Evaluation of Blood Profile in Patients with Oral Lichen Planus Compared to Healthy Subjects

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Abstract

Background: Oral Lichen Planus (OLP) is a chronic autoimmune, inflammatory disease. Previous studies have shown the association of this disease with changes in several blood parameters. This study aimed to conduct a comprehensive study and determine the status of blood parameters of OLP patients that previous studies had shown conflicting evidence of changes.

Materials and Methods: In this cross-sectional study, 59 patients with OLP (case group) were compared with 60 healthy individuals (control group). Subjects' blood profile was analyzed for Hemoglobin, Serum Iron, FBS, HDL, LDL, Cholesterol, Triglyceride, T3, T4, TSH, blood group and RH antigen. Blood indices of case and control groups were compared in regard to age, gender, and Body Mass Index (BMI). Data were analyzed by using Independent T-test, Pearson Chi-square, Linear Regression, and Logistic Regression.

Results: The mean values of LDL, Cholesterol, Triglyceride, TSH and FBS were significantly higher in the case group ($P<0.05$) and the mean values of T3 and T4 were significantly lower in the case group compared to the control group. Frequency of Rh+ factor was significantly higher in the case group. Considering gender, in the case group, the mean values of serum Iron, hemoglobin and T3 indices was significantly lower in women and TSH values were significantly higher in women. There was a significant difference between subjects with normal and above normal BMI in Serum Iron, Cholesterol and Triglyceride indices ($P<0.05$).

Conclusion: Blood profile of people with OLP, in most of the studied indices was significantly different from healthy people.

Keywords: Lichen planus • Blood • Hyperlipidemia • Thyroiditis • Diabetes mellitus

Introduction

Lichen Planus (LP) is a chronic mucocutaneous autoimmune disease that often affects the oral cavity. The disease is more common in females aged 30 to 70 years and its prevalence in different populations ranges from 0.5 to 2.3% [1,2]. About one-quarter of patients with Oral Lichen Planus (OLP) also have skin lesions [3]. Oral lesions are commonly seen as symmetrical and bilateral lesions with multifocal involvement. Buccal mucosa, dorsal surface of the tongue and gingiva are the most common areas of disease [4]. The etiology of this disease has not been recognized properly yet. In different systematic situations like taking certain medications, different autoimmune diseases, exposure to some substances and infections, similar lesions to OLP lesions are observed. The exact relationship between these factors and the occurrence of the lesion has not been established but immune reactions are effective in the occurrence of the disease [5]. A number of recent studies are currently investigating the association of blood index values such as Hemoglobin [6,7], Serum Iron [6-8], Lipid [9-13], Thyroid [14,15] and Blood Glucose [16-18] with OLP disease. Up to now, the status of different blood parameters in OLP patients has not been evaluated simultaneously. Previous studies have selected a number of blood parameters and evaluated the performance of the system related to that index. All of the blood parameters mentioned above have not been evaluated in a comprehensive study so far. There is no specific blood profile for OLP patients. Understanding the status of blood parameters in patients referred to the dental clinic can have many diagnostic aspects. The results of Miller and Westgate's study showed that many dental patients have abnormal tests that are not aware of their systemic condition [19]. So awareness of altered blood parameters in patients with OLP disease can provide insight into their possible effect on the onset of the disease or vice versa OLP disease may be a risk factor for other diseases by a specific change in one of the blood parameters. For example, according to the results of the study by Lie et al, there was a relationship between dyslipidemia and LP disease, so LP disease is considered a risk factor for heart disease [12]. There are few studies about blood parameters and OLP disease. It is still unclear whether these changes are due to the OLP disease or the cause of OLP disease, it is required numerous studies to achieve these relationships. Due to all blood parameters which may have changed in OLP disease and have not been tested in one sample, investigating all the variables in a single community will increase the degree of generalization in order to further generalize these variables and determine their association with the disease and even among themselves. So in the present study with investigating published studies on blood changes in OLP disease and their association with the specific disease such as diabetes, thyroid diseases, anemia and dyslipidemia we decided to provide a list of related blood parameters and investigate all blood parameters with contradictory evidence of their changes in the studies and recognize blood profile of patients with OLP disease.

