

Hormonal Changes Across the Life Cycle of Women and its Effects on the Periodontium

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Abstract

In recent years, it has been realized that women's oral health may differ from that of men in many areas. It is rightly said that the health of a woman's body and oral cavity are bidirectional, hence women need exceptional dental health facilities and attention. The role that different endocrine hormones imbalances during puberty, 1st to 3rd trimester of pregnancy, menopause, oral contraceptive use, and females reproductive cycle details has the main role in various sex data in orofacial health status is supported by different medical clinical trials. The oral conditions commonly observed during these phases of the lifecycle of females include inflamed gingiva, the formation of granulomatous tissue in the body, disease of periodontium,, and grade 1,2,3 mobility of tooth. The closest bonding between status and worst dental health condition in the female will need excellent care in investigation plan that assimilates and controls for the diverse array of lurking varying, such as dental diseases (gingivitis, periodontitis and missing tooth), the whole history of female's reproductive physiology, and benefaction communal and financial variables. Dental practitioners need to actively counsel female patients about general and oral health strategies so that they can maintain their oral health and maximize their quality of life. The effect of hormonal changes during the life cycle of a female affects the prevalence and intensity of the oral disease. This understanding is helpful for a clinician in rendering oral health care to these patients.

Keywords: *Gingivitis, Oral Health, Periodontal disease, Tooth loss.*

Introduction

Excellent oral health is mandatory for excellent general systemic health there is a close interlink among dental and systemic health according to surgeon general data.^[1] WHO on its Oral Health data 2003 outlines the global burden of oral disease with particular emphasis on

the important matter: oral health is vital and necessities to systemic health, dental health is essential for maintaining an excellent quality of life and oral and systemic health are two sides of a coin both are dependent on each other.^[2] All these points emphasize the importance of oral health in connection with the general health as well. Good health status changes according to different phages of life of women widely in the entire population and to their economic status. Dental health condition declined to some state in between the 1st trimester to 3rd trimester of pregnancy and it is a matter of concern which has a bad impact on the lifestyle of human beings.^[3] Females should need special oral care and attention due to hormonal imbalance and it has excellent effects on the oral environment.^[4]

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Nowadays, female's systemic health oral health has become a matter of a global focal point. Thus a

long term follow up research is mandatory in females dental health. The aspects of research study on the dental health of females are through clinical examination of oral physiology, long experiences on clinical practice, and dental health attitude knowledge behavior among various age groups between the circumstances of society transitions. It is rightly said that the health of a woman's body and oral cavity are bidirectional, hence they have special oral health needs and considerations.^[4] Periodontal disease occurs due to a complex interplay between susceptibility of host and microflora of the oral cavity. Different internal variables of the host has a direct or indirect impact on different stages of various oral infectious disease.^[5] Among these variables, sex hormones likely influence the pathophysiology of gingival inflammation, various periodontists like (ANUG), as hormonal changes have a great effect on the pathophysiological mechanism of human-parasite interlink inside the oral environment.^[6,7,8,9] secretion of the endocrine gland is unique controlling particles that regulate the reproductive system, growth factors, and proper maintenance of internal systems of the body as well as generation of energy and its consumption and remaining for storage in proper form.^[10]

We know it better than various changes that occur during 1st trimester to the 3rd trimester of pregnancy for which certain changes also occur inside an oral environment like gingival inflammation, periodontitis, pigmentation on the oral mucosa, etc most of these things are revers to normal form after some days.^[11,12] The true causative factor behind these changes are not well mentioned anywhere. These endocrine secretion changes can cause certain complications during pregnancy.^[13] The changes most commonly reported are pregnancy gingivitis and pregnancy epulis.^[14] Also, an association has been reported between Poor oral health and premature births and low birth weight.^[15,16,17,18]

When women reach their Menopause that leads to permanent stoppage of regular menstruation cycle which is next immediately stoping the ovulation mechanism. Non-inflammatory destructive periodontal disease (NIDPD) appears in old aged females through their menopause cycle or there is a tight bonding between menopause and on inflammatory destructive periodontal disease (NIDPD).^[19] The marginal, interdental, attached gingival status became worst during menopause in the absence of secretion of hormone-like gonadocorticoids. The present review addresses the effect of puberty, pregnancy, menopause, post-menopause, and oral

contraceptives and the changes in the hormonal level during this period of the life cycle of women affecting the periodontium.

