

# Sonographic Assessment of Endometrial Layering in Different Menstrual Stages in Sudanese Normal Women in Khartoum State

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**Abstract:** Purpose of this study was to determine the endometrial layering in Sudanese normal women in Khartoum state in all stages of menstrual cycle. Design is a descriptive non-interventional analytical study using ultrasound investigation to scan the pelvis in 102 normal menstruating Sudanese women between [14 – 45 years]. The data was collected by designed clinical data collection sheet. Findings were, in normal Sudanese menstruating women in Khartoum state 96.2% of the volunteers were with one line appearance in the menses stage. 61.9% of them were with three line appearance in the early proliferative stage. In the late proliferative stage, 82.4% of them were with five line appearance. In the secretary stage 84.2% of them were with wide appearance.

**Keywords:** Endometrium, Layering, Menstrual stages, Appearance, Khartoum

## 1. Introduction

Uterus [or the womb] is a major female hormone-responsive reproductive sex organ of most mammals including humans. It is located inside the pelvis immediately dorsal to the urinary bladder and ventral to the rectum. It is hallow, pear-shaped organ with thick Muscular walls. It is about 3 in long. It is divided into the fundus, Body and cervix. [1, 2]

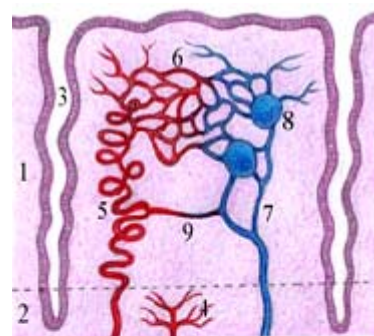
### 1.1 The layers of the uterus

- Peritoneum, surround the uterus. The peritoneal space anterior to the uterus is the vesico-uterine pouch or anterior cul-de-sac. This space is usually empty, but may contain bowel loops. Posteriorly, the peritoneal reflection extends to the posterior fornix of the vagina, forming the recto-uterine recess or posterior cul-de-sac. Laterally, the peritoneal reflection forms the broad ligaments, which extends from the lateral aspect of the uterus to the lateral pelvic sidewalls.
- Perimetrium, is the loose surrounding tissue
- The myometrium, consists of smooth muscles arranged in three zones [inner, middle and outer]. The inner consists largely from longitudinal and circular fibers. The outer or external zones consist mainly of Longitudinal fibers that pass over the fundus and converge at the Cornua. The middle or inner mediate zone is the thickest, consisting two principle groups of symmetric smooth muscle, each arising in each uterine cornu. These three zones are arranged to optimize uterine Contractility during the labour and delivery. The innermost layer of myometrium is known as junctional zone.
- The endometrium, is the inner most layer of the uterus which lines the uterine cavity, specialized form of mucous membrane that is responsive to circulating hormones and a variety of drugs. It is continuous above with the mucous membrane lining the uterine

tubes and below with the mucous membrane lining the cervix. The appearance of it is highly variable, depending on the timing of the menstrual cycle and the effects of any drugs [1, 2, 3, 4, 5].

### 1.2 Histology of the endometrium

#### 1.2.1 Endometrial layering



1. Endometrial Functional Layer
2. Endometrial Basal Layer
3. Endometrial Gland
4. Straight Artery
5. Spiral Artery
6. Capillary Plexus
7. Veins
8. Venous Lake
9. Arteriovenous Anastomosis

**Figure 1.1:** Endometrial layers (Source: mum.org)

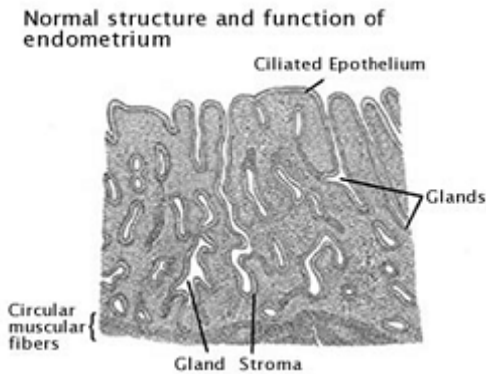
The endometrium consists of a single layer of columnar epithelium, resting on a layer of connective tissue, which varies in thickness according to hormonal influences-the stroma. Simple tubular uterine glands reach from the endometrial surface through the base of the stroma, which also carries a rich blood supply of spiral arteries. In a woman of reproductive age two layers of endometrium can be distinguished:

1. The functional layer: It is adjacent to the uterine cavity. It consists of endothelium, glands and stroma. This is the

superficial layer of the endometrium and it is further divided into compact and spongy zones.

2. The basal layer: Is adjacent to myometrium and below the functional layer, is not shed at any time during menstrual cycle, and from it the functional layer develops. It contains the blind ends of the glands [2, 4].

**1.2.2 Cellular components of the endometrium**



**Figure 1.2:** Endometrial cellular components (Source: endometrial hyperplasia.net)

- a. The luminal epithelium: The human endometrial luminal epithelium is the first maternal interface encountered by the implanting blastocyst. The human endometrial luminal epithelium contains both ciliated and nonciliated cells. The number of the former increases during the proliferative phase.
- b. The glandular epithelium: During the proliferative phase of the menstrual cycle estrogen is the dominant hormone. The gland cells proliferate and assemble the cellular machinery necessary for the dynamic processes which occur later in the cycle. During the early secretory phase the glandular epithelial cell becomes transformed into a highly polarized cell actively involved in the production and secretion of complex secretory products which are thought to be important in supporting the trophoblast.
- c. The endometrial stroma: The endometrial stroma is a connective tissue composed of cells and a complex extra-cellular matrix containing fibers and ground substance.
- d. Endometrial leukocytes: The immunological aspects of implantation are complex and the endometrium contains a wide spectrum of immune-competent cells. These include T-lymphocytes, macrophages and endometrial granulated lymphocytes [6].

