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Original Research Article

Knowledge and Perception of Saudi Public towards the Role of Systemic Diseases in Aggravating Oral Diseases; A Survey-based Study in Riyadh

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Introduction: Several systemic diseases affect the oral cavity either directly or indirectly, which include diabetes, rheumatoid arthritis, anemia, obesity, and others. Knowledge of these associations may be an important step towards the proper management of oral diseases. Materials and methods: This study was targeted towards the Saudi general public in Riyadh city, therefore all males and females more than 18 years of age were sent to fill up the questionnaire. An online sample size calculator was used and the total population of Riyadh city was entered, in the presence of 95% Confidence Interval. Results: A total of 2183 males and females filled up the online survey, which comprised of 41% (n=885) males and 59% (n=1298) females. The sample was divided into subgroups on the basis of age, where 38% (n=831) were 18-30 years, 29% (n=633) were 31-45 years, 28% (n=621) were 46-60 years and 5% (n= 105) were above 60 years. Conclusion: Female Saudi participants showed better knowledge than males. Older aged participants revealed a higher level of awareness. Younger age group required more information on this topic.

Keywords: Systemic disease, Oral health, Saudi public, Knowledge.

INTRODUCTION

Oral diseases may occur due to several reasons, a few being localized as well as systemic. Of these systemic ones, a few diseases are strongly associated with the causing and aggravating of oral diseases. Knowledge of these associations may be an important step towards the proper management of oral diseases (Jin et al, 2016).

The most common oral diseases that are associated with systemic disorders include dental caries, periodontal disease, and mouth ulcers to name a few. Several systemic diseases affect the oral cavity either directly or indirectly, which include diabetes, rheumatoid arthritis, anemia, obesity and others (Chapple et al, 2017; Nazir, 2017).

Several studies have been conducted in different parts of the world to determine the association between systemic diseases and oral health. Diabetes is considered to be one of the most prevalent systemic conditions which have prominent effects on oral condition. An investigation conducted in Karnataka, India revealed a low level of knowledge among dental patients regarding the above-mentioned association. Furthermore, the majority of patients having diabetes mellitus reported that they were not informed about this relation by their concerned physicians (Arunkumar et al, 2015). A similar level of knowledge and awareness was observed when a study was conducted in Peshawar, Pakistan. Findings revealed that a healthy percentage of patients were not aware of the possible relation between diabetes mellitus with dental caries and periodontal diseases (Bangash et al, 2011).

Another study in the form of a systematic view presented with the findings, which suggested that the general public is unaware of the fact that periodontal disease is associated with certain systemic disorders (Varela-Cantelles et al, 2016). Another research based on a similar background in Medellin, Columbia suggested that educating people about the relationship between systemic and periodontal diseases improved the awareness level over the period of time (Duque et al, 2011).

Sickle cell anemia is also reported to be strongly associated with dental caries as well as oral ulcers. This relation being proven over the years is not well known among the general public. Furthermore, patients with sickle cell disease were also observed to be suffering from dental caries as compared to healthy patients (Farnendes et al, 2016; Al-Alawi et al, 2015).

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STUDY HYPOTHESES

Saudi public's knowledge about the association of systemic conditions and oral health is poor.

AIMS OF THE STUDY

- To assess the perception of the general public towards the association of systemic diseases with oral health.
- To determine the level of knowledge of this association.
- To compare the findings on the basis of gender, age, and educational levels.

MATERIALS AND METHODS

Study Design

This is a cross-sectional study, which utilized a closed-ended questionnaire.

Questionnaire Design

The questionnaire was constructed online using Google forms and began with questions related to demographics, including age, gender, educational level, socioeconomic status, etc. Furthermore, questions were asked about the perception of the public towards systemic and oral disease association, each systemic disease having a direct or indirect relation with oral health was inquired.

Study Sample

This study was targeted towards the Saudi general public in Riyadh city, therefore all males and females more than 18 years of age were sent to fill up the questionnaire. An online sample size calculator was used and the total population of Riyadh city was entered, in the presence of 95% Confidence Interval. A total of 2000 Saudi general public will be included in this study. The survey was sent using online links via social media and other sources.

Validity and Reliability of the Questionnaire

The questionnaire was sent to the experts in research, which include a few faculty members of REU in order to confirm the validity. As far as the reliability is concerned, a pilot study was conducted using 20 online questionnaires filled randomly by university students. Reliability was tested using Chronbach's coefficient alpha in the Statistical Package for Social Sciences (SPSS) version 19.