Pathophysiology of Sex Hormones: Estrogen has a great impact directly on various cellular mechanisms, amplification, and development of body tissue.^[19] Oestrogen is the main causative factor in the process of various physiologic interchanges in females in different aspects of their life span: starting the age of puberty, during every periodic cycle, 1st to 3rd trimester of their each pregnancy, after the starting of the menopausal cycle in old age.^[19] Oestrogen and progesterone are the main sex hormones that can affect the periodontium by significantly influencing the different organ systems.^[10,20]

Various important cells in the mouth deeply affected by sex hormone-like estrogen, progesterone etc.^[19] through various cellular activities like the development of specialized cells of squamous epithelium the estrogen act.^{20]} various important receptors of sex hormone present in osteoblast has a great impact on compact bone, spongy bone in their development process. Some additional receptors of sex hormones which are mainly attached to different periodontal ligaments has some significant mechanical action on targeted periodontal cells.^[21]

The sex hormone mainly estrogen hinder the progress of IL-1, IL12, TNF-alfa, and GM-CSF which has great hand behind osteoclastic activity leading to compact and spongy bone loss. When there is less synthesis of sex hormone its plays a key role in severe inflammation of attached gingiva, marginal gingiva in generalized periodontitis case. On the other hand it has some contribution to skeletal bone loss mechanism.^[19]

Various sex hormones have a key role in different microvascular changes like inflammation of the endothelial layer of oral tissue, interruption in various mast cell formation, thrombi formation, the process of permeability of vessels became faster.^[19]

Role of Different Phases of Lifecycle on Oral Health:

Puberty: Puberty is regarded as the very first sign of maturity in turn towards the adult age group. Puberty is always linked with more production of estrogen and testosterone in both gender men and women. A lot of prevalence and follow up survey data tells that there is an interlink between the development of gingivitis in the

absence of dental during the starting period of puberty. severity of gingivitis has definite bonding with serum sex which fluctuate mean plaque score.^[22] Severe generalized inflammation of interdental gingiva, marginal gingiva, attached gingiva of maxilla and mandible sometimes associated with bleeding from the gingiva. Inflammation of gingiva (Generalised) is seen all around the labial surface and palatal surface of interdental, marginal, and attached gingiva in some case interdental gingiva is absent due to severe inflammation.^[23] A significant increase in gingivitis in children has been reported during the starting phase of the menstruation cycle. There is severe gingival inflammation reported among females at the age of 12 years, 10 months, and among males at 13 years, 7 months. This has been seen to coincide with the onset of puberty which could strongly play a major role in changes in oral-microflora in the presence of gram -ve anaerobic bacteria *P. Intermedia*, which later helps for the production of BGF in proper suitable oral environment. The mass of dental bio-film increases rapidly with various types of spirochetes like *Aa*. Gingival bleeding also present.^[23]

Menstruation: During the starting phase of the pubertal cycle there is a sudden increase in the release of sex hormone (estrogen, progesterone) in a regular manner.^[24] The female periodic cycle goes through 4 phases- 1st- menstrual, 2nd follicular, 3rd ovulation and 4th one is luteal phases. During the ovulation period the amount of secretion of sex hormone rapidly increased than its normal secretion.^[23] According to Lindhe et al at the time of ovulation the amount of secretion of GCF and exudate fluid of gingiva is more than normal days.^[25] Holm et al concluded from their study that there is a presence of mild to moderate gingivitis who are running through their periodic cycle.^[26] Data of Some studies say that most of the females developed minor or sometimes major aphthous ulcers during their periodic cycle. Some other surveys give data that minor aphthous ulcer develops in females only in the last phase of their periodic cycle that is the luteal phase where ovulation starts again. The study of Ferguson state that repeated aphthous ulcer develops in the oral cavity of the female during the periodic cycle but this data is still in controversy.^[10]

Pregnancy: In between 1st to 3rd trimester of pregnancy there are many changes in the amount of secretion of endocrine fluids. Corpus luteum took the amount of sex hormone very high due to constant secretion.^[23] There is a marked increase in the level

of estrogen and progesterone to the level hundred and six nanograms per milliliter during the last days of pregnancy.^[10] Changes in endocrinal secretion (release of sex hormone) during 1st trimester to 3rd trimester associated with marked increase in mild to severe gingival inflammation in some cases localize periodontitis seen.^[10]

Pregnancy gingivitis is a common condition reported among pregnant women affecting between thirty to a hundred percent between all pregnant female cases. Pinard was the first person to disclose the fact that increase gingival bleeding, edema like symptoms are seen during 1st to 3rd trimester. The information of all types of gingiva (attached marginal and interdental) some times associated with moderate referred pain with mild gingival bleeding. Some clinical periodontal signs found like increase BOP, amount of GCF increase, severe gingivitis found, increase gingival pocket depth beyond 4mm. Most frequently lower and upper anterior region of tooth segments are affected and the interproximal gingival unit also.^[27] A high amount of estrogen and progesterone found in oral fluid during 1st trimester to 3rd trimesters of pregnancy.^[28] Chances to develop oral infection like mild periodontitis, mild to severe gingival inflammation is more during 1st trimester due to low immunity, associated with low production of suppressor T cell, early maternity stress, disruption in realizing of various body hormones.^[23] A small majority of the pregnant women (0.5-9.6%) of which develop inflammation of gingiva which is associated with P Granulomatous tissue. This growth some times called benign tumor of pregnancy or pregnancy linked granuloma in reality these things are not true neoplasm. It cant be distinguished histologically nor clinically. This type of growth is painless, developed from marginal gingiva some times developed from interproximal area maxillary anterior tooth segments growth base is pedunculate type.^[23]

