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Research Article

Prevalence of Oral Health Problems and Distribution According to Socio-demographic Variables and Blood Groups among Patients in the Tripoli Region

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Abstract: Background: Oral health plays an important role in maintaining life functions and quality of life**.** Periodontal disease can vary with respect to bacterial etiology, host response, and clinical disease progression. A key role of genetic effects has suggested distribution of lesions and severity of destruction in each individual**.** Many diseases, particularly digestive disorders, cancer, and infection, show preferences among the ABO blood types. Knowledge of blood groups and their association with oral diseases is very important, as it may help in early diagnosis and treatment strategies. **Objectives:** The study aimed to investigate the distribution of patients with oral and dental health problems according to age, regions, Socio-demographic Variables, and blood groups in the Tripoli region. **Material and Methods:** The present study was conducted on 200 patients with oral and dental health problems attending six medical centers in Tripoli region from the 01st March 2022 to the 01st June 2022. Also, 100 healthy individuals without any oral and dental health problems or any other diseases were recruited as a control group. This study was approved by the Research and Ethical Committee of the medical centers and Libyan Academy of graduate studies. One ml of venous blood was withdrawn from each participant in the study for determination of blood groups. The data were compared using Chi-Square using SPSS Statistics for Windows, Version 25. **Results:** The results showed that the mean age of the patients was 43.03±13.82 years. The higher distribution of patients was 58 patients (29%) in the age group (26-35) years while the lower distribution was 10 patients (5%) in the age group (66-75) years. The distribution of patients according to the region were 81.5%, 13%, 4%, and 1.5% in Tripoli, South Tripoli, West Tripoli, and East Tripoli, respectively. The Distribution of patients according to occupation were 4.5% Students, 30% Housewives, 10.5% Employers, 12.5% Teachers, 14% Nurses, 7.5% Doctors, 12.5% Laboratory Technicians and 8.5% Freelance workers. The distribution of patients according to levels of education were 23.5% Pre-Secondary, 19% Secondary, 46% Bachelor's or equivalent, and 11.5% Master's or equivalent. The distribution of patients according to marital status were 26% single and 74% married. The distribution of patients according to oral and dental problems were 5% with bridge, 8% with missing teeth, 86% with dental caries, 63.5% with bleeding of gum, and 25.5% with swelling of gum. The degrees of gingival erythema among patients were 36.5% mild, 38% moderate, and 25.5% severe. The degrees of gingival inflammation among patients were 36% mild, 38.5% moderate, and 25.5% severe. The distribution of A, B, AB, and O blood groups showed a significant (*P=0.000*) difference between healthy individuals and oral and dental health problems among patients that, were 54%, 12%, 4%& 30%, and 21.5%, 9%, 3.5% & 66%, respectively. Also, the distribution of A^+, A^-, B^+, B^-, AB^+, O^+, and O^- blood groups showed a significant (*P=0.000*) difference between healthy individuals and patients with oral and dental health problems that, were 49%, 5%, 10%, 2%, 4%, 25%, & 5%, and 18%, 3.5%, 8%, 1%, 3.5%, 60%& 6%, respectively. But, the distribution of Rh^+ and Rh^- blood groups showed a non-significant (*P=0.695*) difference between healthy individuals and patients that, were 88% & 12%, and 89.5%& 10.5%, respectively. **Conclusion:** It can be concluded that the mean age of the patients with oral and dental health problems was 43.03 years and the

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higher distribution of patients was in the age group (26-35) years. The higher distribution of ABO blood groups was O blood group among patients especially O^+ blood groups. The distribution of Rh+ and Rh- blood groups were showed a non-significant difference between healthy individuals and patients with oral and dental health problems. Further studies are needed to confirm these results.

Keywords: Oral Health Problems, Periodontitis, Dental caries, Age groups, Blood Groups, Rhesus factor, Tripoli Region

1. Introduction

Oral health plays an important role in maintaining life functions and quality of life [1]. Periodontitis is a chronic inflammatory condition of the tissues that surround and support the teeth and is initiated by inappropriate and excessive immune responses to bacteria in subgingival dental plaque leading to loss of the integrity of the periodontium, compromised tooth function, and eventually tooth loss [2]. Bacteria, environmental influence, various host factors such as diabetes, smoking, and genetic predisposition are considered to be major cause of periodontitis [3, 4, 5]. It is more common in smokers, in obesity, in people with diabetes, and in heart disease patients [2]. It is well known that periodontal disease can vary with respect to bacterial etiology, host response, and clinical disease progression [4]. A key role for genetic effects has suggested distribution of lesions and severity of destruction in each individual [3, 5]. Periodontitis has a worldwide prevalence of 5–15% and the prevalence of severe disease in western populations has increased in recent decades [2].

A dental caries is a chronic bacterial infection [6]. Dental caries and oral diseases occur as a result of a complicated relationship between the pathogenic microorganisms and the host. They are contagious diseases with the most common multifactorial etiology [7].

Inflammatory oral disease has a negative effect on the respiratory, cardiovascular, digestive, and skeletal systems [8].

ABO blood grouping was first described by Karl Landsteiner in 1900, based on the presence or absence of specific antigens on the human red blood cell (RBC) membrane. Blood type is classified as group A, B, O, or AB depending on whether the RBC membranes contain antigen A, antigen B, neither antigen, or both antigens, respectively [9, 10]. The other important blood system is the Rhesus (Rh) system. This system is determined by the nature of different proteins present on the surface of erythrocytes [9].

Many diseases, particularly digestive disorders, cancer, and infection, show preferences among the ABO blood types [9]. Blood group A has been associated with increased risks of certain tumor types, colitis, and gallstones [11, 12, 13], whereas non-O blood groups have been associated with cardiovascular diseases [14, 15], including ischemic heart disease and atherosclerosis [16].

