



The Association of Oral Diseases with Lifestyle, Oral Hygiene Habits, and Vitamin D Deficiency among the Students in Libyan Primary Schools

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Abstract

This study aims to investigate the relationship between lifestyle, oral hygiene practices, vitamin D deficiency, and the oral diseases among the Libyan primary school students aged between 10-14 years. Questionnaires were designed to assess the four studied variables and distributed to both students and parents with 73% as a response rate of the total 331 participants (n=241). The results showed a strong significant relationship of oral diseases with oral hygiene practices ($r=0.634$ for parents, and $r=0.644$ children) and vitamin D deficiency ($r=0.532$ for parents, $r=0.514$ for children) whereas it showed a moderate relationship with lifestyle ($r=0.419$ for parents, and $r=0.426$ for children). In another hand, a strong significant correlation was noted between lifestyle and vitamin D deficiency ($r=0.559$ for parents, and $r=0.571$ for children). The findings highlight the need for more attention towards oral health awareness among the children and the parents to promote the oral health of the students in Libyan primary schools.

Keywords: Oral diseases, Vitamin D, Deficiency, Lifestyle, Hygiene habits.



ملخص

تهدف هذه الدراسة إلى دراسة علاقة نمط الحياة ، ممارسات النظافة الفموية ، ونقص فيتامين (د) بأمراض الفم بين طلاب المدارس الابتدائية اللببية الذين تتراوح أعمارهم بين 10-14 سنة. تم تصميم الاستبيانات لتقييم المتغيرات الأربعة التي تم دراستها و تم توزيعها على كل من الطلاب و الأولياء حيث تم الحصول على نسبة 73 ٪ (ن = 241) كمعدل استجابة من مجموع 331 مشارك. أظهرت النتائج وجود علاقة معنوية قوية بين أمراض الفم وممارسات النظافة الفموية ($r=0.634$ بالنسبة للأولياء ، و $r = 0.644$ للأطفال) ونقص فيتامين (د) $= 0.532$ بالنسبة للأولياء ، $r = 0.514$ للأطفال) بينما أظهرت علاقة متوسطة مع نمط الحياة ($r=0.419$ بالنسبة للأولياء ، و $r=0.426$ للأطفال). من ناحية أخرى ، لوحظ وجود علاقة معنوية قوية بين نمط الحياة ونقص الفيتامين د $r=0.559$ بالنسبة للأولياء ، و $r=0.571$ للأطفال). تسلط النتائج الضوء على الحاجة إلى مزيد من الاهتمام نحو الوعي بصحة الفم بين الأطفال وأولياء الأمور لتعزيز صحة الفم لدى الطلاب في المدارس الابتدائية.

1. Introduction

Nowadays, Oral diseases are not really considered as serious diseases, but in fact, several studies published after 1990 reported that they are often related with chronic diseases and serious health problems (Chalmers, Carter, & Spencer, 2002; Ellefsen et al., 2008; Friedlander & Mahler, 2001; Stewart, Sabbah, Tsakos, D'Aiuto, & Watt, 2008). Recently, an authoritative review proved a clear association between oral diseases and heart problems (Touger-Decker, Mobley, & Epstein, 2014). Furthermore, the same review showed that people with oral health problems, on average, lead shorter lives. The relationship between oral diseases and diabetes is also a hot issue, ongoing research (Balasubramanian, Dhanalakshmi, & Amperayani, 2013; Díaz-Romero et al., 2005; Twetman, Johansson, Birkhed, & Niderfors, 2002).

The availability of sufficient nutrients is important for the growth, development, and repair oral tissues and to maintain a healthy dentition. Calcium, protein, fluoride, A, B, C, and D vitamins are especially the relevant nutrients to the dental practice. Deficiencies of these nutrients affect almost every structure in the oral cavity, causing directly or indirectly to poor mineralization, caries, scurvy, enamel hypoplasia, cleft palate, and other pathoses (Pflipsen & Zenchenko, 2017). Among these nutrients, Vitamin D has been recently received more attention in several studies which shed the light on its critical role to maintain oral health.