Oral Contraceptives: Birth control method are important factors with association with human chorionic gonadotropin trigger every trimester of pregnancy to stop the release of eggs from the ovary.^[22] Oral contraceptives tablets tries its best to make hormone level balance during the trimester.^[23] Currently, oral contraceptives pills come with the doses point zero five milligram estrogen per day and one point five milligram per day dose for progestins.^[22]

The clinical studies have reported that the use of

hormonal contraceptives in women influences periodontal disease progression in the form of a higher prevalence of gingival inflammation, loss of attachment, and gingival enlargement.^[29] marginal attached Gingival have an great response to localize triggering factors. Mild to severe gingival enlargement associated with mild to moderate gingival bleeding sometimes with hyperplasia. Melanin pigments of skin occasionally reported. Establishment of close bonds found in between the use of contraceptive tablets and the development of excess melanin pigment on the skin.^[22] A statistically significant increase in the prevalence of severe periodontitis was reported among Oral Contraceptive (OC) users, particularly smokers by Brusca et al.^[30] Loss of attachment ≥ 2 and ≥ 5 mm were reported among OC users in comparison to the non-users. Maximum numbers of culture media were found +ve to *Candida albicans*. The link with sub-gingival *C. albicans* to *Porphyromonas gingivalis* more than eighty-five percent in patients who regularly consume Oral contraceptives.^[30]

Menopause: When female reaches above 50 years menopause start which is also a natural process starting of menopause leads to permanent stoppage of females monthly period. Permanent stoppage of periods for a long period. A permanent interruptions around twelve months considered as menopause.^[31] When menopause starts in females after fifty years of age it has a great effect on their intra-oral structures. Studies give data that various new oral sign symptoms appear intraorally in females due to insufficient release of estrogen from the gland. Deficiency of Vit-E, Vit-K, Vit-B, Vit-D, and calcium also found in some females after menopause start.^[32,33] Xerostomia, burning mouth syndrome, alter in sensation of the test (most commonly metallic test) found in some females. Most of the females develop dental caries (mainly class 5 and class 2), mild to severe periodontitis in menopause. The maxillary and mandibular alveolar bone become unfit for endosteal implants in some cases because alveolar bone became very weak.^[34]

In association with xerostomia, some patients develop breathing difficulty, difficulty in digitization, mild to severe intraoral and extraoral pain.^[35,36] Periodontal problems can also be observed. Many females develop severe generalized gingivitis with mild bleeding.^[37,38,39] There is a minute interlink in between osteoporosis of maxillary and mandibular alveolar bone, climacteric, periodontal gingivitis, and mild periodontitis, but there is no data about direct link in this case because periodontitis and osteoporosis are multifactorial.^[40]

Some changes found in the buccal mucosa, mucosa of tongue etc. Some autoimmune disorder li and mucosal lichen planus also found intraorally.^[36]

Post-menopausal women: Females who receive HRT during post menopause to get rid of menopausal symptoms enjoying a good lifestyle.^[41,42] Many menopausal signs and Symptoms disappear after taking combine sex hormone therapy (progesterone and estrogen combination).^[43] The female who never receive HRT after menopause had developed lots of oral problems according to Allen NE study in the year 2010. Allen et al have published a systematic review on HRT vs dental outcomes with an emphasis on the costs of dental care.^[44] According to Paganini-Hill study use of ERT for a longer period reduces the risk for tooth loss.^[45]

Discussion

Different medical interventional research study gives new important data about oral health and its interlink with various sexual variation. The role that female sex hormones, pregnancy, and women's reproductive history play in contributing to the sex difference in oral health is supported by clinical research.^[5] A causal relationship between parity and poorer oral health in women will require greater care in research design that incorporates and controls for the diverse array of confounding variables, such as related oral lesions (periodontal disease and tooth loss), the details of women's reproductive histories, and contributing social and economic variables.^[46] Intersectoral approach between dental and other health departments can collect excellent data share among themselves for giving an excellent treatment plan.^[47] Preventive oral health care services should be provided during the onset of puberty, early stages of pregnancy, menopause and post-menopausal women to improve their quality of life.

Conclusion

Dental practitioners need to actively counsel female patients about general and oral health strategies so that they can maintain their oral health and maximize their quality of life. Excellent knowledge about the systemic disease and its link with different oral lessons at different phases of a women's life cycle will help a lot in the diagnosis and treatment of disease for doctors like gynecologists, endocrinologists, specialized dental professional and at last fulfill the needs of the suffering patients.

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