Knowledge of blood groups and their association with oral diseases is very important, as it may help in early diagnosis and treatment strategies [5]. Although several studies have investigated the relationship between ABO blood groups, and medical diseases, few reports have explored the association with oral diseases, including periodontal disease.

1.1. Objectives

The study aimed to investigate the distribution of patients with oral and dental health problems according to age, regions, Socio-demographic Variables, and blood groups in the Tripoli region.

2. Materials and Methods

The present cross-sectional study was carried out on 200 subjects with oral and dental health problems attending Six medical centers in Tripoli region from the 01st March 2022 to the 01st June 2022, and 100 healthy individuals with healthy gingival, aged from 15 to 80 years. Subjects were selected from among patients who were referred to the clinics of dentistry in the Tripoli region for periodontal treatment and for other dental health reasons.

Ethical approval and patients consent statements were taken from every patient. The study design was reviewed and approved by the Ethical Committee of the medical centers and Libyan Academy of graduate studies.

The study was done in two phases, during the first phase blood samples of all the study subjects were collected and were sent for estimation of the ABO blood group, and Rh factor in the hospital laboratory. During the second phase of the study, the demographic data (gender, age, educational level, marital status, and other diseases) were recorded on a questionnaire, and an oral health examination was carried out in the department of public health dentistry.

All the clinical measurements were made using a manual periodontal probe (Williams' periodontal probe) on the gingival area adjacent to the teeth of each participant. The subjects were examined clinically for the presence of plaque, gingival bleeding, clinical attachment level, and probing pocket depth. The following indices were determined: DMFT (decayed, missing, and filled permanent teeth), DMFS (decayed, missing, and filled permanent surfaces), DEFT (decayed, extracted, and filled deciduous teeth), DEFS (decayed, extracted, and filled deciduous surfaces), GI (Gingival Index) [17] and PI (Plaque Index) [18], Deep grooves, and White spots were also recorded by the same dentist.

2.1. Blood sampling and determination of blood groups

A blood sample of one ml was drawn by venous puncture from each participant. The blood samples were collected in K, EDTA tubes for the determination of blood groups.

Blood groups were determined by using open slide methods where a drop of a blood sample from sterile finger pricks was placed into three different locations on a clean glass slide followed by a drop of blood grouping reagents, anti-A, anti-B, and anti-D. The reagents and the blood were mixed using a clean stick, and spread by moving gently. After one minute, the test slide was checked for agglutination.

2.2. Statistical Analysis

The data were analyzed with the Chi-Square test by using SPSS ver. 25. A P-value of <0.05 was considered significant for all statistical tests.

3. Results

The results showed that the highest mean age in patients with oral and dental health problems group (43.03±13.82 years, with range 16–75 years) compared with the control group (31.66±8.45 years, with range 18-51years).

3.1. Distribution of patients with oral and dental health problems according to gender

The Distribution of patients with oral and dental health problems according to gender was 157 females (78.5%) and 43 males (21.5%) (Table 1 & Figure 1).

Table 1. Distribution of patients with oral and dental health problems according to gender.

Gender	Frequency	Percent (%)
Males	43	21.5
Females	157	78.5

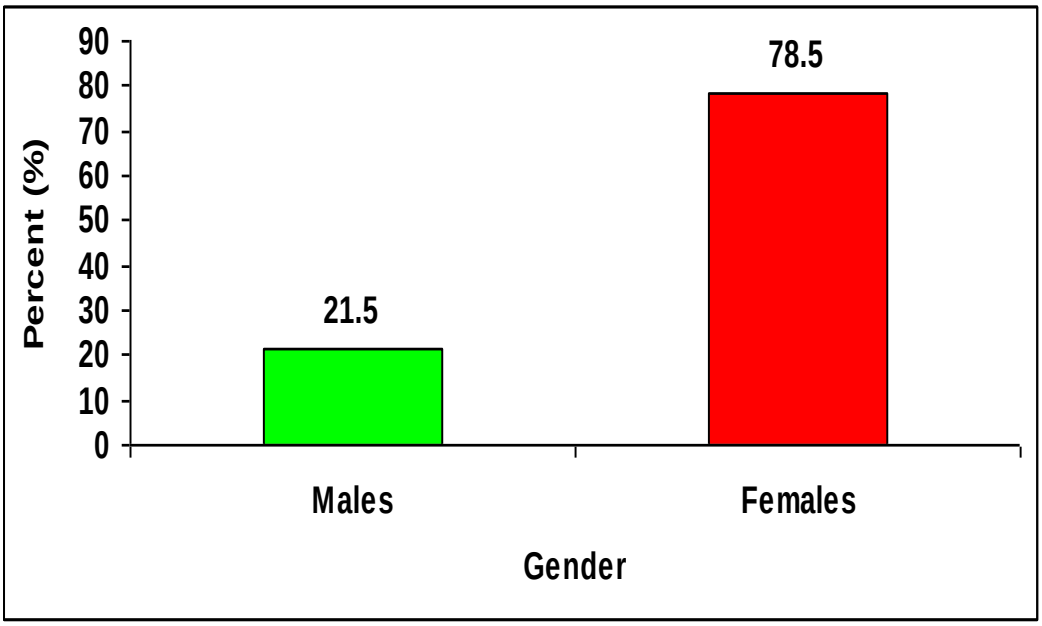

Figure 1. Distribution of patients with oral and dental health problems according to gender.

3.2. Distribution of patients with oral and dental health problems according to age groups

Data in Table 2 and Figure 2 show the distribution of patients with oral and dental health problems according to age groups. The higher distribution of patients with oral and dental health problems was 58 patients (29%) in the age group (26-35) years while the lower distribution was 10 patients (5%) in the age group (66-75) years.

Table 2. Distribution of patients with oral and dental health problems according to age groups

Age group (Years)	Number of Patients	Percent (%)
16-25	18	9%
26-35	58	29%
36-45	42	21%
46-55	38	19%
56-65	34	17%
66-75	10	5%

3.3. Distribution patients with oral and dental health problems according to the regions

The Distribution of patients with oral and dental health problems according to the regions were 81.5%, 13%, 4%, and 1.5% in Tripoli, South Tripoli, West Tripoli, and East Tripoli, respectively (Table 3 and Figure 3).

