

Periodontal therapy in the female patient

¹Dr. Mukesh Kumar, MDS, Professor, Deptt. of Periodontics, Himachal institute of dental science Paonta Sahib, Himachal Pradesh.

²Dr. Kanika Thakur, MDS ³RD Year Post Graduate Student Deptt. of Periodontology, Himachal institute of dental science Paonta Sahib, Himachal Pradesh.

³Dr. Shilpa Kaundal, MDS ³RD Year Post Graduate Student Deptt. of Periodontology, Himachal institute of dental science Paonta Sahib, Himachal Pradesh.

⁴Dr. Tenzing Yutso, MDS ³RD Year Post Graduate Student Deptt. of Periodontology, Himachal institute of dental science Paonta Sahib, Himachal Pradesh.

Corresponding Author: Dr. Kanika Thakur, MDS ³RD Year Post Graduate Student Deptt. of Periodontology, Himachal institute of dental science Paonta Sahib, Himachal Pradesh.

Citation of this Article: Dr. Mukesh Kumar, Dr. Kanika Thakur, Dr. Shilpa Kaundal, Dr. Tenzing Yutso, “Periodontal therapy in the female patient”, IJDSIR- March - 2021, Vol. – 4, Issue - 2, P. No. 24 – 31.

Copyright: © 2021, Dr. Kanika Thakur, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Review Article

Conflicts of Interest: Nil

Abstract

Sexual hormone plays an important role in influencing periodontal disease progression and wound healing. These effects are different depending on the gender as well as the lifetime period analyzed. The influence of sex hormones can be minimized with good plaque control as well as with hormone replacement therapies. 80% of the osteoporotic patients are female, correlating with the higher frequency of hip fractures in females, who are also more likely to experience hormonal imbalance throughout their lives than males. However, the true mechanism of how these interactions actually occur remains to be determined.

Keywords: Hormones; Estrogen; Periodontium; Pregnancy; Osteoporosis.

Introduction

Leonardo de Vinci & others brought tremendous insight into the anatomy of the female reproductive system, but as late as the 1600s, the role of the ovary still remained a mystery. Bacterial plaque has been established as the primary etiologic factor for the initiation of periodontal disease (**Loe et al. 1965**). However, it has also been shown that without a susceptible host the periodontal pathogens are necessary but not sufficient for disease to occur. Hence, the systemic factors/conditions of the host must be understood since they may affect disease prevalence, progression, and severity (**Lang et al. 1983**).^[1] Hormones are specific regulatory molecules that modulate reproduction, growth and development, maintenance of

the internal environment, as well as energy production, utilization, and storage (Mariotti 1994).^[2]

Refinement in molecular techniques have further expanded our understanding from the onset of puberty to an active process that is guided by peptides/steroids and they are known as hormones.

The term hormone was given by **Starling in 1905** and described by **Secretin and Gastrin. Mariotti in 1994** stated that these molecules modulate:

- Reproduction
- Growth and development
- Maintenance of internal environment
- Energy production, utilization and storage

More specifically; a significant link has been established between the relationship of gonadal hormones and periodontal tissues in both normal functions and pathophysiology of the disease.

Female Hormonal System

The human female has distinctive periods of urges in endogenous sex hormones, beginning or onset of puberty to an active process that is guided by specific peptides i.e.

Kisspeptin.

The female reproductive axis is governed by the interplay of the hypothalamus; the anterior pituitary and the ovary. The hypothalamus neuron i.e. kiss neuron is stimulated in the anteroventral periventricular and arcuate nuclei through leptin pathway which release the Gonadotrophin-releasing hormone from hypothalamus.

Gonadotrophin – releasing hormone further stimulates the release of luteinizing hormone and follicle stimulating hormone (FSH) from the anterior pituitary gland which in return release testosterone from the thecal cells of the ovary. The testosterone is converted to estradiol by the granulosa cells of the ovary. (Figure 1)

Since the main aim of any periodontal treatment is to establish a healthy tissue so that it becomes maintainable by the patient.

