

**Assessment of dental caries status among school children aged 9-12 years of Sebha city-Libya by using of dft/ DMFT & SiC indices***Wenisa. S.Arrish¹, Salima A Altaher², Mona A Ahmed¹¹Department of Preventive and Community Dentistry, Dental School of Sebha University, Sebha, Libya²Department of Paediatric Dentistry, Dental School of Sebha University, Sebha, Libya*Corresponding author: wen.arrish@sebhau.edu.ly

Abstract Aim: To assess the dental caries status among school children aged 9-12years old in Sebha city of Libya. **Material and Methods:** This cross-sectional study in which a total of 579 schoolchildren (315 were females and 264 were males) aged 9-12 were involved. Trained dentists had examined the subjects to determine dental indices: DMFT (Decayed, Missed & Filled teeth), dft (decayed and filled teeth) and SiC (significant caries index). The mean, standard deviation and *P* value were used to analyse data. **Results:** About 85% of participants had dental caries. The general mean DMFT was 1.3, the general mean dft was 2.4. Significant caries index for primary teeth was 5 and for permanent teeth was 3. No significant difference between males and females, however, there were significant differences between means of age groups in both primary and permanent dentition ($P < 0.05$). **Conclusion:** The prevalence of dental caries in primary teeth was greater than in permanent teeth. The high SiC scores suggested that there is a subgroup of participants experienced high rates of dental caries and they need special attention from Libyan health authorities. The health authorities should establish school-based dental health programs to reduce the caries prevalence between schoolchildren in the city.

Keywords: dental caries, schoolchildren, DMFT index, dft index, SiC index, Sebha/Libya, prevalence.

دراسة بعنوان: تقييم معدل انتشار تسوس الاسنان بين اطفال المدارس (من 9 الى 12 سنة) في مدينة

سبها/ليبيا باستخدام قيم منسب الاسنان المنخورة والمفقودة والمحشية لاسنان الدائمة DMFT ومنسب

الاسنان المنخورة والمحشية لاسنان اللبنية dft ومنسب تسوس الاسنان SiC

ونيسة سليمان عريش¹ و سليمة العربي الطاهر² و منى عبدالسلام احمد¹¹ قسم طب الاسنان الوقائي والمجتمعي-كلية طب الاسنان-جامعة سبها، ليبيا² قسم طب اسنان الأطفال-كلية طب الاسنان-جامعة سبها، ليبيا للمراسلة: wen.arrish@sebhau.edu.ly

المخلص تهدف الدراسة لتقييم معدل انتشار تسوس الاسنان بين اطفال المدارس الذين تتراوح اعمارهم بين 9 الى 12 سنوات في مدينة سبها المواد والطريقة: دراسة مقطعية شملت 597 من اطفال المدارس منهم 315 انثى و 264 ذكر في مدينة سبها/ ليبيا حيث قام اطباء متدربون بفحص مناسب تسوس الاسنان dft/ DMFT/ SiC لكل الاطفال المستهدفون الدراسة النتائج: 85% من الاطفال يعانون من تسوس الاسنان، المتوسط العام لمنسب الاسنان الدائمة المنخورة والمفقودة والمحشية DMFT = 1.3 والمتوسط العام لمنسب الاسنان اللبنية المنخورة والمحشية dft = 2.4 وكان وسطي منسب تسوس الاسنان اللبنية SiC = 5 ووسطي منسب تسوس الاسنان الدائمة SiC = 3، لم توجد فروق يعتد بها بين القيم للجنسين ولكن وجدت بين متوسطات مناسب التسوس المستخدمة في الدراسة بين الفئات العمرية لكل من الاسنان اللبنية والدائمة ($P < 0.05$) الخلاصة: معدل تسوس الاسنان في الاسنان اللبنية كان اكثر من الاسنان الدائمة. القيم العالية لمنسب تسوس الاسنان SiC تشير الى وجود فئة من الاطفال المشاركين في الدراسة تعاني من معدلات عالية لتسوس الاسنان ويحتاجون اهتمام خاص من المسؤولين في القطاع الصحي بالمدينة. السلطات الصحية يجب ان تستهدف المدارس ببرامج صحية لتقليل معدلات تسوس الاسنان بين الاطفال في المدينة.