Table 3. Distribution of oral health problems among patients according to the regions

Regions	Number of patient	(%)
East Tripoli	3	1.5%
Tripoli	163	81.5%
West Tripoli	8	4%
South Tripoli	26	13%

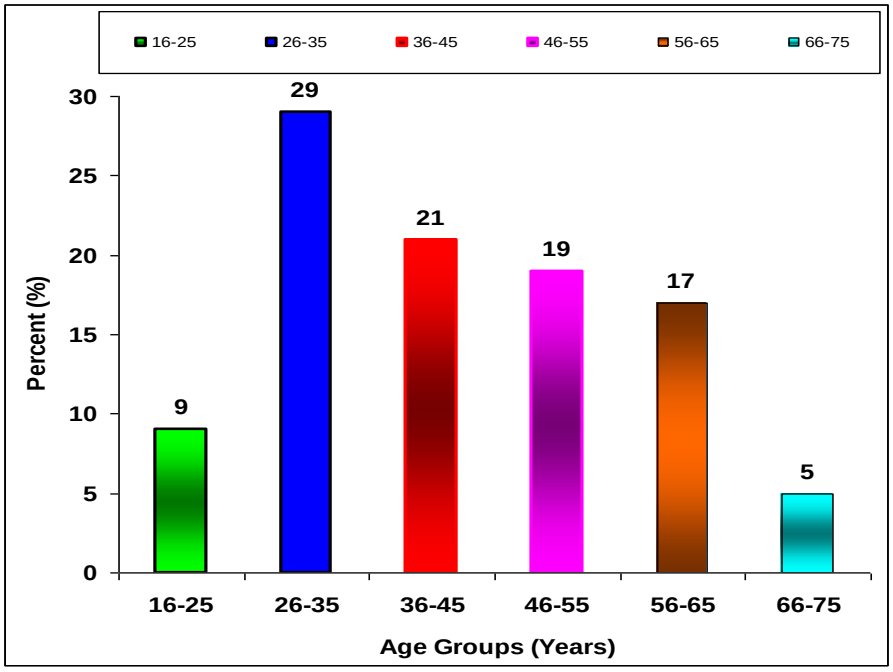

Figure 2. Distribution of patients with oral and dental health problems according to age groups.

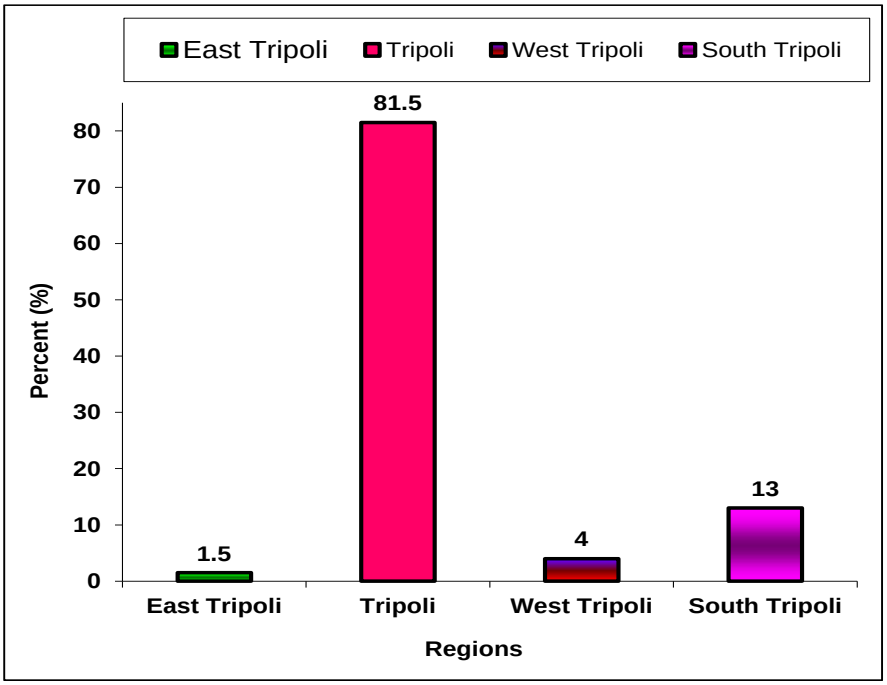

Figure 3. Distribution of patients with oral and dental health problems according to regions.

3.4. Distribution of patients with oral and dental health problems according to occupation

The Distribution of patients with oral and dental health problems according to occupation were 4.5% Students, 30% Housewives, 10.5% Employers, 12.5% Teachers, 14% Nurses, 7.5% Doctors, 12.5% Laboratory Technicians and 8.5% Freelance workers (Table 4 and Figure 4).

Table 4. Distribution of patients with oral and dental health problems according to occupation.

Occupation	Frequency	Percent (%)
Students	9	4.5
Housewives	60	30
Employers	21	10.5
Teachers	25	12.5
Nurses	28	14
Doctors	15	7.5
Laboratory Technicians	25	12.5
Freelance workers	17	8.5
Total	200	100

3.5. Distribution of patients with oral and dental health problems according to levels of education

The distribution of patients with oral and dental health problems according to levels of education were 23.5% Pre-Secondary, 19% Secondary, 46% Bachelor's or equivalent, and 11.5% Master's or equivalent (Table 5 and Figure 5).

Table 5. Distribution of patients with oral and dental health problems according to Levels of Education.

