



RELATIONSHIP OF SNACKING PATTERNS WITH DENTAL CARIES IN SDN 1 JEUMPET STUDENTS, ACEH BESAR REGENCY IN 2022

¹Dea Maulizani, ²Ratna Wilis

Student, Lecturer of the Department of Dental Health,

Jl. Soekarno Hatta Integrated Campus of Poltekkes Aceh Indonesia

Email Contributors: deamaulizani16@gmail.com, ratna66wilis@gmail.com

Received: 1 Februari 2022

Accepted: 1 Maret 2022

Published: 6 Juni 2022

Abstract

Dental caries is a major dental and oral health problem in the world. Dental caries is a disease of dental hard tissue that is closely related to the consumption of cariogenic foods or drinks. Cariogenic foods are sweet foods that can cause dental caries. The large number of street food vendors will encourage students to have a habit of consuming street food, especially during class breaks. Based on the results of the initial data on dental caries examination conducted at SDN 1 Jeumpet, from 15 students, the average dental caries was 3.8 in the moderate category. This study aims to determine the relationship between snacking patterns and dental caries in students of SDN 1 Jeumpet, Aceh Besar District. Using the chi-square test with a value of <0.05 . The research was carried out at SDN 1 Jeumpet, Aceh Besar District and was carried out on 19-21 January 2022. The population in this study amounted to 102 students. The sample of this research is all students of SDN 1 jeumpet taken using Random Sampling technique that is as many as 50 students. The results showed that the value obtained was $p = 0.034$. Based on the results of the study, it was found that the pattern of snacking was not good with dental caries status in the high category of 13 students (50%). Meanwhile, a good snack pattern with dental caries status was found in the moderate category, namely 13 respondents (54.2) with a p value of 0.034 ($p < 0.05$). The results of the chi-square statistical test show that there is a relationship between snacking patterns and dental caries in SDN 1 Jeumpet students, Aceh Besar district in 2022. It can be concluded that there is a relationship between snacking patterns and dental caries. Suggestion: It is expected that students will reduce the pattern of snacking on sweet and sticky foods and it is recommended to increase the consumption of fibrous snacks as daily food and maintain dental and oral hygiene.

Keywords: *Snack Patterns, Dental Caries*

A. Introduction

Dental and oral health is a very important thing in human life. The problem of dental and oral health is a serious problem that must be

considered, because dental and oral disease is still a problem that often arises in the community. Dental and oral health in children is influenced by several things, including children's irregular snack eating patterns, wrong patterns in brushing teeth and children's motivation to brush their teeth. Snack consumption patterns can affect dental health and foods that are easily sticky on the tooth surface can accelerate the process of dental caries. (Jainal Abidin, 2017).

Dental caries is a major dental and oral health problem in the world. In developing countries, the prevalence of dental caries tends to increase as a result of increased sugar consumption and less use of flour. Limited access to dental health services in developing countries causes caries teeth to be left untreated or extracted to simply relieve pain. (Permatasari, et al, 2014).

Tooth decay can affect the health of other body parts, thus interfering with daily human activities. The emergence of a disease often goes unnoticed or is considered unimportant. Problems like this also occur in dental diseases such as dental caries. Dental caries disease is a disease that attacks the dental caries tissue, namely the occurrence of damage to tooth enamel, dentin and cementum, due to a carbohydrate body. The main cause of caries is *Streptococcus Muntans*. Microorganisms can colonize the surface of the teeth so that they quickly produce acids that affect the demineralization process. (Jainal Abidin, 2017).

Snack eating pattern is a form of human behavior in meeting the need for food, including the types of snacks and the frequency of consumption of snacks in one day. Elementary school age children prefer snack foods, compared to heavy meals. They tend to spend their food money in the school canteen and street vendors around the school. (Jainal Abidin, 2017).

Cariogenic foods are sweet foods that can cause dental caries. The nature of cariogenic foods is that they contain lots of carbohydrates, are sticky and break easily in the mouth. Cariogenic foods contain a lot of sugar and are sticky so they can stick to the surface of the teeth if not cleaned properly. Sweet foods affect the formation of dental caries. The pattern of consumption of foods such as sugar or sucrose accelerates the occurrence of dental caries, especially in children who like to consume

these sweet foods. In addition, other foods such as syrup, soda or soft drinks should also be avoided.

The relationship of sugar in snacks with caries is greater than the total diet because snacks are eaten more often in a high frequency. The influence of diet in the caries process is usually more local, especially in the frequency of food consumption. Every time a person consumes food and drinks that contain carbohydrates, acid will be produced by several caries-causing bacteria in the oral cavity, resulting in demineralization that lasts for 20-30 minutes after eating. (Rahenna, 2020).