الكلمات المفتاحية: تسوس الاسنان، اطفال المدارس، مناسب تسوس الاسنان dft/ DMFT/ SiC، سبها/ليبيا، معدل انتشار.

1. Introduction

Dental caries (DC) is a common oral disease that affecting people across the globe. [1] The current concept of the aetiology of DC is that it is an interaction of four important factors: Microorganism, host, substrate (principally sucrose) and the time. [2] If not treated, dental

caries has severed impact on life quality. [3,4] The best treatment for dental caries is preventing it by reducing sugar intake, optimal exposure for fluoride and proper use of fissure sealants. [5] Availability of good data about the prevalence and distribution of dental caries is necessary for better

provision of dental preventive and therapeutic services. [6]

Prevalence of dental caries can be measured by using many indices such as dft & DMFT indices. [7] However such these indices do not focus the attention to those people with highest caries scores and will not give the accurate picture of carious status for the population. [8] To solve this problem, significant caries index (SiC Index) was proposed by Bratthal (2000); this index has been used recently to measure the caries severity in those people with high risk. [9]

Dental caries has been classified as one of the major public health problems in many countries. [3] According to the World Health Organization (WHO) reports, countries suffering poverty and limited access to sugary food have very low levels of caries, and conversely, in developing countries, the prevalence of dental caries is increasing due to increase of access to sugary food. [10]

At present, the prevalence of oral diseases differs between countries and also between cities in the same country. [3] According to expectations, the incidence of dental caries will rise in developing communities within Africa due to excessive use of sugar in food and lack of dental preventive measures such as using of fluoride. [3]

According to Previous reports, Dental caries prevalence in Libya showed an upward trend in the mean of DMFT index from 0.7 in 1989 to 1.17 in 1996 to 1.63 in 2000. [11] However, the prevalence is expected to rise due to the poor health system and political instability that has its impact on the health of people. [12,13,14,15] Further more, carious status of Libyan population is not regularly assessed; therefore, it is difficult to plan effective preventive interventions in the country. [12] Sebha is one of cities in Libya that lacks to such regular national oral surveys. According to literature, only four cross-sectional observational studies have been published about the oral health in the city and the last one was in 2010. [16,17,18]

The purpose of this study was to estimate the prevalence and severity of dental caries in school

children of age 9-12 years old in Sebha city/Libya and obtaining such data is helpful for establishing preventive dental health interventions.

2. Material and Methods:

This study is a cross-sectional survey that was carried out during January 2020. The survey was conducted on 579 of school children attending public primary schools for boys and girls in Sebha city. Three public schools were randomly selected to be included in this survey. The sample size was calculated according to information obtained from previous study conducted in 2010 in the same city. [16] Formal consent was obtained from managers of the involved schools.

The clinical examinations of students were carried out within their schools. The examiners were trained within dental school of Sebha University. The examinations were performed as reported by World Health Organization (WHO) standard. [19]

The examinations include taking information from subjects (Name, age and sex) and clinical examination for assessment dental caries indices (DMFT and dft). The SiC index was calculated by sorting the values of DMFT and dft indices in ascending manner and taking the third of scores that have highest values [8]. The statistical data were calculated included: mean, standard deviations and P value. The results were analysed by using Microsoft Excel for Mac 2011 software and online statistical services. P value was calculated significant at < 0.05.

3- Results

Of the study participants, 315 (54%) were females and 264 (42%) were males. The mean dft of the schoolchildren was 2.4 and the SiC index for the primary teeth was 5 (Table 1). The mean DMFT of the schoolchildren was 1.3 and sic index for permanent teeth was 3 (Table 1). No significant difference was found between females and males in regard all used indices (Table 1).

