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Perspective

The Oral Health of Sportswomen from a Periodontist's Standpoint

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Abstract

Sports dentistry is gaining momentum beyond the injuries of the maxillofacial areas. The importance of maintaining good oral health on sports performance and overall quality of life is now understood. The recent increase in women's participation in sports creates a need for special attention towards women's periodontal health. Hormonal fluctuations influence periodontal health. Evidence shows that sports persons have poorer periodontal health due to immune alterations as a result of intense workout, hormonal and physiological changes, nutrition, stress, etc. Along with this, in the case of women sportspersons, the hormonal fluctuations that occur during puberty, regular menstrual cycle, pregnancy and menopause can be detrimental to the periodontium. Thus, this makes women sportspersons a special population that needs a personalised preventive approach to ensure good periodontal health and a positive effect on sports performance.

1. INTRODUCTION

In Brazil during the World Cup Soccer in 1958, Sports dentistry was introduced as a branch of dentistry[1,2]. Academy for Sports Dentistry defines "Sports Dentistry as the branch of sports medicine that deals with the prevention and treatment of dental injuries and related oral diseases associated with sport and exercise"[3-5].

Sports Dentistry primarily focused on sports-related maxillofacial injuries, but now, with an understanding of the impact on overall oral health, there is a paradigm shift that can be seen with emphasis on

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periodic evaluation of oral health. In recent times, Women's sports are gaining momentum, with increasing viewership and participation across the globe. Hence, there is a need for another paradigm shift - attention toward the oral health of female sportspersons. This narrative review aims to focus on the periodontal and oral health of female sportspersons.

2. DICHOTOMY OF ADVERSE PERIODONTAL HEALTH IN SPORTSPERSONS

Periodontitis is a multifactorial disease, and hence prevention is not just limited to maintenance of good oral hygiene but includes lifestyle modifications. Regular exercise, for instance, not only boosts physical capacities but also reduces many inflammatory markers. A recent meta-analysis states that the risk of periodontitis is 1.86 times higher in overweight/obese individuals, and the risk of periodontitis can be reduced by 23% with daily physical activities[6].

Physical activity improves periodontal health through various mechanisms (Figure 1). It decreases various proinflammatory mediators[7-10]; vascular

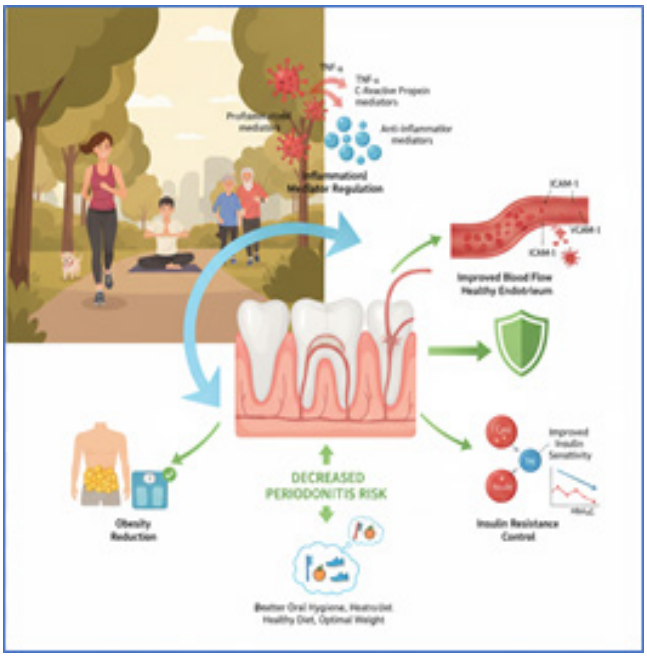


Figure 1. Mechanisms by which physical activity improves periodontal health.

changes brought about by exercise enhance circulation, improve endothelial function, drastically bring down vascular inflammatory markers and help in curtailing periodontal disease progression[11]. Physical activity improves diabetic control by lowering

Table 1. Sports and periodontal health[11]

