



## **A Correlative Study of Endometrial Glycogen Content in Female Infertility**

**Archana Rajan<sup>1</sup>, B. O. Parijatham<sup>1</sup> and Vindu Srivastava<sup>1\*</sup>**

<sup>1</sup>Department Of Pathology, Sree Balaji Medical College and Hospital (Affiliated to Bharath Institute of Higher Education and Research), Chennai, Tamil Nadu, India.

### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Infertility is a global problem. It has been viewed as a discredit and social humiliation thrust upon healthy young adults. The present detects the glycogen content in the endometrial glands of infertile women in the age group of 18 -39 years. This study aimed to compare infertility and the glycogen content in the endometrial glands of fertile women of the same age group. The endometrium is the tissue of attention because it is the site for implantation of ovum. The current study was done to evaluate the glycogen content in the endometrium of infertile patients and compare it with that of fertile patients. This study was done on 60 cases and 20 controls. Our study showed that large masses of glycogen (+++++) was seen in only 7 secretory endometria in infertile cases (14.9%) when compared to 14 secretory endometria infertile subjects (77.7%). Also, endometrial glycogen grading in the secretory phase in infertile patients showed glycogen depletion (Grade 0) in 13 cases (27.7%) whereas it was nil in the fertile group. Glycogen is an essential and straight source of nutrient for the primary concepts and also helps in the successful implantation of blastocyst and continuation of pregnancy.

*Keywords: Infertility; endometrial glands; glycogen.*

## 1. INTRODUCTION

Infertility is a global problem and observed as a discredit and public stigma drive upon healthy young adults. Approximately one out of ten marriages is barren [1]. According to American Fertility Society, marriage is to be considered infertile when pregnancy has not happened after one year of sexual intercourse without contraception [2]. WHO studies show that more than 80 million people (8%-12% of all couples) worldwide are or have been infertile. There is an estimated 10 million infertile couples in India [3]. Human endometrium is an essential site in nidation of young fertilized ovum. One of the main pathological factors of sterility is poor quality endometrium that leads to the death of ovum before or after implantation.

After the fertilization of egg, the zygote begins to divide as it moves through the oviduct, finally arriving in the uterus as a blastocyst [4]. After the formation of the placenta, the embryo exchanges the nutrients and wastes directly with the maternal circulation. Until then, the survival and development of embryo is completely dependent on the secretions present in the epithelial cells lining the uterus [5]. These secretions termed as his tiotroph, are rich in glycogen and has been hypothesized in playing a vital role in the development of blastocyst as early as third century B.C. by Aristotle [6].

Endometrial glycogen is one of the most vital factors for the nutrition and progress of blastocyst in the initial periods of gestation. Glycogen is again converted into a monosaccharide like glucose at the time of implantation [7,8,9,10]. Glycogen level in numerous stages of endometrium can be noticed by streak premenstrual endometrial biopsy with Periodic acid Schiff stain (PAS). Thus endometrial tissue removal shows a key diagnostic role in measuring the maturation of endometrium and in detecting the amount of glycogen. The infertile pair has to be examined to measure their chance of attaining pregnancy and to identify the factors which can be treated. Hence, the present study is done to detect the glycogen content in the endometrium of infertile women and to compare it with the glycogen content in endometrium of fertile women.

## 2. MATERIALS AND METHODS

This study was accompanied in the Department of Pathology, Sree Balaji Medical College and Hospital (SBMCH), Chrompet, Chennai for a

period of 18 months from April 2015 to September 2016.

### 2.1 Inclusion Criteria

Cases- 60 endometrial biopsies obtained from premenstrual D&C done on women in the age group of 20 – 40 years with primary and secondary infertility, received from the Department of Obstetrics and Gynaecology (OBG), SBMCH, for histopathological examination were included in the study.

Study population - It was divided into 2 groups.

Primary in fertility and Secondary in fertility.

Patients who failed to conceive after 1 year of unprotected coitus were grouped as Primary infertility.

Patients who failed to conceive after having a previous conception were grouped as secondary infertility.

Control- 20 endometrial biopsies obtained from premenstrual D&C done on women in the age group of 20 -40 years with proved fertility (having 2 children) were included as controls.

### 2.2 Exclusion Criteria

Male factors causing infertility Cases with uterine or cervical anomalies causing infertility. Cases with Tuberculous endometritis and polyps Cases with endometrial hyperplasia Detailed clinical history including age, Last menstrual period (LMP), marital history, obstetric history (in secondary infertility) and duration of infertility, menstrual pattern and date of biopsy were collected. The endometrial tissue obtained from premenstrual Dilatation and curettage (D&C) was fixed in 10% formalin for 24 hours and processed routinely. 5 microns thick tissue sections were cut and stained with Hematoxylin & Eosin to date the endometrium. Then Periodic Acid Schiff (PAS) staining was performed to detect the amount of glycogen in the endometrium. PAS with diastase was performed to enhance the specificity of the PAS technique.

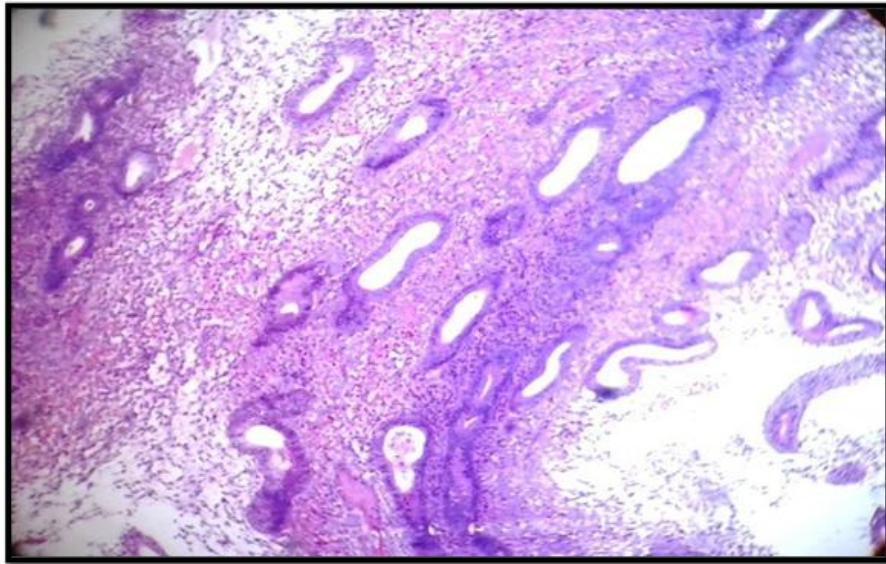
## 3. RESULTS AND DISCUSSION

The endometrium is the tissue of interest because it is the site for the nidation of ovum. Glycogen is an essential and direct source of nutrient for the early concepts. It also helps in the