In school children, dental caries is an important problem because it not only causes pain, but also spreads infection to other parts of the body, resulting in decreased productivity. This condition will certainly reduce the frequency of children's attendance to school, interfere with learning concentration, affect appetite and food intake so that it can affect nutritional status and in the end can cause physical growth disorders. Generally, children entering school age have a high caries risk because at this school age children usually like to snack on food and drinks as they wish. (Worotitjan, et al, 2013).

The large number of street food vendors will encourage students to have a habit of consuming street food, especially during class breaks. Snack food sold in schools is not necessarily healthy for consumption by students. In addition, not many students have the awareness to consume healthy snacks. One of the causes is students' ignorance about the nutrition of street food. (Hartanto, 2014).

Children who enter school age have a high risk of developing caries. At the age of 6-12 years, more intensive care is needed because at that age there is a change of teeth and the growth of new teeth. The number of snacks in schools, with sweet foods and drinks, threatens children's dental health (Salfiyadi, 2017).

The results of research Khotimah, et al (2013) showed that there was a relationship between consuming cariogenic snacks and the incidence of caries. This happens because generally children often consume it in large quantities and often, but rarely brush their teeth after consuming these foods. This condition also causes the child's mouth to become dirty. If cariogenic foods are consumed with a more frequent frequency, the child

is more likely to have dental caries compared to consuming large amounts of food but with less frequency. In the case of children who consume cariogenic snacks less frequently but still experience dental caries, this condition may be due to the wrong way of brushing their teeth or the wrong time to brush their teeth. From the above explanation, it shows that caries threatens children's dental health, so parents, especially mothers, need to monitor their children's snack patterns, especially when at school. If possible, children are not accustomed to snacking at school and are provided with food from home. (Mukhbitin, 2018)

From the explanation above, it can be concluded that at the age of 6-12 years, children are undergoing a process of growth and development, plus children at that age begin to consume a lot of cariogenic foods that can trigger caries. Dental health conditions in adulthood, one of which is influenced by dental health conditions when they were children. So, the role of parents is needed to familiarize children with maintaining oral hygiene, especially for children aged 6-12 years. (Mukhbitin, 2018)

The results of the Basic Health Research (RISKESDAS) conducted by the Indonesian Ministry of Health in 2018 showed an increase in the proportion of Indonesian people experiencing dental and oral problems compared to the 2013 RISKESDAS results, from 25.9% in 2013 to 57.6% in 2018. The results of the 2018 Basic Health Research or Riskesdas stated that 93 percent of early childhood experienced cavities. This means that only seven percent of children in Indonesia are free from dental caries problems. (Romida, 2020).

Based on data obtained from the Lampeuneret Public Health Center, Darul Imarah through interviews with dental health workers at the Lampeuneret Health Center, during the current pandemic UKGS activities are only carried out once a year on dental and oral health as well as counseling at SDN 1 Jeumpet and mass toothbrushing which done occasionally and only checked on some students having caries of 4.2% in SDN 1 Jeumpet students.

Based on the results of the initial data on dental caries examination conducted at SDN 1 Jeumpet, from 15 students, the average dental caries was 3.8 in the moderate category, therefore there is a gap between the government's target and the results obtained. Based on the results of

interviews conducted with 15 students, it was found that most of the students bought the food provided in the school canteen and did not bring lunch from home. The results of the researchers' observations, in the canteen there are several cariogenic snacks such as chocolate fried bananas, donuts, sweets, meatballs, crackers and in schools there are no fiber foods such as fruits.

B. Method

Based on the description and background above, the problem formulation of this research is "Is there a relationship between snacking patterns and dental caries in SDN 1 Jeumpet Aceh Besar students?"

1. General Purpose

The general objective of this study was to determine the relationship between snacking patterns and dental caries in students of SDN 1 Jeumpet Aceh Besar in 2022.

2. Special Purpose

Knowing the pattern of snacks in SDN 1 Jeumpet Aceh Besar students.
Knowing the status of dental caries in students of SDN 1 Jeumpet Aceh Besar.

3. Scope of Research

The scope of this research is limited to dental and oral health to determine the relationship between snacking patterns and dental caries in students of SDN 1 Jeumpet Aceh Besar.