Author, Year of study	Study population	Results
Gay-Escoda, 2011[14]	Professional soccer players	Plaque index score and Gingival index were 2.3 and 1.1, respectively; periodontal pocket depth was 1.9 mm.
Needleman *et al.*, 2012[15]	302 athletes from 25 sports	gingivitis in 76% of athletes, periodontitis in 15% of athletes
Kragt *et al.*, 2016[16]	800 athletes	mean± SD DPSI-score was 2.0 ± 0.73.
Gallagher *et al.*, 2018[17]	UK elite athletes from different sports	Basic Periodontal Examination score 1 or 2 was seen in 77% and score 3 or 4 in 21.6%.
Botelho *et al.*, 2021[18]	Group of professional footballers	Prevalence of periodontitis was 40.9%, and peri-implantitis
Merle *et al.*, 2022[19]	Young German athletes including the comparison of competitive (CA) and amateur sports (AA).	Both groups exhibited mild gingivitis (PBI <1). Periodontal therapy was required more in competitive sports

glycated haemoglobin (HbA1C) levels; diabetes and periodontitis have an established two-way relationship[12,13].

Despite evidence stating that physical activity improves periodontal health, sportspersons who have a prime focus on fitness and physical activity exhibit poor periodontal health (Table 1)

The answer to this dichotomy lies in the pleotropic effects intense physical activities can have on periodontal health. Although moderate physical activity enhances immune function, intense physical activity for a longer period may impair immune function[20]. Intense exercise causes an increase in leukocytes, plasma concentrations of various inflammatory, proinflammatory and anti-inflammatory cytokines, and acute-phase proteins[21]. Plasma concentration of several hormones also increases with intense workout. Elevated levels of cortisol due to muscle-derived IL-6 is seen in excessive exercise[22]. Athletes are also prone to develop mouth breathing, which can cause dry mouth. Competitive sports and championships are usually associated with tremendous performance stress on the athletes; stress by itself can predominantly increase the chance of periodontitis[23]. Athletes usually have a healthy diet; however, the intake of sports drinks and energy bars, which contain a high amount of carbohydrates, can be detrimental to periodontal health[24].

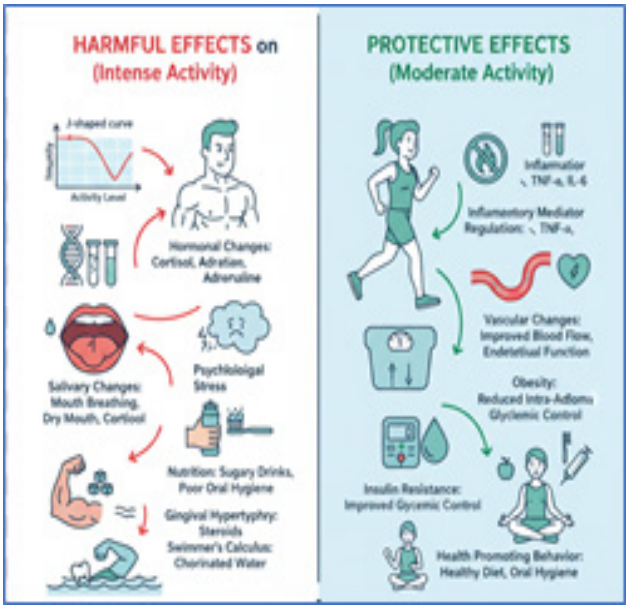


Figure 2. Adverse effects of intense exercise and sports-associated risk factors for periodontium in contrast to positive effects of moderate activity.

3. SPORTS AND PERIODONTAL HEALTH - A CONCERN FOR FEMALE SPORTSPERSON

The understanding of the requirement of special focus on women sportsperson and periodontal health can be better comprehended with the knowledge of basic anatomical, physiological and biological differences between male and female sportsperson. The sports

Table 2. Differences between male and female sportsperson[25]

Factors	Male	Female
Muscular and anaerobic power	Larger skeletal muscles Greater anaerobic power	Comparatively smaller skeletal muscles Lesser anaerobic power
Aerobic power	Higher VO_2 max	Lower VO_2 max
Body composition and anthropometrics	Taller, heavier and leaner than females	Greater % of fat. Lower power to lean mass ratio
Fuel metabolism	More glycolytic activities than females	Oxidise more fat and fewer carbohydrates and amino acids.
Biological	High level of testosterone at puberty	Hormonal variations due to the menstrual cycle, contraceptive pills and pregnancy

that an athlete plays determine how these factors play a role.