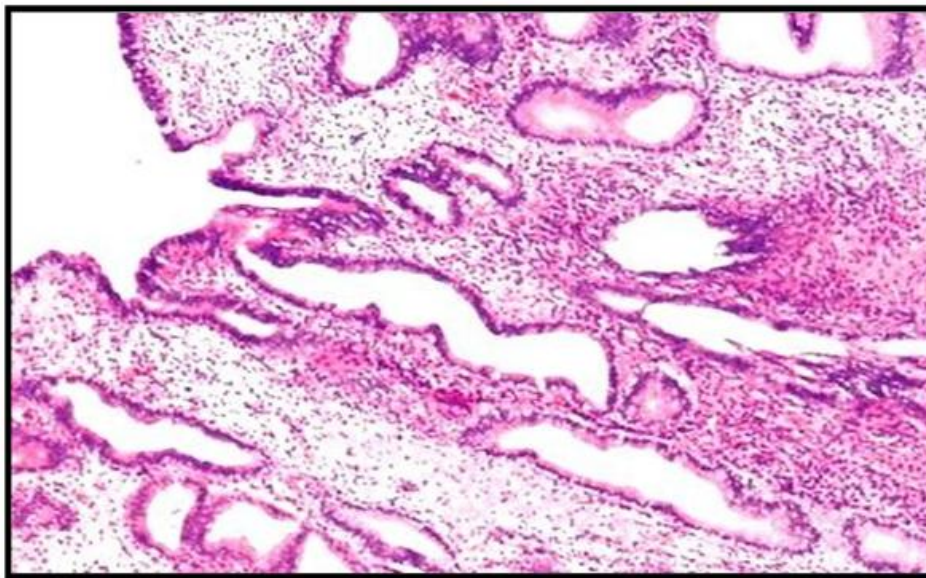
successful implantation of blastocyst and continuation of pregnancy [11,12,13,14].

Amongst the study population of 80 members, 60 were cases (infertile) and 20 were controls (fertile). Both the control and case groups were in the age group of 18-39 years. Amongst the fertile group, glycogen grading was 0 to1+ in 2 of the

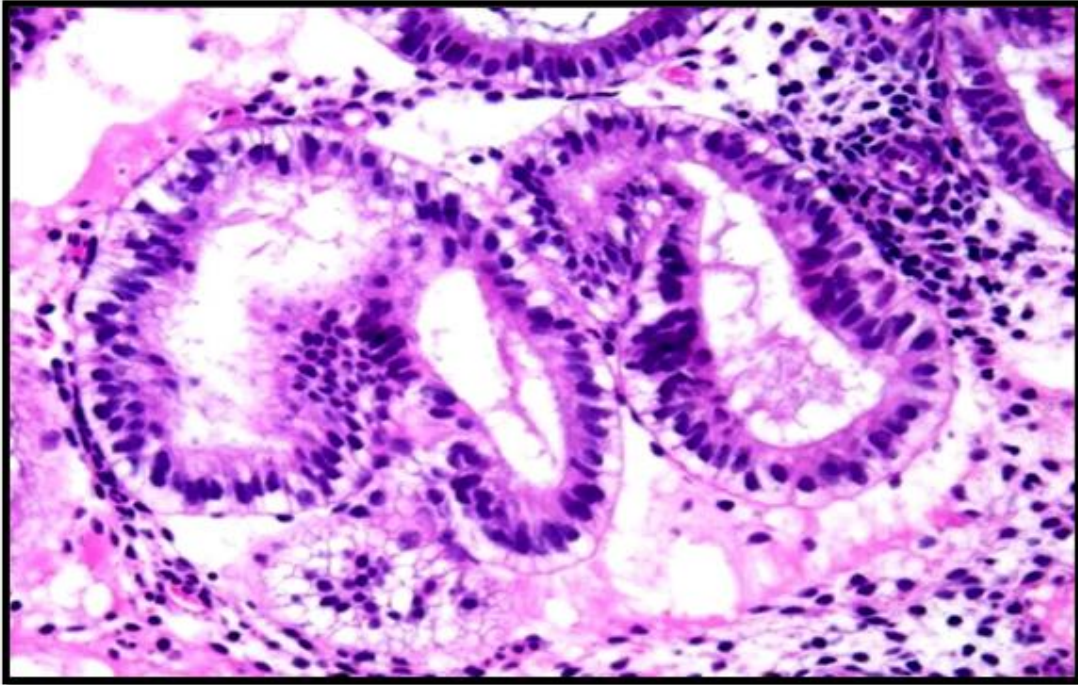
proliferative endometria, whereas out of the 18 secretory endometria glycogen grading was ++ in 1 (5.6%), +++ in 3 (16.7%) and ++++ in 14 (77.7%) secretory endometria. This suggests that glycogen is present in traces in the proliferative phase and increases progressively during the secretory phase [15,16,17,18].



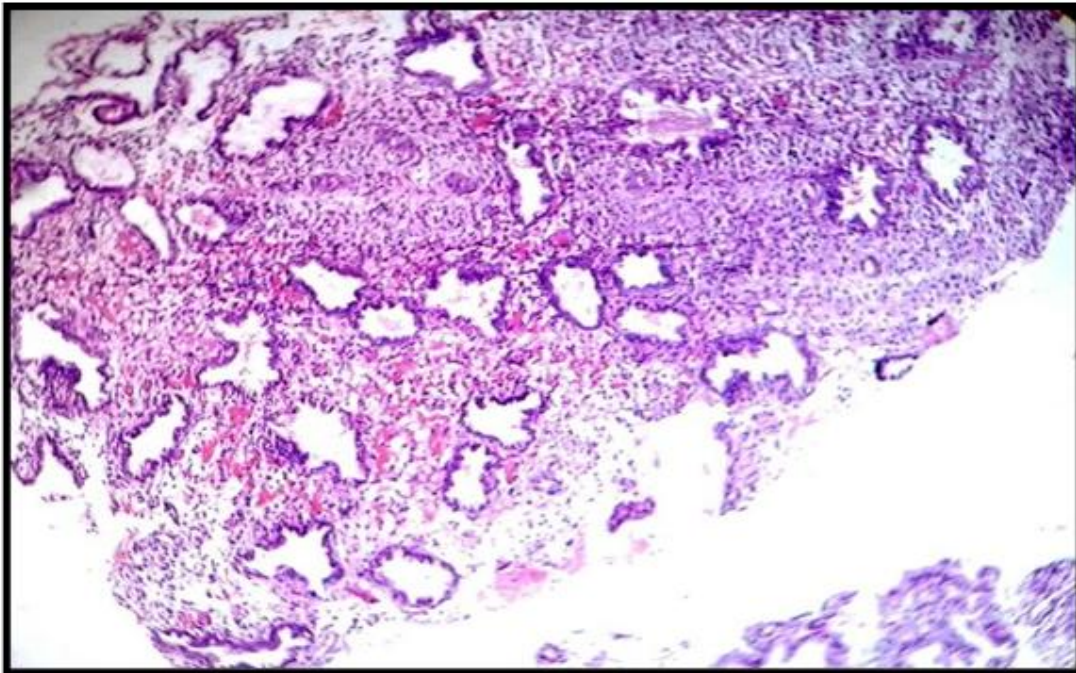
**Fig. 1. H&E stain, LPF (100X) - Proliferative endometrium showing regularly placed tubular glands in abundant stroma**