TABLE 1 Comparison of Caries indices between males and females [\bar{x} is Mean, SD is standard deviation, P value (<0.05)]

Caries index	Male	Female	P value
Primary dft	\bar{x} 2.4 SD \pm 2.22	\bar{x} 2.4 SD \pm 2.31	P= 1.0000
Primary SiC	\bar{x} 5 SD \pm 1.5	\bar{x} 5 SD \pm 1.4	P= 1.0000
DMFT	\bar{x} 1.2 SD \pm 1.5	\bar{x} 1.3 SD \pm 1.44	P= 0.4
Permanent SiC	\bar{x} 3 SD \pm 1.1	\bar{x} 3 SD \pm 1.2	P=1.0000

The percentage of schoolchildren who experienced caries was 85%, while the percentage of those who are free of caries was 15% (Figure 1). The

prevalence of caries in primary teeth was 72% and in the permanent teeth was 58% (Figure 2).

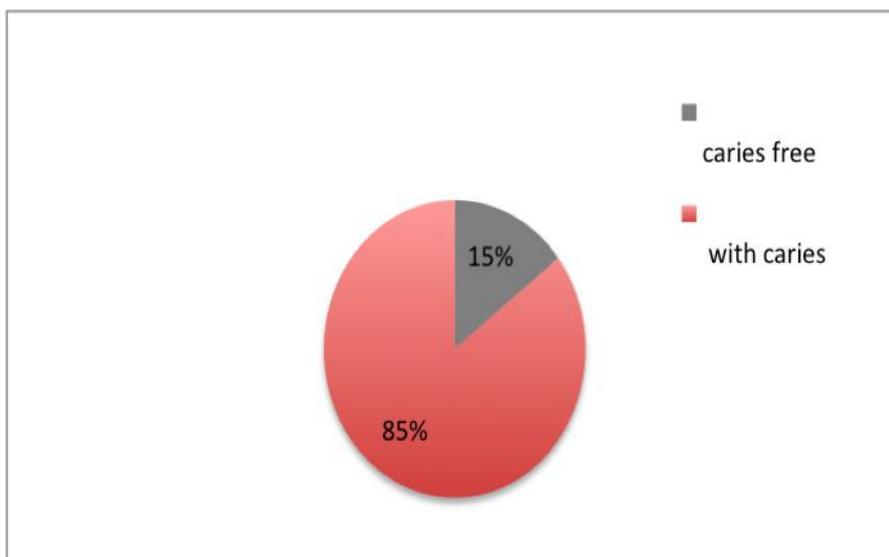


Figure 1: Prevalence of dental caries among schoolchildren in Sebha city

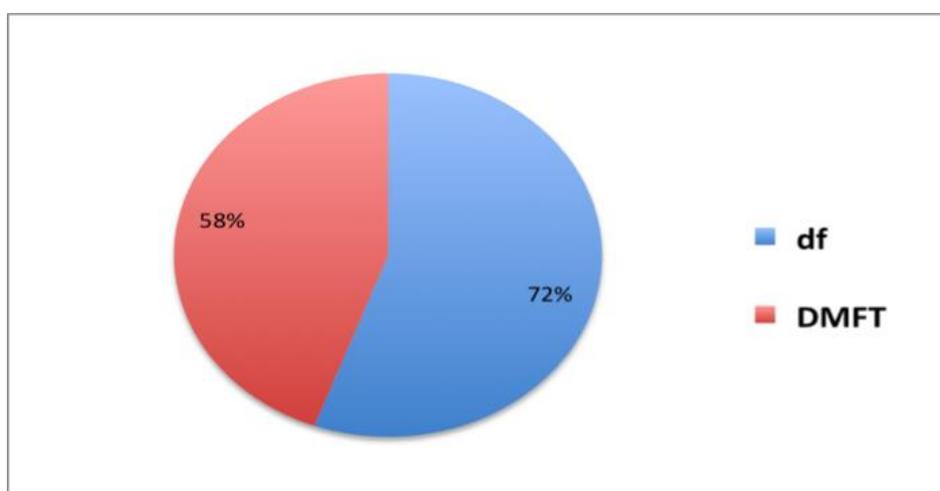


Figure 2: Prevalence of dental caries according to the type of dentition

In this study, the comparison between caries indices based on the age revealed that there are statistically significant differences between the examined age groups in regard their caries indices scores ($P < 0.05$). The study revealed that the caries prevalence in primary teeth declined as the age of