Vitamin D is a fat-soluble vitamin which can be obtained from the diet and nutritional supplements, and exposure to sunlight. Vitamin D is metabolized to 25-hydroxy vitamin D (25(OH)D) in the liver and then metabolized to its active form, 1,25-dihydroxy vitamin D (1,25-(OH)₂D) in the kidneys (Holick & Chen, 2008).

Vitamin D is involved in controlling calcium absorption during the digestion, bone mineralization, and regulating plasma calcium concentration (Lips, 2006). Vitamin D deficiency causes mineralization defects in teeth, leading to poorly mineralized and hypoplastic dentin consisting of calcospherites rather than properly mineralized dentin. The development of tooth and its maturity may affect by both tooth mineralization as well as hypophosphatemia (Ngangom, Jain, & Verma, 2018).

Vitamin D deficiency can result from inadequate exposure to sunlight; malabsorption; accelerated catabolism from certain medications; and, in infants, the minimal amount of vitamin D found in breast milk. It is an accepted fact that moderate exposure to sunlight is sufficient to maintain an adequate level of vitamin D in the body (Lanske & Razzaque, 2007; Wharton & Bishop, 2003). However, numerous factors may influence vitamin absorption such as ageing, air quality (e.g., pollution), application of sunscreen location (e.g., higher latitude geographically), skin pigmentation, thicker epidermal layer (Uwitonze et al., 2018). Several recent reports demonstrate a significant association between oral health and the intake of vitamin D. Due the variety of factors (geography location, age, nutritional habits, hygiene practices, genetics) involved in vitamin D uptake, it is really needed to take all these factors into account for more reliability during the study of prevalence of oral diseases and its association with vitamin D deficiency. In this regard, this study aims to investigate associations between lifestyle, oral hygiene practices, Vitamin D deficiency and the presence of oral diseases, and adjusted for socio-demographic factors, to focus only on Libyan primary school students aged between 10-14 years in Sirte city, Libya.



2. Material and methods

2.1. Data collection

This cross-sectional study with quantitative and qualitative approach has been conducted among the Libyan primary school students aged between 10-14 years over June 2018-June 2019. Survey questionnaires have been designed and distributed among the students and their parents as an instrument allowing the collection of primary data from a large sample size with the ability to measure the behaviour, beliefs, and attitudes of respondents through statistical analysis, which assists in assuring the reliability of the findings. In this context, the survey questionnaire for this study has been designed using an interval scale method with a 5-point Likert-type scale. All the human studies have been approved by the Research Ethics Committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

2.2. Questionnaire design

The survey questionnaire was designed in both the Arabic and English languages with the aim to determinate the prevalence of oral diseases in the selected schools and to evaluate its relation with vitamin D deficiency, oral habits, and lifestyle. The Vitamin D & Sun (VIDSUN) questionnaire was used Vitamin D deficiency indicator in this study as it has previously shown a good agreement with 25(OH)D level test (Nabak, Johnson, Keuler, & Hansen, 2014).

The questionnaire was divided into 4 main sections for children and for parents with a total of (37 items) for both questionnaires (Table.1). A cover letter was attached to each questionnaire to explain the aims of this study, the confidentiality of data and the instructions.

Table 1. Summary of Survey Questionnaire Contents for both children and parents.

Section	Description
Section one:	This section comprised 5 questions about oral diseases.
Section two:	This section comprised 2 questions (for parents) and 5 questions (for children) about oral hygiene practices.
Section three:	This section comprised 5 questions about the lifestyle.
Section four:	This section comprised 5 questions about vitamin D.



2.3. Population of study

A total of 331 students aged (10-14 years) years were selected from four main primary schools in Sirte city-Libya, however, the remaining students were excluded either because they are critically ill students (e.g., hepatic, renal, endocrine or mal-absorption disease), or under long term treatment., taking Vitamin D supplemental, or free from oral diseases. Only 241 feedbacks were received from 331 with 73% as response rate.

