

Abstract

Introduction: The low birth weight is a newborn babies weighing less than 2,500 g. It's a global health problem as well as Lao People's Democratic Republic, this issues has be solved by the policy of the Ministry of Health. The low birth weight have many risk factors related as the oral health condition. The majority of the studies were conducted in the different part of Association of Southeast Asian Nations (ASEAN) countries and as well as of the world, while none of the researchers focused on oral risk factors affecting the low birth weight in Lao PDR.

Objective: The aim of the study was identify the relationship between oral health of the pregnant women and low birth weight of the newborns.

Methods: This cohort study was conducted at 4 District hospitals in Vientiane capital, Lao PDR. lasting for 12 months. The inclusion criteria of the pregnant of female as follows: age 18-35 years old, any nation and ethnic group, 36 weeks and over of gestation with in term birth and who will be voluntary in the research. Exclusion criteria: smoking, drinking habits and drug-related status, with the systemic diseases, Psycho-neurological status, number of teeth less than two in the sextant. The tool for data collection was used a questionnaire form, oral examination form and record data of newborn weight from hospital. Data analysis was used the SPSS version 25.0 for descriptive analysis and Chi-square test for statistical analysis to identify the association between oral health status of the mothers and low birth weight.

Results: The prevalence of the low birth weight /LBW of newborns was 12.9%. This study was strongly found the relationship between dental caries and LBW P -value 0.001, whereas the periodontal diseases and the socio-economic income of family were not significantly related with LBW infants (P -value > 0.05).

Conclusion: Oral health of pregnant women as dental caries was relationship with the low birth weight, while the other oral factors were not figured in the study.

Keywords: Low birth weight, oral health, pregnant women, Laos

Introduction

A newborn weighing less than 2,500g is a child with an abnormally birth weight, which the World Health Organization called “**Low birth weight/LBW**” [1, 2], they found this problem averaged 15 to 20% and more than 20 million people per year world widely estimated [3, 4], in Asian countries such as India has 15-20% [5], China has 9.30% [6], Thailand has 9.40% [7] and in Laos also has this mentioned issue with 19.40% [8].

Low birth weight infants were 20 times more likely to have complications and die comparing to normal birth weight babies [9]. The etiology of low birth weight as: the age of pregnant female less than 20 years old or more than 34 years old [10], preterm birth [11], born with mother who has malnutrition [12], from a mother underlying with a systemic disease or with chronic inflammation [13] and oral health problems [14]. Several studies published that the relationship between oral health problems and low birth weight as dental caries was negatively associated [15, 16]. And there is also published that the tooth decay was significantly correlated to lower birth weight [17], other conditions as periodontal disease was not related to lower birth weight [18] and but other publication positively showed the association [19, 20, 21].

Therefore, the purpose of this study was to determine the prevalence of the low birth weight and to find the relationship between dental caries and periodontal disease with lower weight with antenatal care of pregnant at 4 district hospitals.

Methodology

This research was a cohort study, it was conducted at 4 district hospitals at Xaythany, Sisattanak, Pakngum and Sangthong in Vientiane capital Lao PDR. with a total subject of 412 participating pregnant females. Inclusion criteria: age 18-35 years old, pregnant women with any nation and ethnic group, 36 weeks and over of gestation with in term birth, of course the pregnant women who was voluntary participated in this research. Exclusion criteria: pregnant woman who has smoking, drinking habits and drug-related status, a systemic diseases, Psycho-neurological condition and disable pregnant women. The tools study used the interview information form to describe as age, education, occupation and ethnic group.

Oral examination procedure: The calibrated examiner sat facing the patient who laid down or sat straight on the dental chair, using to reflex light or headlight and clearing for vision. Mouth mirror to reflex light and clearing for vision. Caries detection: Using explorer explored tooth surface for discolored and soft spot by applying light pressure. The diagnostic criteria used the WHO guideline and coding as follows: 0 = sound, 1 = decayed tooth, 2=filled tooth with decay, 3 = filled tooth without decay, 4 = tooth missing due to decay, 5= tooth missing for any other reason [23]. The criteria codes for periodontal status as: 0=healthy, 1=bleeding after probing, 2 = calculus, 3=probing pocket 4-5 mm, 4= probing pocket >5 mm, 5= calculus with bleeding after probing, X=excluded sextant (less than two teeth present), 9=not recorded [24]. Record data of newborn after delivery will be taking from delivery document (Hospital record). Statistical analysis was done using SPSS (Statistical Package for Social Sciences) version 25.0 for analyze data [25]. The descriptive statistic frequency, percentage are used to present data on the following characteristics of mothers. Statistical analysis using Chi-square test [26].