children increased, while in permanent teeth, the case is converse and the caries prevalence increased as the age of children advanced (Table 2).

TABLE 2 Comparison of Caries indices between age groups

Caries index	Age group	Mean ±SD	P value
Primary dft	9-10	3.1±2.6	$P = .00005$
	11-12	1.5±2.3	
Primary SiC	9-10	6±1.7	$P = .000026$
	11-12	4.2±2.3	
DMFT	9-10	1.3±1.5	$P = 0.0012$
	11-12	1.7±1.9	
Permanent SiC	9-10	3±1.11	$P = .000524$
	11-12	4±1.24	

During the calculation of df index for primary dentition, dft histogram showed positive skewing with majority of participants has 0-2 scores (Figures 3). In the group of those have the highest scores of dft, SiC histogram was positively skewed with majority of children has 4 & 6 scores (Figure

4). The histogram of DMFT index showed positively skewed with greater number of the children has 0-1 scores. The histogram of SiC index for the permanent teeth is also positively skewed with superiority of the subjects has 2&4 scores.

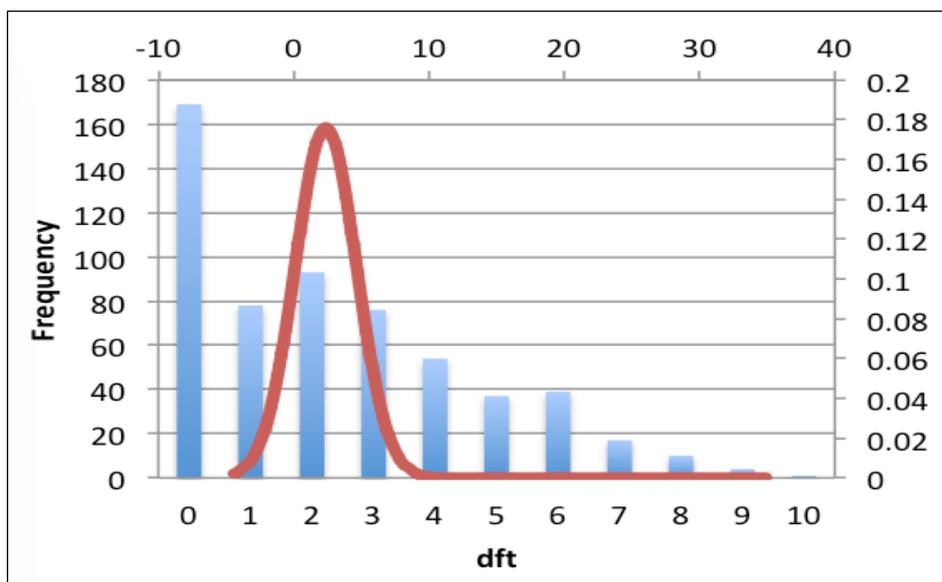


Figure 3: Skewed distribution of dft scores in primary dentition among the participants