Materials and Methods

This cross-sectional study was conducted on 59 patients with OLP and 60 healthy persons. Neither subject of the control group had OLP. Meanwhile, they were matched with oral lichen planus patients in terms of age and gender. The participants were collected using convenient sampling from people who presented in Oral Medicine Department, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran-Iran between September 2017and March 2019. This study was approved by the ethical committee of the school of dentistry (IR.SBMU.DRC.REC.1397.027). Inclusion criteria for case group patients in the study were: the definitive diagnosis of oral lichen planus according to clinical features or histopathologic examination and no other oral lesion except lichen planus. Also, inclusion criteria for the control group were the absence of any oral lesions, systemic health, no

illness and had not taken any medication in the last three months [20,21]. Exclusion criteria included: patient dissatisfaction, smoking, alcohol consumption and, pregnancy [9,17,22].

Then, a data form including demographics, and characteristics of lesions, as well as informed written consent, was completed for them. Body Mass Index (BMI) was calculated as weight (kg)/height (m2). Blood samples were collected at the laboratory of the Taleghani Hospital, Tehran-Iran. A total of 5 mL of venous blood sample was taken from each participant after the subjects had fasted overnight. The levels of Serum Iron, Hemoglobin, Cholesterol, Triglyceride, High-Density Lipoproteins (HDL), Low-Density Lipoproteins (LDL), T3, T4, TSH, FBS and ABO and Rh blood groups were determined. A p-value of <0.05 was considered to indicate statistical significance. Quantities of Serum Iron, Hemoglobin, Cholesterol, Triglyceride, HDL, LDL, T3, T4, TSH, and FBS in the two groups were compared by using Independent T-test. A linear regression analysis was performed to assess the association of the blood parameters and the factors (age, gender, BMI, case and control groups).

Results

This study was performed on 59 patients with oral lichen planus (case group) and 60 healthy individuals (control group). The mean age of the case group was 49.92 (± 12.89) and the control group was 47.30 (± 14.8). The mean BMI of case group was 26.98 (± 2.40) and the control group was 28.03 (± 3.92). Independent T-test and Pearson Chi-square tests revealed no significant differences between genders, age and body mass index between the case and control groups (P> 0.05) [Table1].

Table 1. Comparison of gender, age and BMI in case and control groups.

		Case group	Control group	P.value
		Frequency(percent)	Frequency (percent)	
Gender	Male	(37%)22	(%37)22	0/945
	Female	(63%)37	(63%)38	
Age	years20-29	(3%)2	(2%)1	0/190
	years30-39	(24%)14	(17%)10	
	years 40-49	(17%)10	(40%)24	
	years 50-59	(32%)19	(37%)22	
	≥60	(24%)14	(5%)3	
BMI	9/24 – 5/18	(19%)11	(20%)12	0/84
	9/29 – 25	(68%)40	(48%)29	
	Higher than 30	(%13)8	(32%)19	

The most frequent blood group among case group was B^+ (22%) and the least frequent group was O- (3%). However, among the control group the most frequent blood group was O+ (22%) and the least frequent group was AB+ (7%). Pearson Chi-square test showed no significant difference between the frequency of blood groups in case and control groups (P>0.05) [Table 2]. Pearson Chi-square test showed that the frequency of Rh+ factor was significantly higher in the case group (P<0.05) in other words lichen planus was more prevalent in people with positive Rh (Odds Ratio=2/131) (P=0/047) [Table 3].

Table 2. Comparison of frequency of blood groups in case and control groups.

Blood group	Case	Control	P value
	Frequency (percent)	(percent)Frequency	
A+	11 (19%)	(8%)5	0.351
B+	13 (22%)	(15%)9	
AB+	6 (10%)	(7%)4	
O+	11 (19%)	(22%)13	
A-	4 (7%)	(15%)9	
B-	7 (12%)	(12%)7	
AB-	5 (8%)	(12%)7	
O-	2 (3%)	(10%)6	

Table 3. Comparison of Rh factor frequency in case and control groups

Rh	Case	Control	P value
	Frequency (percent)	Frequency (percent)	
-	(31%)18	(48%)29	0/047
+	(69%)41	(52%)31	

The Comparison of variables related to blood profile in case and control subjects were analyzed by using independent T-test. The mean serum iron and HDL in the case group were higher than in the control group but these differences were not statistically significant (P>0.05). The mean hemoglobin level in the case group was lower than in the control group. However, this difference was not statistically significant (P>0.05). Mean LDL, cholesterol, triglyceride, TSH and FBS levels were significantly higher in the case group than in the control group (P<0.05). Mean T3 and T4 levels in the case group were significantly lower than in the control group (P<0.05) [Table 4].

