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An observational study of endometrial vascularity in implantation

Research Article

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Abstract

Background: According to Ayurveda, *Ambu* is one of the four essential factors of *Garbhasambhav Samugri* for formation and development of the embryo. The word *Ambu* means nutrients essential for formation and growth of embryo which it receives from mother. According to modern science, during implantation, embryo receives its nutrients from endometrium. Though some women have normal endometrial thickness, normal endometrial pattern, normal endometrial morphology, still they are unable to get impregnated. During peri-implantation period of menstrual cycle, endometrial vascularity has major role in implantation of fertilised egg and also further growth of foetus. Objectives: The objective of this study is to evaluate implantation rates in women having endometrial vascularity upto V1, V2, V3, V4 zones. Material & Methods: Anonymous data of endometrial vascularity by transvaginal colour doppler ultrasound examination done, on the day of rupture of follicle of menstrual cycle, on 160 women, willing to conceive, has been collected from gynaecologist. And also, her status whether she was implanted or not implanted was collected from the gynaecologist. Data about her pregnancy status upto 20 weeks were collected. From this collected data, results regarding endometrial vascularity were derived. Results: Implantation rate in cases having vascularity upto V1 zone, upto V2 zone, upto V3 zone, upto V4 zone were 0 %, 8.33 %, 25 %, 30.5% respectively. Conclusion: Implantation rate is greater in cases having vascularity upto V3 and V4 zone than V1 & V2 zone. Endometrial vascularity is an important factor for implantation of fertilized egg and also for further growth of embryo.

Key Words: Endometrium, Endometrial vascularity, Implantation, Miscarriage.

Introduction

Garbhasambhav Samugri is a concept in Ayurveda which describes factors to bring healthy offspring into the society. The *Ambu* is one of the four essential factors for the formation and development of the embryo. The word *Ambu* means nutrients essential for the formation and growth of the embryo which it receives from mother (1,2). *Sukshma garbha* needs small amount of liquid nutrients. The growing foetus needs more nutrients. These nutrients are regularly supplied to the foetus from the mother in the right amount at the right time.

Acharya Sushruta stated that, from the time of conception to visibility of the body parts of the foetus, it receives nourishment by upasneha through the rasavaha dhamani, running obliquely into all body parts. After apparent evidence of body parts in the foetus, the foetal umbilical cord is attached to the maternal rasavahanadi which carries the essence of the mother's diet, and the foetus grows by obtaining nourishment through upasneha (1).

According to modern science, during implantation, the embryo receives its nutrients from endometrium (3,4,5).

According to modern science, after fertilisation, the foetus is nourished by following three stages (3,4,5)

- Absorption - In the early post fertilization period, the fertilized egg is nourished by nutrients present in deutoplasm in cytoplasm, it will also receive very small amount of nutrients from tubal and uterine secretion.
- Histotrophic transfer – After implantation and before the formation of the utero-placental circulation, it gets its nutrition from eroded decidua by diffusion and then from maternal blood in the trophoblastic lacunae.
- Hematotrophic - From the 3rd week onwards, with the formation of the fetal circulation, nutrition is obtained by active and passive transfer.

The previous research shows that, though some women have normal endometrial thickness, normal endometrial pattern, normal endometrial histopathology still they are unable to get impregnated. (6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

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18, 19). During peri-implantation period of menstrual cycle, endometrial vascularity has major role in implantation of fertilised egg and also further growth of the foetus (20,21,22).

This study will give useful information about effects of endometrial vascularity on implantation and foetal growth. This will help to improve results of Assisted Reproductive Technology like Intrauterine Insemination, In-Vitro Fertilization, Intracytoplasmic sperm injection.

Aim & Objective

Aim

Aim of this study is to find out effects of endometrial vascularity on implantation, as fertilised egg implants in the endometrial lining of the uterus.

Objective

The objective of this study is to evaluate implantation rates in women having endometrial vascularity upto V1, V2, V3, V4 zones.

Materials & Methods

This work was carried out after getting the permission from institutional ethical committee (BVDUCOA/EC/-1302 dated:19/11/2019).

Anonymous data of endometrial vascularity by transvaginal colour doppler ultrasound examination done, on the day of rupture of follicle of menstrual cycle, on 160 women, willing to conceive, has been collected from gynaecologist. And also, whether she was implanted or not implanted was collected from the gynaecologists. Data about her pregnancy status upto 20 weeks were collected. Format of collected data is shown in Table 1.

On this data following steps were applied

a. All cases are grouped according to vascularity zones into V1, V2, V3, V4 zones.
b. For each group percentage of implanted cases were calculated
c. For each group percentage of miscarried cases were calculated

From this data relation between endometrial vascularity and implantation is derived.