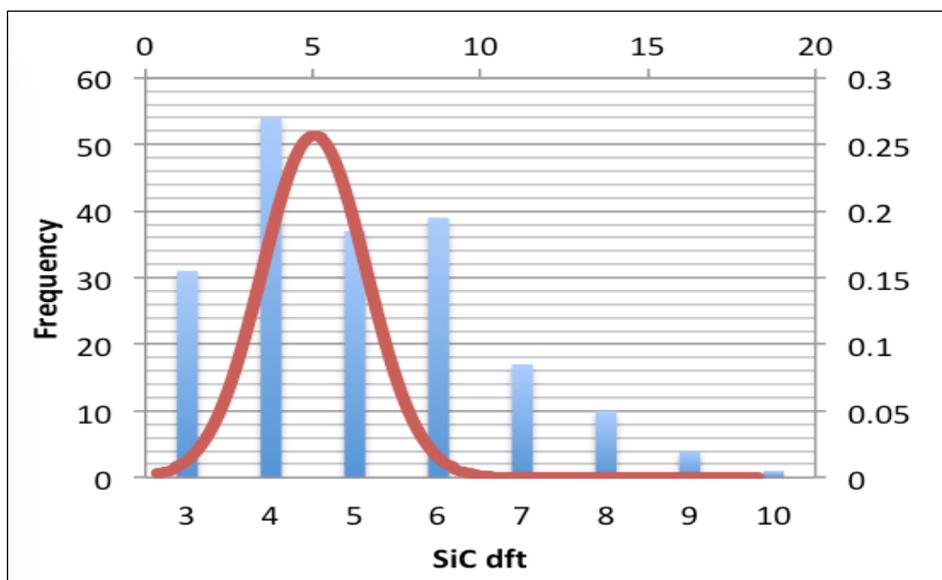


Figure 4: Skewed distribution of SiC score in primary dentition among highest one third socioeconomic and psychosocial determinants

4- Discussion

The oral health system in Libya is lacking into regular surveys that used in the assessment of dental needs of the population. [12] Therefore, this survey is important at least to provide Libyan health authorities with primary information on the current dental caries status of schoolchildren within the city.

In the present study, 85% of subjects have dental caries; this result is considered higher than the prevalence of DC in the same city in 2010, at which the prevalence of caries was 77%. [16] Also it is higher than the prevalence of DC in Tripoli (74.7%). [20] The prevalence of DC in this study is similar to the prevalence of DC from study in Qatar (85%) and the authors of that study attributed the high DC prevalence to poor oral hygiene, unawareness with oral health. [21] Such risk factors might be considered as reasons for high DC prevalence in this study; however,

socioeconomic and psychosocial determinants could play main role in this problem. [22]

The prevalence of DC in primary teeth was 72%, this is considered higher than that in Tripoli 63.5%. [20]. The prevalence of dental caries in permanent teeth was 58%. This percentage is considered higher than that found in other Libyan cities: Benghazi (57.8%) and in Tripoli (32.7). [11,20]

The mean DMFT index was 1.3, this score is considered higher than that observed in previous study conducted by Naveen Kumar et al within Sebha city in 2010, [16] where the mean DMFT score for children from 9-11 was 0.9. The aforementioned study emphasised the need for focusing on school-based preventive and therapeutic services. However, The results of this study reflected the failure of the Libyan health system to improve dental health and health in general in the country until now. The score of dft

for schoolchildren in this study was 2.4. This score was higher than that reported in Naveen Kumar *et al* study (dft=1.9). This increase in the dft score was expected as long as no preventive interventions have been taken to reduce the dental caries in schoolchildren in the city. [16]

Although many previous studies showed that caries prevalence is related to sex, [23] in our present study, there was no significance difference between males and females in all types of indices. These results are identical to previous findings of Naveen Kumar *et al* study and also study from Benghazi/Libya. [24] However, Two studies from Tripoli/Libya found that the prevalence of dental caries is more in female than in male and the authors justified that could be because eruption of teeth in females is earlier than in males or females eat more sugary food, [22,25], the similar finding was found in Sudia Arabia, China and Australia. [26,27,28,29] Other international studies have converse findings, one of them is from India, which founded that caries prevalence is higher in males more than females and the authors attributed that to that males eat more than females in Indian society. [30]