Statistical Analysis

Collected data was transferred from Google sheets to SPSS version 19, where descriptive as well as inferential statistics were conducted. Comparisons between groups were made with the value of significance kept under 0.05.

RESULTS

A total of 2183 males and females filled up the online survey, which comprised of 41% (n=885) males and 59% (n=1298) females. The sample was divided into subgroups on the basis of age, where 38% (n=831) were 18-30 years, 29% (n=633) were 31-45 years, 28% (n=621) were 46-60 years and 5% (n= 105) were above 60 years.

The participants were also grouped on the basis of their education level, which demonstrated that 2% (n=36) are primary school or less, 26% (n=567) are high school or less, 72% (n=1571) have a university education.

The participants were also grouped on the basis of their frequency of dental visits, which demonstrated that 61% (n=1321) have 0-2 dental visits per year, 29% (n=630) have 3-5 dental visits per year and 10% (n=218) have more than 6 dental visits per year.

Validity and Reliability of the Questionnaire

According to the experts in REU, we made minor changes to our questionnaire before we distributed it to the study participants. As far as the reliability is concerned, we performed Chronbach's coefficient alpha in SPSS and the value retrieved was 0.76, which is acceptable to carry out the data collection after the pilot study.

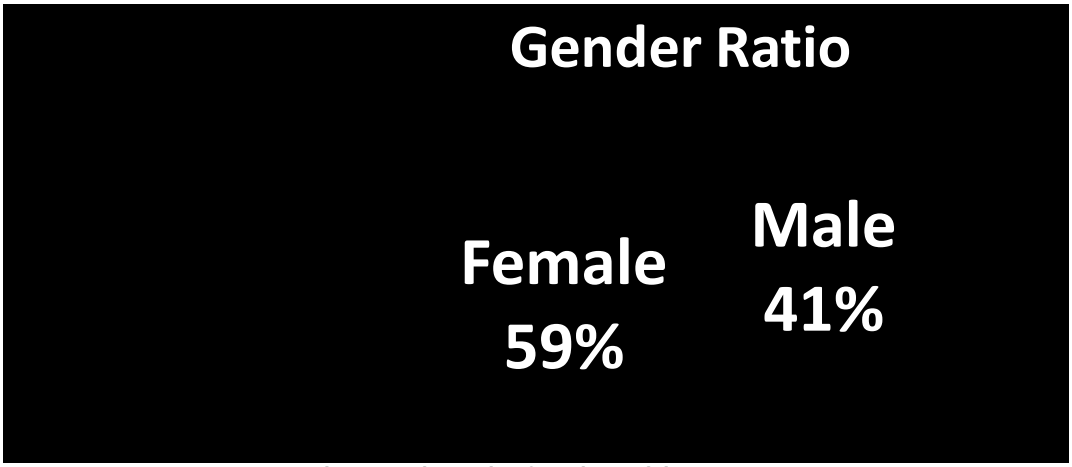

Fig.1: Gender Ratio of Study Participants

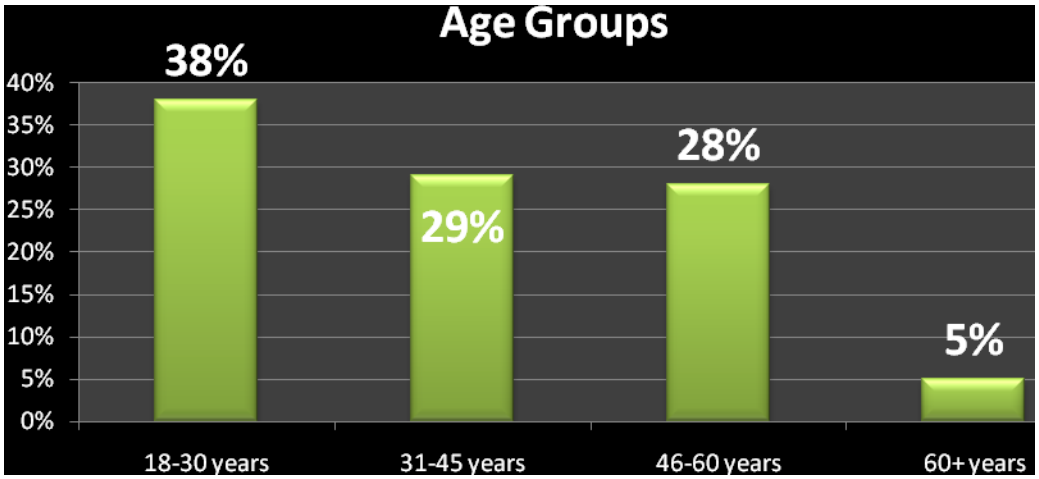

Fig.2: Age Group Ratio of Study Participants

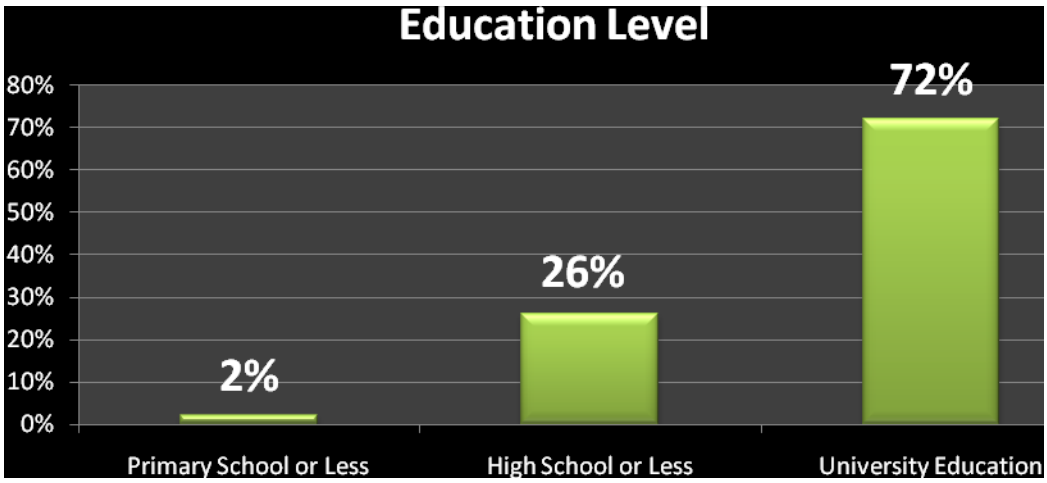

Fig.3: Distribution of Study Participants on the Basis of Education Level

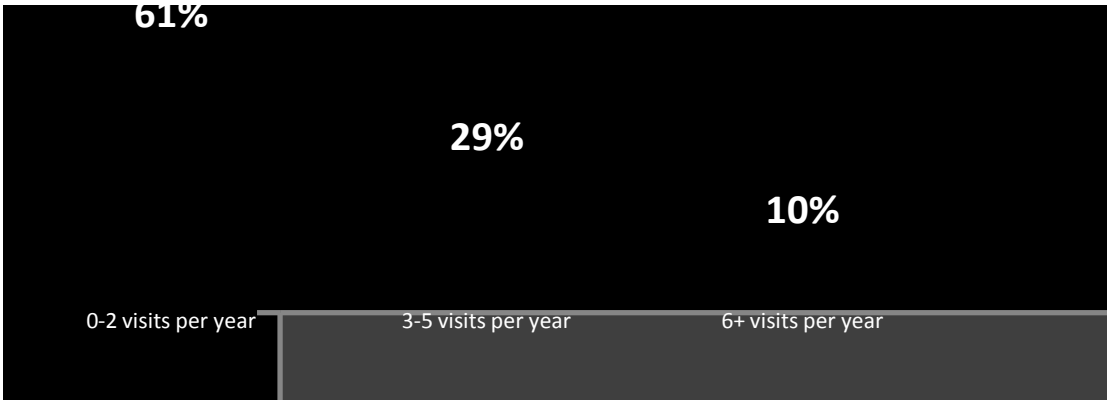

Fig. 4: Distribution of Study Participants on the Basis of Frequency of Dental Visits