C. Result and Discussion

A. Research Results

The research was conducted on January 19, 2022 at SDN 1 Jeumpet, Aceh Besar District. The sample of this research is all students of SDN 1 taken using random sampling technique that is as many as 50 students. Collecting data using interview techniques using questionnaires and conducting direct examinations of respondents. Based on the results of processing the questionnaire data and the results of the examinations that have been obtained in the field, it can be seen as follows:

1. Univariate Data

a. General data

1) By Age

Distribution of Age Frequency to Students at SDN 1 Jeumpet, Aceh Besar District

No	Age	Frequency	%
1	6	10	20
2	7	5	10
3	8	10	20
4	9	7	14
5	10	10	20
6	11	8	16
total		50	100

Based on the table above, it is found that the percentage of respondents by age is 20% of respondents aged 6 years, 10% of 7 years old, 20% of 8 years old, 14% of 9 years old, 20% of 10 years old and 11 years old. year by 16%.

2) By Gender Gender

Frequency Distribution of Students at SDN 1 Jeumpet, Aceh Besar District.

No	Snack pattern	Frequency	%
1	Male	24	48
2	Female	26	52
Total		50	100

Based on the table above, the percentage of respondents based on gender is obtained where respondents who are female are 52% and male are 48%.

Special Data

3) Snack Pattern

Distribution of Snack Patterns in SDN 1 Jeumpet Students, Aceh Besar District

Dental Health Journal of Aceh

No	Snack pattern	Frequency	%
1	Good	24	48
2	Bad	26	52
total		50	100

Based on the table above, it can be seen that the snack pattern of 50 respondents who have a less good snack pattern is more than 26 respondents (52%).

4) Dental Caries Status

Distribution based on dental caries status in students of SDN 1 Jeumpet, Aceh Besar District

No	Dental Caries Status	DMFT/Deft	%
1	Very low	2	4
2	low	6	12
3	Currently	18	36
4	tall	18	36
5	Very high	6	12
total		50	100

Based on the table above, it can be seen that the most dental caries status in the medium and high categories were 18 respondents (36%).

1. Bivariate Data

Distribution based on the relationship between snack patterns and dental caries in students of SDN 1 Jeumpet, Aceh Besar District

No	Snack pattern	Dental Caries Status										Total		P value
		Very low		Low		Mendium		High		Very high		F	%	
		F	%	F	%	F	%	F	%	F	%			
1	Not enough	1	3,8	2	7,7	5	19,2	13	50	5	19,2	26	100	$\alpha = >0,05$ Df = 4 P = 0,034
2	Well	1	4,2	4	16,7	13	54,2	5	20,8	1	4,2	24	100	
	total	2	4	6	12	18	36	18	36	6	12	50	100	

Based on the table above, it can be seen that from 50 respondents the pattern of eating less well with dental caries status was obtained in a high category, namely as many as 13 students (50.0%). Meanwhile, a good snack pattern with dental caries status was found in the moderate category, namely 13 respondents (54.2%).

D. Conclusion

Based on the results of the research and discussion, it can be concluded that, There is a relationship between snacking patterns and dental caries in students of SDN 1 Jeumpet, Aceh Besar District with a p value = 0.034, Snacking patterns of 50 respondents have less good snack patterns, namely as much as 26 respondents (52%). The most dental caries status was found in the medium and high categories as many as 18 respondents (36%)

Bibliography

- Adrien, A. (2017). Relationship between Diet and Caries Experience in Middle School Students at the Andreas Christian College Foundation. <http://repositori.usu.ac.id/handle/123456789/1638>
- Ali, M. R. (2020). An Overview of Knowledge Levels About Maintenance of Dental and Oral Health and Dental Caries in Class IV and V Students (Study was conducted at SDN 6 Sasetan, South Denpasar District in 2019). Diploma Thesis, 2004, 6–23.
- Armilda, D., Aripin, D., & Sasmita, I. S. (2017). Dietary Patterns of Cariogenic and Non Cariogenic Foods and Caries Experience of 11-12 Years Old Children. *Padjadjaran Journal of Dental Researchers and Students*, 1(2), 127. <https://doi.org/10.24198/pjdrs.v2i1.22125>
- Dyna, F., Putri, VD., D., & Indrawati, D. (2018). Relationship between Snack Consumption Behavior on Traders. *Endurance*, 3(3), 524–530.
- Hartanto, V. (2014). The Relationship between Nutrition Knowledge and Snack Food Selection Behavior for Class X Students of the Culinary

Expertise Program at SMK Negeri 1 Sewon Yogyakarta.
<https://adoc.pub/relationship-knowledge-nutrition-with-food-choice-behavior-.html>