Levels of Education	Frequency	Percent (%)
Pre-Secondary	47	23.5
Secondary	38	19
Bachelor's or equivalent	92	46
Master's or equivalent	23	11.5
Total	200	100

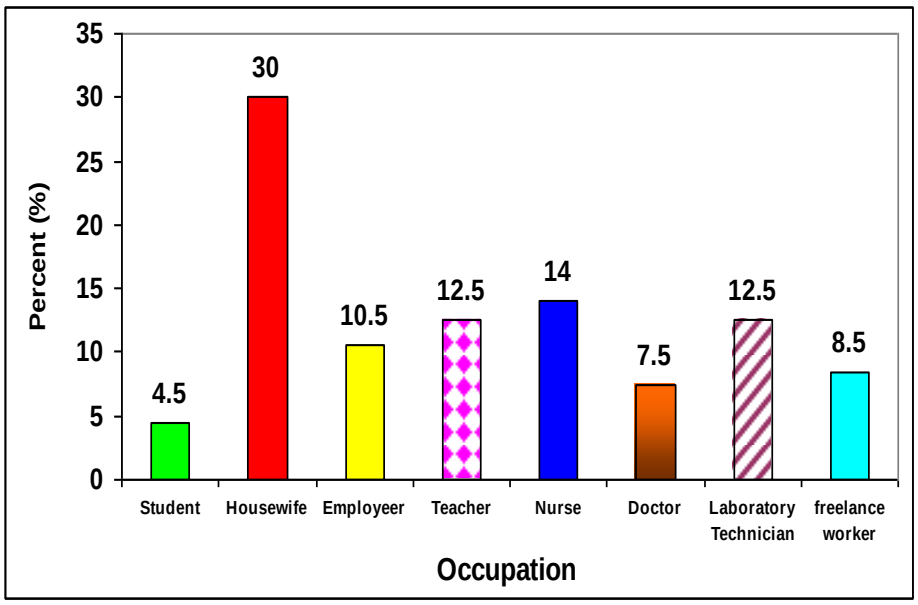

Figure 4. Distribution of patients with oral and dental health problems according to occupation.

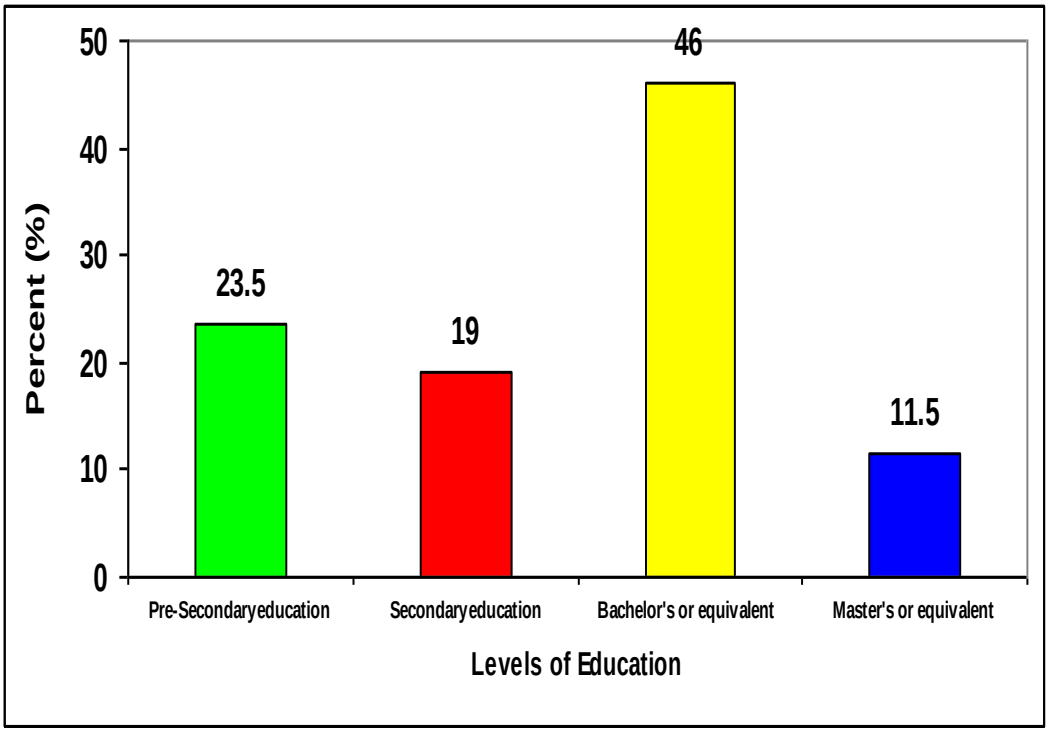

Figure 5. Distribution of patients with oral and dental health problems according to Levels of Education.

3.6. Distribution of patients with oral and dental health problems according to marital status

The distribution of patients with oral and dental health problems according to marital status were 26% single and 74% married (Table 6 and Figure 6).

Table 6. Distribution of patients with oral and dental health problems according to marital status.

Marital Status	Frequency	Percent (%)
Single	52	26
Married	148	74
Total	200	100

3.7. Distribution of patients with oral and dental health problems

The distribution of patients according to oral and dental problems was 5% with bridge, 8% with missing teeth, 86% with dental caries, 63.5% with bleeding of gum, and 25.5% with swelling of gum (Table 7 and Figure 7).

Table 7. Distribution of oral and dental health problems among patients.