2.4. Statistical analyses

Data analysis was carried out for all variable: sex, age, education, habits, family income per month, vitamin D level, and oral disease status under one group (10 -14 years). The four variables are expressed as the mean \pm standard deviation. Categorical data of the two groups were compared by the Pearson χ^2 test. All the data have been analysed using statistical package for social science (SPSS) version 22.

3. Findings

3.1. Reliability analysis

It is critical to verify the appropriateness of the questionnaire to be used for the measurement of the variables. According to Sekaran (2016), the best reliability coefficient is 1.0, but the values close to 0.80 are considered as good. For the values close to 0.70 are considered acceptable, however, a value less than 0.60 reflects very poor reliability (Sekaran & Bougie, 2016).

Table 2. Reliability Analysis

Variable	Parents			Children		
	No.of Item	Item Dropped	Cronbach's Alpha	No.of Item	Item Dropped	Cronbach's Alpha
Life style	5	0	0.710	5	0	0.780
Habits	2	0	0.720	4	0	0.760
Vitamin D deficiency	5	0	0.801	5	0	0.855
Oral diseases	5	0	0.848	5	0	0.748



Table.3 shows the Cronbach's Alpha value of the four variables for parents and children. For the parent questionnaire, the Cronbach's Alpha range was between 0.710 and 0.848. In another hand, the range of Cronbach's Alpha was between 0.748 and 0.855. These results reflect good reliability for the received questionnaires from both children and parents.

3.2. Descriptive analysis

Descriptive analysis as means and standard deviation were obtained for the interval scaled independent and dependent variables. The means and standard deviations for all variable used in this study are recorded in Table.4.

Table 3. Descriptive statistics of all variables in the Study

Variable	Parents		Children	
	Mean	Std. deviation	Mean	Std. deviation
Life style	17.3659	3.04092	16.2512	2.56398
Oral hygiene	17.4024	2.52816	17.6654	3.29846
Vitamin D deficiency	18.4268	3.16240	17.9957	2.89222
Oral diseases	16.5244	3.19423	17.4233	3.28766

All variables were evaluated based on a 5-point scale. Table 2 shows that independent variable which is lifestyle had an average score of 16.2512 with a standard deviation of 2.56398. Oral hygiene practices factor had an average score of 17.6654 with a standard deviation of 3.29846. Vitamin D deficiency variable had an average score of 17.9957 with a standard deviation of 2.89222. The oral diseases variable had an average score of 17.4233 with a standard deviation of 3.28766.

3.3. Correlation between the variables

According to Sekaran (2016), in a research project that included several variables, beyond knowing the means and standard deviation of the dependent and independent variable, the researcher would often to know how one variable related to another (Sekaran & Bougie, 2016). Correlation analysis indicates the nature, direction and significance of the bivariate relationship of the variables used in the study.



The R-value was used to evaluate the intercorrelation analysis between the different variables where: $R\text{-value} \geq 0.70$ very strong relationship, $0.70 > R\text{-value} \geq 0.50$ strong relationship, $0.50 > R\text{-value} \geq 0.30$ moderate relationship, $0.30 > R\text{-value} \geq 0.10$ low relationship, $0.70 > R\text{-value} > 0.01$ very low relationship. The correlation matrix between dependent variables and independent variables is presented in Table.5 as below:

Table 4. Pearson Inter-Correlation between the variables

Variable	Parents				Children			
	LS	OP	VD	OD	LS	OP	VD	OD
LS	1	0.185	0.559**	0.419**	1	0.173	0.571**	0.426**
OP		1	0.203	0.634**		1	0.186	0.644**
VD			1	0.532**			1	0.514**
OD				1				1

** Statistically significant correlation at the 0.01 level (2-tailed).

LS: Lifestyle

OP: Oral hygiene practices

VD: Vitamin D Deficiency

OD: oral diseases.

