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ORIGINAL RESEARCH

EXPLORING THE KNOWLEDGE AND ATTITUDE OF DENTAL STUDENTS AND PROFESSIONALS TOWARDS CORRELATION BETWEEN POLYCYSTIC OVARY SYNDROME (PCOS) AND DENTAL CARIES-A QUESTIONNAIRE STUDY.

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Abstract

Background: Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder among women of reproductive age, characterized by metabolic disturbances and chronic low-grade inflammation. Recent studies suggest a possible association between PCOS and oral health, particularly dental caries, potentially linked to elevated pro-inflammatory cytokines. However, the awareness and perspectives of dental students and professionals regarding this connection remain underexplored. This study aims to evaluate their knowledge and perceptions of the PCOS–dental caries relationship.

Methods: A validated, self-administered online questionnaire was used to assess awareness among dental professionals and students. The survey was distributed via Google Forms. Data were analyzed using SPSS, applying descriptive statistics and chi-square tests ($p \leq 0.05$) to identify knowledge gaps.

Results: Of 153 respondents, 92.81% identified PCOS as a hormonal disorder, yet only 49.67% recognized its oral health implications. Over 60% were unaware of the PCOS–dental caries link, and 34.64% lacked confidence in managing affected patients. Just 10.46% had received PCOS-related training. Awareness was higher among younger participants ($p=0.010$) and postgraduates ($p=0.031$). Nearly half (48.37%) considered PCOS "somewhat important" in treatment planning.

Conclusion: Despite recognizing PCOS as a hormonal disorder, its oral health relevance is poorly understood. Targeted education and curriculum inclusion are essential to enhance clinical awareness and patient care.

Keywords: Polycystic Ovary Syndrome, Oral health, Dental caries, Periodontal diseases, dental students and professionals.dental education, competence, formative, summative, student support

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting 4% to 20% of women of reproductive age, often marked by menstrual irregularities, hyperandrogenism, and polycystic ovaries.(1) Despite its prevalence, up to 70% of cases may go undiagnosed. PCOS is a multifactorial metabolic condition linked to insulin resistance, cardiovascular risk, dyslipidaemia, and chronic inflammation.(2) Contributing factors include hormonal imbalance, genetic predisposition, gut microbiota changes, and lifestyle elements such as obesity, poor diet, and stress.(3) Emerging research highlights a significant association between PCOS and oral health, particularly periodontal disease and xerostomia.(4) Chronic infections like gingivitis, frequently observed in PCOS patients, may exacerbate systemic inflammation.(5) Hormonal dysregulation and reduced salivary flow can complicate periodontal treatment and increase susceptibility to dental caries and other oral pathologies.(6)

Despite growing evidence, awareness among dental students and professionals regarding this link remains limited. Understanding the oral implications of PCOS is crucial for effective dental care and management. This study aims to bridge the knowledge gap by evaluating the awareness and attitudes of dental students and practitioners toward the relationship between PCOS and dental caries through a structured questionnaire survey.

Materials and Methods: According to available literature studying gingival health and oral complications, this questionnaire survey was designed to assess the knowledge and attitudes of dental professionals and students about the possible link between dental caries and Polycystic Ovary Syndrome (PCOS).[7] The questionnaire was divided into two sections: the first part elicited demographic information like age, gender, and educational level; the second part measured participants' awareness and knowledge of PCOS and how it relates to dental caries.[8]

A close-ended, self-administered, structured electronic questionnaire was created. The questionnaire was content validated and suggested changes were taken into consideration. The form was distributed through WhatsApp to achieve the highest possible reach and response rate.

Data thus collected from the responses were fed into a computerized system and analyzed on SPSS software (version 16.0). Descriptive and inferential statistics were utilized. Continuous variables were presented as mean and standard deviation, and the categorical variables as frequency and percentage. A significance level of $p \leq 0.05$ was fixed. The chi-square test was utilized to evaluate associations between the categorical variables and to determine statistical significance of the study parameters.