4. THE EFFECT OF MENSTRUAL CYCLE ON SPORTS PERFORMANCE

Female physiology is intriguing due to the fluctuating female sex hormone concentrations that are seen during menstrual cycle phases. These constantly changing hormonal concentrations should be taken into consideration for ensuring optimum sports performance while maintaining women's health.

The following mechanisms can explain the impact of the menstrual cycle on sports performance[26]

- Altered muscle activation
- Substrate metabolism
- Thermoregulation
- Transient fluctuations in body composition
- Neuroexcitatory effect of estrogen
- Cortical excitability inhibition by progesterone
- Changes in testosterone bioavailability
- Alterations in tissue stiffness

5. THE FEMALE ATHLETE TRILOGY

It is an assemblage of three clinical conditions seen among young sports women-

- menstrual dysfunction,
- low available energy (eating disorder may or may not be present), and
- decreased bone mineral density[27]

Menstrual Dysfunction: Functional Hypothalamic Amenorrhea (FHA) is a type of amenorrhea that is characterised by absence of menstrual cycle. This occurs when the hypothalamic-pituitary-ovarian axis is suppressed. Exercise and stress are commonly linked with this condition and hence the increased prevalence in female athletes[28-30].

Low energy availability: Female athletes are constantly under pressure to maintain body weight at a low level; in the absence of proper nutritional guidance, this can put them at risk for eating disorders[31]. Eating disorders can lead to low availability of energy.

Decreased bone mineral density: In young female athletes with the trilogy, a decrease in bone strength leads to low bone mineral density at a young age[32].

6. MENSTRUAL CYCLE AND PERIODONTAL HEALTH

Fluctuations in levels of estrogen and progesterone affect the periodontium. These have been extensively investigated with respect to puberty, pregnancy and post-menopause; however, there is a constant and consistent fluctuation that also occurs during the menstrual cycle and thus can have a transient effect as a modifying factor that can exacerbate pre-existing gingival inflammation.

Puberty gingivitis that occurs during puberty is essentially a response of the gingiva to the increase in sex hormones. Increased levels of progesterone and estrogen lead to alteration of immune response and also the oral microenvironment. This in turn can cause pathogenic strains to colonise on the tooth surface and also accentuate the response of gingival tissue to plaque accumulation[33]. valuvation of cytokines in the menstrual phase has shown that before ovulation, cytokine tumour necrosis factor-alpha (TNF-α) increases, while both interleukin-2 (IL-2) and IL-6 show no fluctuations before menstruation[34,35].

During pregnancy, especially the second trimester, pregnancy-associated gingivitis occurs due to the increase in progesterone. Pyogenic granuloma, also called a pregnancy tumour, is commonly seen. This is an inflammatory gingival lesion that results from hormonal fluctuation and its effect on the immune system and vasculature[33,36].

Periodontal health in women constantly faces challenges from hormonal fluctuation and the

cascade of alterations that follows in the immune and inflammatory responses of the body. The use of contraceptive pills, hormone replacement therapies and increased cortisol levels have also shown increased prevalence of gingivitis in women[37].

7. MENSTRUAL DYSFUNCTION AND PERIODONTITIS

Polycystic Ovarian syndrome, which is characterised by amenorrhea or oligorrhea, has been associated with increased susceptibility to periodontal disease[38,39]. Thus, menstrual dysfunction can cause alterations in hormones leading to exacerbation of underlying inflammatory conditions.

Menopause phase in women leads to a pleothara of changes; age-associated periodontitis can be a common occurrence in this phase. This susceptibility to periodontal disease results from the hormonal alterations. Premenopausal and menopausal phases are characterised by a decrease in estrogen[40]; this in turn causes a diminished flow of saliva and alters the composition as well to create pro-pathogenic organism colonisation[41].

The four important symptoms seen in menopause in the oral cavity are menopausal gingivostomatitis, osteoporosis, burning mouth syndrome, and xerostomia. These conditions are risk factors for periodontitis; hence, the increased occurrence of tooth loss and periodontitis is seen in this population[33,42].

8. EATING DISORDERS AND PERIODONTITIS

Eating disorders not only affect the teeth but also have an effect on the periodontium and oral mucosa. Dry lips, exfoliative cheilitis, labial erythema, burning tongue, and periodontal diseases are seen in individuals with eating disorders[43,44].