Table1: Comparison of the study participants on the basis of gender

Item	Male	Female	P- Value
In general, systemic health is associated with oral health	**Strongly Agree** 26% **Agree** 43% **Neutral** 18% **Disagree** 8% **Strongly Disagree** 5%	**Strongly Agree** 25% **Agree** 48% **Neutral** 16% **Disagree** 9% **Strongly Disagree** 2%	0.002
Do hormonal disorders (diabetes incipedus, hypothyroidism, thyroid disease, iodine deficiency) affect oral health?	**Strongly Agree** 22% **Agree** 36% **Neutral** 25% **Disagree** 12% **Strongly Disagree** 4%	**Strongly Agree** 20% **Agree** 48% **Neutral** 16% **Disagree** 14% **Strongly Disagree** 2%	0.000
Do cardiac disorders (cardiovascular disease, angina, hypertension) affect oral health?	**Strongly Agree** 12% **Agree** 29% **Neutral** 34% **Disagree** 18% **Strongly Disagree** 7%	**Strongly Agree** 11% **Agree** 31% **Neutral** 31% **Disagree** 24% **Strongly Disagree** 3%	0.000
Do metabolic disorders (diabetes mellitus, obesity, metabolic acidosis, phenylketonuria) affect oral health?	**Strongly Agree** 18% **Agree** 40% **Neutral** 25% **Disagree** 12% **Strongly Disagree** 5%	**Strongly Agree** 14% **Agree** 48% **Neutral** 24% **Disagree** 12% **Strongly Disagree** 2%	0.000
Do blood disorders (anemia, haemophilia, sickle cell disease, iron deficiency) affect oral health?	**Strongly Agree** 15% **Agree** 35% **Neutral** 31%	**Strongly Agree** 14% **Agree** 44% **Neutral** 23%	0.000

	Disagree **16%** **Strongly Disagree** **4%**	**Disagree** **15%** **Strongly Disagree** **4%**	
Do autoimmune disorders (rheumatoid disorders, Sjogren syndrome, Connective tissue disease) effect oral health?	**Strongly Agree** **10%** **Agree** **29%** **Neutral** **38%** **Disagree** **18%** **Strongly Disagree** **6%**	**Strongly Agree** **10%** **Agree** **28%** **Neutral** **35%** **Disagree** **23%** **Strongly Disagree** **5%**	**0.020**
Do pulmonary diseases (asthma, tuberculosis, bronchitis) affect oral health?	**Strongly Agree** **11%** **Agree** **33%** **Neutral** **33%** **Disagree** **17%** **Strongly Disagree** **6%**	**Strongly Agree** **11%** **Agree** **35%** **Neutral** **29%** **Disagree** **22%** **Strongly Disagree** **4%**	**0.003**
Do infectious diseases (AIDS, Hepatitis B, Candidiasis) affect oral health?	**Strongly Agree** **21%** **Agree** **35%** **Neutral** **27%** **Disagree** **13%** **Strongly Disagree** **4%**	**Strongly Agree** **21%** **Agree** **41%** **Neutral** **21%** **Disagree** **15%** **Strongly Disagree** **2%**	**0.002**
Does pregnancy affect oral health?	**Strongly Agree** **17%** **Agree** **32%** **Neutral** **34%** **Disagree** **13%** **Strongly Disagree** **5%**	**Strongly Agree** **27%** **Agree** **40%** **Neutral** **15%** **Disagree** **16%** **Strongly Disagree** **3%**	**0.000**
You require more knowledge about the association of systemic disease with oral health.	**Strongly Agree** **33%** **Agree** **47%** **Neutral**	**Strongly Agree** **27%** **Agree** **52%** **Neutral**	**0.000**