Results

A total of 153 individuals participated in the study. The demographic distribution revealed that the majority of respondents were between 18 and 25 years of age (81.70%), followed by those aged 26–35 years (10.46%) and those above 36 years (7.84%). In terms of gender, females constituted the majority (75.82%), while males accounted for 24.18% (Table 1).

In terms of professional category, undergraduate dental students formed the largest category (80.39%), followed by postgraduate students (11.11%), practitioners (4.58%), and teachers (3.92%). The results indicate that the sample was largely made up of female, young undergraduate dental students, which could be indicative of contemporary demographic trends in institutions of dental education. The lower rates of response from postgraduates, teachers, and practitioners emphasize the possible demand for more extensive outreach and continuing dental education programs on the oral health aspects of PCOS.

Awareness and Knowledge of PCOS:

The majority (89.54%) of the participants claimed to know about Polycystic Ovary Syndrome (PCOS) and correctly identified it as a hormonal disorder of women in 92.81% (Table 2) . There was comparatively lesser awareness about its effects on oral health, with only half (50.33%) confirming there was a relationship between PCOS and oral health (Table 3).

When questioned as to the particular impact of hormonal changes associated with PCOS on oral health, replies were divergent. While 35.29% acknowledged a risk of dental caries, a considerable percentage (37.91%) was unsure. These results indicate differing levels of knowledge and imply that gaps in knowledge about the systemic and oral health relationship in PCOS exists (Table 4)

Oral Manifestations of PCOS:

Out of the described oral conditions among women with PCOS, the most commonly identified was periodontal disease (47.71%), followed by dental caries (39.22%) and dry mouth or xerostomia (20.26%). The least common identified manifestation was enamel erosion (9.15%). Interestingly, more than one-third of the participants (37.25%) were not sure about the respective oral manifestations of PCOS, reflecting lack of knowledge in this respect (figure 1).

Knowledge of the Link Between PCOS and Dental Caries:

While overall awareness of PCOS was high, knowledge of its particular relationship to dental caries was reported by only 39.87% of respondents. When asked where they had heard about this, 22.22% mentioned social media, 21.57% attributed knowledge to healthcare practitioners, and 9.80% cited scientific literature. Yet a very significant number of respondents (44.44%) were not aware of any relation between PCOS and dental caries, indicating the restricted communication of this issue through formal as well as informal communication channels (Table 5).

Confidence and Clinical Practices Around PCOS Patients:

The investigation showed differing degrees of confidence in the care of PCOS dental patients. Less than a tenth (11.11%) of those surveyed—mostly undergraduates—were very confident, while 34.64% had no confidence at all (Table 6). As shown in (Table 7) almost half (47.06%) reported that they do take PCOS into account in clinical practice, e.g., considering endocrine or reproductive history when assessing patients to enhance diagnosis and treatment planning. Not withstanding this, fewer than one in ten (10.46%; again, mostly undergraduates) had received any training in oral health management in PCOS.

For clinical referral, 46.41% of the respondents said they would refer PCOS patients to specialists, and 41.18% were uncertain, implying a confusion with interprofessional collaboration practices.

Table 1. Demographic profile of respondents.

Demographic profile	No of respondents	% of respondents
Age groups		
18-25yrs	125	81.70
26-35yrs	16	10.46
36+yrs	12	7.84
Gender		
Male	37	24.18
Female	116	75.82
Qualifications		
UG	123	80.39
Postgraduates	17	11.11
Faculty members	6	3.92
Practitioner	7	4.58
Total	153	100.00

*p<0.05

Table 2 Awareness and knowledge of the respondents.

Items	No of respondents	% of respondents
Have you heard about Polycystic Ovary Syndrome (PCOS)?		