The present study also found that there is statically difference between age groups in regard caries indices scores. It found that the caries prevalence in primary teeth declined with the age increased and this might be due to the normal exfoliation of primary teeth. It also founded that the prevalence of caries increased as the age increased. These results are along with similar findings from India. [30,31]

This study also was used to measure the significant caries index for schoolchildren in Sebha city. To our knowledge, this is the first survey provided information about the significant caries index of schoolchildren in Libya. The SiC index score for primary teeth in the present was 5, this value highlight the subgroup of children who have higher scores of dmft index and it considered high when it compared with the dft score 2.4 (Figure 5). However, the value of Sic index in this study is lower than that of Turkey (SiC index =7.75). [32] As the international average of Sic Index for 12- years old is 3, [9] SiC index score for permanent teeth in the present study does not exceeded the global average and it is lower than SiC values of permanent teeth in other developing countries such as Iraq (SiC=4) and Eriterea (SiC=4,97). [33,34]

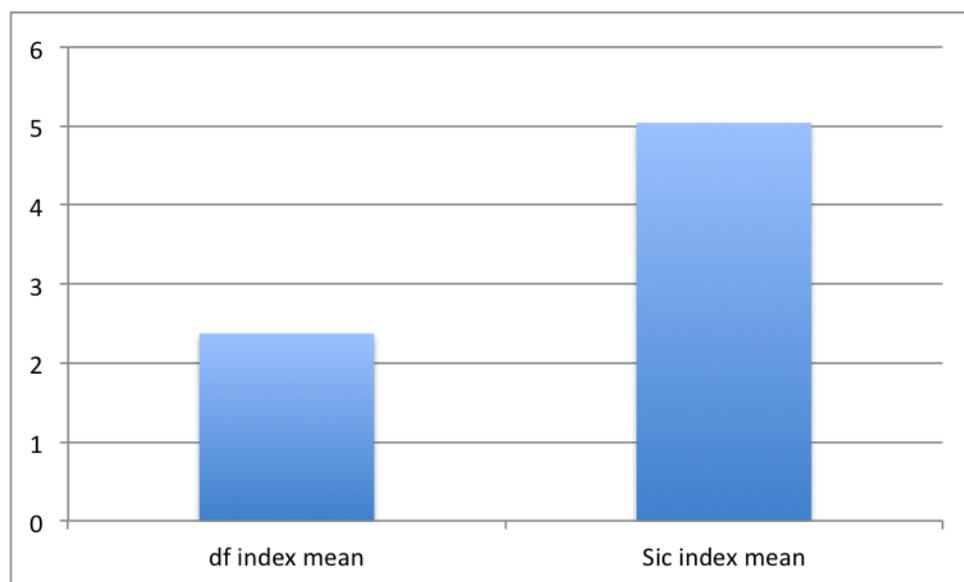


Figure 5: comparison the mean of df index & mean of Sic index in primary dentition

All used indices in this study showed positively skewed distribution of the scores; this result is similar to results of study from India, in which the prevalence of dental caries was high in primary teeth. [30]

The limitation of this study is that the index age for primary teeth that is 5-6 years of old was not included in this study. Further oral health surveys should be implemented to include adolescents aged from 13-18 and also to investigate the relation of dental indices with risk factors such as oral hygiene, socioeconomic status and education level in order to obtain a complete picture on dental caries status in Sebha city and help Libyan health authorities to improve their

therapeutic and preventive services provided for the community.