Table 4. Comparison of variables related to blood profile in case and control subjects.

P.value	Control Mean ± SD	Case Mean ± SD	Blood index
141/0	06/24 ± 80/74	50/26 ± 71/81	Serum Iron (µg/dL)
546/0	74/1 ± 02/14	26/1 ± 85/13	Hemoglobin (g/dL)
230/0	52/8 ± 36/48	75/10 ± 51/50	HDL (mg/dL)
001/0<	10/18 ± 71/92	84/26 ± 47/118	LDL (mg/dL)
028/0	27/31 ± 02/170	75/34 ± 51/183	Cholesterol (mg/dL)
032/0	19/55 ± 87/120	65/42 ± 53/140	Triglyceride (mg/dL)
<0/001	18/0 ± 79/1	28/0 ± 20/1	T3 (ng/ml)
009/0	01/1 ± 30/8	73/1 ± 60/7	T4 (µg/dL)
<0/001	80/0 ± 51/1	15/1 ± 69/2	TSH (mIU/L)
021/0	93/23 ± 65/93	48/45 ± 39/109	FBS (mg/dl)

The values of blood indexes based on the gender, age and, BMI of the subjects are shown in tables 5, 6 and 7 respectively.

Table 5. Blood profile of case and control groups based on gender.

Male Mean ± SD	Female Mean ± SD		Gender Blood Index
96/23 ± 23/37	72/83 ± 24/54	Case	Serum Iron
81 ± 23/28	71/21 ± 24/07	Control	
15/01 ± 0/722	13/15 ± 0/977	Case	Hemoglobin
15/55 ± 1/53	13/13 ± 1/13	Control	
48/73 ± 9/84	51/57 ± 11/25	Case	HDL
45/96 ± 7/43	49/75 ± 8/89	Control	
121/77 ± 24/72	116/51 ± 28/17	Case	LDL
93/48 ± 19/22	92/26 ± 17/67	Control	
188/73 ± 37	180/41 ± 33/47	Case	Cholesterol
169/95 ± 31/55	170/05 ± 31/53	Control	
143/45 ± 42/11	138/78 ± 43/45	Case	Triglyceride

131/36 ± 59/24	114/79 ± 52/55	Control	
1/31 ± 0/31	1/14 ± 0/25	Case	T3
1/82 ± 0/12	1/76 ± 0/20	Control	
7/51 ± 1/34	7/65 ± 1/94	Case	T4
8/35 ± 0/90	8/27 ± 1/08	Control	
2/31 ± 0/75	2/92 ± 1/29	Case	TSH
1/29 ± 0/70	1/64 ± 0/84	Control	
104 ± 29/19	112/59 ± 52/98	Case	FBS
98/09 ± 28/76	91/08 ± 20/61	Control	

Table 6. Blood profile of case and control groups based on age.

60 ≤ Mean ± SD	50-59 Mean ± SD	40-49 Mean ± SD	30-39 Mean ± SD	20-29 Mean ± SD		Age Blood Index
82 ± 28/51	81/58 ± 28/07	76 ± 25/39	87/43 ± 25/58	69/50 ± 26/16	Case	Serum Iron
81 ± 6/55	75/23 ± 23/58	74/42 ± 27/66	75/50 ± 21/11	49	Control	
13/65 ± 1/06	13/61 ± 1/62	13/5 ± 0/93	14/44 ± 0/80	15/1 ± 1/97	Case	Hemoglobin
15/56 ± 1/62	14/33 ± 1/67	13/31 ± 1/41	14/57 ± 2/21	14	Control	
50 ± 7/64	50/11 ± 11/65	55/80 ± 10/60	47/93 ± 12/71	49/50 ± 2/12	Case	HDL
49/13 ± 1/26	48/88 ± 8/90	48/95 ± 9/14	45/18 ± 7/91	52/2	Control	
110/14 ± 39/64	118/47 ± 24/64	123/60 ± 17/53	122/71 ± 21/29	121/5 ± 16/26	Case	LDL
104/70 ± 12/04	94/87 ± 19/16	91/25 ± 15/83	89/24 ± 22/74	78/5	Control	
187/21 ± 48/11	191/84 ± 29/38	180/30 ± 23/60	173/71 ± 34/42	163 ± 14/14	Case	Cholesterol
190/67 ± 19	177/59 ± 34/24	165/5 ± 26/35	159/7 ± 36/51	153	Control	
134/79 ± 46/99	146/95 ± 44/17	140/6 ± 39/62	141/43 ± 41/57	113 ± 48/08	Case	Triglyceride
142/33 ± 77/10	144 ± 61/97	102/42 ± 46/55	111/30 ± 39/30	86	Control	
1/25 ± 0/27	1/22 ± 0/28	1/11 ± 0/38	1/23 ± 0/25	1/08 ± 0/26	Case	T3
1/74 ± 0/09	1/82 ± 0/18	1/76 ± 0/21	1/78 ± 0/11	1/9	Control	
7/62 ± 1/77	8/03 ± 1/71	6/85 ± 1/74	7/53 ± 1/76	7/55 ± 1/76	Case	T4
8/33 ± 0/43	8/02 ± 1/26	8/41 ± 0/95	8/67 ± 0/51	8	Control	
2/60 ± 1/58	2/71 ± 0/74	3/04 ± 1/17	2/46 ± 1/22	3/05 ± 0/21	Case	TSH
1/13 ± 0/43	1/65 ± 0/82	1/49 ± 0/82	1/28 ± 0/79	2/48	Control	
105/93 ± 19/95	117/79 ± 67/54	106/90 ± 39/60	106/93 ± 34/55	83/50 ± 6/36	Case	FBS
125/67 ± 72/61	103/45 ± 23/37	83/71 ± 10/86	87/90 ± 10/14	78	Control	