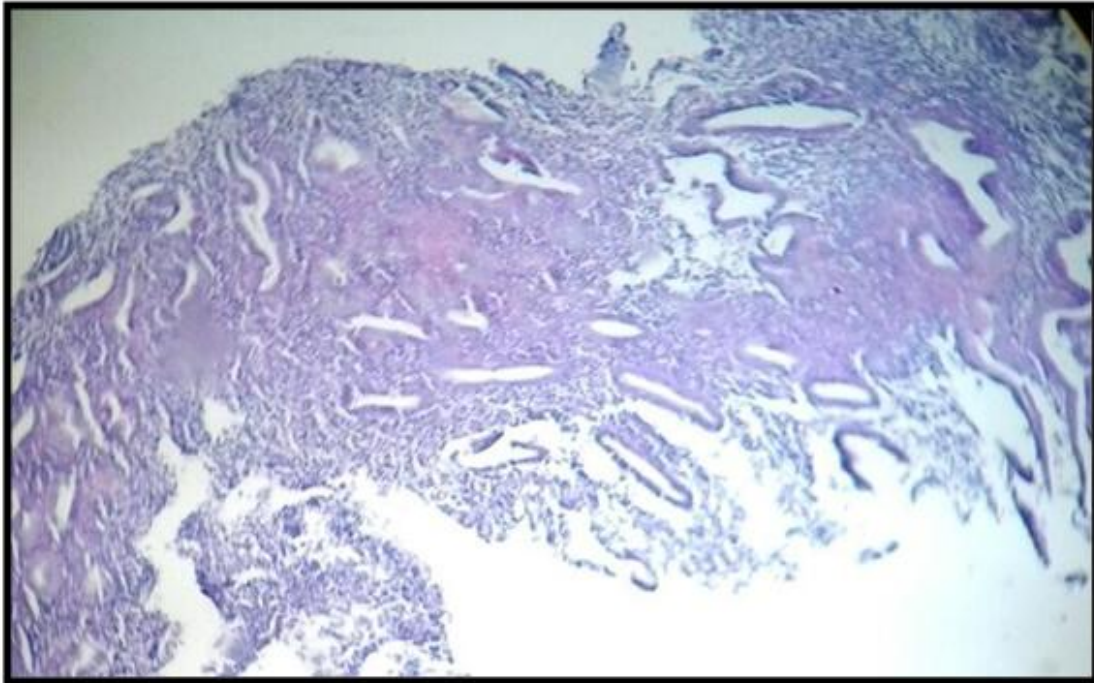
**Fig. 2. H&E stain, LPF (100X) – Late proliferative endometrium showing long tortuous glands**



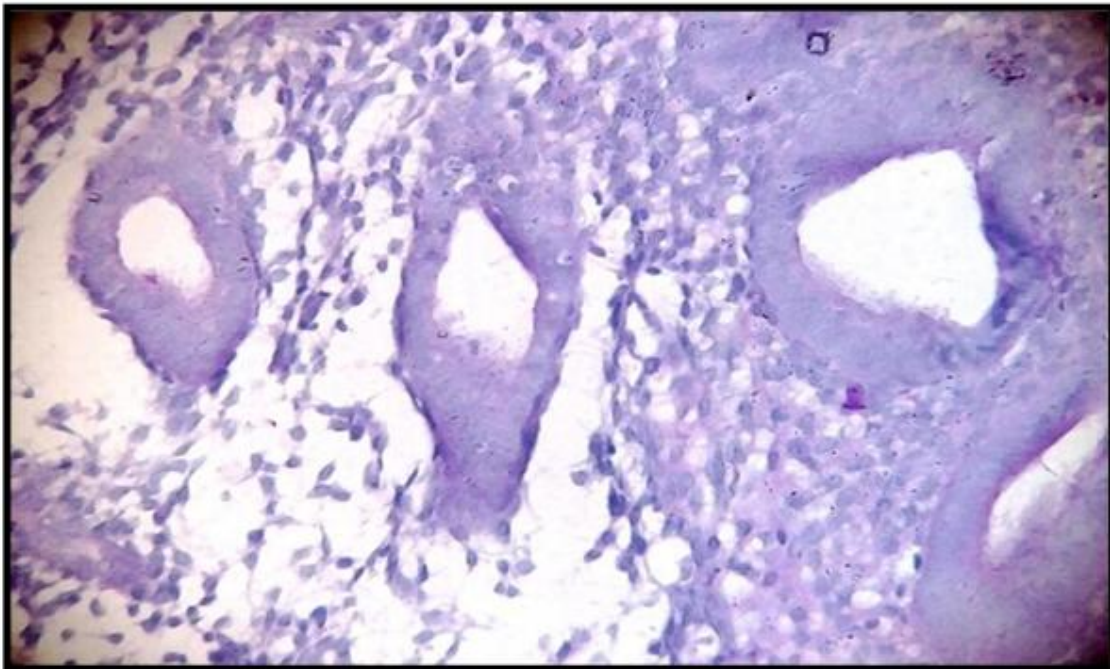
**Fig. 3. H&E stain, HPF (400X): Early Secretory endometrium showing sub nuclear vacuoles and intra luminal secretions**