5- Conclusion

The prevalence of dental caries in primary teeth was greater than in permanent teeth. The high SiC scores suggested that there is a subgroup of participants experienced high rates of dental caries and they need special attention from Libyan health authorities. Ministry of health in Libya in association with other related sectors such as Sebha University should begin in the implementation of school-based dental health programs such as pit and fissure sealant applications, periodic screening for

schoolchildren, and also should provide financial and logistic support for school-based dentists to help them to perform their work effectively. In addition, Ministry of health in Libya should also focus on conducting regular oral health surveys to evaluate oral health needs of the population and help decision makers in planning effective preventive programs that bring an improvement in the oral health of the country.

References

- [1]- Selwitz RH, Ismail AI, Pitts NB. Dental caries. *Lancet* 2007; 369(9555): 51-9. ^[1] _{SEP}
- [2]- Whelton H, M O'Mullane D. Public Health Aspects of Oral Diseases and Disorders- Dental Caries. In: Pine C & Harris R editors. *Community Oral Health*, 2nd ed. Surrey. Quintessence Publishing Co.Ltd; 2007.p.165.
- [3]- Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century--the approach of the WHO global Oral health Programme. *Community Dent Oral Epidemiol* 2003; 31: 3-23.
- [4]- Krisdapong S, Prasertsom P, Rattananangsim K, Sheiham A. School absence due to toothache associated with sociodemographic factors, dental caries status, and oral health-related quality of life in 12- and 15-year-old Thai children. *J Public Health Dent* 2013; 73: 321- 328.
- [5]- Irish Oral Health Services Guideline Initiative. Strategies to prevent dental caries in children and adolescents: evidence-based guidance on identifying high caries risk children and developing preventive strategies for high caries risk children in Ireland. Cork: Oral Health Services Research Centre; 2009. [Cited 2020 Oct 1]. Available from: <http://ohsrc.ucc.ie/>
- [6]- Wyber R, Vaillancourt S, Perry W, Mannava P, Folaranmi T, CeliLA. Big data in global health: improving health in low- and middle-income countries. Geneva: Bull World Health Organ 2015; 93:203-208.
- [7]- Burt BA, Eklund SA. *Dentistry, Dental Practice, and the Community*, 5th ed. Philadelphia. PA:W.B.Sauanders Company;1999.p.194.
- [8]- Campus G, Solinas G, Maida C, Castiglia P: The 'Significant Caries Index' (SiC): a critical approach. *Oral Health Prev Dent* 2003; 1:171-178.
- [9]- Bratthall D. Introducing the Significant Caries Index together with a proposal for a new global oral health goal for 12-year-olds, *Int Dent J* 2000; 50:378-384.
- [10]- Daly B, Watt RG, Batchelor PB, Treasure ET. *Essential Dental Public Health*. Oxford: Oxford University Press; Oxford; 2013.p.74.
- [11]- Huew R, Waterhouse P, Moynihan P and Maguire A. Prevalence and severity of dental caries in Libyan schoolchildren, *International Dental Journal* 2011; 61:217-223.
- [12]- Peeran SW, Altaher OB, Peeran SA, Alsaid FM, Mugrabi MH, Ahmed AM, et al. Oral health in Libya: addressing the future challenges. *Libyan J Med* 2014; 9:23564.
- [13]- Sullivan R, McQuinn B, Purushotham A. How are we going to rebuild public health in Libya? *J R Soc Med* 2011; 104: 490-492.
- [14]- Ben-Ismail ATA. Improving the Government of the Libyan Health Sector: Can Lessons on Decentralization and Accountability Be Drawn From Health Care Delivery in the UAE? A thesis for the degree of Doctor of Philosophy in Politics. The University of Exeter; 2014. [Cited 2020 Oct 1]. Available from: <https://ore.exeter.ac.uk/>
- [15]- Petersen P, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. *Bull World Health Organ* 2005; 83: 661-669.
- [16]- Naveen Kumar PG, Abdallah K, Al-Zain MG, Peeran SW. Dental caries status among 6-14 years old school going children of Sebha city, Libya. *Sebha medical journal* 2011; 10 (2).
- [17]- Peeran SW, Singh AJ, Alagamuthu G, Naveen Kumar PG. Periodontal status and its risk factors among young adults of the Sebha city (Libya). *Dent Res J (Isfahan)* 2013; 10: 533-8.
- [18]- A. K. Hassan, "Reasons for tooth extraction among patients in Sebha, Libyan Arab Jamahiriya: a pilot study," *Eastern Mediterranean Health Journal* 2000; 6:176-178.
- [19]- WHO. *Oral Health Surveys. Basic methods*, Geneva 1997; 39-44.
- [20]- Kabar A, Elzahaf R, Shakhatreh F. Prevalence and Risk Factors of Dental Caries Among 6 To 12 Years Old Children In Tripoli City, Libya. *Sch Dent Sci* 2019; 6: 223-233.
- [21]- Al-Darwish M, El Ansari W, Bener A. Prevalence of dental caries among 12-14 year old children in Qatar. *Saudi Dent. J* 2014; 26: 115-125.
- [22]- Armfield JM, Mejia GC, Jamieson LM. Socioeconomic and psychosocial correlates of oral health. *International Dental Journal* 2013; 63: 202-209.
- [23]- Cheng Y, Liao Y., Chen D, Wang Y, Wu Y. Prevalence of dental caries and its association with body mass index among school-age children in Shenzhen, China. *BMC Oral Health* 2019; 19: 270.
- [24]- Al-Sharbaty MM, Meidan TM, Sudani O. Oral health practices and dental caries among Libyan pupils, Benghazi (1993-94). *Eastern Mediterranean Health Journal* 2000; 6: 997-1004.
- [25]- Baccush MM, Nayak CS. Prevalence of dental caries in schoolchildren from a suburban area in Tripoli, Libya. *Acta Stomatologica croatica* 1991; 25: 5-1.
- [26]- Gandeh MBS, Milaat WA. Dental caries among schoolchildren: report of a health education campaign in Jeddah, Saudi Arabia (1996-97). *Eastern Mediterranean Health Journal* 2000; 6: 396-401.
- [27]- Ding L. Prevalence of permanent teeth caries among primary and secondary school students in Suzhou in 2015. *Chinese J Child Health Care* 2015; 25: 621-4.