Table 7. Blood profile of case and control groups based on BMI.

Higher than normal	Normal		BMI

(25 ≤ BMI) Mean ± SD	(18/5-24/9) Mean ± SD		Blood Index
81/98 ± 27/37	82/90 ± 24/60	Case	Serum Iron
71/11 ± 22/93	88/15 ± 24/15	Control	
13/70 ± 1/87	14/47 ± 1/37	Case	Hemoglobin
14/1 ± 1/81	13/73 ± 1/46	Control	
50/62 ± 11/36	48/2 ± 7/08	Case	HDL
47/73 ± 7/33	50/63 ± 12/01	Control	
119/0 ± 28/29	114/9 ± 24/63	Case	LDL
94/16 ± 16/79	87/45 ± 22/18	Control	
190/93 ± 35/10	157/30 ± 20/41	Case	Cholesterol
172/13 ± 28/64	162/38 ± 39/78	Control	
146/8 ± 43/95	118 ± 29/84	Case	Triglyceride
130/47 ± 54/28	86/15 ± 44/89	Control	
1/19 ± 0/31	1/25 ± 0/21	Case	T3
1/79 ± 0/18	1/77 ± 0/16	Control	
7/58 ± 1/81	7/53 ± 1/24	Case	T4
8/29 ± 1/06	8/33 ± 0/84	Control	
2/82 ± 1/20	2/36 ± 0/93	Case	TSH
1/47 ± 0/76	1/64 ± 0/97	Control	
114/80 ± 50/67	91/50 ± 9/41	Case	FBS
95/98 ± 25/65	85/23 ± 13/98	Control	

According to the linear regression analysis there were significant differences in levels of LDL, cholesterol, triglyceride, T3, T4, TSH and FBS between the case and control groups (P <0.05).

Considering the gender, there were significant differences in the levels of serum iron, hemoglobin, T3 and TSH between men and women (P<0.05).

Considering the BMI, there were significant differences in the levels of serum iron, cholesterol and triglyceride between individuals with normal BMI and higher than normal BMI (P<0.05).

Considering the age there was no significant changes in any of the variables with increasing age (P>0.05) [Table8].

Table 8. Linear regression results based on case/control group, gender, BMI and age.

Increasing age with each year	**Higher than normal BMI group compared to normal group**	**Women compared to men**	**Case group compared to control group**		**Variable Blood Index**
0/292 (0/229)	-12/80 (5/88)	-17/68 (4/66)	6/77 (4/51)	β (SE)	Serum Iron
0/205	0/032	<0/001	0/136	P. value	
0/010 (0/011)	-0/277 (0/279)	-2/16 (0/22)	-0/198 (0/21)	β (SE)	Hemoglobin
0/343	0/322	<0/001	0/353	P. value	
0/020 (0/092)	-0/632 (2/38)	3/17 (1/88)	1/76 (1/82)	β (SE)	HDL