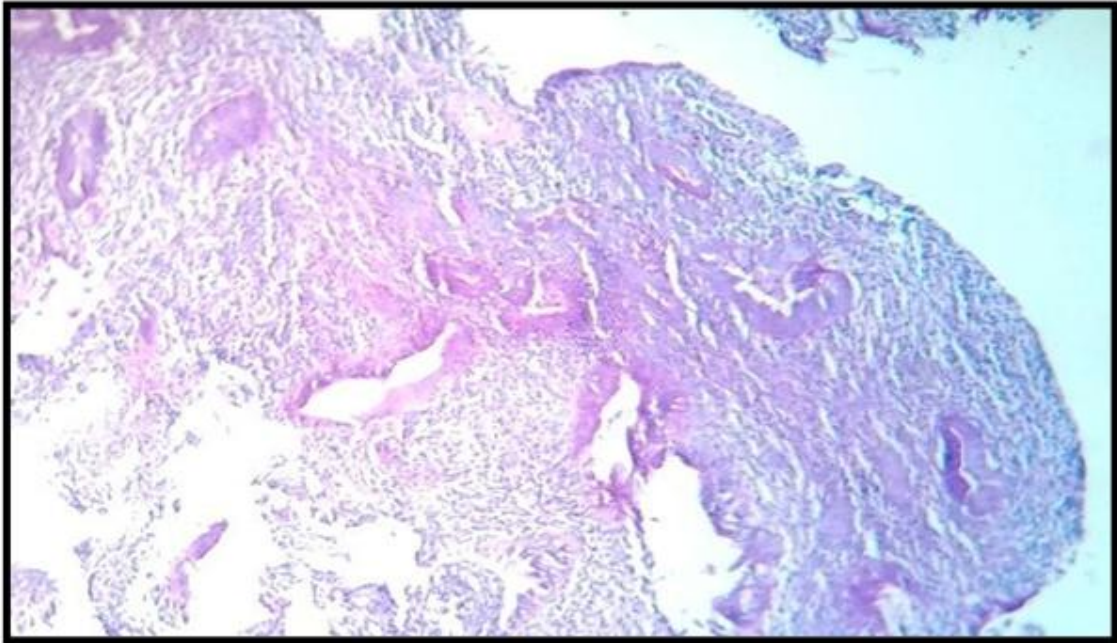
**Fig. 4. H&E stain, LPF (100X): Late secretory phase showing glands with serrated appearance and decreased luminal secretion**



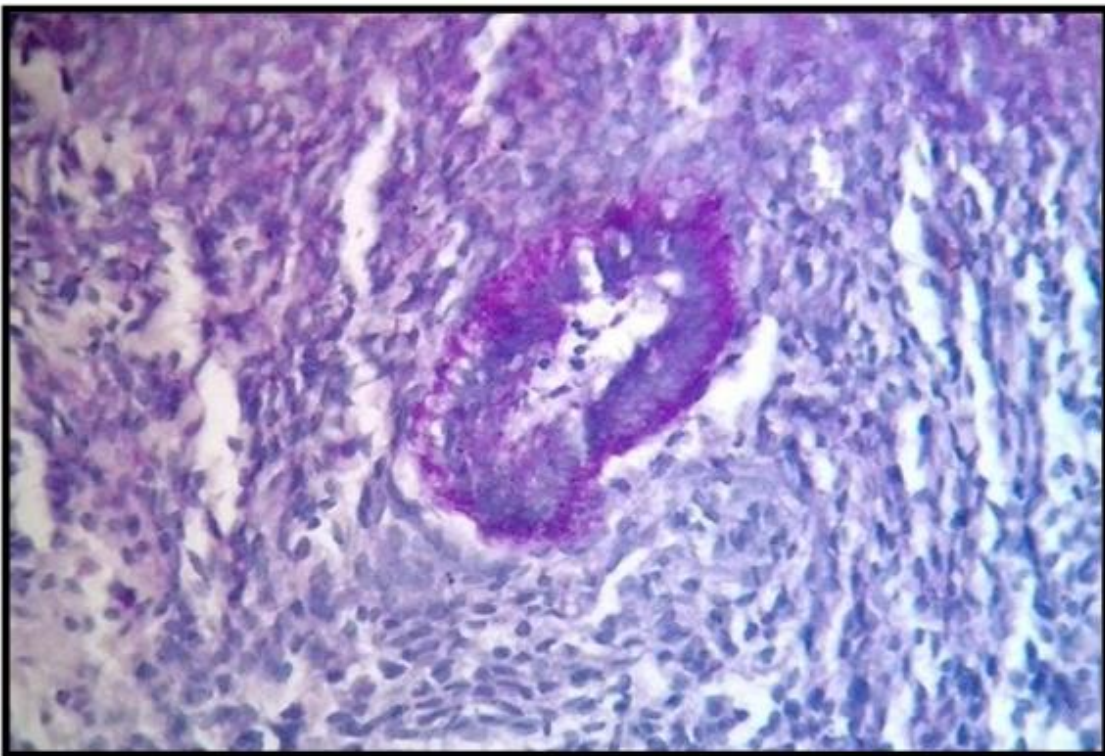
**Fig. 5. PAS stain, LPF (100X): Proliferative endometrium showing Grade 0 glycogen (Glycogendepletion)**



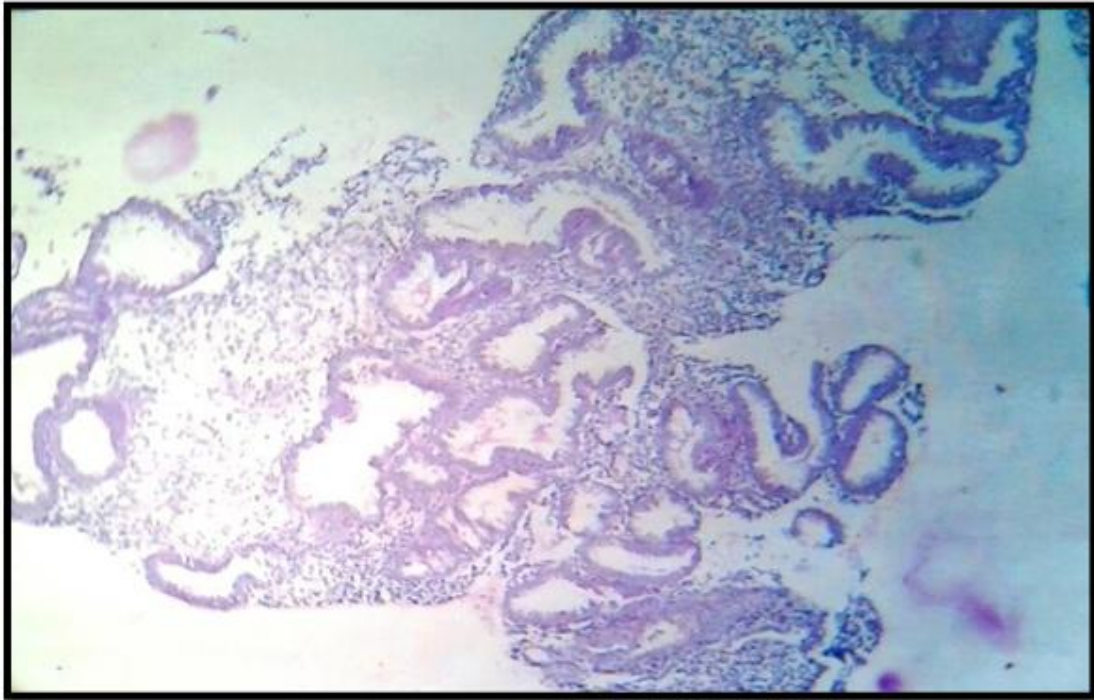
**Fig. 6. PAS stain, HPF (400X): Proliferative endometrium showing Grade 0 glycogen (Glycogendepletion)**