Eating disorders like anorexia nervosa and bulimia nervosa have been commonly seen in young females[45]. Athletes too are at a greater risk of developing eating disorders[46]. A high prevalence of these eating disorders is seen in female athletes[47]. Female athlete triad can also be a contributory factor for eating disorders.[32] Though eating disorders are prevalent in both lean aesthetic and non-lean sports categories, athletes participating in sports that demand a lean body are at a greater risk of eating disorders[46,48]. Eating disorders present with certain classical features like a predominant focus on food, body weight, and shape that pave the path for deranged eating patterns, such as fasting, skipping meals, starvation, overeating, and binge-eating, which eventually leads to clinical eating disorders[49].

9. BONE MINERAL DENSITY AND PERIODONTITIS

Periodontitis is a chronic disease-causing attachment loss and alveolar bone loss and, when left untreated, leads to tooth loss. Low bone mineral density is associated with an increased risk of periodontitis[50].

The poor periodontal health among sportspersons due to intense workouts and, in addition, gender-associated hormonal fluctuations makes sportswomen

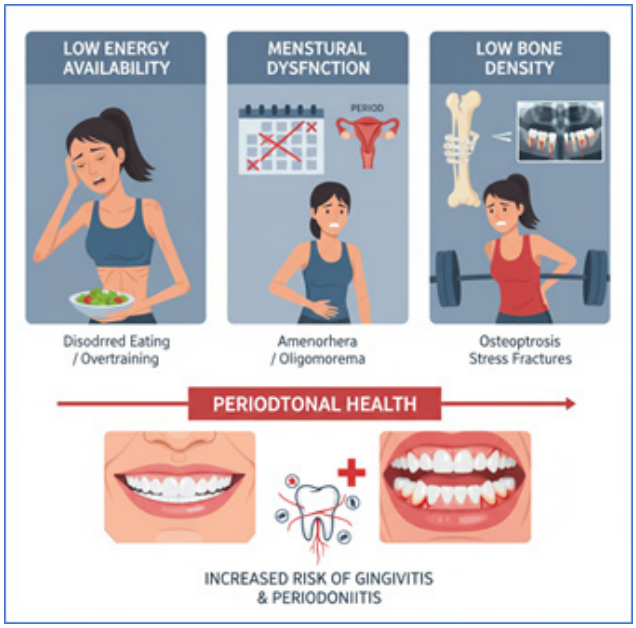


Figure 3. The female athlete trilogy and periodontal risk.

a highly susceptible population to periodontitis. (Figure 3) Relative Energy Deficiency in sports (REDs) is a syndrome characterised by impaired physiological and/or psychological functioning caused by longer exposure to low energy availability[51]. This syndrome occurs essentially due to a combination of disordered training and overtraining. These impairments in physiological functioning can be a contributory factor towards ammenhorreha and thus lead to the female athlete triad, in which low bone mineral density is one of the factors.

It has been seen that low Bone Mineral Density can cause interproximal bone loss and thus osteopenia is among the risk indicators of periodontal disease[50].

10. PREPUBERTAL AND PUBERTAL GINGIVITIS

Most sportspersons start young in childhood and adolescence, like swimmers and gymnasts; hence, they are also susceptible to prepubertal gingivitis and pubertal gingivitis. It is an exaggeration of gingivitis by alterations in sex hormone levels during puberty. The relation between elevated levels of hormones and pubertal gingivitis can be established from the prevalence of gingivitis seen in girls at an earlier age than boys, overlapping with the puberty period[51].

11. CONCLUSION

A woman's life can be sculpted through the various phases of hormonal fluctuation, from puberty, pregnancy, perimenopausal, to the menopausal phase; each part has a large impact on mental and physical well-being. The oral cavity and especially periodontal health endures numerous alterations. The change in oral microenvironment promoting growth of periodontal pathogens causes initiation of periodontal disease, and an exaggerated immune inflammatory response ensures the progression of the disease. These changes, along with extraoral manifestations, can impact the quality of life as well. This demands that women's oral health needs special attention, and while treating women with periodontal disease, the hormonal fluctuations should be considered.

Sportspersons have been shown to have increased periodontitis due to the immunomodulatory effects resulting from intense workouts and various other risk factors. This can have an impact on sports performance as well. Thus, women sports persons become a population that needs urgent attention due to the dual effect of hormones and intense workout. The focus should not only be on treating the disease, but also should aim at creating awareness on preventive measures among women sportspersons.