The overall results of variables association indicate an agreement between children questionnaire analysis and parent questionnaire results which reflects the reliability of the results. All the independent variables (lifestyle, oral hygiene practices, vitamin D deficiency) showed a significant positive relationship with the dependent variable (oral diseases). Both oral hygiene practices and vitamin D deficiency have a strong relationship with oral diseases where the oral hygiene practices showed the strongest relationship ($r=0.634$ for parents, and $r=0.644$ children) followed by the vitamin D deficiency ($r=0.532$ for parents, $r=0.514$ for children). In another hand, a moderate relationship was observed between lifestyle and oral diseases with $r=0.419$ for parents and $r=0.426$ for children. In term of the correlation between the independent variables, a strong significant relationship was noted between lifestyle and vitamin D deficiency ($r=0.559$ for parents, and $r=0.571$ for children). All the other relationships between independent variables were low and statistically not significant.



4. Discussion

It is difficult to define the oral health-related quality of life, as the concept is multidimensional, illusive, personal, abstract, subjective, and without clear determination of its main components. Moreover, it is variable within and across the population groups, as culture and societal expectations change in varied situations (Paul et al., 2014). The lack of the studies on oral diseases and its association with lifestyle, oral hygiene habits, and vitamin deficiency in the Libyan primary school, was prompted to conduct this study.

The presented results revealed a strong association between the hygiene oral practices among the Libyan primary school. This confirms the importance of hygiene oral practices as brushing practices and regular dental visits to maintain good oral health. In contrast, bad hygiene oral practices play the role of critical factor leading to oral diseases. A large ratio of these diseases can be prevented at individual and community levels by providing oral health-related education; thus, improving the oral health attitude and practices among the general population (Paul et al., 2014).

Vitamin D deficiency was the second factor showing a strong association with oral health diseases. It was clear that a large ratio of these participants having a poor oral health status was suffering from poor nutrition in term of vitamin D deficiency, or they did not spend enough time under sun exposure. Therefore, a balanced nutritional diet with sufficient Vitamin D and balanced time of daily hours of sun exposure will be very useful to help the children to maintain their oral health. In this regard, the critical role which vitamin D play in the oral health status has been widely discussed in previous studies (Lanske & Razzaque, 2007; Nabak et al., 2014; Uwitonze et al., 2018; Wharton & Bishop, 2003).

Even though it does not show the strength in term of association with oral diseases compared to oral hygiene practices and vitamin D deficiency but lifestyle is still a very important factor affecting the oral health status. The lifestyle which was measured by questions about dietary habits and soft drinks consumption showed a moderately significant relationship with oral diseases. Sakki et al. (1995) have reported that lifestyle had an independent association with periodontal health. and they suggest that lifestyle could explain some of the social and sex differences in periodontal health (Sakki, Knuuttila, & Anttila, 1998).



In another previous study, Petersen & Nörtov (1989) have reported that people with an active lifestyle have fewer symptoms in their teeth and gums than those with an inactive one (Petersen & Nörtov, 1989).

The strong relationship between vitamin D deficiency and lifestyle is understood as the dietary habits were used the main tool to measure the lifestyle factor while nutritional supplements are considered one of the most important sources of vitamin D besides the exposure to sunlight (Pflipsen & Zenchenko, 2017).

Consequently, the findings of this study were in agreement with previous studies which reported the significant effect of vitamin D deficiency, oral hygiene habit, lifestyle on the oral status (Genco, 1996; Krstrup & Erik Petersen, 2006; Petersen & Nörtov, 1989; Sakki et al., 1998; Shimazaki et al., 2005).

5. Conclusion

Oral hygiene practices, Vitamin D deficiency, and lifestyle have a significant impact on oral diseases/oral health status among the students aged between 10-14 years attending primary schools in Sirte, Libya. Moreover, a remarkable strong relationship was noted between lifestyle and vitamin D deficiency. The findings of this study turn the light on the need for dental health awareness and education of oral health-related habits to promote good oral health for the children in the Libyan primary schools.

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Ethical clearance: all the human studies have been approved by the Research Ethics Committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.



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