Oral and dental problems	Yes		NO	
	Frequency	Percent (%)	Frequency	Percent (%)
Bridge	10	5	190	95
Missing teeth	16	8	184	92
Dental caries	172	86	28	14
Bleeding of gum	127	63.5	73	36.5
Swelling of gum	51	25.5	149	74.5

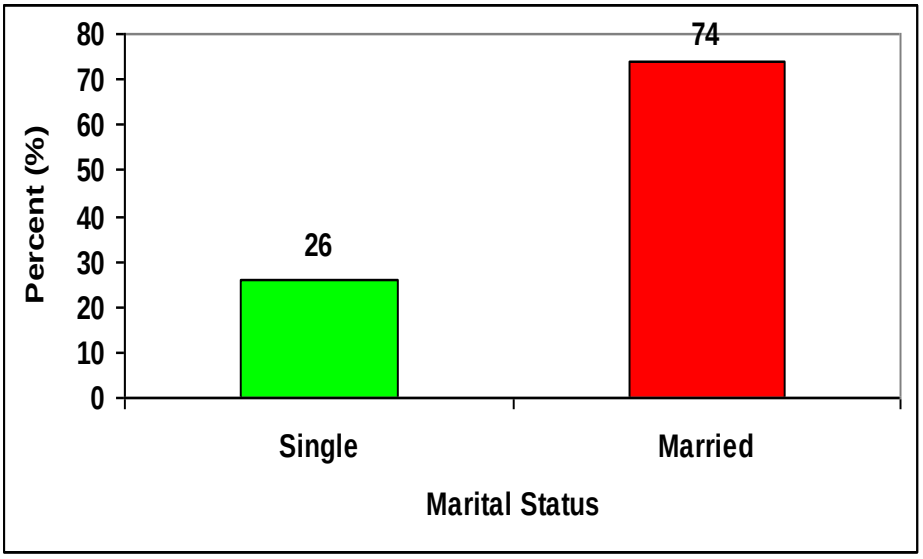

Figure 6. Distribution of patients with oral and dental health problems according to Marital Status.

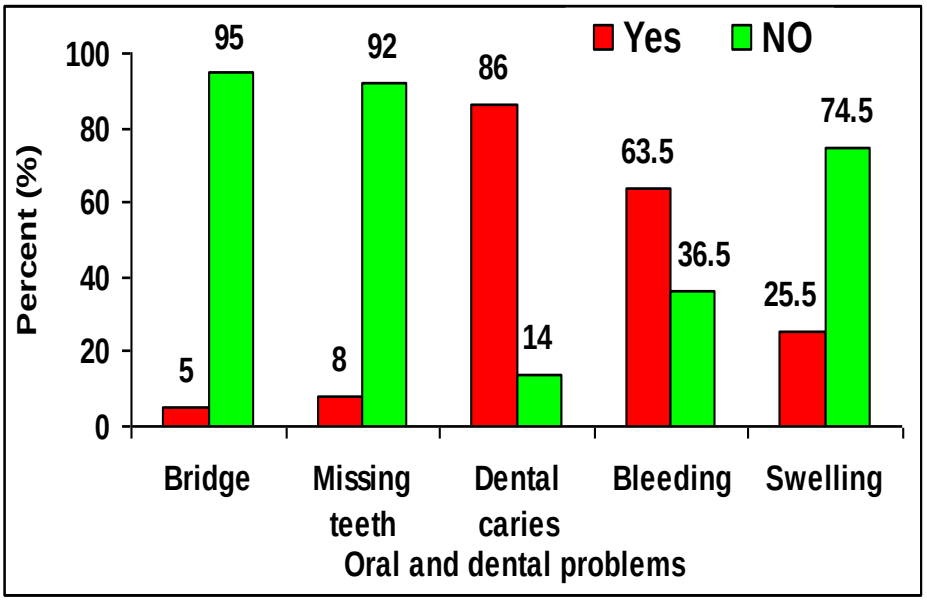

Figure 7. Distribution of oral and dental health problems among patients.

3.8. Degrees of gingival erythema and inflammation among patients

The degrees of gingival erythema among patients were 36.5% mild, 38% moderate, and 25.5% severe. The degrees of gingival inflammation among patients were 36% mild, 38.5% moderate, and 25.5% severe. (Table 8 & Figure 8).

Table 8. Degrees of gingival erythema and inflammation among patients

Degree	Mild		Moderate		Severe	
Gingival problem	Frequency	%	Frequency	%	Frequency	%
Erythema	73	36.5	76	38	51	25.5
Inflammation	72	36	77	38.5	51	25.5

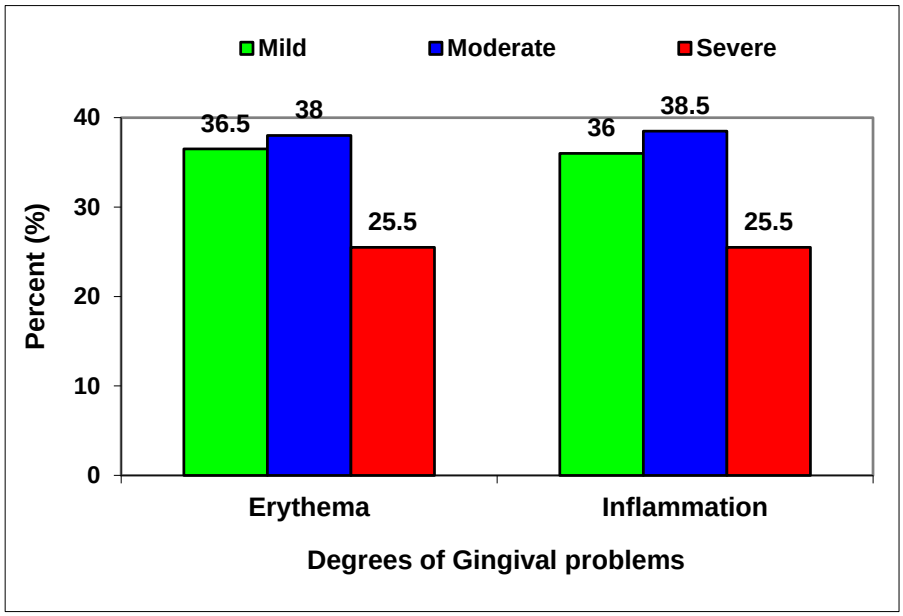

Figure 8. Degrees of gingival erythema and inflammation among patients.