Thus, by implementation of strategies to control the manifestations of hormonal fluctuations and intense workout, women sportspersons can boost both their sports performance and quality of life.

12. REFERENCES

1. Soares PV, Tolentino AB, Machado AC, Dias RB, Coto NP. Sports dentistry: A perspective for the future. Rev Bras Educ Fís Esporte. 2014; 28:351-358. https://doi.org/10.1590/1807-55092014000200351
2. Saini R. Sports dentistry. Natl J Maxillofac Surg. 2011; 2:129-131. https://doi.org/10.4103/0975-5950.94465 PMid:22639498 PMCid:PMC3343409
3. Kaur A, Kochhar G, Ahlawat B, Bansal V. Sports dentistry-guarding generation next! Ind J Dent Sci. 2013; 5:6-10.
4. Smith WS, Kracher CM. Sports-related dental injuries and sports dentistry. Dent Assist. 1998; 67:12-16.
5. Deogade SC, Dube G, Sumathi K, Dube P, Katare U, Katare D, *et al.* Sports dentistry and mouthguards. Br J Med Med Res. 2016; 11:1-10. https://doi.org/10.9734/BJMMR/2016/20413 PMid:26846342
6. Rodríguez-Archilla A, Padrón-Curiel DA. Influence of physical exercise on periodontal disease: A meta-analysis. Int J Dent Sci. 2022; 4(1):21-26.
7. Al-Zahrani MS, Borawski EA, Bissada NF. Increased physical activity reduces prevalence of periodontitis. J Dent. 2005; 33(9):703-710. https://doi.org/10.1016/j.jdent.2005.01.004 PMid:16150525 PMCid: PMC10513807
8. Iwasaki M, Yoshihara A, Suwama K, Zaitsu T, Suzuki S, Ihira H, *et al.* Association between periodontitis and

physical activity in the Japanese population: A cross-sectional study. J Periodontal Res. 2023; 58(2):350-359. https://doi.org/10.1111/jre.13095 PMid:36642784