However at times there are various contributing factors that exaggerate the existing periodontal disease. One such is observed in female patient where as a result of hormonal influences seen during life cycle at puberty; pregnancy, on usage of oral contraceptive, menopause in the already existing periodontal disease worsen resulting in the loss of Periodontium.

These periodontal manifestations in a female's life are seen during these phases:

1. Puberty

- It occurs between the average ages of 11 to 14 in most girls.
- It is a transitional phase when a sexually immature girl becomes sexually mature by growth of accessory sex organs.
- The production of sex hormones (estrogen & progesterone) increases, then remains constant during the remainder of the reproductive phase.

Marshall –Day CD in 1951 found that due to dramatic rise in steroid hormone levels, there is a transient effect on the inflammation status of the gingival. In a cross sectional done by **Dr. Hefti** on 7380 children, found that the gingival inflammation increased at 11 years of age while plaque levels remained constant. The mean age at which girls reached their maximum gingivitis experience was 12 years, 10 months in females and 13 years, 7 months in males.^[2]

Kornman & Loesche in 1982; **Mombelli et al** in 1990 & **Mariotti** in 1994 found higher bacterial counts of *Prevotella intermedia* & *Capnocytophaga* species, luteinizing ovarion hormone as a substitute for vitamin K growth factors. These organisms have been implicated in increased bleeding tendency observed during puberty.^[3]

Clinical Features

1. During puberty, periodontal ligament tissues have an exaggerated response to local factors.
2. Hyperplastic reaction of the gingival tissue may occur where food debris, material alba, plaque & calculus are deposited.
3. The inflamed tissues becomes erythematous, lobulated and retractable.
4. Bleeding may occur easily especially interproximally and there is decreased salivary flow rate.
5. The clinician should recognize the intra oral effects of chronic regurgitation of gastric contents on intraoral tissues which is a common complaint in puberty.
6. Also, they should recognize that the incidence of asthma and mouth breathing may be higher in pubertal female which causes gingival enlargement especially in the anterior area as a result of dehydration.
7. **Mandel L** in 1992 estimated the enlargement of parotid gland in 10 to 50% patients.^[4]

Management

1. To be a part of successful periodontal therapy, education of the parent/the care giver and patient is must.
2. Preventive care: vigorous program of oral hygiene for maintaining periodontal health.

Milder cases of gingivitis

Respond well to SRP within frequent oral hygiene reinforcement.

Severe cases:

- SRP
- Microbial culturing
- Antimicrobial mouthwash
- Local site delivery and antibiotic therapy

2. Menstrual Cycle

- During the reproductive years, the ovarian cycle is controlled by the anterior pituitary gland which

secretes FSH and LH. The monthly cyclic events that take place in a rhythmic fashion during the reproductive period of a woman's life is called Menstrual cycle. The commencement of the menstrual cycle is called menarche and there is an ongoing changes in the concentration of the gonadotropins and ovarian hormones during the cycle.

- The cycle has 4 phases:
 - Menstruation phase: 1-4 days.
 - Follicular phase/proliferative phase: 5-13 days
 - Phase of ovulation: 14 day
 - Luteal phase/Secretory phase: 15 -28 days

In Follicular Phase

- FSH levels are elevated.
- Estradiol is synthesized by developing follicle and peaks approximately 2 days before ovulation.

In Secretory Phase

Corpus luteum is developed which synthesis both estradiol and progesterone helping the endometrium for implantation of fertilized egg. If fertilization does not occur the corpus luteum involves dropping the level of ovarian hormone and issues the menstruation.

Effects on Periodontium

Increases inflammation in gingival tissues and exaggerate the response to local irritants.

The cause for the increase in gingival inflammation is that the progesterone and estrogen modulate the receptors which result in:

- Fluctuation of TNF- alpha.
- Elevation of PGE₂ synthesis.
- Elevation of angiogenic factors, endothelial growth factors.