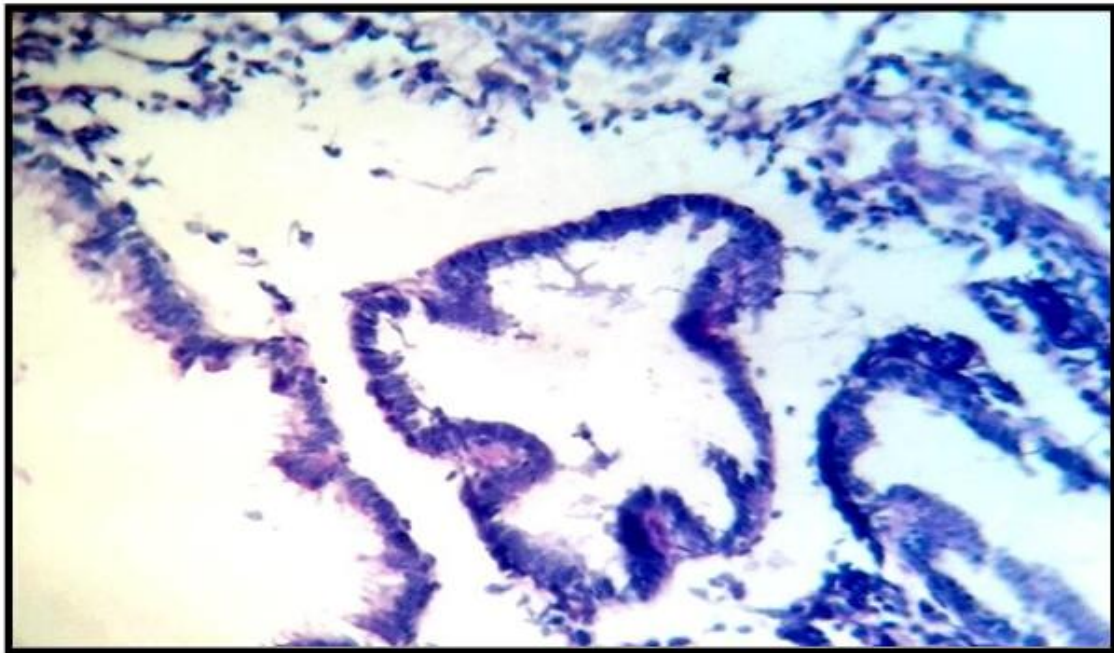
**Fig. 7. PAS stain, LPF (100X): Proliferative endometrium showing Grade +glycogen**



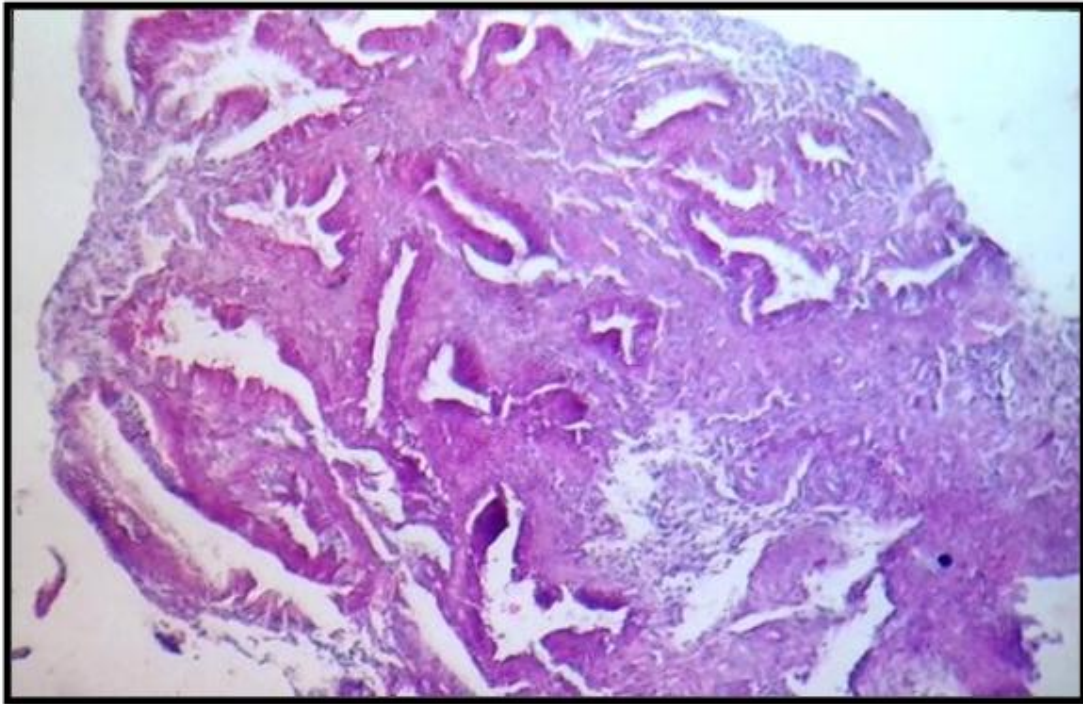
**Fig. 8. PAS stain, HPF (400X): Proliferative endometrium showing Grade +glycogen**