No	**16**	**10.46**
Yes	**137**	**89.54**
What is PCOS?		
Hormonal disorder affecting females	**142**	**92.81**
Genetic disorder	**2**	**1.31**
Uncertain	**9**	**5.88**
Are you aware of any PCOS health implications associated with oral health?		
No	**77**	**50.33**
Yes	**76**	**49.67**
How do hormonal fluctuations in PCOS impact on oral health ?		
Increased risk of dental caries	**54**	**35.29**
Altered salivary composition	**26**	**16.99**
Affect gingival health	**51**	**33.33**
Not sure	**58**	**37.91**
Are you aware of PCOS and its association with dental caries?		
No	**92**	**60.13**
Yes	**61**	**39.87**

***p<0.05**

Table 3. Knowledge , Confidence and Practice of the respondents

17. Are you confident in managing dental patients with PCOS?		
Very confident	**17**	**11.11**
Somewhat confident	**83**	**54.25**
Not at all confident	**53**	**34.64**
18.Do you incorporate PCOS considerations into clinical practice?		
No	**81**	**52.94**
Yes	**72**	**47.06**
19. Do you refer PCOS patients to specialists?		
Yes	**71**	**46.41**
No	**19**	**12.42**
Uncertain	**63**	**41.18**
Total	**153**	**100.00**

***p<0.05**

Table 4:Association between Age of respondents and awareness of PCOS.

Items	18-25	%	26-35	%	36+	%	Total	Chi-square	p-value
Have you heard about Polycystic Ovary Syndrome (PCOS)?						Type your text			
No	**11**	**68.75**	**5**	**31.25**	**0**	**0.00**	**16**	**9.1550**	**.010***
Yes	**114**	**83.21**	**11**	**8.03**	**12**	**8.76**	**137**		
What is PCOS?									
Hormonal disorder affecting females	**120**	**84.51**	**11**	**7.75**	**11**	**7.75**	**142**	**25.8620**	**.000***
Genetic disorder	**1**	**50.00**	**0**	**0.00**	**1**	**50.00**	**2**		
Uncertain	**4**	**44.44**	**5**	**55.56**	**0**	**0.00**	**9**		
Are you aware of any PCOS health implications associated with oral health?									
No	**64**	**83.12**	**8**	**10.39**	**5**	**6.49**	**77**	**0.3990**	**0.8190**
Yes	**61**	**80.26**	**8**	**10.53**	**7**	**9.21**	**76**		
Are you aware of PCOS and its association with dental caries?									

No	**75**	**81.52**	**9**	**9.78**	**8**	**8.70**	**92**	**0.3150**	**0.8540**
Yes	**50**	**81.97**	**7**	**11.48**	**4**	**6.56**	**61**		

***p<0.05**

Table 5. Association of age and understanding of PCOS as hormonal disorders.

Do you inquire about PCOS in patients' medical history?									
No	**68**	**80.95**	**10**	**11.90**	**6**	**7.14**	**84**	**0.5020**	**0.7780**
Yes	**57**	**82.61**	**6**	**8.70**	**6**	**8.70**	**69**		
Do you think it's important to consider PCOS in dental treatment planning?									
Very important	**39**	**82.98**	**5**	**10.64**	**3**	**6.38**	**47**	**7.5420**	**0.2740**
Somewhat important	**64**	**86.49**	**5**	**6.76**	**5**	**6.76**	**74**		
Not at all important	**3**	**75.00**	**0**	**0.00**	**1**	**25.00**	**4**		
Uncertain	**19**	**67.86**	**6**	**21.43**	**3**	**10.71**	**28**		
Are you confident in managing dental patients with PCOS?									
Very confident	**13**	**76.47**	**0**	**0.00**	**4**	**23.53**	**17**	**13.0120**	**.011***

Somewhat confident	**71**	**85.54**	**6**	**7.23**	**6**	**7.23**	**83**		
Not at all confident	**41**	**77.36**	**10**	**18.87**	**2**	**3.77**	**53**		

***p<0.05**

Table 6. Association of Age and Confidence in managing PCOS patients.