The main potential effects of these hormones on periodontal tissues can be summarised as:

- Estrogen has stimulatory effects on the metabolism of collagen. (**Sultan et al 1986**)

- Estrogen and progesterone modulate vascular responses and connective tissue turnover in periodontium, associated with interaction with inflammatory mediators. (Soory 2000)
- Progesterone has been associated with increased permeability of the microvasculature altering the rate and pattern of collagen production in gingiva. (Thomson ME & Pack AR 1982).
- Progesterone stimulate the production of PGE₂ that mediates the body response to inflammation. PGE₂ is the major secretory products of monocytes and is increased in the inflamed gingiva.
- Progesterone enhanced the chemotaxis of PMN's, but this reduced by estradiol. (Miyagi et al 1992).

Clinical Presentation

1. Gingival tissue have been reported to be more edematous during menses and erythematous before onset of menses.
2. Gingival bleeding (Kribbs & Chesnut-1984; kribbs et al 1989, 1990, 1992).
3. Minor increase in tooth mobility. (Grant D et al 1988).
4. When progesterone level is higher (during luteal phase) I/O recurrent apthous ulcers, herpes labialis lesion & candidal infections occur.
5. More susceptible to gastroesophageal reflux disease.

Management

1. Closer periodontal monitoring in case of increased gingival bleeding and tenderness.
2. Periodontal ligament check up with in 3 to 4 months.
3. Antimicrobial mouth rinse before cyclic inflammation.
4. Oral hygiene reinforcement.
5. If patient with history of excessive menstrual flow, schedule the surgical unit after cyclic menstruation is purudent.

6. Consult with the physician and do recent blood test, if the patient is anaemic.
7. Treat the mucosa in apthous prone area gently with moistened gauze pads or cotton rolls with a lubricant or make the patient rinse with CHX/water.
8. Advice the patient to have a light snack before her appointment because of the elevated hypoglycaemic threshold.
9. Patients with premenstrual syndrome are often treated by antidepressants.

3. Pregnancy

The ability of the woman to carry a pregnancy depends on major hormonal changes within the female body.

Two different units:

1. Maternal
2. Placental

Interact in a complex system for a mother to maintain a pregnancy and the development of the foetus.

Maternal Unit

Produce large quantities of Estradiol 200 mg/day and Progesterone 300 mg /day

Placental Unit

Human chorionic gonadotrophin:

Maintains corpus luteum during the pregnancy so as to secrete progesterone.

Human placental lactogen:

Modifies the metabolic state of mother to facilitate energy supply to foetus.

The pregnancy comprises of 3 trimesters:

1st Trimester

- It is about 1 to 12 weeks in which foetal organ formation take place.
- Most susceptible to adverse effects of teratogens.
- Avoid all elective care.

IIND Trimester

- It is of foetal growth and maturation.

➤ Safest period to provide the dental care.

IIIRD Trimester

➤ It is from 25-40 weeks period in which foetal growth continues.

Effect on Periodontium

The link between pregnancy and periodontal inflammation has been known for many years. In 1818, **Pitcarim** describes gingival hyperplasia in pregnancy and the first case of pregnancy gingivitis was recorded by **Pinard** in 1877.

Pregnancy Gingivitis

- It is extremely common with incidence of 30-100%.
- Characterized by erythema & hyperplasia of the gingiva with increased bleeding.
- Mainly anterior region and interproximal surface is affected.
- Increased pocket depth with transient tooth mobility.

In 3rd trimester, anterior site inflammation may exacerbated by increased mouth breathing. **Loe & Silness 1963; Silness & Loe in 1964, Robiusion & Amar 1992; & Soory in 2000** found the increased tendency for gingivitis and periodontitis in pregnant women.

Cohen et al 1969 & Brabin in 1985 found increased susceptibility to infection.

Kornman & Loesche in 1980 & Tsai & Chen 1995 found increased number of *P.gingivalis* & *P. intermedia*.

Also the pregnant women, some time shows a mulberry overgrowth on the interdental papilla & this condition is known as pregnancy tumor / tumor like enlargement.

Its incidence is reported to be 0.2% to 9.6% & is seen either in 2nd/3rd trimester of pregnancy.