- [28]- Dong YH, Ruan Q, Liu XH. Prevalence of dental caries among primary and secondary school students in Guangxi province in 2010. *Chinese J Child Health Care* 2014; 22: 1221-3.
- [29]- Barret H J, Willamson J. Oral health of Australian aborigines: Survey methods and prevalence of dental caries. *Austral Dent J* 1972; 17:37-50.
- [30]- Prabakar J, Arumugham IM, Sri Sakthi D, Kumar RP, Leelavathi L. Prevalence and Comparison of Dental Caries experience among 5 to 12 year old school children of Chandigarh using dft/ DMFT and SiC Index: A Cross-sectional study. *J Family Med Prim Care* 2020; 9:819-25.
- [31]- Goenka P, Dutta S, Marwah N, Sarawgi A, Nirwan M, Mishra P. Prevalence of Dental Caries in Children of Age 5 to 13 Years in District of Vaishali, Bihar, India. *International Journal of Clinical Pediatric Dentistry* 2018; 11: 359-364.
- [32]- Namal N, A.A.Yuceokur and G.can. Significant caries index values and related factors in 5-6 year-old children in Istanbul,Turkey. *La Revue de Sante de la Mediterranee orientale* 2009; 15(1).
- [33]- Abbas HF. Prevalence and Comparison of Dental Caries Status of Primary and Permanent Dentition in School Children of Iraq using Significant Caries Index, *International Journal of Medical Research & Health Sciences* 2018; 7: 110-113.
- [34]- Andegiorgish A, Weldemariam B, Kifle M, Mebrahtu F, Zewde HK, Tewelde MG et al. Prevalence of dental caries and associated factors among 12 years old students in Eritrea. *BMC Oral Health* 2017; 17:169.