9. Codella R, Guardia LD, Terruzzi I, Solini A, Folli F, Varoni EM, *et al*. Physical activity as a proxy to ameliorate inflammation in patients with type 2 diabetes and periodontal disease. Nutr Metab Cardiovasc Dis. 2021; 31(8):2199-209. https://doi.org/10.1016/j.numecd.2021.04.022 PMid:34099361
10. Ferreira RO, Corrêa MG, Magno MB, Almeida A, Fagundes NCF, Rosing CK, *et al*. Physical activity reduces the prevalence of periodontal disease: Systematic review and meta-analysis. Front Physiol. 2019; 10:234. https://doi.org/10.3389/fphys.2019.00234 PMid:30949062 PMCid: PMC6438044
11. Deepa NS, Chatterjee A. Periodontal health: A game changer in sports dentistry. RGUHS J Dent Sci. 2025; 17(4):9-14. https://doi.org/10.26463/rjds.17_4_10
12. Asfaw MS, Dagne WK. Physical activity improves glucose control in diabetes patients: A systematic review and meta-analysis. Heliyon. 2022; 8(12):e12267. https://doi.org/10.1016/j.heliyon.2022.e12267 PMid:36578408 PMCid:PMC9791347
13. Yun I, Joo HJ, Park YS, Park EC. Association between physical exercise and glycated haemoglobin levels in Korean patients with diabetes. Int J Environ Res Public Health. 2022; 19(6):1667. https://doi.org/10.3390/ijerph19063280 PMid:35328970 PMCid:PMC8951637
14. Gay-Escoda C, Vieira-Duarte-Pereira DM, Ardèvol J, Pruna R, Fernandez J, Valmaseda-Castellón E. Effect of oral health on physical condition of professional soccer players of FC Barcelona. Med Oral Patol Oral Cir Bucal. 2011; 16:436-439. https://doi.org/10.4317/medoral.16.e436 PMid:20711109
15. Needleman I, Ashley P, Petrie A, Fortune F, Turner W, Jones J, *et al*. Oral health and impact on performance of athletes at London 2012 Olympic Games. Br J Sports Med. 2013; 47:1054-1058. https://doi.org/10.1136/bjsports-2013-092891 PMid:24068332 PMCid:PMC3812828
16. Kragt L, Moen MH, Van Den Hoogenband CR, Wolvius EB. Oral health among Dutch elite athletes prior to Rio 2016. Physician Sportsmed. 2019; 47(2):182-188. https://doi.org/10.1080/00913847.2018.1546105 PMid:30408425
17. Gallagher J, Ashley P, Petrie A, Needleman I. Oral health and performance impacts in elite athletes. Community Dent Oral Epidemiol. 2018; 46(6):563-568. https://doi.org/10.1111/cdoe.12392 PMid:29938820
18. Botelho J, Vicente F, Dias L, Júdice A, Pereira P, Proença L, *et al*. Periodontal health, nutrition and anthropometry in professional footballers. Nutrients. 2021; 13(6):1792. https://doi.org/10.3390/nu13061792 PMid:34070244 PMCid:PMC8225082
19. Merle CL, Richter L, Challakh N, Haak R, Schmalz G, Needleman I *et al*. Orofacial conditions and oral health behavior of young athletes. Scand J Med Sci Sports. 2022; 32:903-912. https://doi.org/10.1111/sms.14143 PMid:35174553
20. Gleeson M. Immune function in sport and exercise. J Appl Physiol. 2007; 103(2):693-699. https://doi.org/10.1152/japplphysiol.00008.2007 PMid:17303714
21. Northoff H, Berg A, Weinstock C. Immune response to exercise and trauma: The IFN concept. Can J Physiol Pharmacol. 1998; 76:497-504. https://doi.org/10.1139/y98-052 PMid:9839075
22. Steensberg A, Fischer CP, Keller C, Møller K, Pedersen BK. IL-6 enhances IL-1ra, IL-10, and cortisol in humans. Am J Physiol Endocrinol Metab. 2003; 285(2):E433-E437. https://doi.org/10.1152/ajpendo.00074.2003 PMid:12857678
23. Ashley P, DiIorio A, Cole E, Tanday A, Needleman I. Oral health of elite athletes and association with performance: A systematic review. Br J Sports Med. 2015; 49(1):14. https://doi.org/10.1136/bjsports-2014-093617 PMid:25388551 PMCid:PMC4316843
24. Khan K, Qadir A, Trakman G, Aziz T, Khattak MI, Nabi G, *et al*. Energy drink consumption and oral health among athletes. Nutrients. 2022; 14(23):5089. https://doi.org/10.3390/nu14235089 PMid:36501119 PMCid:PMC9738880
25. Hunter SK, Angadi SS, Bhargava A, Harper J, Hirschberg AL, Levine BD, *et al*. Biological basis of sex differences in athletic performance. Transl J Am Coll Sports Med. 2023; 8(4):1-33. https://doi.org/10.1249/TJX.0000000000000236
26. Carmichael MA, Thomson RL, Moran LJ, Wycherley TP. Menstrual cycle phase and athletes' performance. Int J Environ Res Public Health. 2021; 18(4):1667. https://doi.org/10.3390/ijerph18041667 PMid:33572406 PMCid:PMC7916245
27. Nazem TG, Ackerman KE. The female athlete triad. Sports Health. 2012; 4(4):302-311. https://doi.

