


Original Research Article

The importance of oral hygiene in Polycystic Ovarian Syndrome (PCOS) and its effect on overall treatment of PCOS - A questionnaire based survey

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Abstract

Background: Polycystic ovary syndrome (PCOS) is the most common endocrine disorder among women of reproductive age. A convergent association between polycystic ovary syndrome (PCOS) and periodontal disease, in particular chronic periodontitis (CP), has recently been proposed. The underlying molecular mechanisms of this association are not fully understood, though it is thought that chronic inflammation is responsible.

Aim: To assess the awareness of periodontal health status and systemic inflammation of women receiving medical treatment for PCOS and women newly diagnosed with PCOS.

Materials and methods: A total of 500 PCOS diagnosed women were recruited based on convenience sampling and completed a survey containing questions related to demography, lifestyle preferences, PCOS awareness and periodontal awareness.

Results: Lack of awareness of oral hygiene and its importance on overall treatment of PCOS was observed.

Conclusion: There is a dire need of generating oral hygiene awareness via health centres, internet, media etc. and providing full information about the association of PCOS with Oral hygiene, so that many symptoms of PCOS can be overcome after strictly following oral hygiene measures.

Key words

PCOS, Oral hygiene, Systemic health, Periodontal awareness.

Introduction

Periodontal diseases are infectious diseases caused by bacteria that affect the periodontium, which is composed of the gum, periodontal ligament, cement, and alveolar bone. Chronic periodontitis (CP) is initiated by an accumulation of bacterial plaque containing periodontopathic germs, which require the presence of a susceptible host [1]. The presence of supra- and subgingival biofilms triggers the activation of the host's immune system, primarily with protective objectives, but this ultimately leads to the destruction of periodontal tissues due to the synthesis and release of cytokines, proinflammatory mediators, and matrix metalloproteinases (MMPs) [2], which favour the chronification of low-grade inflammation [3, 4]. In addition to the worsening of oral health related quality of life, due to its chronic inflammatory nature, CP is associated with a systemic state of oxidative stress, mitochondrial dysfunction [5], and multiple systemic diseases [6, 7]. Diabetes mellitus is a traditional risk factor for CP and a bidirectional association between the two diseases has been established [8]. In recent years, newly discovered interactions between CP and other systemic disorders have been the subject of translational research that has confirmed an association of CP with other insulin-resistance (IR) diseases, such as polycystic ovary syndrome (PCOS), rheumatoid arthritis, and cardiovascular disease (CVD), and with a risk of premature births and even some types of cancer [9, 10].

PCOS is a complex endocrine disorder (prevalence ranging from 9.13% - 36% in India) characterized by the presence of anovulation, menstrual dysfunction, infertility, and hirsutism. In its typical form, it is frequently associated with obesity (predominantly of the abdominal phenotype), dyslipidemia, IR, and hyperinsulinemia, thereby increasing the risk of type 2 diabetes and CVD [11]. The pathogenesis of PCOS is poorly understood, but chronic

infections like those that characterise this disease are associated with an increase in oxidative stress and systemic inflammation, and in lipid peroxidation markers, myeloperoxidase, c-reactive protein (CRP), inflammatory cytokines, adhesion molecules, and blood lymphocytes and monocytes [12-14].

Recently, a significant association has been proposed between CP and PCOS. The stimulation and chronic secretion of proinflammatory cytokines associated with periodontal infection contributes to IR. This pathognomonic state of systemic inflammation and IR, present in both CP and PCOS, could be an etiologic mechanism linking these two diseases [15].

Keeping in view an association between periodontal disease and PCOS, as is evident from various researches, it has been found that periodontal parameters are altered more frequently in PCOS patients than in healthy young women and vice versa. To achieve good oral hygiene in PCOS females and to overall have a good impact on PCOS treatment by following oral hygiene maintenance, a survey was warranted to inform the PCOS females about the relationship between the two diseases. Hence this study was sought to clarify the relationship between PCOS and periodontal disease and achieve good results in PCOS treatment by educating the females.