8. How do hormonal fluctuations in PCOS impact on oral health ?									
Increased risk of dental caries	**46**	**85.19**	**4**	**7.41**	**4**	**7.41**	**54**	**5.9985**	**0.4233**
Altered salivary composition	**18**	**69.23**	**5**	**19.23**	**3**	**11.54**	**26**		
Affect gingival health	**37**	**72.55**	**7**	**13.73**	**7**	**13.73**	**51**		
Not sure	**49**	**84.48**	**6**	**10.34**	**3**	**5.17**	**58**		

Table 7. Association of age and incorporation of PCOS consideration in practice

Do you incorporate PCOS considerations into clinical practice?									
No	**63**	**77.78**	**13**	**16.05**	**5**	**6.17**	**81**	**6.0830**	**.048***
Yes	**62**	**86.11**	**3**	**4.17**	**7**	**9.72**	**72**		

***p<0.05**

Statistical Associations:

Chi-square testing identified a number of statistically significant correlations. Knowledge of PCOS was significantly correlated with level of qualification (p = 0.010) and confidence in treating PCOS patients (p = 0.011). Further, consideration of PCOS in dental practice was also significantly correlated with educational level and other demographic factors (p = 0.048). These results highlight the role of academic exposure and professional standing on knowledge, attitudes, and clinical practice concerning oral health related to PCOS.

DISCUSSION

The results of this study corroborate those of Azziz et al., reaffirming that Polycystic Ovary Syndrome (PCOS) is a common though not infrequently underdiagnosed endocrine-metabolic disorder. It is marked by systemic sequelae like insulin resistance, chronic inflammation, and hormonal imbalance, all of which could affect oral health, specifically the incidence of periodontal disease and dental caries. In the presence of well-documented diagnostic criteria and established clinical phenotypes, this study demonstrates limited dental professional awareness of the oral implications of PCOS. The findings highlight the necessity of enhanced interdisciplinary knowledge that has been previously indicated within the literature. Incorporation of PCOS-related issues into dental education curricula could promote earlier detection and broader management of affected patients.[9]

The most frequent sources of information on the association of PCOS with dental caries, as identified through our data, were healthcare workers (21.57%) and social media (22.22%). Yet, nearly half (44.44%) of the participants identified no previous knowledge of the existence of such a relationship. This indicates an important knowledge deficit and underscores conclusions by Nivedha et al., who stressed the need for public health campaigns and professional education to raise awareness of oral health risks associated with PCOS.[10]

While respondents generally were highly aware of PCOS overall, knowledge regarding its association with oral diseases was still lacking. Most lacked any formal education on this subject, and fewer than half felt adequately trained to handle dental patients with PCOS. This result is consistent with the findings of Gomula et al., who have described women with PCOS as often seeking information online because they feel there is inadequate clinical support.[11] The incompatibility between professional readiness and patient requirements established by both of these studies indicates a critical need for more vigorous educational paradigms and better clinical practices.

Together, the findings underscore the need for an important gap in dental education and practice. Addressing this will require the integration of PCOS-related modules in dental education and the development of a multidisciplinary, patient-focused approach. This would serve not only to enhance clinicians' skills in the management of patients with PCOS but also to underpin wider initiatives in addressing the systemic oral–reproductive interface.

Derya S. et al. showed a high correlation between DMFT index values and both Streptococcus mutans counts and resting salivary flow rate/pH in PCOS patients ($p < 0.05$), which proves a microbiological and biochemical etiology for enhanced caries risk in these patients.[6] Contrarily, however, our investigation found that a large percentage of dental students and practitioners were not aware of any relationship between PCOS and dental caries. This knowledge disparity was also reflected in the channels through which participants initially became aware of the association—mainly social media sites. Based on Naroji S. et al., PCOS content is actually widespread on social media, demarcating how non-clinical information pathways increasingly influence public and professional knowledge through new forms of health communication.[12]

Subbiah et al.'s results and our own findings indicate a wide gap between available clinical evidence and the knowledge of healthcare providers on the oral health effects of PCOS. Subbiah et al. reported that newly diagnosed PCOS patients had significantly worse periodontal parameters—higher gingival and plaque indices, increased probing depths, and clinical attachment loss—than treated PCOS patients ($p < 0.001$). Even with this, a very limited 47.71% of our survey respondents identified periodontal disease as an oral presentation of PCOS, and a significant 57.52% were unclear about its contribution to caries risk.