- Clinically, they bleed easily & become hyperplastic & nodular and are associated with poor oral hygiene.
- Perimylosis (acid erosion of teeth) may occur due to morning sickness.
- Xerostomia

Management

1. Thorough medical history should be taken & the gynaecologist should be contacted for periodontal treatment plan if needed.
2. Plaque control reinforcement should be done.
3. SRP & Polishing may be performed whenever necessary.
4. Use of non-alcohol based mouth rinses is **Listerine zero; periobrite; colgate plax; tea tree therapy.**

Use of prenatal fluoride supplements has been an area of controversy is studies by **Glenu FB (1977 & 1982)** claimed the benefits whereas ADA & AAPD does not show any efficacy of prenatal fluoride supplements. In case of acid exposure due to morning sickness/esophageal reflex.

Do not brush teeth as brushing action can remove the outer layer of enamel. Therefore, rinse with in a solution of water rinsed with baking soda/liquid antacids/plain water/do a fluoride mouth rinse.

Elective Dental Treatment

Given during 2nd trimester.

Short appointment should be given.

Do not make the patient to sit in a supine position / semireclined portion as it may results compression of inferior vena cava due to uterus leading to maternal hypotension. Decreases cardiac output leads to loss of consciousness and finally it leads to foetal hypoxia.

This condition is known as supine hypotensive syndrome. So, to present this turn the patient on her left side or 6 – inch soft rolled towel should be placed on the patients right side when she is reclined.

The safety of dental radiography has been well established by using high spread film & protective patients lead apron. It should be avoided during first trimester because the developing foetus is susceptible to radiation damage.

Medications in Pregnancy

Drug therapy in pregnant women is controversial because drugs can affect the foetus by diffusion across the placenta, therefore medications must only be used if the gravity of the condition being treated outweighs the consequences.^[5]

The classification system was established by US food & drug administration in 1979 to rate the foetal risk levels associated with prescribed drugs.

A list of local anesthetics drugs

Pregnancy

Drug	FDA category	During pregnancy
Lidocaine	B	Yes
Mepivacaine	C	Use the caution
Prilocaine	B	Yes
Bupivacaine	C	Use the caution
Etidocaine	B	Yes
Procaine	C	Use the caution
Articaine	B	Yes

Analgesics during Pregnancy

Drug	FDA category	During pregnancy
Aspirin	C/D, third trimester	Caution avoid
Acetaminophen	B	Yes
Ibuprofen	B/D, third trimester	Caution avoid
Codeine	C	Use with caution
Hydrocodone	B	Use with caution
Oxycodone	B	Use with caution
Propoxyphene	C	Use with caution

Wilson JT et al 1980 found that the amount of drug excreted in breast milk is usually not more than 1% to 2% of the material dose; therefore it is highly unlikely that most drugs have any pharmacologic significance for the infant.

Later on **Pitts DL et al in 1983 & Jiang HW et al in 2006** stated that mother should take prescribed drugs after breast feeding & then avoid nursing for 4 hours. Therefore AAP has developed a statement regarding the need for providing proper periodontal ligament therapy for pregnant patient.

Females on oral contraceptives

Contraceptives utilizes synthesis gestational hormones estrogen & progesterone to reduce the likelihood of ovulation/implantation. (**Guyton 1987**).

Current oral contraceptives consist of low doses of estrogen <50 micron gram/day and or progesteins < 1.5 mg/day.

But the early formulation contained higher concentration of sex steroid hormones depicting following changes in gingiva that is

Gingival enlargement - **Mariotti A 1994**

Excessive inflammation - **Grover AB 1989**

Attachment loss – **Wade AB 1974**

In contrast to the current findings there is lack of gingival inflammation in females which are on oral contraceptive pills.^[6]

Thus oral contraceptives should not viewed as a risk factor for gingival and periodontal diseases.

In case there is a gingival response, the treatment should include:

- Plaque control
- Antimicrobial mouth washes
- Periodontal surgery to be indicated if there is no resolution after phase I therapy.