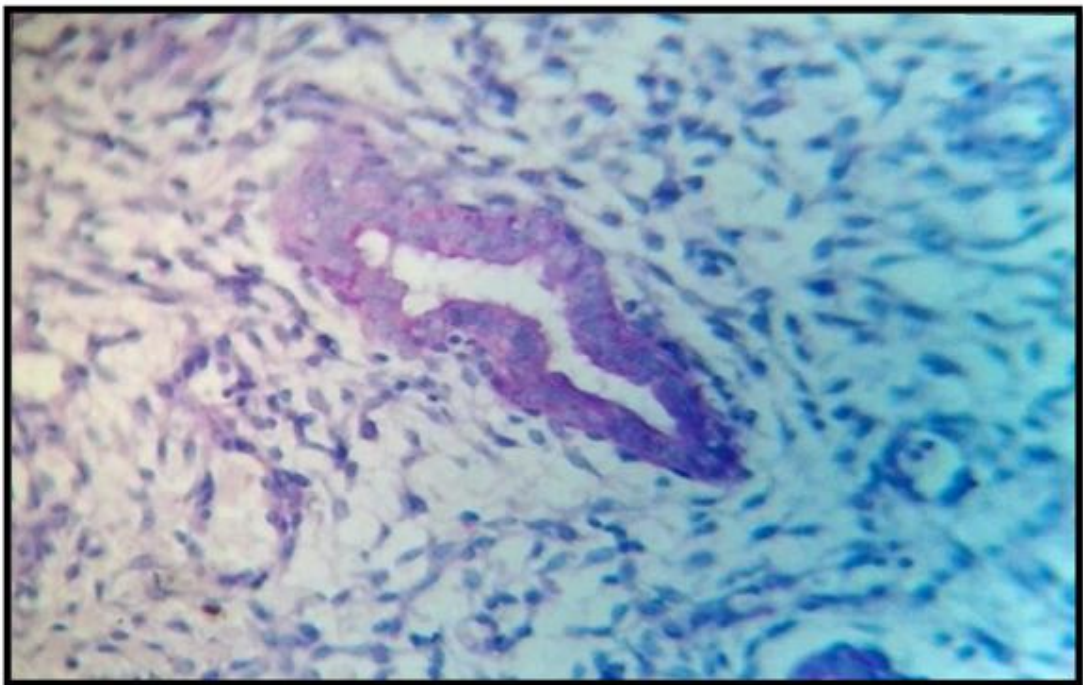
**Fig. 9. PAS stain, LPF (100X): Secretory endometrium showing Grade 0 glycogen(Glycogendepletion)**