This disparity continues despite high general knowledge of PCOS (89.54%). The youngest respondents (18–25 years), who made up the majority of the sample, showed a markedly lower level of knowledge (p = 0.010), as expressed in their answers. In addition, only 10.46% had received any official training in the oral health impact of PCOS, and only 46.41% reported referring PCOS patients for further management to specialists.

These results highlight an urgent need for more rigorous educational programs that incorporate the systemic–oral health correlation of PCOS into undergraduate and postgraduate dental teaching. Uniform screening protocols and interprofessional collaboration should be emphasized in order to bridge the gap between new scientific evidence and actual clinical practice. Due to the complex etiology of PCOS and its dental health effect, dental practitioners need to be armed not only with knowledge but also with clinical resources that

address the total care of this high-risk patient group.[13]

Our investigation found that there was a considerable awareness of Polycystic Ovary Syndrome (PCOS), with 89.54% of the interviewees stating they had heard of the condition. Nevertheless, an astonishingly low 49.67% knew about its oral implications, meaning there is a huge knowledge gap in interdisciplinary understanding. Even though the sample consisted primarily of female undergraduate students between 18 and 25, only 1.96% claimed their PCOS-related knowledge was excellent, and merely 11.11% were confident handling patients with PCOS. Although oral manifestations like dental caries and periodontal disease were recognized by some, 37.25% of the respondents were still uncertain, indicating a lack of proper incorporation of systemic concepts in dental education.

Statistical analysis demonstrated that awareness levels, clinical adoption, and confidence in treating PCOS cases were significantly affected by age. These findings are consistent with those by Khan et al., who outlined the genetic determinants of PCOS—i.e., gene variations in CYP, SHBG, and INS—as major players in its endocrine and metabolic phenotype. This systemic information, however, seems poorly translated into dental practice. With a mere 10.46% of the respondents citing any formal training in the oral health properties of PCOS, augmenting interdisciplinary education that includes genetic, hormonal, and environmental factors is critical to enhance clinical proficiency and patient outcomes.[14]

Subbiah et al. reported elevated levels of pro-inflammatory cytokines—such as interleukin-6, interleukin-17, and tumor necrosis factor—in women with PCOS compared to healthy individuals, emphasizing its systemic inflammatory burden.[13] Similarly, Wendland et al. found correlations between metabolic and hormonal profiles, salivary cytokine levels, and gingival health among adolescent females with PCOS.[15] Marcinkiewicz et al. further suggested a potential link between oral microbiota and female reproductive health, reinforcing the need for cross-disciplinary collaboration.[16]

Results of Varghese S.R. et al. indicate that while most healthcare providers know the clinical and oral manifestations of PCOS, less than 10% can diagnose the condition early in careers. Our findings mirror similar trends as the majority of respondents did not routinely ask about PCOS during patient histories and include it in clinical considerations.[17] Even though they identified PCOS as a hormonal condition, most had no formal education and expressed low confidence in the clinic. These findings are consistent with Lobo et al., who highlighted the systemic role of PCOS—inflammation and insulin resistance, for example—which can give rise to periodontal disease and caries.[18]

As a whole, our results highlight a fundamental lack of awareness and readiness among dental practitioners of the oral-systemic connections of PCOS. While overall knowledge of the condition was good, less than half knew of its relevance to oral health, and only a minority had specifically been trained or felt competent dealing with such cases. This is consistent with the findings of Singh et al., who emphasized the link between PCOS and periodontal disease by virtue of common inflammatory and hormonal mechanisms.[19] The strong relationships identified between confidence and age ($p < 0.05$) support the need to include education regarding PCOS as part of the early stages of dental education. Complementing interdisciplinary and evidence-based educational programs will be critical to enhancing overall patient care and cooperation between the dental and medical communities.