Aim and objectives

With increasing prevalence of polycystic ovary syndrome (PCOS) in J&K, it is important that sufficient awareness of this issue be generated, especially in ethnic population of J&K. Hence, the aims and objectives of this study were as follows:-

1. To assess the awareness of periodontal health status and systemic inflammation of women receiving medical treatment for

PCOS and women newly diagnosed with PCOS.

2. To explore the periodontal status, importance of oral hygiene maintenance and its consequences on the overall treatment of PCOS.

Materials and methods

In this cross-sectional study, a total of 500 women were selected of the age group 18-45 years, visiting the Department of Endocrinology Government Medical College, Srinagar. Informed consent was obtained prior to the study. All clinical assessments were performed for all 500 women with PCOS. PCOS condition was diagnosed according to the criteria of Rotterdam2003 [16] with the presence of at least two of the following: (1) polycystic ovaries (presence of >12 follicles in each ovary measuring 2–9 mm in diameter and/or increased ovarian volume >10 ml), (2) oligomenorrhea and/or anovulation and (3) hyperandrogenism (Clinical: Acne, Hirsutism, acanthosisnigrans, Biochemical: Total T >70 ng/dl, Androstenedione >245 ng/dl, DHEA-S >248 µg/dl). Sufficient information about the study was provided to all participants. A pre-structured questionnaire was filled with the demographic details along with history of systemic diseases, antibiotics consumption, pregnancy, periodontal diseases treatment, smoking, and oral health will be collected. The exclusion criteria for this study group were as follows: less than 18 years of age; systemic antibiotics, corticosteroids and/or immunosuppressive drugs within the last 3 months prior to periodontal examination or periodontal treatment within the last year.

Data Collection Instrument and Procedure

The questionnaire was designed in consultation with a gynaecologist, statistician, and a periodontist. Socio-demographic and Medical Questionnaires by means of a structured questionnaire, the following information was collected: (1) gender, age, educational level; (2) smoking habits; (3) oral hygiene-related behaviours (toothbrushing frequency and

interproximal cleaning); (5) attitudes and awareness towards oral health; (6) presence of systemic diseases (such as diabetes mellitus and hypertension).

Questionnaire

Demographic information

1. Age:-

- a) 18-25yrs.
- b) 25-30yrs.
- c) 35-40yrs.
- d) 40-45yrs.

2. Marital status:-

- a) Unmarried
- b) Married (having children)
- c) Married (unable to conceive)

3. Weight:-

- a) <50kgs.
- b) 50-60kgs.
- c) 60-70kgs.
- d) 70-80kgs.
- e) >80kgs.

4. Height:-

- a) <140cm
- b) 140-150cm
- c) 150-160cm
- d) >160cm

5. Academic level:-

- a) Elementary
- b) Middle
- c) Higher
- d) Professional

Lifestyle preferences

1. Smoking habit:-

- a) Non-smoker
- b) Former smoker
- c) Active smoker

2. Frequency of Physical activity:-

- a) 5hrs.or </week
- b) >10hrs./week
- c) sedentary

3. Fast food consumption:-

- a) <5times/week
- b) 5-10times/week
- c) >10times/week
- d) doesn't take

4. Carbonated drink consumption:-

- a) 1-3 soft drinks/week
- b) > 5/week
- c) doesn't like

PCOS awareness

1. Have you heard about PCOS?

- a) Yes
- b) No

2. PCOS symptoms:-

- a) Acne
- b) Absent/excess bleeding
- c) excessive hair growth
- d) patches of dark skin
- e) obesity
- f) infertility
- g) all of the above

3. Presence of any other systemic disease:-

- a) Hypertension b) Diabetes Mellitus c) Any other d) None

4. Do you know any family member or friend experiencing symptoms of PCOS?

- a) Yes b) No

5. Are you aware that PCOS can be managed with diet and exercise?

- a) Yes b) No

6. Preferred source of obtaining PCOS related information?

- a) School/colleges b) Health centre c) Internet d) Media

7. Does PCOS put me at risk for other health conditions:-

- a) Yes_ Diabetes b) No
_ High BP
_ Heart ailments
_ Endometrial hyperplasia
_ Sleep apnea
_ Depression