	11% Disagree 6% Strongly Disagree 3%	11% Disagree 8% Strongly Disagree 2%	

Table 2: Comparison of the study participants on the basis of age group

Item	18-30 Years	31-45 Years	46-60 Years	60+ Years	P- Value
In general, systemic health is associated with oral health	Strongly Agree 23% Agree 46% Neutral 21% Disagree 7% Strongly Disagree 3%	Strongly Agree 24% Agree 43% Neutral 13% Disagree 16% Strongly Disagree 4%	Strongly Agree 29% Agree 48% Neutral 15% Disagree 5% Strongly Disagree 3%	Strongly Agree 24% Agree 52% Neutral 15% Disagree 6% Strongly Disagree 3%	0.000
Do hormonal disorders (diabetes incipedus, hypothyroidism, thyroid disease, iodine deficiency) affect oral health?	Strongly Agree 21% Agree 40% Neutral 22% Disagree 16% Strongly Disagree 2%	Strongly Agree 21% Agree 40% Neutral 18% Disagree 17% Strongly Disagree 4%	Strongly Agree 22% Agree 52% Neutral 19% Disagree 6% Strongly Disagree 2%	Strongly Agree 23% Agree 46% Neutral 17% Disagree 10% Strongly Disagree 5%	0.000
Do cardiac disorders (cardiovascular disease, angina, hypertension) affect oral health?	Strongly Agree 11% Agree 29% Neutral 30% Disagree 24% Strongly Disagree 6%	Strongly Agree 12% Agree 27% Neutral 31% Disagree 26% Strongly Disagree 4%	Strongly Agree 12% Agree 35% Neutral 37% Disagree 14% Strongly Disagree 2%	Strongly Agree 8% Agree 31% Neutral 35% Disagree 19% Strongly Disagree 8%	0.000
Do metabolic disorders (diabetes mellitus, obesity, metabolic acidosis, phenylketonuria) affect oral health?	Strongly Agree 15% Agree 44% Neutral 23% Disagree 13% Strongly Disagree 5%	Strongly Agree 14% Agree 40% Neutral 25% Disagree 18% Strongly Disagree 3%	Strongly Agree 18% Agree 49% Neutral 25% Disagree 6% Strongly Disagree 2%	Strongly Agree 18% Agree 50% Neutral 21% Disagree 8% Strongly Disagree 3%	0.000

Do blood disorders (anemia, haemophilia, sickle cell disease, iron deficiency) affect oral health?	**Strongly Agree 15%** **Agree 36%** **Neutral 26%** **Disagree 18%** **Strongly Disagree 5%**	**Strongly Agree 12%** **Agree 40%** **Neutral 25%** **Disagree 19%** **Strongly Disagree 4%**	**Strongly Agree 15%** **Agree 47%** **Neutral 26%** **Disagree 9%** **Strongly Disagree 3%**	**Strongly Agree 10%** **Agree 44%** **Neutral 39%** **Disagree 7%** **Strongly Disagree 2%**	**0.000**
Do autoimmune disorders (rheumatoid disorders, Sjogren syndrome, Connective tissue disease) effect oral health?	**Strongly Agree 12%** **Agree 28%** **Neutral 31%** **Disagree 23%** **Strongly Disagree 6%**	**Strongly Agree 9%** **Agree 25%** **Neutral 37%** **Disagree 25%** **Strongly Disagree 4%**	**Strongly Agree 8%** **Agree 31%** **Neutral 41%** **Disagree 16%** **Strongly Disagree 4%**	**Strongly Agree 6%** **Agree 35%** **Neutral 46%** **Disagree 11%** **Strongly Disagree 2%**	**0.000**
Do pulmonary diseases (asthma, tuberculosis, bronchitis) affect oral health?	**Strongly Agree 13%** **Agree 37%** **Neutral 26%** **Disagree 18%** **Strongly Disagree 6%**	**Strongly Agree 10%** **Agree 27%** **Neutral 32%** **Disagree 27%** **Strongly Disagree 4%**	**Strongly Agree 10%** **Agree 36%** **Neutral 37%** **Disagree 14%** **Strongly Disagree 3%**	**Strongly Agree 10%** **Agree 40%** **Neutral 29%** **Disagree 18%** **Strongly Disagree 3%**	**0.000**
Do infectious diseases (AIDS, Hepatitis B, Candidiasis) affect oral health?	**Strongly Agree 22%** **Agree 37%** **Neutral 21%** **Disagree 16%** **Strongly Disagree 4%**	**Strongly Agree 21%** **Agree 35%** **Neutral 23%** **Disagree 19%** **Strongly Disagree 2%**	**Strongly Agree 19%** **Agree 46%** **Neutral 26%** **Disagree 7%** **Strongly Disagree 2%**	**Strongly Agree 18%** **Agree 41%** **Neutral 26%** **Disagree 113%** **Strongly Disagree 2%**	**0.000**
Does pregnancy affect oral health?	**Strongly Agree 20%** **Agree 37%** **Neutral 24%** **Disagree 14%**	**Strongly Agree 23%** **Agree 34%** **Neutral 21%** **Disagree 19%**	**Strongly Agree 26%** **Agree 39%** **Neutral 22%** **Disagree 10%**	**Strongly Agree 17%** **Agree 42%** **Neutral 24%** **Disagree 12%**	**0.000**