0/826	0/792	0/095	0/335	P. value	
-0/130 (0/221)	6/66 (5/73)	-3/96 (4/53)	25/93 (4/37)	β (SE)	LDL
0/559	0/247	0/384	<0/001	P. value	
0/517 (0/308)	15/81 (7/97)	-5/77 (6/30)	12/51 (6/08)	β (SE)	Cholesterol
0/096	0/050	0/362	0/042	P. value	
0/419 (0/456)	33/56 (11/79)	-10/70 (9/33)	18/13 (9/01)	β (SE)	Triglyceride
0/360	0/005	0/254	0/047	P. value	
0/003 (0/002)	-0/038 (0/060)	-0/120 (0/047)	-0/592 (0/045)	β (SE)	T3
0/264	0/526	0/012	<0/001	P. value	
0/009 (0/014)	-0/073 (0/350)	-0/103 (0/277)	-0/752 (0/267)	β (SE)	T4
0/521	0/835	0/711	0/006	P. value	
-0/002 (0/009)	0/142 (0/243)	0/471 (0/192)	1/228 (0/185)	β (SE)	TSH
0/815	0/559	0/016	<0/001	P. value	
0/241 (0/349)	14/26 (9/03)	-0/068 (7/15)	15/60 (6/90)	β (SE)	FBS
0/492	0/117	0/992	0/026	P. value	

Discussion

In this study, the prevalence of oral lichen planus was higher in women than in men. This finding is similar to Lavaee et al. and Siponen et al. Due to the greater prevalence of LP in women this study is similar to previous studies [14,23,24].

In the present study, the most common age for oral lichen planus disease was 50-59 and the mean age of the case group was 49.9 years, which was 9 years higher than Panchal et al. study and similar to Siponen et al. study. According to the average age of 55 years in OLP disease, the average of patients in this study was almost the same and close to previous findings [13,14,24].

Approximately one-fifth of the case and control groups (19% and 20% respectively) had normal BMI and almost 80% of the case and control groups had overweight or obese and the BMI difference between the case and control groups was not statistically significant. The Mean BMI in the case group was 26.98 kg/m2. In the Hashba et al. study the mean BMI was 24/26 kg/m2 and in Arias-Santiago study the mean BMI was reported 26/4 kg/m2. In Krishnamoorthy et al. study the sample size of the case group was 18 patients, despite not reporting a mean BMI, most of the patients in that study were reported with normal or less than normal BMI, which is justifiable by differences in the geographical area of study, the lifestyle of participants, dietary differences and fewer samples in that study [10,25,26].

In this study, the most frequent blood group was B in the case group and O in the control group but the difference was not statistically significant. In Moshavernia et al. study the most frequent blood group in both case and control group was O and there was no significant difference between the two groups. Taheri et al. study also reported that the most frequent blood group in the patients with oral lichen planus is O. However, in Kumar et al. study, the blood group A was significantly more frequent in the patients with lichen planus whereas the most common blood group in the control group was O. In conclusion due to the differences in results between different studies, there is no specific blood group that can be attributed to the patients with oral lichen planus disease and further studies with bigger sample sizes are needed in this matter.

This study showed that lichen planus was more prevalent in people with positive Rh (Odds Ratio=2.131) which is similar to Taheri et al. study. However, Moshavernia et al. and Kumar et al. studies oppose this result. Differences in findings can be related to differences in the communities studied [27-29].

In the present study, the mean hemoglobin levels were lower in oral lichen planus patients compared to the control group and the mean serum iron levels were higher in oral lichen planus patients compared to healthy subjects, however, none of these two differences were statistically significant. Chang et al., Wu et al., and Chen et al. found that the mean levels of hemoglobin and serum iron levels in Lichen planus patients were significantly lower than in healthy individuals. Therefore, the results in the present study oppose these researches [6-8]. In comparing these studies, there have been differences in the research method and the difference of the geographical location where the studies had been conducted, these could explain the difference between the results of these studies.

Regarding the lipid profile indices, the results of the present study showed that the mean levels of cholesterol, triglyceride, and LDL were significantly higher in patients with oral lichen planus than in healthy individuals. Although the mean level of HDL was higher in patients with oral lichen planus than in healthy individuals but the result was not statistically significant. Lai and Schwartz, Chalkoo et al. and Panchal et al. found that people with lichen planus had higher triglyceride, cholesterol and LDL levels, and lower HDL levels than healthy controls. They also stated that chronic inflammation in patients with lichen planus may be able to justify the association between lichen planus, dyslipidemia and the risk of cardiac diseases. Regarding the higher levels of LDL, cholesterol, and triglyceride in patients with lichen planus, this study agrees with the previous studies, however, there is a controversy over the HDL levels. This controversy may be justified by differences in lifestyle and dietary differences [12,13,30]. In general, it is not possible to conclude whether these changes are due to the OLP disease or the cause of OLP disease, to determine these relationships we need to do several studies.