Stage	Layering
1- Menses: (one-line appearance)	 www.sciencedirect.com
2-Early proliferative: (Three-line appearance)	 www.jaypeejournal.com
3-Late proliferative: (Five-line appearance)	 www.aiumcommunities.org
4-Secretory: (Wide appearance)	 www.jaypeejournal.com

**2. Results**

**Table 1:** Distribution of layers in menses stage

Layering	Frequency	Percent
1 layer	25	96.2%
3 layers	1	3.8%
Total	26	100%

**1.2.3 Endometrial layering in different menstrual stage**

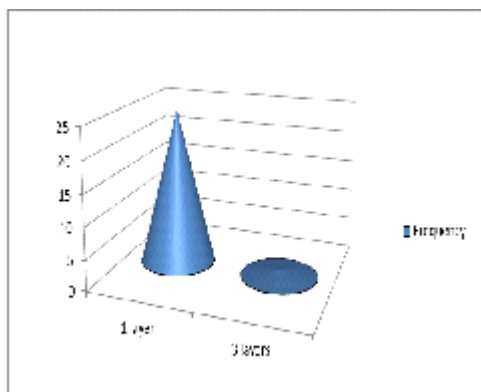


Figure 1: Distribution of layers in menses stage

96.2% of the volunteers in this stage were with the standard appearance [one line] and 3.8% were with three-line appearance.

Table 2: Distribution of layers in early proliferative stage

layering	Frequency	Percent
1 layer	6	28.6%
3 layers	13	61.9%
5 layers	2	9.5%
Total	21	100%

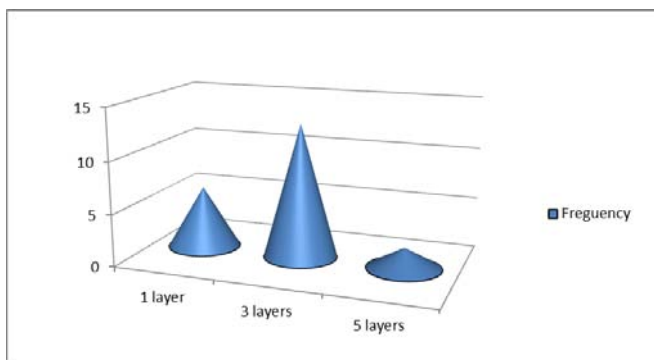


Figure 2: Distribution of layers in early proliferative stage

61.9% of the volunteers in this stage were with the standard appearance [three lines], 28.6% were with one line and 9.5% were with five-line appearance.

Table 3: Distribution of Layers in late proliferative stage

layering	Frequency	Percent
3 layers	1	5.9%
5 layers	14	82.4%
wide	2	11.8%
Total	17	100%

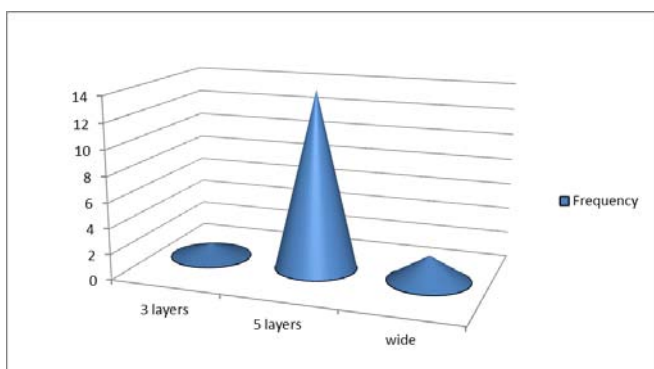


Figure 3: Distribution of Layers in late proliferative stage

82.4% of the volunteers in this stage were with the standard appearance [five lines], 11.8% were with wide appearance and 5.9% were within three-line appearance.

Table 3: Distribution of layers in secretory stage

layering	Frequency	Percent
3 layers	2	5.3%
5 layers	4	10.5%
wide	32	84.2%
Total	38	100%

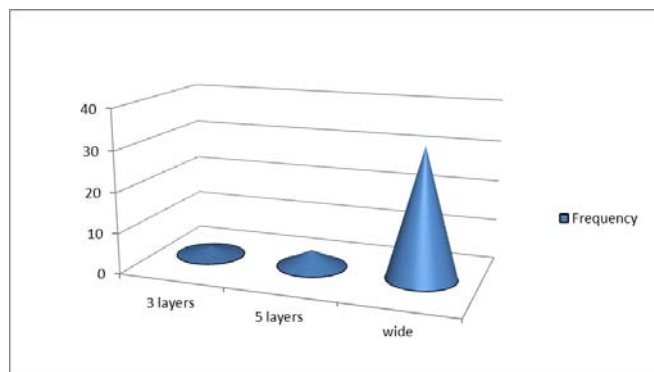


Figure 4: Distribution of layers in secretory stage

In the secretory stage, 84.2% of the volunteers were with the standard appearance [wide], 10.5% were with five lines and 5.3% were with three-line appearance.

### 3. Conclusion

In menses stage, 96.2% of the volunteers were with one-line appearance and 8.3% of them were with three-line appearance. In early proliferative stage, 61.9% of the volunteers were with three-line appearance, 28.6% of them were with one-line appearance and 9.5% of them were with five-line appearance. In late proliferative stage, 82.4% of the volunteers were with five-line appearance, 11.8% were with wide appearance and 5.9% of them were with three-line appearance. In secretory stage, 84.2% of the volunteers were with wide appearance, 10.5% were with five-line appearance and 5.3% were with three-line appearance.

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### **Author Profile**

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