8. Do you think it is important for girls of your age to know more about PCOS?

- a) Yes b) No

Periodontal awareness

1. How many times do you clean your teeth?

- a) Once b) Twice c) After every meal d) Never

2. What do you use for cleaning teeth?

- a) Toothbrush and toothpaste b) Toothbrush and toothpowder c) Finger and toothpaste/ toothpowder d) Neem stick e) Neem twig

3. Do you use any other cleaning aid?

- a) Floss b) Interdental brush c) Tongue cleaner d) Mouth wash e) No

4. Do you think oral hygiene is mandatory for overall health of the body?

- a) Yes b) No c) haven't heard about it

5. Do you seek routine dental visit for oral hygiene maintenance?

- a) Yes b) No c) dental visit only at the time of emergency

6. Do you think there is a relation between oral hygiene maintenance and PCOS?

- a) Yes b) No c) haven't heard about it

7. What do you think PCOS can cause:-

- a) Bleeding gums b) More plaque build up c) Foul odour d) Loose teeth d) all e) None

8. Do you know maintaining good oral hygiene may result in improving health in PCOS?

- a) Yes b) No

9. Have you started taking medicines for PCOS?

- a) Yes b) No c) haven't been prescribed

10. Do you know medicines taken for PCOS may result in improving gum diseases in PCOS?

- a) Yes b) No

11. Are you more aware of PCOS after completing this survey than before?

- a) Yes b) No

The study was approved by the Research Ethical Committee at Government Dental college, Srinagar. (No.:- ECC-GDC/0051, date:- 6/2/2022).

Statistical analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0(SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean + Demographic, lifestyle, PCOS awareness and Periodontal awareness variables were expressed in frequencies and percentages.

Results

Demographics

Of the 500 patients who participated in the study, the majority of respondents were between 18-25 years of age (66.8%), 23.4% were between 25-30 years of age, and 9.8% were above 30 years. However, age did not appear to influence knowledge of reproductive health or PCOS awareness and even oral hygiene maintenance.

The majority (83.4%) of patients was unmarried and 16.6% were married. It was observed that 46.6% of participating women weighed between 50–60 kgs and 23.4% weighed between 60–70 kgs, 13.4% weighed above 70 kgs, and 16.6% weighed less than 50 kgs. Women who reported

being diagnosed with PCOS were distributed through all the weight ranges and weight did not seem to correlate with the periodontal awareness. The majority of women (49.6%) reported that they were more than 150 cm in height and only 3.8% were below 140 cm (**Table – 1**).

Table - 1: Demographic information of study subjects.

Variable		Number	Percentage
Age (Years)	18-25 Yrs	334	66.8
	25-30 Yrs	117	23.4
	≥ 30 Yrs	49	9.8
Marital status	Married	83	16.6
	Unmarried	417	83.4
Weight (Kg)	< 50 Kg	83	16.6
	50-60 Kg	233	46.6
	60-70 Kg	117	23.4
	70-80 Kg	67	13.4
Height (cm)	< 140 cm	19	3.8
	140-150 cm	216	43.2
	150-160 cm	248	49.6
	≥ 160 cm	17	3.4
Academic level	Elementary	16	3.2
	Middle	64	12.8
	Higher	203	40.6
	Professional	217	43.4

Table - 2: Lifestyle preferences of study patients.

		Number	Percentage
Smoking status	Smoker	7	1.4
	Non smoker	493	98.6
Frequency of physical activity	≤ 5 hours/week	337	67.4
	5-10 hours/week	134	26.8
	> 10 hours/week	29	5.8
Fast food consumption	Doesn't take	129	25.8
	< 5 times/week	284	56.8
	5-10 times/week	87	17.4
Carbonated drink consumption	Doesn't like	347	69.4
	1-3 soft drinks/week	153	30.6

PCOS diagnosed women appeared to be divided in their academic level at the elementary (3.2%), Middle (12.8%), higher (40.6%) and professional degrees (43.4%). It was observed from the demographic results that highly qualified women

were more having PCOS condition than almost women with less academic level.