**Fig. 10. PAS stain, HPF (400X): Secretory endometrium showing Grade 0 glycogen (Glycogendepletion)**

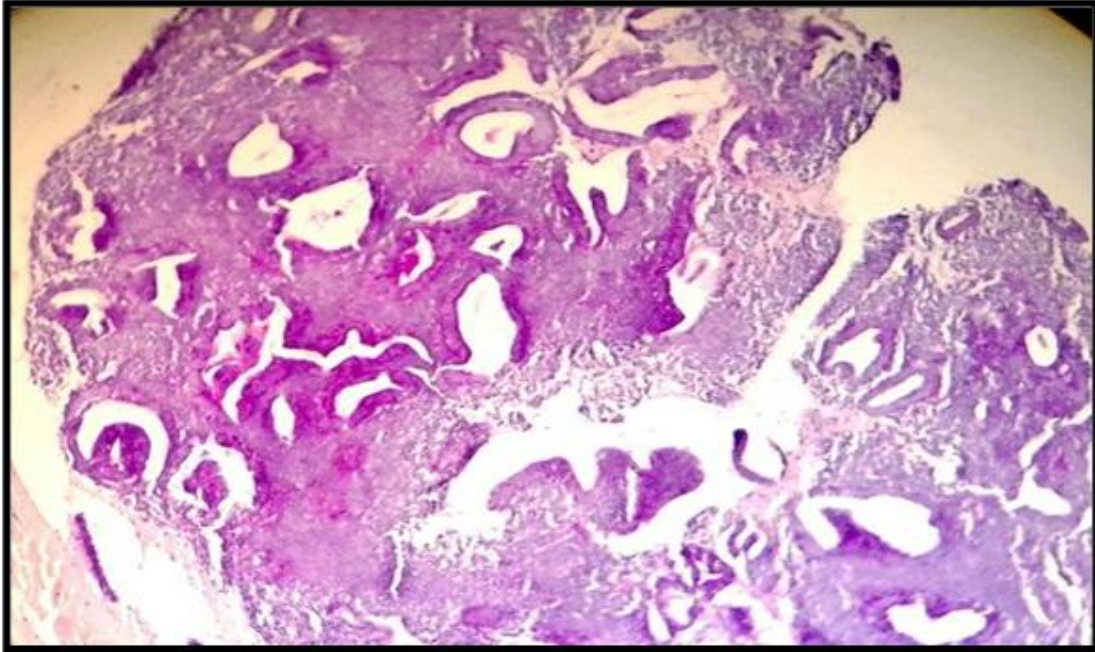


**Fig. 11. PAS stain, LPF (100X): Secretory endometrium showing Grade +glycogen**

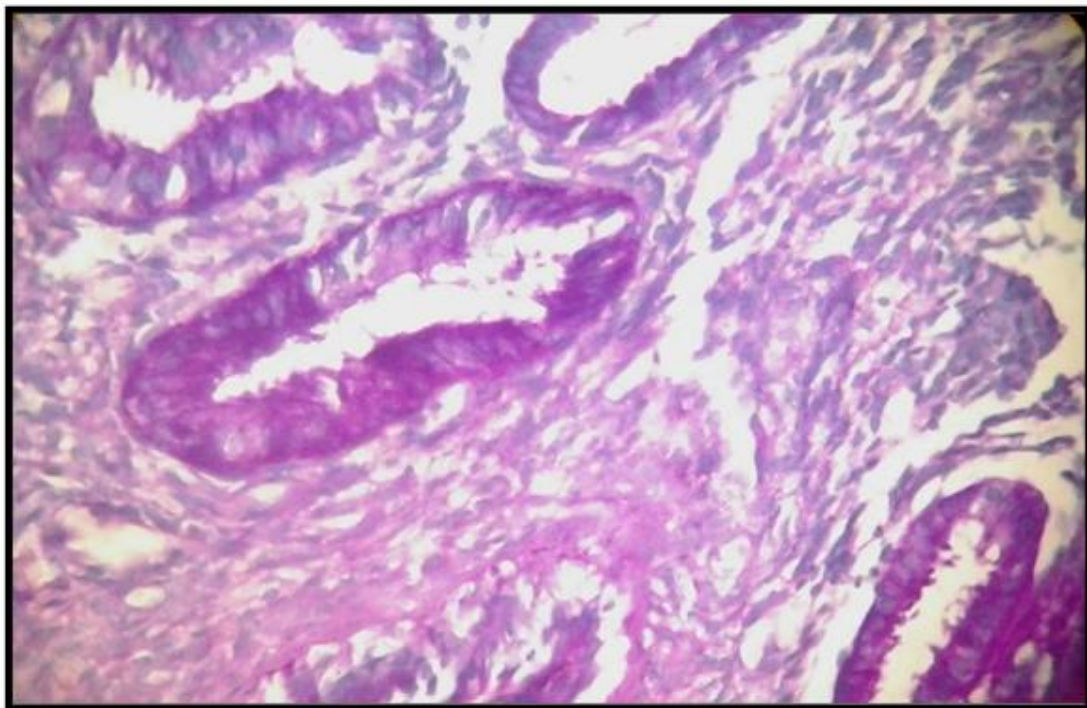


**Fig.12. PAS stain, HPF (400X): Secretory endometrium showing Grade +glycogen**





**Fig. 13. PAS stain, LPF (100X): Secretory endometrium showing Grade ++glycogen**



**Fig. 14. PAS stain, HPF (400X): Secretory endometrium showing Grade ++glycogen**

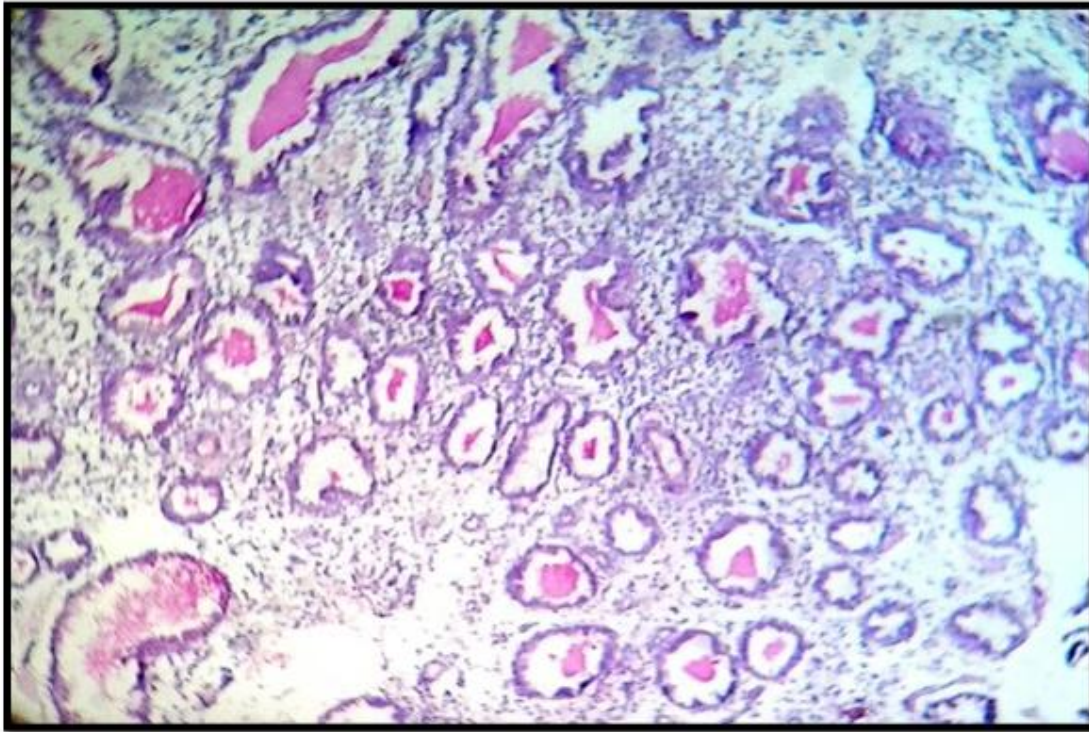


Fig. 15. PAS stain, LPF (100X): Secretory endometrium showing Grade +++ glycogen

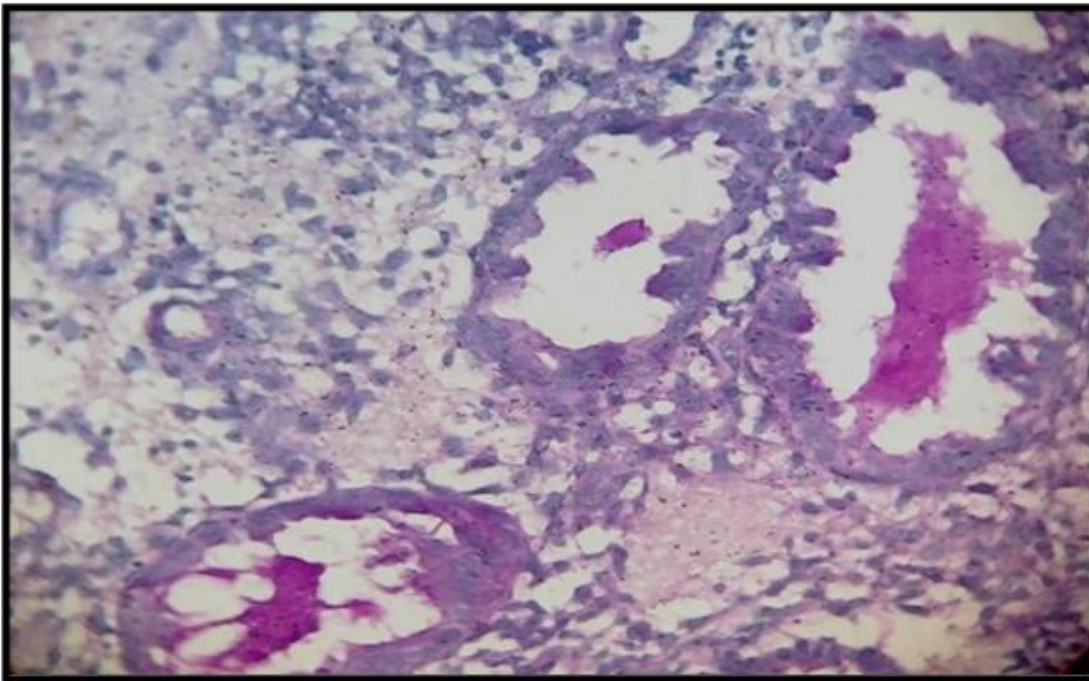
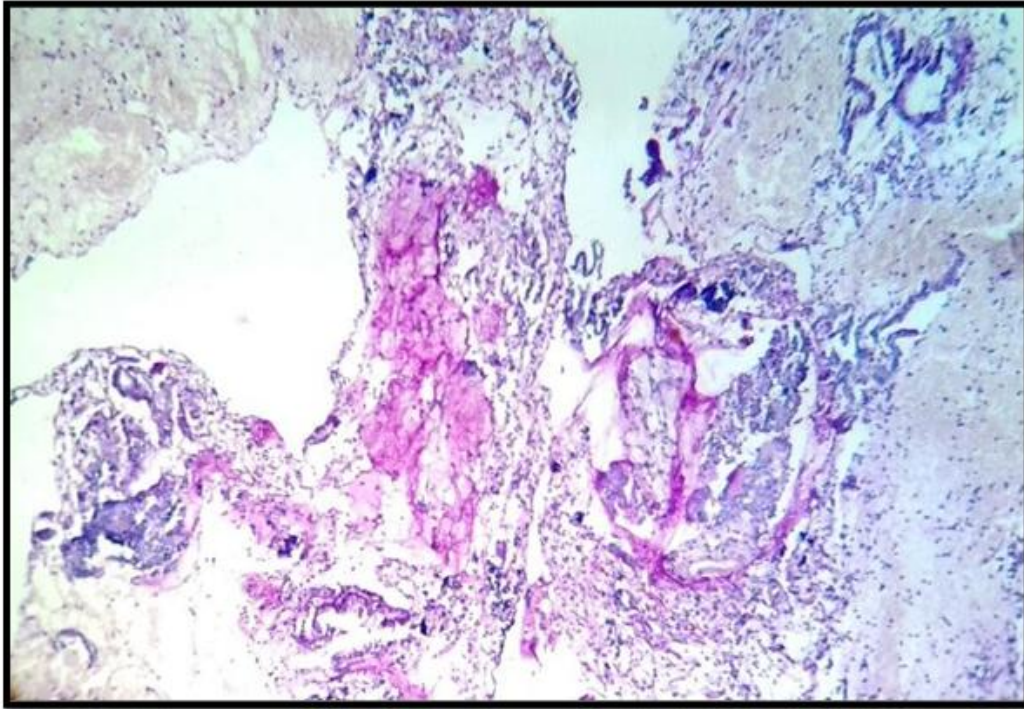
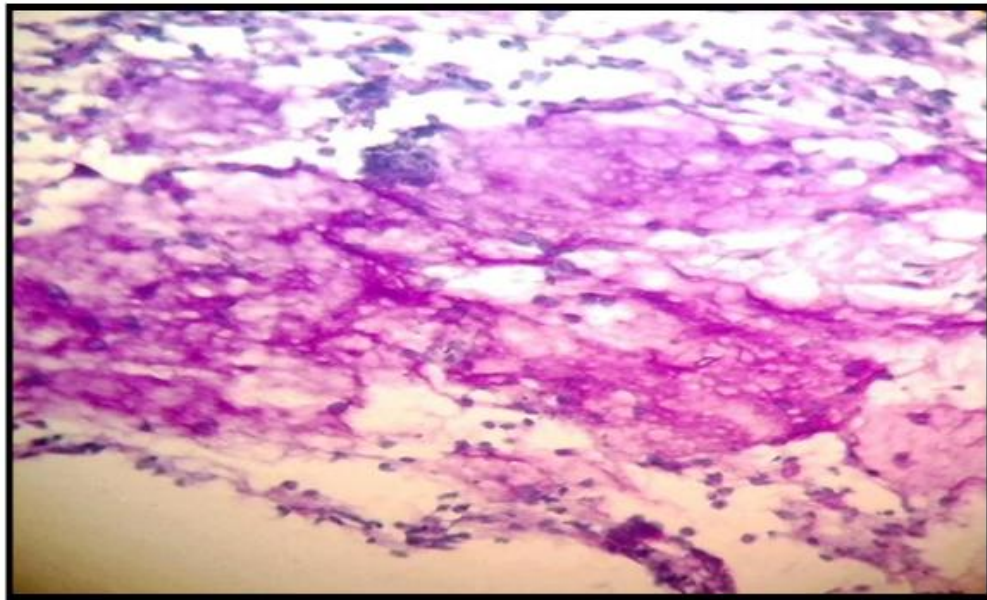


Fig. 16. PAS stain, HPF (400X): Secretory endometrium showing -Grade +++ glycogen



**Fig. 17. PAS stain, LPF (100X): Secretory endometrium showing Grade ++++glycogen**



**Fig. 18. PAS stain, HPF (400X): Secretory endometrium showing Grade ++++glycogen**

Amongst the 60 cases, there were 37 patients with primary infertility (61.7%) and 23 patients with secondary infertility (38.3%). Majority of patients had regular menstrual cycles (58.3%) and were asymptomatic (37%) [19,20,21]. Among the patients with primary infertility, nine endometria were in proliferative phase (24.3%) and 28 endometria were in secretory phase

(75.7%). In the patients with secondary infertility, 4 endometria were in proliferative phase (17.4%) and 19 endometria were in secondary endometrium (82.6%). Out of the 13 proliferative endometria in infertile patients, glycogen grading was 0 in 8 cases (61.5%), + in 3 cases (23%) and ++ in 2 cases (15.5%). Grade +++ and ++++ were absent. This again confirms that glycogen is present in very small amounts in proliferative endometrium. Out of the 47 secretory endometria in infertile patients, glycogen depletion (0) was seen in 13 cases (27.7%), + in 8 cases (17%), ++ in 10 cases (5.6%) and +++ in 9 cases (16.7%). Only 7 patients with infertility had glycogen grading as ++++ in secretory endometrium (14.9%) as against 14 subjects in fertile group (77.7%) [22,23,24,25-27].

While comparing the glycogen content in secretory phase in infertile (cases) and made: glycogen depletion /Grade 0 was seen in 27.7% of secretory endometrium in infertile patients whereas it was nil in the secretory phase of endometrium in fertile subjects.

Hence, the present study shows that in majority of infertile patients, secretory phase endometrium showed decreased glycogen content.

#### 4. CONCLUSION

In the present study it was also found that in normal endometrium, the glycogen content in the endometrium is present in traces (+ to ++) during the proliferative phase and increases progressively (+++ to ++++) during the secretory phase.

Hence, to conclude; in infertile women, there is a significant reduction in the amount of endometrial glycogen which is a major source of nutrition for the developing embryo. This can lead to poor implantation of the blastocyst or early embryonic loss leading to infertility.

#### CONSENT

As per international standards or university standards, patient's consent has been collected and preserved by the authors.

#### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s). (Ref .No. 002/SBMC/IHEC/2015-92).

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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