	Strongly Disagree 5%	Strongly Disagree 3%	Strongly Disagree 3%	Strongly Disagree 5%	
You require more knowledge about the association of systemic disease with oral health.	Strongly Agree 32% Agree 47% Neutral 12% Disagree 6% Strongly Disagree 3%	Strongly Agree 29% Agree 47% Neutral 11% Disagree 12% Strongly Disagree 1%	Strongly Agree 28% Agree 57% Neutral 10% Disagree 4% Strongly Disagree 1%	Strongly Agree 24% Agree 57% Neutral 12% Disagree 5% Strongly Disagree 2%	0.000

Table 3: Comparison of the study participants on the basis of education level

Item	Primary School or Less	High School or Less	University Education	P- Value
In general, systemic health is associated with oral health	Strongly Agree 17% Agree 28% Neutral 13% Disagree 19% Strongly Disagree 22%	Strongly Agree 20% Agree 40% Neutral 17% Disagree 19% Strongly Disagree 4%	Strongly Agree 27% Agree 49% Neutral 17% Disagree 5% Strongly Disagree 1%	0.000
Do hormonal disorders (diabetes incipedus, hypothyroidism, thyroid disease, iodine deficiency) affect oral health?	Strongly Agree 26% Agree 23% Neutral 14% Disagree 14% Strongly Disagree 23%	Strongly Agree 14% Agree 36% Neutral 22% Disagree 26% Strongly Disagree 2%	Strongly Agree 24% Agree 47% Neutral 19% Disagree 8% Strongly Disagree 2%	0.000
Do cardiac disorders (cardiovascular disease, angina, hypertension) affect oral health?	Strongly Agree 22% Agree 19% Neutral 22% Disagree 17% Strongly Disagree 19%	Strongly Agree 7% Agree 25% Neutral 34% Disagree 31% Strongly Disagree 3%	Strongly Agree 13% Agree 32% Neutral 32% Disagree 18% Strongly Disagree 5%	0.000
Do metabolic disorders (diabetes mellitus, obesity, metabolic acidosis, phenylketonuria) affect oral health?	Strongly Agree 14% Agree 23%	Strongly Agree 9% Agree 38%	Strongly Agree 18% Agree 48%	

	Neutral **23%** **Disagree** **23%** **Strongly Disagree** **17%**	**Neutral** **23%** **Disagree** **25%** **Strongly Disagree** **5%**	**Neutral** **24%** **Disagree** **8%** **Strongly Disagree** **2%**	**0.000**
Do blood disorders (anemia, haemophilia, sickle cell disease, iron deficiency) affect oral health?	**Strongly Agree** **17%** **Agree** **19%** **Neutral** **38%** **Disagree** **14%** **Strongly Disagree** **11%**	**Strongly Agree** **11%** **Agree** **33%** **Neutral** **25%** **Disagree** **26%** **Strongly Disagree** **5%**	**Strongly Agree** **15%** **Agree** **44%** **Neutral** **26%** **Disagree** **11%** **Strongly Disagree** **4%**	**0.000**
Do autoimmune disorders (rheumatoid disorders, Sjogren syndrome, Connective tissue disease) effect oral health?	**Strongly Agree** **17%** **Agree** **14%** **Neutral** **40%** **Disagree** **14%** **Strongly Disagree** **14%**	**Strongly Agree** **7%** **Agree** **22%** **Neutral** **32%** **Disagree** **33%** **Strongly Disagree** **6%**	**Strongly Agree** **11%** **Agree** **30%** **Neutral** **37%** **Disagree** **17%** **Strongly Disagree** **5%**	**0.000**
Do pulmonary diseases (asthma, tuberculosis, bronchitis) affect oral health?	**Strongly Agree** **17%** **Agree** **19%** **Neutral** **36%** **Disagree** **14%** **Strongly Disagree** **14%**	**Strongly Agree** **9%** **Agree** **27%** **Neutral** **31%** **Disagree** **28%** **Strongly Disagree** **4%**	**Strongly Agree** **12%** **Agree** **37%** **Neutral** **30%** **Disagree** **17%** **Strongly Disagree** **4%**	**0.000**
Do infectious diseases (AIDS, Hepatitis B, Candidiasis) affect oral health?	**Strongly Agree** **28%** **Agree** **14%** **Neutral** **25%** **Disagree** **22%** **Strongly Disagree** **11%**	**Strongly Agree** **15%** **Agree** **32%** **Neutral** **27%** **Disagree** **22%** **Strongly Disagree** **4%**	**Strongly Agree** **23%** **Agree** **42%** **Neutral** **22%** **Disagree** **11%** **Strongly Disagree** **2%**	**0.000**
Does pregnancy affect oral health?	**Strongly Agree** **28%**	**Strongly Agree** **20%**	**Strongly Agree** **23%**	**0.000**