Both Rathi N. et al. and our study highlight a significant bidirectional relationship between PCOS and periodontal disease, connected through common mechanisms like chronic inflammation, hormonal imbalance, and oral microbiome dysbiosis.[20] Yet, our results also show significant gaps in awareness among dental professionals and students. Just 49.67% recognized oral health risks of PCOS, and 60.13% did not know the association with dental caries. These deficits were most glaring among younger participants and those without specialized education, highlighting the imperative for specific educational interventions.

In order to close this divide, it is necessary to incorporate PCOS screening into standardized dental check-ups, encourage interdisciplinary cooperation, and leverage commonly used platforms—like social media—to both professional and public health education. Such a multi-pronged strategy could enhance early detection and reduce the oral-systemic risks to women with PCOS.

Augmenting this, Cai et al. further emphasized the systemic nature of PCOS, which encompasses inflammation and immune dysfunction and leads to enhanced oral health susceptibility. Although the majority of our participants were familiar with PCOS as a hormonal disorder, formal training and confidence in clinical practice were significantly low. Statistically significant age differences in awareness and practice behavior further emphasize the need to introduce PCOS-related materials early in dental education to facilitate holistic care provision.[21]

Our study demographics—predominantly female participants (75.82%)—should suggest higher awareness of women's health issues. However, as also seen in K. Nivedha et al.'s study, only 39.87% of respondents in our sample recognized the association between PCOS and dental caries, and just 49.67% acknowledged any oral implications.[10] Chi-square analysis indicated lower awareness in young professionals ($p = 0.010$, Q5), and qualification

differences in identifying oral manifestations (p = 0.0108, Q9). Though 89.54% were familiar with PCOS, only 11.11% felt "very confident" managing affected patients (Q17), the gap between theoretical understanding and clinical preparedness.

Considering that the most frequent sources of information (Q11) were social media (22.22%) and healthcare professionals (21.57%), the use of these sources must be strategically planned for awareness campaigns. The strong association between age and confidence (p = 0.011, Q17) supports the necessity of early-stage professional training programs.

The implications of this educational deficit are severe—less than optimal care for PCOS patients and lost opportunities for early intervention. Our results echo those of S.C. Tanguturi et al., who labeled PCOS as a complex, multisystem disorder with metabolic, inflammatory, and changed salivary biochemistry implications, all of which make persons susceptible to oral diseases like caries and periodontal disease. Tanguturi et al. also recommended early multidisciplinary treatment—reiterated in our call for coordinated medical-dental collaboration.[22]

Chi-square testing in our research further revealed the following associations with age: and overall awareness (p = 0.010), and the knowledge of PCOS as a hormonal disorder (p = 0.000). These findings are reflective of the variance in knowledge levels among age groups and emphasize the need to make younger dental professionals more aware about systemic–oral health relationships.

Conclusion: Despite the high prevalence of Polycystic Ovary Syndrome (PCOS) among women, this study reveals a notable gap in awareness regarding its oral health implications among dental professionals. This knowledge deficit not only impacts clinical decision-making but also limits the delivery of comprehensive care to patients with PCOS. The study reveals a critical gap in the understanding and integration of Polycystic Ovary Syndrome (PCOS)-related oral health considerations among dental professionals. While a majority of respondents are aware of PCOS as a hormonal disorder, there is insufficient recognition of its oral health implications, such as increased risks of dental caries and periodontal diseases. The lack of targeted training further compounds this challenge, with many respondents feeling uncertain or ill-equipped to address the unique oral health needs of patients with PCOS. It is imperative that dental education programs emphasize the connection between systemic conditions like PCOS and oral health. Specialized training and workshops can empower practitioners to incorporate PCOS considerations into patient care, fostering improved clinical outcomes and interdisciplinary collaboration. By addressing these gaps, the dental community can lead the way in promoting holistic, patient-centered care, ensuring that no health aspect is overlooked**.**

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Informed Consent : Informed Consent was obtained from all participants included in the study

Data Availability: The data that supports the findings of this study are available from the corresponding author upon reasonable request.

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