org/10.1177/1941738112439685 PMid:23016101 PMCid:PMC3435916

28. Golden NH, Iglesias EA, Jacobson MS, Carey D, Meyer W, Schebendach J, *et al*. Alendronate for osteopenia in anorexia nervosa. J Clin Endocrinol Metab. 2005; 90(6):3179-3185. https://doi.org/10.1210/jc.2004-1659 PMid:15784715
29. Meczekalski B, Podfigurna-Stopa A, Warenik-Szymankiewicz A, Genazzani AR. Functional hypothalamic amenorrhea. Gynecol Endocrinol. 2008; 24(1):4-11. https://doi.org/10.1080/09513590701807381 PMid: 18224538
30. Saadedine M, Kapoor E, Shufelt C. Functional hypothalamic amenorrhea: Recognition and management. Mayo Clin Proc. 2023; 98(9):1376-1385. https://doi.org/10.1016/j.mayocp.2023.05.027 PMid:37661145 PMCid: PMC10491417
31. Nichols DL, Sanborn CF, Essery EV. Bone density in young athletic women. Sports Med. 2007; 37(11):1001-1014. https://doi.org/10.2165/00007256-200737110-00006 PMid:17953469
32. Beals KA, Meyer NL. Female athlete triad update. Clin Sports Med. 2007; 26(1):69-89. https://doi.org/10.1016/j.csm.2006.11.002 PMid:17241915
33. Sathish AK, Varghese J, Fernandes AJ. Sex hormones and the periodontium. Curr Oral Health Rep. 2022; 9(4):146-156. https://doi.org/10.1007/s40496-022-00321-0
34. Baser U, Cekici A, Tanrikulu-Kucuk S, Kantarci A, Ademoglu E, Yalcin F. Gingival inflammation during menstrual cycle. J Periodontol. 2009; 80(12):1983-1990. https://doi.org/10.1902/jop.2009.090076 PMid: 19961381
35. Markou E, Boura E, Tsalikis L, Deligianidis A, Konstantinidis A. Sex hormones and cytokines in gingiva. J Periodontal Res. 2011; 46(5):528-532.
36. Jawed STM, Jawed TK. Hormonal changes and gingival health in women. Cureus. 2025; 17(6):e85270.
37. Deasy MJ, Vogel RI. Female hormonal factors in periodontal disease. Ann Dent. 1976; 35(3):42-46.
38. Ozcaka O, *et al*. Interaction between PCOS and gingival inflammation. J Clin Periodontol. 2012; 39:113.
39. Porwal S, Tewari S, Sharma RK, Singhal SR, Narula SC. Periodontal status in PCOS. J Periodontol. 2014; 85:1380-9. https://doi.org/10.1902/jop.2014.130756 PMid:24592911
40. Meurman JH, Tarkkila L, Tiitinen A. Menopause and oral health. Maturitas. 2009; 63:56-62. https://doi.org/10.1016/j.maturitas.2009.02.009 PMid:19324502
41. Lopes Cardoso I, Fryde M, Guimarães MI, Leal F. Female hormonal changes and oral health. J Dent Sci. 2026; 21(1):31-48. https://doi.org/10.1016/j.jds.2025.09.016 PMid:41585155 PMCid:PMC12826029
42. Güncü GN, Tözüm TF, Çağlayan F. Effects of sex hormones on the periodontium. Aust Dent J. 2005; 50:138-145. https://doi.org/10.1111/j.1834-7819.2005.tb00352.x PMid:16238210
43. Romanos GE, Javed F, Romanos EB, Williams RC. Orofacial manifestations in eating disorders. Appetite. 2012; 59:499-504. https://doi.org/10.1016/j.appet.2012.06.016 PMid:22750232
44. Schlosser BJ, Pirigyi M, Mirowski GW. Oral manifestations of hematologic and nutritional diseases. Otolaryngol Clin North Am. 2011; 44(1):183-203. https://doi.org/10.1016/j.otc.2010.09.007 PMid:21093629
45. Sharan P, Sundar AS. Eating disorders in women. Indian J Psychiatry. 2015; 57(Suppl 2):S286-S295. https://doi.org/10.4103/0019-5545.161493 PMid:26330646 PMCid: PMC4539873
46. Godoy-Izquierdo D, Ramírez MJ, Díaz I, López-Mora C. Exercise addiction and eating disorders. Int J Ment Health Addict. 2021; 1-33.
47. Smolak L, Murnen SK, Ruble AE. Female athletes and eating problems. Int J Eat Disord. 2000; 27(4):371-380. https://doi.org/10.1002/(SICI)1098-108X(200005)27:4<371::AID-EAT1>3.0.CO;2-Y
48. De Bruin AK. Athletes with eating disorder symptomatology. Curr Opin Psychol. 2017; 16:148-53. https://doi.org/10.1016/j.copsyc.2017.05.009 PMid: 28813340
49. Nattiv A, Loucks AB, Manore MM, Sanborn CF, Sundgot-Borgen J, Warren MP. Female athlete triad. Med Sci Sports Exerc. 2007; 39(10):1867-1882. https://doi.org/10.1249/mss.0b013e318149f111 PMid:17909417
50. Tezal M, Wactawski-Wende J, Grossi SG, Ho AW, Dunford R, Genco RJ. Bone mineral density and periodontitis. J Periodontol. 2000; 71(9):1492-1498. https://doi.org/10.1902/jop.2000.71.9.1492 PMid:11022780
51. Pradhan S, Mohanty S, Acharya S, Shukla M, Bhuyan S. Gingival diseases in children and adolescents. Indian J Forensic Med Toxicol. 2020; 14(4).