3.9. Distribution of ABO blood groups among healthy individuals and patients with oral and dental health problems

The distribution of A, B, AB, and O blood groups showed a significant (*P=0.000*) difference between healthy individuals and oral and dental health problems among patients that, were 54%, 12%, 4%& 30%, and 21.5%, 9%, 3.5% & 66%, respectively (Table 9 and Figure 9).

Table 9. Distribution of ABO blood groups among healthy individuals and patients with oral and dental health problems.

Blood group	Control		Patients with Oral and Dental Health Problems.		Chi-Square	P-Value
	Number of healthy individuals	Percent (%)	Number of patients	Percent (%)		
A	54	54%	43	21.5%	38.424	0.000
B	12	12%	18	9%		
AB	4	4%	7	3.5%		
O	30	30%	132	66%		

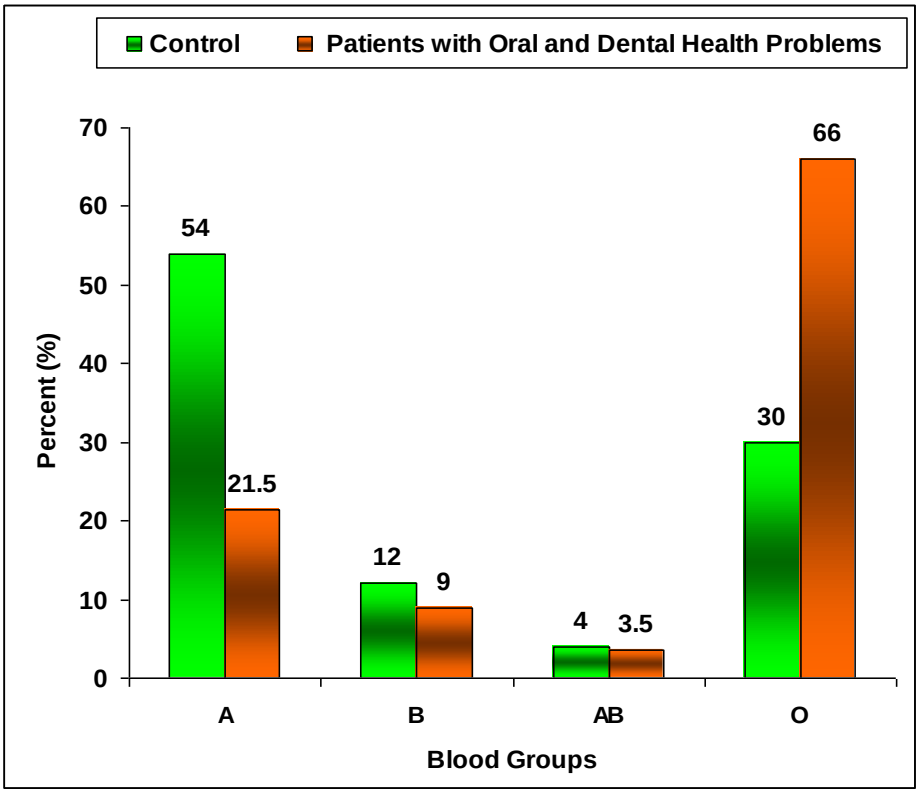

Figure 9. Distribution of ABO blood groups among healthy individuals and patients with oral and dental health problems.

3.10. Distribution of healthy individuals and patients with oral and Dental health problems according to the ABO blood groups system and Rhesus factor

The distribution of A^+, A^-, B^+, B^-, AB^+, O^+, and O^- blood groups showed a significant (*P=0.000*) difference between healthy individuals and patients with oral and dental health problems that, were 49%, 5%, 10%, 2%, 4%, 25%, & 5%, and 18%, 3.5%, 8%, 1%, 3.5%, 60%& 6%, respectively (Table 10 and Figure 10).

Table 10. Distribution of healthy individuals and patients with oral and dental health problems according to ABO/Rhesus blood group system.

Blood Groups	Control		Patients with Oral Health Problems.		Chi-Square	P-Value
	Number of healthy individuals	Percent (%)	Number of patients	Percent (%)		
A^+	49	49%	36	18%		
A^-	5	5%	7	3.5%		
B^+	10	10%	16	8%		
B^-	2	2%	2	1%	40.854	0.000
AB^+	4	4%	7	3.5%		
O^+	25	25%	120	60%		
O-	5	5%	12	6%		

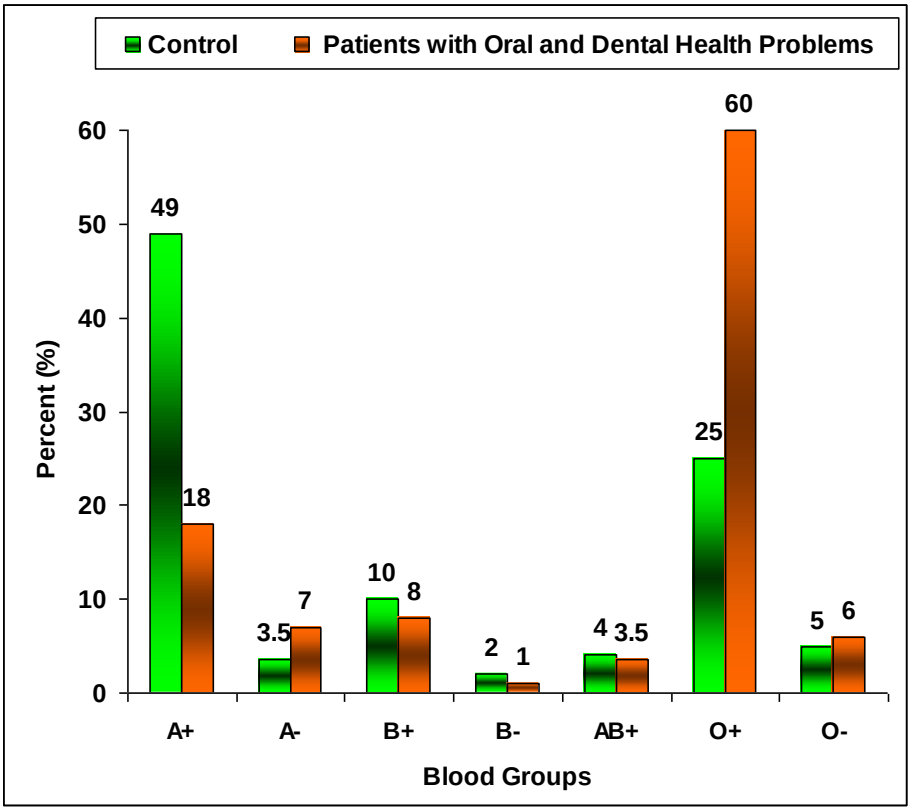

Figure 10. Distribution of healthy individuals and patients with oral and dental health problems according to ABO blood group system and Rhesus factor.