Lifestyle preference

The majority of PCOS women (98.6%) were non-smokers. In total, 67.4% women responded

saying that they performed 5 hours or less of physical activity per week and only 5.8% reported doing more than 10 hours/week. There was no significant association between physical activity and PCOS diagnosis. Also, 56.8% of women reported consuming fast food less than 5 times a week, 17.4% at least 5–10 times a week, and 25.8% said no to fast food consumption;

majority of women (69.4%) did not take carbonated drinks and 30.6% consumed 1–3 soft drinks per week. This analysis suggested good awareness about harmful effects of carbonated drinks and fast food on health but this thing cannot relate with the periodontal awareness (**Table – 2**).

Table - 3: PCOS awareness.			
		Number	Percentage
Have you heard about PCOS	Yes	467	93.4
	No	33	6.6
PCOS Symptoms	Acne	228	45.6
	Excessive bleeding	217	43.4
	Excessive hair growth	267	53.4
	Patches of dark skin	102	20.4
	Obesity	203	40.6
	Infertility	52	10.4
	All of the above	114	22.8
Presence of any systemic disease	Diabetes Miletus	129	25.8
	Hypertension	87	17.4
	Others	23	4.6
Do you know any family member or friend experiencing symptoms of PCOS	Yes	417	83.4
	No	83	16.6
Are you aware that PCOS can be managed with diet and exercise	Yes	483	96.6
	No	17	3.4
Preferred source of obtaining PCOS related information	Internet	257	51.4
	Health centre	164	32.8
	Media	48	9.6
	School/College	31	6.2
Does PCOS put me at risk for other health conditions	Yes	436	87.2
	No	64	12.8
Do you think it is important for girls of your age to know more about PCOS	Yes	481	96.2
	No	19	3.8

PCOS awareness

Due to its high incidence rates almost 93.4% had heard about PCOS condition. Preferred source of information about PCOS was internet (51.4%) followed by health centres (32.8%). Women were asked about the symptoms of PCOS they face. In response, 43.4% of students reported experiencing heavy/absent bleeding, 53.4% reported excessive hair growth on unusual locations such as the face, chest, abdomen, or upper thighs, 45.6% reported oily skin with acne,

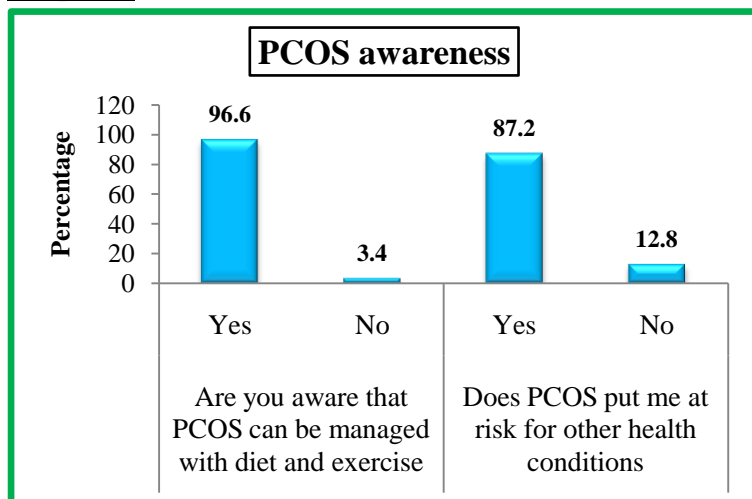
and 20.4% reported persistent occurrence of patches of thick dark skin. 4.6% women were obese and 10.4% were infertile and 22.8% were experiencing all the major symptoms. There was a strong correlation of PCOS occurrence with obesity. When asked about the presence of any other systemic disease, the respondents reported 25.8% of diabetes mellitus followed by hypertension. While 83.4% women knew friends or family who were experiencing symptoms of PCOS, 96.6% of total respondents were aware

that PCOS could be managed with proper diet, exercise, and medication. Of the 500 women that participated in the survey, 87.2% agreed that PCOS can put one at risk for other health conditions and 83.4% agreed that they were more