Results

The study of pregnancy aged 18-35 years old with 412 subject, 91.50% shows the weigh more than or equal to 50 Kg, 36.70% had a height of more than or equal to 160 cm, 61.70% had completed elementary-high school and 73.80% were housewives as detailed in table 1.

The results of this study also found that dental caries was a related to lower birth weight in all 45 people with 84.90% (P-Value= 0.001), but it was found that periodontal disease is not related to lower birth weight, there are 8 people with 15.10% (P-Value= 0.246). And monthly income economic status has no relationship with lower birth weight, there are 5 people accounting for 9.40% (P-Value= 0.796) as shown in table 2.

Discussion

This study found the prevalence of low birth weight was higher than other study in China and Thailand [6, 7] but when compared with the results of the World Health Organization, India and Laos was lower [3, 4, 5, 8].

Low birth weight was associated with oral health of mothers as dental caries compared to non-dental caries mothers, because toothache causes food intake, food intake is reduced and the mother receives less energy. When the mother receives less nutrients, the baby in the womb will also receive less nutrients, this was similar to the study done by Kadhim H in 2022 [17] and not related with the study by Geum Joon cho, 2020 and Mr.

Elifuraha GS, 2007 [15,16]. Low birth weight was no relationship with the periodontal disease, because this study selected the target group of participants in the age range of 18-35 years old, which group was not have many problems with periodontal disease according to the World Health Organization. Therefore, the results of the study was not similar the several studies by Moliner-Sánchez, 2020, Manrique-Corredor, 2019, Porto, E, 20 21 [19, 20, 21].

In this study, we did not found any women who had problems with soft mucous membrane disease in the oral cavity, probably because the participants were a group that did not come into contact with various factors such as drink alcohol, taking drugs and did systemic diseases.

Table 1: **General information**

Weight (Kg)	Number	Percentage
< 40	3	0.70
40-44.9	4	1.00
45-49.9	28	6.80
≥50	377	91.50
Height (cm)		
< 145	29	7.00
145-149.9	22	5.30
150-154.9	89	21.60
155-159.9	121	29.40
≥ 160	151	36.70
Education		
Did not study	17	4.10

Primary school	84	20.40
Secondary school	145	35.20
High school	109	26.50
College up	57	13.90
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Occupation		
Housewife	304	73.80
Factory employee	32	7.80
Government employee	19	4.60
Private employee	11	2.70
Business	46	11.20
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	Normal birth weight		lower birth weight		<i>P</i> -Value
	Number	Percentage	Number	Percentage	
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Dental status					
Non dental caries	177	49.3	8	15.1	0.001
Dental caries	182	50.7	45	84.9	
Total	359	87.10	53	12.90	
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Periodontal status					
Non periodontal diseases	323	90.0	45	84.9	0.246
Periodontal diseases	36	10.0	8	15.1	
Total	359	87.10	53	12.90	
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Family income (per month)					
< 1,700,000 Kip	31	8.6	5	9.4	0.796
≥ 1,700,000 Kip	328	91.4	48	90.6	
Total	359	87.10	53	12.90	
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table 2 : Dental and periodontal status

References

- [1]. International statistical classification of diseases and related health problems, 11th revision. Geneva: World Health Organization; 2018.
- [2]. Low birth weight: country, regional and global estimates. New York and Geneva: United Nations Children Education Fund and World Health Organization; 2004.