3.11. Distribution of healthy individuals and patients with oral and dental health problems according to Rhesus factor

The distribution of Rh^+ and Rh^- blood groups showed a non-significant (*P=0.695*) difference between healthy individuals and patients with oral and dental health problems that, were 88% & 12%, and 89.5%& 10.5%, respectively (Table 11 and Figure 11).

Table 11. Distribution of healthy individuals and patients with oral and dental health problems according to Rhesus factor.

Blood group	Control		Patients with Oral and Dental Health Problems		Chi-Square	P Value
	Number of healthy individuals	Percent (%)	Number of patients	Percent (%)		
Rh+	88	88%	179	89.5%	0.153	0.695
Rh-	12	12%	21	10.5%		

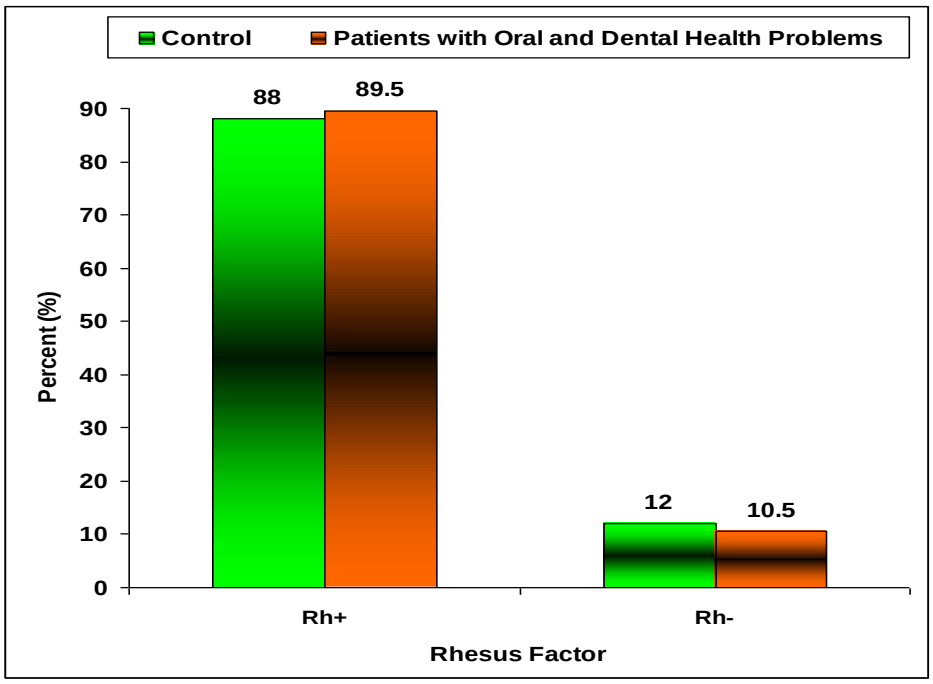

Figure 11. Distribution of healthy individuals and patients with oral and dental health problems according to Rhesus factor.

4. Discussion

The present study aimed to determine the distribution of oral and dental health problems according to gender and age groups, investigate the relationship between blood groups and Rhesus factor in patients with oral and dental health problems in Tripoli region.

The prevalence of dental caries could be due to the change in lifestyle, which includes increasing the sugary food consumption, and soft drinks, and a lack of awareness about proper maintenance of oral and dental health [19, 20].

ABO blood subgroup and Rhesus factor could constitute risk predictors in the development of periodontal disease. Previous studies suggested a possible genetic basis in the association of the blood group AB with aggressive periodontitis, other studies showed that periodontitis was more common among patients with blood group O [3,4, 10, 21, 22, 23], whereas Al Ghamdi, [9] and Pai *et al. [24]* were found an association with blood group B. A significant association of periodontitis with Rh factor was seen with more individuals being Rh-positive as compared with Rh-negative [4].

The results showed that the highest mean value of age in patients with oral and dental health problems group (43.03±13.82 years) compared with the control group (31.66±8.45 years) and the distribution of patients with oral and dental health problems were 91% in the age ranged from 26 to 75years**.** This result run parallel to the results obtained by Mortazavi *et al., [25]* who found that people with periodontitis were significantly older than healyhy individuals. The incidence of oral and dental health problems is usually associated with old age [26, 27]. This may be due to systemic and local factors which are more prevalent in older age group, such as: smoking, lack of oral hygiene, diabetes mellitus, gingival recession, and inadequate plaque biofilm control [28].

The antigens of ABO system acting as receptors for infectious agents [25, 29]. ABO blood antigens had an increased effect on development of oral cavity diseases [25, 30]. ABO blood subgroup and Rhesus factor could constitute risk predictors in the development of periodontal disease. Previous studies suggested a possible genetic basis in the association of the blood group AB with aggressive periodontitis, other studies showed

that periodontitis was more common among patients with blood group O [3, 4, 10, 21- 23], whereas Al Ghamdi, [9] and Pai *et al.*, *[24]* were found an association with blood group B. A significant association of periodontitis with Rh factor was seen with more individuals being Rh-positive as compared with Rh-negative [4].

