert).

https://doi.org/10.1016/j.placenta.2018.05.006
Received 10 November 2017; Received in revised form 9 May 2018; Accepted 11 May 2018
0143-4004/ © 2018 Published by Elsevier Ltd.

hormone (pCRH) in the prediction and treatment of postpartum depression (PPD) [14,15]. During pregnancy, exponentially increased pCRH reaches levels similar to those of CRH in the hypothalamus during conditions of acute stress [16]. These high hormone levels fall immediately after placental expulsion. It has been argued that the acute withdrawal from these high CRH levels after parturition can explain the occurrence of postpartum depressive disorders [17,18].

Only a small number of reviews [1,19–21] and studies [22–27] examining the effect of placentophagy on humans exist and yet the bioavailability of hormones and their possible physiologic effects remain unclear. Current research on placentophagy aims to gain deeper insight into hormone composition and trace element concentration of placental tissue after encapsulation [28,29]. This exploratory study aims to examine the effect of three different preparation methods and the impact of steaming/dehydration on properties of human placental tissue.

2. Material and methods

2.1. Placenta donors

This study was approved by the ethics committee of the University of Jena. At the Department of Obstetrics of the Jena University Hospital written informed consent was obtained from all women who gave birth and donated their placenta to the placenta laboratory for scientific research.

Nine placentas, all from spontaneous, non-interventional deliveries were collected. Exclusion criteria were diseases in pregnancy that required medical intervention, C-section, the administration of synthetic oxytocin during delivery and infection of either the mother or newborn. All placentas were delivered at term, gestational age ranging from 37 + 6 to 40 + 6 weeks. Three women gave birth without any medication, two women had local anesthesia during delivery and two women had other medication (Methyldopa, Butylscopolaminium bromide, Meptazinol hydrochloride) during delivery. One placenta was used to test the preparation methods for this study and was excluded from the evaluation. Another placenta was excluded from hormone and trace mineral analysis because of administration of synthetic oxytocin during delivery but was included in microbiological analysis. One male placenta was removed: for hormone analysis 50% male and 50% female placentas have been used (n = 3 per group).

Basic data including the mother's age, gravida- and para-status as well as newborn and placenta data were collected (Table 1).

2.2. Sample collection and preparation

To resemble the most common method of placenta preparation in a home-based environment, the processing was done under clean but not sterile conditions.

In order to evaluate the effect of preparation on microbial contamination and hormone and trace element concentration, three different preparation methods were applied to tissue from each placenta.

Placentas were taken immediately after birth to the placenta lab in clean containers. Within 2 h a swab was taken from the maternal and fetal side of the placenta. Weight, height and diameter of the placenta were documented and the placenta carefully inspected. Subsequently, the placenta was washed under cold running water and blood and blood clots were removed.

The placenta was cut into three pieces and the umbilical cord was excised.

Table 1
Participant characteristics including newborn and placenta data, (n = 8).

	Mean	Range	SD
Age, y	30.26	20–36	4.8
Gravida	2	1–3	0.5
Para	1.9	1–3	0.6
Gestation Week	39.8	37 + 6–40 + 6	–
Birth weight Newborn, g	3496.3	3170–4190	304.9
Head Circumference Newborn, cm	33.9	31.5–36	1.2
Body length Newborn, cm	51.3	48–54	2
Placenta weight, g	563.73	434–709	91.3
Placenta height, cm	2.13	1.5–2.5	0.4
Placenta diameter, cm	18	16–19	1

2.3. "Raw" preparation process

One piece ("r" = raw) was homogenized using a food processor (Moulinex DP800G, Frankfurt am Main, Germany) and samples were taken from the raw homogenized tissue.

2.4. "Steamed" and "steamed dehydrated" preparation process

Another piece ("s" = steamed) was steamed using a steamer pot with boiling water.

The piece was steamed at least 10 min until the core temperature reached 70 °C and there was no bleeding when pressed. After the steaming process a sample was taken for microbiological analysis. The steamed piece was then cut into 0,5 cm thin slices and placed on baking foil in a dehydrator tray ("s-dhy" = steamed dehydrated).

2.5. "Raw dehydrated" preparation process

The third piece of placenta ("r-dhy" = raw dehydrated) was cut into 0,5 cm thin slices and placed on baking foil in a dehydrator tray.

Both raw and steamed placenta slices were dehydrated for 8 h at a temperature of 55 °C using a food dehydrator (Stöckli Dörrgerät, Netstal, Switzerland). The dehydration temperature varied from 45 to 59 °C in the bottom tray and from 47 to 60 °C in the top tray. After 8 h of dehydration the samples were inspected, a "snap test" was done to evaluate the complete desiccation of the tissue. If the tissue was snap dry, the dehydration process was stopped. If the material was still flexible the dehydration was resumed for another hour.

The dehydrated placenta slices were grinded using a food processor (Moulinex DP800G, Frankfurt am Main, Germany) and samples were taken from that pulverized tissue. During the preparation process the working space was cleaned and disinfected using antibacterial Wipes (Disinfectant Mikrobac forte 0,5%). Scalpel, scissors and all utilities made of steal were autoclaved after each whole preparation process.

2.6. Retained samples

To evaluate the microbiological contamination of the dehydreated, pulverized placental tissue, retained samples of every processed placenta were stored for 6 months (± 8 weeks). A retained sample of steamed dehydrated and raw dehydrated tissue from every processed placenta was stored in non-sterile reaction tubes at room temperature and in the refrigerator (4 °C).

3. Sample analysis

3.1. Microbiologic analysis

Samples from raw, steamed, raw dehydrated and steamed dehydrated tissue and swabs of seven placentas were sent to the Institute of Medical Microbiology of the Jena University Hospital for microbiological analysis. Standard routine procedures were used to identify potentially pathogenic bacteria and fungi.

A loop was used to inoculate agar plates with the powder from steamed and dehydrated placental tissue. The placenta samples were

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