- [3]. L. Tshotetsi, L. Dzikiti, P. Hajison, and S. Feresu, "Maternal factors contributing to low birth weight deliveries in Tshwane district, South Africa," *PLoS One*, vol. 14, no. 3, Article ID e0213058, 2019.
- [4]. World Health Organization, *World Health Assembly Global Nutrition Targets 2025: Low Birth Weight Policy Brief*, World Health Organization, Geneva, Switzerland, 2014, http://www.who.int/nutrition/topics/globaltargets_stunting_policybrief.
- [5]. Singh et al. Prevalence and correlates of low birth weight in India: findings from national family health survey 5. *BMC Pregnancy and Childbirth* (2023) 23:456.
- [6]. Liping Shen, Jie Wang, Yifan Duan & Zhenyu Yang Prevalence of low birth weight and macrosomia estimates based on heaping adjustment method in China *Scientific Reports* (2021) 11:15016 .
- [7]. Photisan N. Factors predicting low birth weight infants from mothers with previous antenatal care service use at Huayloo Hospital, Nakhon Pathom, The 10 International Graduate Students Conference on Population and Public Health Sciences (IGSCPP), July 25, 2019.
- [8]. Nagatani et al. Risk of low birthweight associated with the timing and frequency of antenatal care visits in Lao PDR: a retrospective cohort study *BMC Pregnancy and Childbirth* (2023) 23:119.
- [9]. UNICEF, WHO. *Low Birth Weight: Country, regional and global estimates*. UNICEF, New York, 2004.
- [10]. Patricia A et al. Maternal age and risk of labor and delivery complications. *Matern Child Health J.* 2015 June; 19(6): 1202–121.
- [11]. Taha et al. Factors Associated with Preterm Birth and Low Birth Weight in Abu Dhabi, the United Arab Emirates. *Int. J. Environ. Res. Public Health* 2020, 17, 1382;
- [12]. Usha Ramakrishnan. *Nutrition and low birth weight: from research to practice*. *Am J Clin Nutr* 2004;79:17–21. Printed in USA. © 2004 American Society for Clinical Nutrition.
- [13]. Girma et al. Factors associated with low birthweight among newborns delivered at public health facilities of Nekemte town, West Ethiopia: a case control study. *BMC Pregnancy and Childbirth* (2019) 19:220.
- [14]. Elifuraha GS Mumghamba and Karim P Manji. Maternal oral health status and preterm low birth weight at Muhimbili National Hospital, Tanzania: a case-control study. *BMC Oral Health* 2007, 7:8.
- [15]. Geum Joon cho. Association between dental caries and adverse pregnancy outcomes *Scientific RepoRtS* (2020) 10:5309.
- [16]. Elifuraha GS Mumghamba and Karim P Manji. Maternal oral health status and preterm low birth weight at Muhimbili National Hospital, Tanzania: a case-control study, *BMC Oral Health* 2007, 7:8.

- [17]. Kadhim H. Dental Caries among Pregnant Women in Basrah. *Int J Oral Dent Health* 2022, 8:142.
- [18]. L. M. Souza et al. Effect of maternal periodontitis and low birth weight—A case control study. *Acta Odontologica Scandinavica*. 2016; 74: 73–80.
- [19]. Moliner-Sánchez, C.A.; Iranzo-Cortés, J.E.; Almerich-Silla, J.M.; Bellot-Arcís, C.; Ortolá-Siscar, J.C.; Montiel-Company, J.M.; Almerich-Torres, T. Effect of per Capita Income on the Relationship between Periodontal Disease during Pregnancy and the Risk of Preterm Birth and Low Birth Weight Newborn. Systematic Review and Meta-Analysis. *Int. J. Environ. Res. Public Health* 2020,17, 8015. [CrossRef]
- [20]. Manrique-Corredor, E.; Orozco-Beltran, D.; Lopez-Pineda, A.; Quesada, J.; Gil-Guillen, V.; Carratala-Munuera, C. Maternal Periodontitis and Preterm Birth: Systematic Review and Meta-Analysis. *Community Dent. Oral Epidemiol.* 2019, 47, 243–251. [CrossRef].
- [21]. Porto, E.; Gomes, I.; Batista, J.; Lyrio, A.; Souza, E.; Figueiredo, A.; Pereira, M.; da Cruz, S. Maternal periodontitis and low birth weight: Systematic review and meta-analysis. *Cienc. Saude Coletiva* 2021, 26, 5383–5392. [CrossRef].
- [22]. Bodecker, Charles F. "The modified dental caries index." *Journal of the American Dental Association* 26 (1939): 1453-1460.
- [23]. Croxson, L. J. "A simplified periodontal screening examination: the Community Periodontal Index of Treatment Needs (WHO) in general practice." *International dental journal* 34.1 (1984): 28-34.
- [24]. Lingen, Mark W., et al. "Evidence-based clinical practice guideline for the evaluation of potentially malignant disorders in the oral cavity: a report of the American Dental Association." *The Journal of the American Dental Association* 148.10 (2017): 712-727.
- [25]. Santoso, Singgih. *Menguasai SPSS versi 25*. Elex Media Komputindo, 2019.
- [26]. Holcomb, Zealure. *Fundamentals of descriptive statistics*. Routledge, 2016.
- [27]. McHugh, Mary L. "The chi-square test of independence." *Biochemia medica* 23.2 (2013): 143-149.