- If teeth has to be extracted, it should be done on non-estrogenic days that is 23 to 28 days of the pill cycle to reduce the risk of post operative localized osteitis.

4. Menopause

- 40% of women live their lives in menopause.
- Ovarian functions declines.
- There is reduction in production & secretion of sex hormones that is fall in estrogen level gradually and the level of LH and FSH increases.

Changes due to menopause

- a) Sex organs: No ovulation
- b) Bone: osteoporosis
- c) Heart : Hypertension
- d) Psychological state : Depression

Effect on Periodontium and chemical presentation

- 1.) Reduction in epithelial keratinisation leads to thinning of oral mucosa.
- 2.) Reduction in salivary flow leads to xerostomia.
- 3.) Reduction in collagen formation.
- 4.) Bleeding on probing.
- 5.) Gingival recession.
- 6.) Redness of gingival tissue
- 7.) Alveolar bone loss and ridge resorption.

Osteoporosis

Osteoporosis, which is defined as a systemic condition characterized by a decrease in the bone mineral density of at least 2.5 times the normal values in a healthy young female, is a major health problem in postmenopausal women. In Western societies, more than one-third of the female population above the age of 65 years suffers from signs and symptoms of osteoporosis, a disorder characterized by low bone mass. Estrogen deficiency is the dominant pathogenic factor for osteoporosis in women (Reinhardt et al. 1999).^[7]

According to WHO- bone mineral density is 2.5. Bone mineral density is reduced.

Two types:

Primary type 1

Primary type 2/ secondary

Type 1: Common in women after menopause.

Type 2: Occurs after age of 75years seen in both male and female of 2:1 in ratio.

Effect of osteoporosis on periodontium

Wowern et al 1994: Poor healing

Payne et al 1999: Reduced bone mineral content

Mittermayer et al 1998: Increase in tooth loss

Treatment

A.) Bisphosphonate drugs

B.) Calcitonin

National institute of health conserves conference recommendations for calcium uptake.

25-50years – pre menopausal women - 1000mg/day.

65 years old – men and women – 1500 mg/day

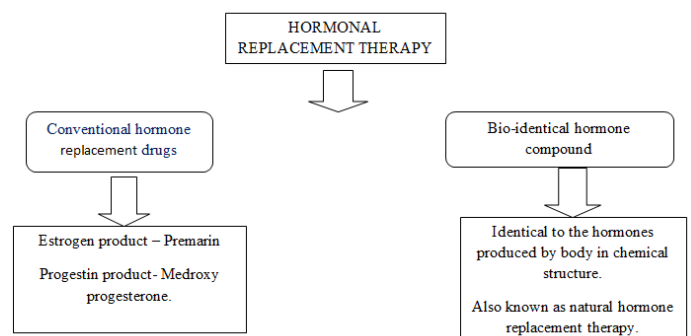
Post Menopausal Women

On Estrogen therapy – 1000mg/day

Not on estrogen therapy – 1500mg/day

C.) Hormonal Replacement Therapy

Prevents discomfort caused by diminished circulating estrogen and progesterone hormone involves the use of one / more group of medications designed to boost hormone levels.



Conclusion

Female body undergoes series of reaction to the hormonal changes. Thorough medical history should be taken

including data related to menstrual regulatory; use of pills; HRT; Pregnancy and breast feeding. Sexual hormones play an important role in influencing periodontal disease progression and wound healing. These effects are different depending on the gender as well as the lifetime period analyzed. It is also clear that not all patients and their periodontium respond in the same way to similar amounts of circulating sexual hormones.

Improper oral hygiene and hormonal imbalance during different cycle of female patient exaggerates the oral tissue response to plaque and worsen the condition. So prevention is better by oral hygiene reinforcement.