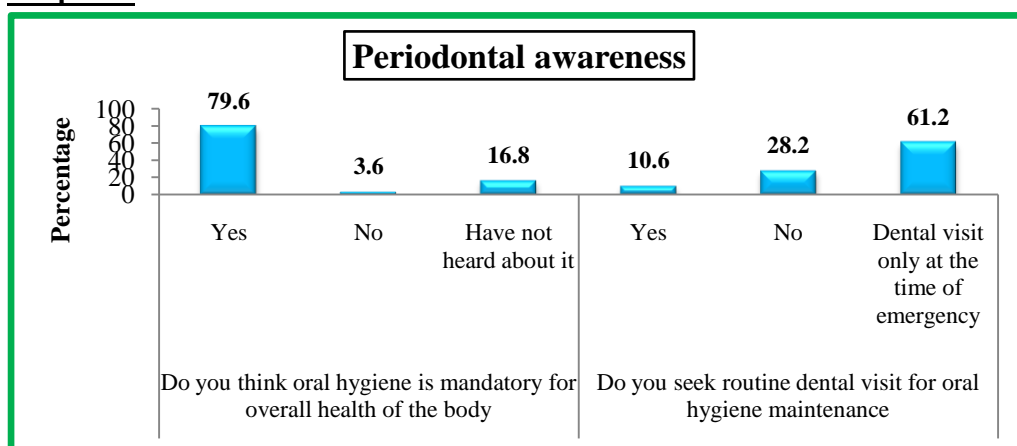
aware about PCOS after completing the survey. A clear majority of 96.2% women felt that it was very important for ladies of their age to know more about this disease (**Table – 3, Graph - 1**).

Table - 4: Periodontal awareness.			
		Number	Percentage
How many times do you clean your teeth	Once	403	80.6
	Twice	83	16.6
	After every meal	14	2.8
What do you use for cleaning teeth	Tooth brush & tooth paste	462	92.4
	Tooth brush & tooth powder	13	2.6
	Finger and tooth paste	4	0.8
	Neem stick	21	4.2
Do you use any other cleaning aid	Floss	51	10.2
	Tongue cleaner	84	16.8
	Mouth wash	17	3.4
	No	348	69.6
Do you think oral hygiene is mandatory for overall health of the body	Yes	398	79.6
	No	18	3.6
	Have not heard about it	84	16.8
Do you seek routine dental visit for oral hygiene maintenance	Yes	53	10.6
	No	141	28.2
	Dental visit only at the time of emergency	306	61.2
Do you think there is a relation between oral hygiene maintenance and PCOS	Yes	52	10.4
	No	84	16.8
	Have not heard about it	368	73.6
What do you think PCOS can cause	Nothing	302	60.4
	Bleeding gums	132	26.4
	More plaque build up	16	3.2
	Foul odour	3	0.6
	Loose teeth	31	6.2
	All of these	16	3.2
Do you know maintaining good oral hygiene may result in improving health in PCOS	Yes	217	43.4
	No	283	56.6
Have you started taking medicines for PCOS	Yes	353	70.6
	No	147	29.4
Do you know medicines taken for PCOS may result in improving gum diseases in PCOS	Yes	117	23.4
	No	383	76.6
Are you more aware of PCOS after completing this survey than before	Yes	417	83.4
	No	83	16.6