	Agree 25% **Neutral 31%** **Disagree 8%** **Strongly Disagree 8%**	**Agree 32%** **Neutral 22%** **Disagree 23%** **Strongly Disagree 3%**	**Agree 39%** **Neutral 23%** **Disagree 11%** **Strongly Disagree 4%**	
You require more knowledge about the association of systemic disease with oral health.	**Strongly Agree 19%** **Agree 33%** **Neutral 19%** **Disagree 17%** **Strongly Disagree 11%**	**Strongly Agree 27%** **Agree 46%** **Neutral 10%** **Disagree 15%** **Strongly Disagree 2%**	**Strongly Agree 31%** **Agree 52%** **Neutral 12%** **Disagree 4%** **Strongly Disagree 1%**	**0.000**

Table 4: Comparison of the Study participants on The Basis of Frequency of Dental Visits per year

Item	0-2 visits per year	3-5 visits per year	6= visits per year	P- Value
In general, systemic health is associated with oral health	**Strongly Agree 23%** **Agree 50%** **Neutral 18%** **Disagree 5%** **Strongly Disagree 4%**	**Strongly Agree 25%** **Agree 40%** **Neutral 15%** **Disagree 18%** **Strongly Disagree 2%**	**Strongly Agree 39%** **Agree 39%** **Neutral 16%** **Disagree 5%** **Strongly Disagree 1%**	**0.000**
Do hormonal disorders (diabetes incipedus, hypothyroidism, thyroid disease, iodine deficiency) affect oral health?	**Strongly Agree 19%** **Agree 46%** **Neutral 22%** **Disagree 10%** **Strongly Disagree 3%**	**Strongly Agree 21%** **Agree 40%** **Neutral 15%** **Disagree 21%** **Strongly Disagree 3%**	**Strongly Agree 32%** **Agree 39%** **Neutral 20%** **Disagree 7%** **Strongly Disagree 2%**	**0.000**
Do cardiac disorders (cardiovascular disease, angina, hypertension) affect oral health?	**Strongly Agree 10%** **Agree 30%** **Neutral 36%** **Disagree 19%**	**Strongly Agree 12%** **Agree 31%** **Neutral 25%** **Disagree 28%**	**Strongly Agree 20%** **Agree 31%** **Neutral 28%** **Disagree 16%**	**0.000**

	Strongly Disagree **5%**	**Strongly Disagree** **4%**	**Strongly Disagree** **5%**	
Do metabolic disorders (diabetes mellitus, obesity, metabolic acidosis, phenylketonuria) affect oral health?	**Strongly Agree** **15%** **Agree** **45%** **Neutral** **27%** **Disagree** **10%** **Strongly Disagree** **3%**	**Strongly Agree** **15%** **Agree** **44%** **Neutral** **19%** **Disagree** **19%** **Strongly Disagree** **3%**	**Strongly Agree** **23%** **Agree** **44%** **Neutral** **22%** **Disagree** **7%** **Strongly Disagree** **4%**	**0.000**
Do blood disorders (anemia, haemophilia, sickle cell disease, iron deficiency) affect oral health?	**Strongly Agree** **13%** **Agree** **43%** **Neutral** **28%** **Disagree** **12%** **Strongly Disagree** **4%**	**Strongly Agree** **14%** **Agree** **37%** **Neutral** **21%** **Disagree** **24%** **Strongly Disagree** **4%**	**Strongly Agree** **24%** **Agree** **36%** **Neutral** **23%** **Disagree** **11%** **Strongly Disagree** **6%**	**0.000**
Do autoimmune disorders (rheumatoid disorders, Sjogren syndrome, Connective tissue disease) effect oral health?	**Strongly Agree** **7%** **Agree** **29%** **Neutral** **39%** **Disagree** **19%** **Strongly Disagree** **5%**	**Strongly Agree** **11%** **Agree** **27%** **Neutral** **30%** **Disagree** **27%** **Strongly Disagree** **5%**	**Strongly Agree** **20%** **Agree** **25%** **Neutral** **32%** **Disagree** **17%** **Strongly Disagree** **6%**	**0.000**
Do pulmonary diseases (asthma, tuberculosis, bronchitis) affect oral health?	**Strongly Agree** **9%** **Agree** **35%** **Neutral** **34%** **Disagree** **18%** **Strongly Disagree** **5%**	**Strongly Agree** **12%** **Agree** **32%** **Neutral** **26%** **Disagree** **25%** **Strongly Disagree** **5%**	**Strongly Agree** **23%** **Agree** **32%** **Neutral** **23%** **Disagree** **18%** **Strongly Disagree** **5%**	**0.000**
Do infectious diseases (AIDS, Hepatitis B, Candidiasis) affect oral health?	**Strongly Agree** **19%** **Agree** **40%** **Neutral** **26%**	**Strongly Agree** **21%** **Agree** **39%** **Neutral** **18%**	**Strongly Agree** **31%** **Agree** **31%** **Neutral** **22%**	**0.000**