Legend Figure

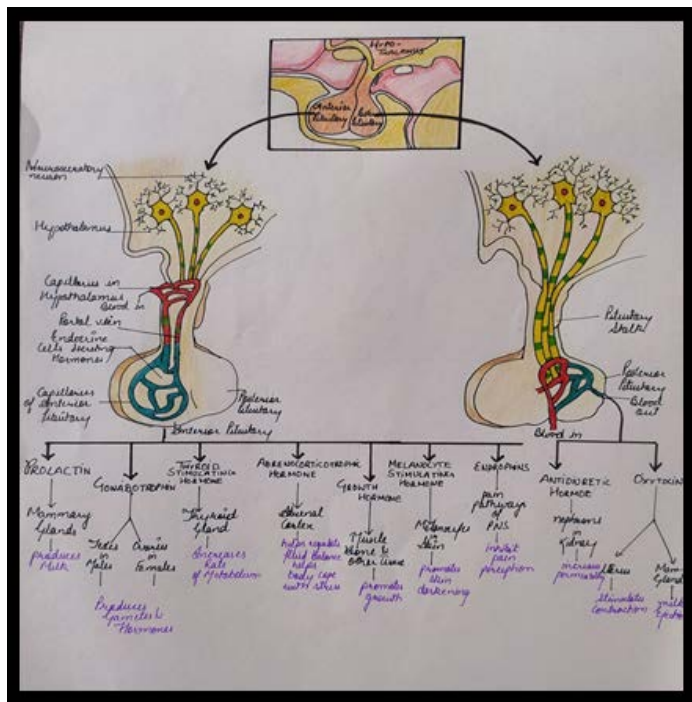


Figure 1: Hypothalamus Pituitary Axis

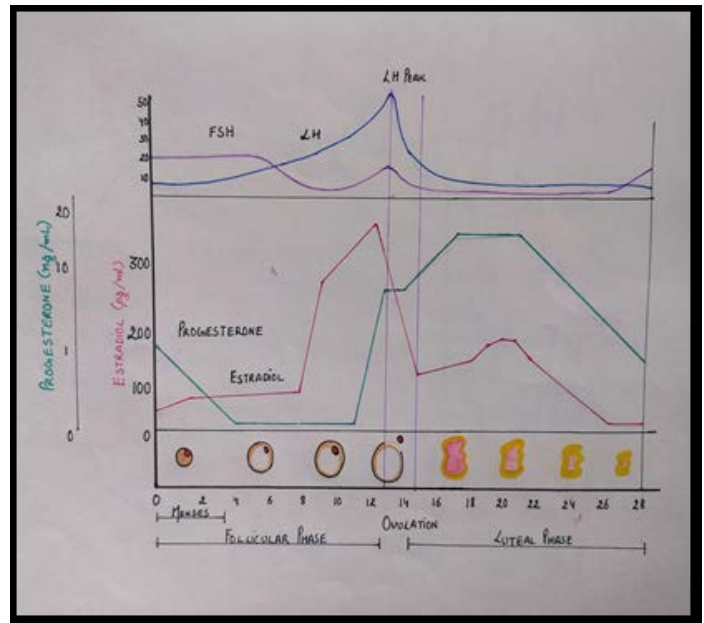


Figure 2: Menstrual Cycle

References

1. Mascarenhas P, Gapski R, Al-Shammari K, Wang H-L: Influence of sex hormones on the periodontium. J Clin Periodontol 2003;30:671-681.
2. Clinical Periodontology By Carranza, Tenth Edition: Periodontal therapy in the female patient, 636-647.
3. Clinical Periodontology and Implant dentistry By Jan Lindhe Fourth Edition: Modifying factors, 183-187.
4. Norderyd OM, Grossi SG, Machtei EE, Zambon JJ, Hausmann E, Dunford RG, Genco RJ. Periodontal status of women taking postmenopausal estrogen supplementation. J Periodontol 1993 Oct;64(10):957-62.
5. Kornman, K. S. & Loesche, W. J. The subgingival microbial flora during pregnancy. J Periodontal Res 1980;15,111-122.
6. Lindhe, J. & Bjorn, A.L. Influence of hormonal contraceptives on the gingiva of women.
7. Saloman Amar et al: Influence of hormonal variation on the periodontium in women; Periodontology 2000, Vol. 6, 1994, 79-87.