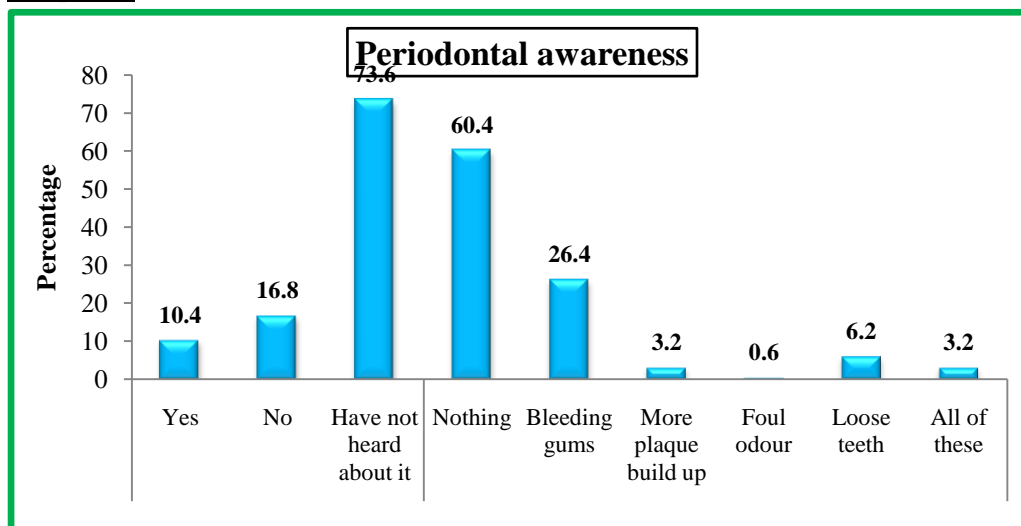
Graph – 1: PCOS awareness.



Graph – 2: Periodontal awareness.



Graph – 3: Periodontal awareness.



Periodontal awareness

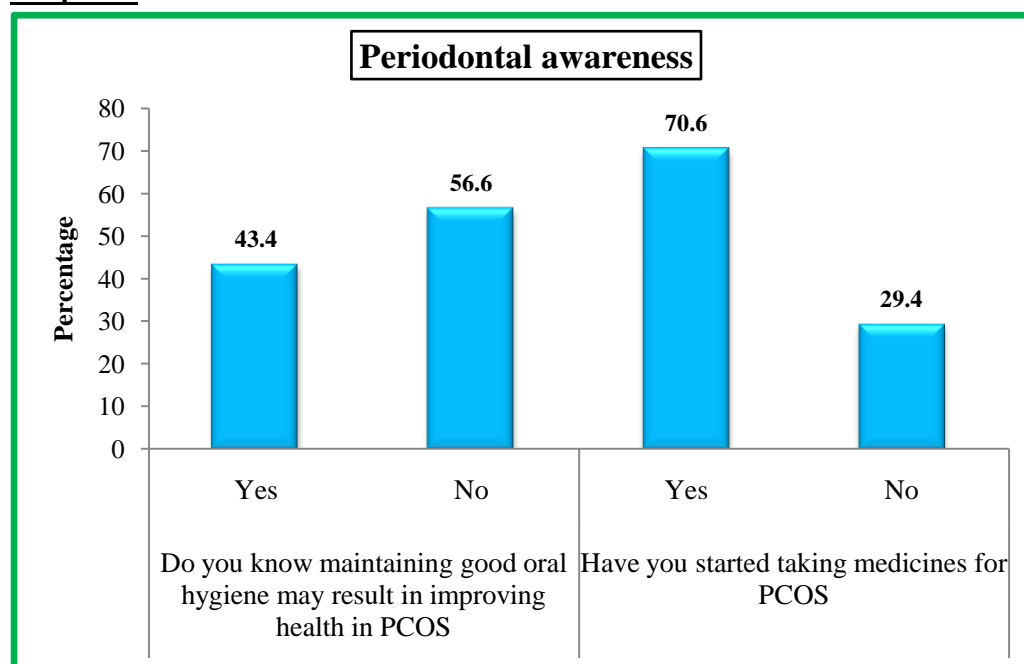
When respondents were asked about their oral hygiene awareness and maintenance many things

revealed.80.6% brushed teeth once a day and 92.4% used tooth brush and tooth paste as a mean of cleaning teeth. Out of 500 respondents

348 persons (69.6%) reported no use of any other cleaning aid. Although 79.6% agreed that oral hygiene is mandatory for overall health of the body but still only 10.6% seek routine dental visit for oral hygiene maintenance and majority (61.2%) visits dentists only at the time of emergency. When asked about the relation between oral hygiene maintenance and PCOS, 73.6% revealed no information about this association and 28.2% completely refuses the relation. Upon more enquiry about the PCOS and

oral hygiene, respondents were asked about the symptoms PCOS can cause in one's mouth and surprisingly 60.4% replied it "does not cause anything" and only 26.4% replied "bleeding gums". 43.4% respondents knew maintaining good oral hygiene may result in improving health in PCOS. Out of 353 women who had started medications for PCOS, only 117 knew medicines taken for PCOS may result in improving gum diseases in PCOS (Table – 4, Graph – 2, 3, 4).