The present study showed that individuals with blood group O have greater severity of periodontal disease, whereas individuals with blood group A have greater resistance to periodontal disease. The distribution of A, B, AB, and O blood groups , were 54%, 12%, 4%& 30%, and 21.5%, 9%, 3.5% & 66% in healthy individuals and oral and dental health problems, respectively. These results are run parallel to the results of the previous studies [21, 31-33]. Koregol *et al.*, [22], Mortazavi *et al.*, *[25]*, and Arowojolu *et al.*, [34] recorded that blood group O had the highest frequency in patients with periodontitis. Gawrzewska, [31] found that individuals with blood group O have greater severity of periodontal disease, whereas individuals with blood group A have greater resistance to periodontal disease. Demir *et al.*, [21] recorded that the A blood group (48.5%) and O blood group (30.3%) were more common. There is a relatively high percentage of blood group A patients (61.5%) in gingivitis and a relatively high percentage of blood group O patients (41.5%) with periodontitis ($P<0.05$). Habeeb ***et*** *al.*,*[32]* mentioned that patients with gingival diseases were showed that about 41.86% of patients were in group O; 21.71% were in group A; 28.68% were in group B, and only 7.75% were in group AB. Mostafa *et al.*, *[33]* reported that the distribution of the ABO blood groups in patients with periodontitis, 40.9% of O blood group, 26.8% of A blood group, 23% B blood group, and 9.3% AB blood group.

The ABO specificity of different bacteria is well-established and antibody titers to those specificities vary with the host blood type. These data suggest that genetic factors may alter oral environment and the process of periodontal disease through limitations imposed by Landsteiner's law: Specific antibody secretion would be expected to be low or undetectable to antigens recognized as "self" and perhaps, more importantly, high to antigens recognized as "non-self." Experimentation is being conducted to further investigate this hypothesis [25, 35]. The strong correlation between blood group and dental caries could be explained by Mazumdar *et al.*, [36] who suggested that ABO blood group substances secreted in saliva lead to an assemblage of microorganisms and their removal from the oral cavity. So, The secretion of the ABO antigens into the saliva probably inhibits the ability of bacteria to attach to teeth surfaces this is because many of these bacteria have surface lectins, which they use to attach to body surface and are often ABO specific [9, 20, 25]. Also, non-secretors have lower levels of immunoglobulin A (IgA) antibodies in their saliva, which may compromise their ability to keep bacterial count low [5, 36]. The possible mechanism by which individuals of a specific blood group have a lower frequency of periodontal disease could be due to increased levels of antibodies [5, 9].

On the other hand, Kaslick *et al.*, [37] found that periodontitis patients were more likely to have A or B blood groups. Also, a cross-sectional study was carried out by Al-Sihli *et al.*, [20] at the College of Dentistry, Umm Al-Qura University to evaluate which type of ABO blood group is associated with an increased risk for dental caries. The results showed that the majority of participants are having B phenotype (33.3%), O phenotype (26.7%), and A phenotype (23.3%) while AB phenotypes constitute the minority that is (16.7%). Salih *et al.*, [28] found that DMFT values were significantly ($P< 0.05$) different among the different ABO blood groups, in which B blood group revealed the highest DMFT value, while the AB blood group showed the lowest DMFT.

Various ABO blood groups might show differences in significant rates in the colonization number of bacteria that are the main etiologic agents of periodontal disease [21, 25]. These differences in findings may be attributed to difference in sample size, study design, races, and geographic localization [25].

In the current study, The distribution of A+, A-, B+, B-, AB+, O+, and O- blood groups showed a significant ($P=0.000$) difference between healthy individuals and patients with oral and dental health problems that, were 49%, 5%, 10%, 2%, 4%, 25%, & 5%, and 18%,

3.5%, 8%, 1%, 3.5%, 60% & 6%, respectively. These results are similar to the study conducted by by Vivek *et al.,* [2], Demir *et al.,* [21], and Humagain & Rokaya, [38].

The present study showed that the distribution of Rh^+ and Rh^- blood groups were 88% & 12%, and 89.5%& 10.5%, in healthy individuals and patients with oral and dental health problems**,** respectively. These results are in accordance with Demir *et al.,* [21] who found that patients with periodontal diseases were 89.9% had Rh-positive, and 10.1% had Rh negative. Also, there was a relationship between Rh positive and gingivitis in borderline ($P<0.05$). Mostafa *et al., [33]* reported that the distribution of patients with chronic periodontitis according to the Rh factor were 90.2% had Rh positive, and 9.8% had Rh-negative. Also, Habeeb ***et*** *al.,* [32] reported that the distribution of patients with gingival diseases according to Rh factor were 90.70% of Rh-positive, and 9.30% Rh-negative. Mortazavi *et al., [25]* reported that periodontitis patients with Rh-positive had a higher distribution than those with Rh-negative factor. This may be related to difference in substitutes of cell membrane proteins, which is determined by a series of allelic genes at a single locus s[22, 33].

5. Conclusion

It can be concluded that the mean age of the patients with oral and dental health problems was 43.03 years and the higher distribution of patients was in the age group (26-35) years. The Distribution of patients according to occupation were 30% among Housewives,. The distribution of patients according to levels of education were 23.5% Pre-Secondary, and 46% Bachelor's or equivalent. The distribution of patients according to marital status were 74% among married. The distribution of patients according to oral and dental problems were 86% with dental caries, 63.5% with bleeding of gum, and 25.5% with swelling of gum. The degrees of gingival erythema among patients were 36.5% mild, 38% moderate, and 25.5% severe. The degrees of gingival inflammation among patients were 36% mild, 38.5% moderate, and 25.5% severe. The higher distribution of ABO blood groups was O blood group among patients especially O^+ blood groups. The distribution of Rh+ and Rh- blood groups were showed a non-significant difference between healthy individuals and patients with oral and dental health problems. Further studies are needed to confirm these results.

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