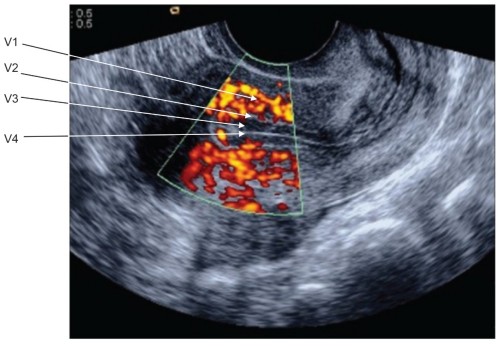
Format of Collected Data

Table 1: Format of collected data

Sr. no.	Age (yr)	Height (cm)	Endometrial Vascularity on the Day of Rupture of Follicle	Implanted/ Non-Implanted (Y/N)	Is Pregnancy Continued upto 20 Weeks (Y/N)
1					
2					

Endometrial Vascularity Zone (23,24)

Fig. 1 Measurement of Endometrial Vascularity Zone



From Fig. 1 following endometrial vascularity zones were done.

V1 – Myometrium surrounding the endometrium.

V2 – Hyperechoic endometrial edge.

V3 – Internal endometrial hypoechoic zone.

V4 – Endometrial cavity.

Study design – Observational study.

Inclusion criteria

- Married Women
- Age between 20 and 30 years
- Women having normal and regular menses.

Exclusion criteria

- Women having abnormal Uterine Cavity.
- Women having uterine disorders, cervix disorders, tubal disorders, ovarian disorders and vaginal disorders.
- Partner having semen abnormality.

Results & Discussion

Distribution of cases according to endometrial vascularity

Table 2: Distribution of cases according to endometrial vascularity

Vascularity Zone	Implanted cases	Non-Implanted cases	Total cases	% of implanted cases	Miscarriage (Upto 20 weeks)	% of Miscarriage cases
V1	0	22	22	0.00	-	-
V2	1	11	12	8.33	1	100
V3	2	6	8	25.00	0	0
V4	36	82	118	30.50	0	0

From table 2, it is seen that implantation rate is greater in cases having vascularity upto V3 and V4 zone than V1 and V2 zone.

Out of 160 cases, 22 cases have endometrial vascularity upto myometrium surrounding the endometrium, 12 cases have endometrial vascularity upto hyperechoic endometrial edge, 8 cases have endometrial vascularity upto internal endometrial hypoechoic zone and 118 cases have endometrial vascularity upto endometrial cavity.

Out of 22 cases having vascularity upto myometrium surrounding the endometrium, zero cases are implanted.

Out of 12 cases having vascularity upto hyperechoic endometrial edge 11 cases are non-implanted and only 1 case is implanted.

Out of 8 cases having vascularity upto internal endometrial hypoechoic zone, 2 cases are implanted and 6 cases are non-implanted.

Out of 118 cases having vascularity upto endometrial cavity, 36 cases are implanted and 82 cases are non-implanted.

Implantation rate in cases having vascularity upto myometrium surrounding the endometrium is zero percent.

Implantation rate in cases having vascularity upto hyperechoic endometrial edge is 8.33 percent. Implantation rate in cases having vascularity upto internal endometrial hypoechoic zone is 25 percent. And implantation rate in cases having vascularity upto endometrial cavity is 30.5 percent.

It is observed that, implantation rate is greater in cases having vascularity upto internal endometrial hypoechoic zone and endometrial cavity.

A single case out of 12 cases having vascularity upto hyperechoic endometrial is implanted but it miscarried.

There were no issues in all the implanted cases having vascularity upto internal endometrial hypoechoic zone and endometrial cavity upto 20 weeks in our observational study.

The range of endometrial thickness of cases in this study were between 6mm -13 mm. And during this study any correlation between endometrial thickness and vascularity was not found. Any data related to hormonal study was not collected during this study.

Endometrial vascularity is an important factor for implantation of fertilized egg and also for further growth of the embryo. Inadequate blood flow of endometrium reduces embryo implantation.

Conclusion

Implantation rate is greater in cases having vascularity upto internal endometrial hypoechoic zone (V3 zone) and endometrial cavity (V4 zone). Endometrial vascularity is an important factor for implantation of fertilized egg and also for further growth of the embryo. Inadequate blood flow of endometrium reduces embryo implantation.

Conflict of interest

The authors have no potential conflict of interest. The disclosure of potential conflict of interest in the prescribed format has been obtained from all the authors.

Ethical approval

The study was approved and the work was performed in accordance with the guidelines of Institutional Ethics Committee of College of Ayurveda, Bharti Vidyapeeth Deemed to be university, Pune, Maharashtra.

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