Graph – 4: Periodontal awareness.



Discussion

PCOS is a disorder affecting reproductive hormones with far reaching effects on metabolism and mental health all through the lifespan of women. A key factor that limits PCOS treatment is that a very high percentage of individuals remain undiagnosed until the disease has progressed and warrants medication. Unhealthy lifestyle and poor awareness accelerate the early onset of the disorder. Early diagnosis and management can help many young women lead healthy lives and achieve normal pregnancy. We, the periodontists, can act mutually in the society to overcome this issue of infertility as we are aware of the relationship of PCOS with periodontitis and vice versa. This

study was undertaken to evaluate the awareness levels pertaining to reproductive health, PCOS, and lifestyle choices, oral hygiene awareness of already diagnosed PCOS women.

The hyperandrogenism status in patients with PCOS not only results in menstrual abnormalities and infertility but also may pose an increased risk of periodontal diseases to these patients. Regarding the conversion of testosterone to estrogen in women with PCOS, the paradox of co-existence of high levels of estrogen and testosterone is appreciable.

The increased vulnerability of PCOS patients to periodontal diseases can be explained regarding

the influence of altered circulating hormones in on periodontal tissues. These derangements impact gingival tissues through initiating changes in oral flora and pro-inflammatory cytokines. In turn, these changes adversely affect bones, adhesive joints and eventually lead to tooth loss [17]. Furthermore, enhanced oxidative stress in affected periodontal tissues may participate in the pathology of PCOS by mechanisms such as increasing glucose intolerance and dyslipidemia [18].

It is worth noting that many PCOS patients with abnormal glucose tolerance and metabolic syndrome are obese. In these patients, adipose tissue converts testosterone to estrogen by aromatase enzyme, triggering a vicious cycle of intense hormonal effects on periodontal tissues. These effects may cause greater likelihood for development of more severe forms of periodontitis in these patients. Therefore, further investigations in obese patients and patients with different degrees of PCOS severity are recommended.

Mohammad Ehsan Rahiminejad, et al. (2015) [19] conducted a study to determine the association between PCOS and periodontal diseases and reached at the conclusion that the prevalence of periodontal disease seemed to be higher in women with PCOS.

Tanguturi, Sri Chandana, Nagarakanti, Sreenivas (2018) [20] published a review article about the association between periodontal disease and polycystic ovarian syndrome and mentioned in their article that there is an extensive literature regarding the association of PCOS and other systemic conditions such as diabetes mellitus, cardiovascular disease, and psychological disorders. However, there is a lack of literature in associating PCOS and periodontal disease.

Sreepoorna Pramodh (2020) [21] conducted a study to assess reproductive health (RH) knowledge and awareness of PCOS among female Emirati students and also to explore their lifestyle choices and completed a survey

containing questions related to demography, lifestyle preferences, RH knowledge, and PCOS awareness and concluded that the Lifestyle choices adopted by Emirati University students may predispose them to disorders such as PCOS.

Keeping in view of very less information about PCOS and oral hygiene maintenance, a questionnaire was formulated and distributed among the already diagnosed PCOS women irrespective of whether they have started medication or not and thus awareness, as evident from 83.4% respondents reply, was generated in a simple way. Few important things need to be highlighted in this study about PCOS awareness. First and foremost the respondents were aware of the role of diet and exercise in the management of PCOS. Although women are aware of the association of PCOS with other health conditions but unfortunately lack of awareness was observed with regards to oral hygiene maintenance and PCOS relationship, even respondents were seen lacking information regarding need of routine dental visits.

Conclusion

Within the limitations of the study the conclusion which can be drawn out this questionnaire is that the lack of awareness regarding the association between PCOS and Oral hygiene needs to redressed properly to overcome the mental and physical symptoms associated with the PCOS. Not only questionnaires but circulating information via media, internet etc and conducting good researches in this perspective is highly needed.

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