	Disagree **12%** **Strongly Disagree** **4%**	**Disagree** **20%** **Strongly Disagree** **2%**	**Disagree** **13%** **Strongly Disagree** **3%**	
Does pregnancy affect oral health?	**Strongly Agree** **21%** **Agree** **39%** **Neutral** **24%** **Disagree** **12%** **Strongly Disagree** **4%**	**Strongly Agree** **22%** **Agree** **34%** **Neutral** **20%** **Disagree** **20%** **Strongly Disagree** **4%**	**Strongly Agree** **32%** **Agree** **31%** **Neutral** **19%** **Disagree** **14%** **Strongly Disagree** **3%**	**0.000**
You require more knowledge about the association of systemic disease with oral health.	**Strongly Agree** **31%** **Agree** **52%** **Neutral** **11%** **Disagree** **4%** **Strongly Disagree** **2%**	**Strongly Agree** **25%** **Agree** **44%** **Neutral** **13%** **Disagree** **15%** **Strongly Disagree** **2%**	**Strongly Agree** **33%** **Agree** **52%** **Neutral** **9%** **Disagree** **5%** **Strongly Disagree** **2%**	**0.000**

DISCUSSION

Several systemic medical conditions have a direct or indirect effect on the oral health of a person, which led us to investigate this issue among the Saudi population. We divided the subjects into groups on the basis of gender, age, educational level and the number of dental visits. As far as the gender was concerned, females showed a better knowledge level regarding the association of certain medical conditions with oral health such as hormonal disorders (p-value: 0.000), metabolic disorders (p-value: 0.000), blood disorders (p-value: 0.000), infectious diseases (p-value: 0.002) and pregnancy (p-value: 0.000). Several studies have demonstrated public's knowledge regarding above-mentioned systemic disorders and their effect on oral health. Diabetes and periodontal health have been strongly associated with (Tasdemir & Alkan, 2015). Similarly, cardiovascular disease has also been linked with oral health, which is reported by study participants in North Carolina, USA (Bell et al, 2012).

Significant comparisons have been seen when inquired about this association from different age groups. Older aged participants showed a better level of knowledge and awareness regarding the association of oral health with metabolic disorders (p-value: 0.000, blood disorders (p-value: 0.000), pulmonary diseases (p-value: 0.000). However, younger aged participants reported that they required more knowledge about this association (p-value: 0.000). Oral health-related knowledge has been seen to be high among old aged patients (Baker et al, 2007).

Educational levels were also being compared for oral health knowledge related to systemic conditions. It was clear from the results that the university graduates showed a significantly higher level of knowledge regarding the above-mentioned association as compared to lesser educated study participants. Moreover, study participants having a higher number of dental visits also showed better knowledge regarding this issue.

CONCLUSION

- Female Saudi participants showed better knowledge than males.
- Older aged participants revealed a higher level of awareness.
- Younger age group required more information on this topic.
- Subjects with higher education had significantly better knowledge as compared to their counterparts.
- Increased number of dental visits improves the overall knowledge about oral health.

CONFLICT OF INTEREST

There was no conflict of interest among the authors of this study.

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