The findings of Mehdipour et al. study were similar to the present study in terms of triglyceride, cholesterol and HDL levels. They also reported that high levels of cholesterol and triglyceride can be predisposing factors of lichen planus and its manifestation [9].

Also, the findings of Krishnamoorthy et al. study were consistent with the present study in terms of high cholesterol and LDL levels which they considered associated with chronic inflammation in lichen planus disease and suggested that the risk of cardiovascular diseases is higher in these people [10]. These authors concluded that immune-mediated diseases can cause chronic inflammation. This inflammation induces disarrangement in the metabolism of lipids and tries to redistribute nutrients for involved cells [10].

Concerning thyroid diseases indices the results of the present study showed that the mean T3 and T4 levels were significantly lower in patients with oral lichen planus and the mean TSH level was significantly higher in patients with oral lichen planus than in healthy subjects.

Li et al. found in their study that the risk of thyroid diseases, especially hypothyroidism is higher in patients with lichen planus than in healthy individuals [31]. The result of Garcia et al. study was also similar to Li et al. They reported that healthy subjects had higher T4 and lower TSH levels than patients with lichen planus which is similar to the present study's result [15].

Siponen et al. also reported that the risk of thyroid diseases in patients with lichen planus is 2 times higher than in healthy individuals [14]. Therefore, based on the present study being inconsistency with previous studies we can conclude that preforming screening tests for thyroid function is one of the appropriate measures in people with oral lichen planus.

In contrary to these studies Lavaee and Majd concluded that there was no significant relationship between lichen planus and hypothyroidism and this finding is inconsistent with the results of the present study [23]. This difference may be due to the fact that Lavaee and Majd's study collected data solely based on the patient's statements and medical and pharmacological history and no blood analysis or assessments were performed. Therefore, this methodology could lead to the reduction of the number of patients identified with thyroid gland dysfunction. Researchers have found that there is a similar pathogenesis between the cause of OLP and hashimoto's thyroiditis- related hypothyroidism. They hypothesized the existence of a molecular similarity in this field. This hypothesis says there is similar structure between human autoimmune reactions and microbial antigens; as a result, autoimmune reaction may occur instead of defensive immune reaction [31].

The present study showed that people with oral lichen planus had a significantly higher mean FBS than healthy individuals. Atefi et al. and Saini et al. also reported the same result as the present study. They found that fasting blood sugar was impaired in patients with lichen planus. In other words, their mean FBS levels were higher than healthy individuals and they had a higher incidence of diabetes [16,18].

In the southeast of Iran Nosratzehi et al. reported that despite the higher levels of HbA1c and FBS in patients with oral lichen planus than in healthy subjects, this difference was not statistically significant which is in contrast with the present study [22]. This contradiction could be due to the small number of samples in Nosratzehi's study, the difference in the geographical area of study and different lifestyles of samples under study. The existence of such inconsistencies may indicate the need for further studies with larger sample sizes. It is possible that endocrine dysfunction increases the susceptibility of development of immunological disorders such as OLP disease [17].

In this study, by performing linear regression analysis, the differences of blood indices were compared between the case and control groups after adjusting for age, gender and BMI. The results of this analysis confirmed the results of previous statistical tests. Linear regression analysis also showed that gender is effective in serum iron, hemoglobin, T3 and TSH indices, which could be justified by hormonal differences between males and females as well as different prevalence of diseases in both genders. In the matter of BMI after dividing the subjects into two groups, with normal BMI and higher than normal BMI, the higher than normal BMI group had higher levels of cholesterol and triglyceride levels than the normal BMI group which is the same result as the Al-Bachir et al. study [32].

Conclusion

In people with oral lichen planus, LDL, cholesterol, triglyceride, TSH, and FBS levels are higher and T3 and T4 levels are lower than healthy subjects.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Ethical Approval

All procedures performed in this study were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the ethical committee of the school of dentistry (IR.SBMU.DRC.REC.1397.027).

Informed Consent

Informed consent was obtained from all individual participants included in the study.

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