- Irlinda, R., & Wibisono, G. (2014). The Relationship between Smoke Exposure and Gingival Enlargement Incidence (Study on Smoked Fish Workers in Bandarharjo Village, Semarang City, Central Java). *Diponegoro Medical Journal*, 3(1), 105053.
- Jainal Abidin, Anafrin Yugistiyowati, F. A. (2017). The Relationship between Children's Snack Eating Patterns and the Incidence of Dental Caries in School-Age Children at SD Rejodadi Brengosan Ngestiharjo Kasihan Bantul 2017 La. 1, 1-12.
- Jeklin, A. (2016). The Relationship of Mother's Parenting Patterns with Cariogenic Food Selection. July, 1-23.
- Kartikasari, H. Y., & Nuryanto, N. (2014). Relationship between the incidence of dental caries with cariogenic food consumption and nutritional status in elementary school children (study on children in grades III and IV at SDN Kadipaten I and II Bojonegoro). *Journal of Nutrition College*, 3(3), 414-421.
<https://doi.org/10.14710/jnc.v3i3.6605>
- Mukhbitin, F. (2018). Description of Dental Caries Incidence in Grade 3 Students of MI Al-Mutmainnah. *Journal of Health Promotion*, 6(2), 155-166.
- Nurohma Hestiani. (2014). The Relationship between Nutrition Knowledge and Snack Food Selection Behavior for Class X Students in the Catering Expertise Program at Smk Negeri 1 Sewon Yogyakarta.
- Permatasari, I., & Andhini, D. (2014). Correlation between tooth brushing behavior and children's snack patterns with the incidence of dental caries in 157 Palembang elementary school students. *Sriwijaya Journal of Nursing*, 1(1), 39-46.

- Rahayu, D. I. (2014). The Relationship between Snack Food Consumption Patterns with Nutritional Status and Cholesterol Levels in Children at the Ikip I Makassar State Elementary School in 2014 Thesis.
- Rahayu, S., & Asmara, L. I. (2018). The Relationship between Consuming Cariogenic Foods and Brushing Patterns with Dental Caries Incidence in School-Age Children. *KOSALA : Journal of Health Sciences*, 6(2). <https://doi.org/10.37831/jik.v6i2.147>
- Rahena, Z. (2020). The Relationship between Types and Frequency of Cariogenic Food Consumption with Dental Caries Incidence in Children at SD Negeri 5 Waai, Central Maluku Regency. *Ukim Health Journal*, 2(1), 41-48.
- Ramayanti, S., & Purnakarya, I. (2013). The Role of Food on the Incidence of Dental Caries. *Journal of Public Health*, 7(2), 89-93. <http://jurnal.fkm.unand.ac.id/index.php/jkma/article/view/114/120>
- Rina Munigar. (2018). The Relationship between Cariogenic Food Consumption and Dental Caries Incidence P Turangga was proposed as one of the requirements for achieving the Bhakti Kencana Health Sciences College Study Program. *Advanced Optical Materials*, 10(1), 1-9. Romida Simbolon. (2020). The Relationship between Snacking Habits and Dental Caries Status of School Children in Suanae State Elementary School in 2020. *01(11)*, 211-217.
- Rosidi A, H. S. & A. E. (2013). Relationship between Cariogenic Food Consumption and Dental Caries Incidence. *National Seminar Proceedings*. National Seminar Proceedings, 299- 305.
- Semito, M. N. L. (2014). The Relationship between Knowledge, Snack Consumption Patterns and Nutritional Status of Elementary School Students in Cilacap Regency. Thesis Final Project.
- Sirat, N. M., Senjaya, A. A., & Wirata, I. N. (2016). Relationship between Cariogenic Snack Patterns and Caries in Elementary School Students

in the Work Area of Puskesmas III South Denpasar, Bali 2016. *Journal of the Essence of Medical Science*, 8(3), 193-197. <https://doi.org/10.1556/ism.v8i3.146>

Wala, H. C. (2014). Description of the Dental Caries Status of 11-12 Years Old Children in the Family of Jamkesmas Holders in Tumatangtang I Village, South Tomohon District. *E-DENTAL*, 2(1). <https://doi.org/10.35790/eg.2.1.2014.4013>

Wawointana, I. P., Umboh, A., & Gunawan, P. N. (2016). Relationship between Snack Consumption and Dental Caries Status of Students at SMP NEGERI 1 Tareran. *E-DENTAL*, 4(1). <https://doi.org/10.35790/eg.4.1.2016.10812>

Worotitjan, I., Mintjelungan, C. N., & Gunawan, P. (2013). The Experience of Dental Caries and Eating and Drinking Patterns in Elementary School Children in Kiawa Village, North Kawangkoan District. *E-DENTAL*, 1(1), 59-68. <https://doi.org/10.35790/eg.1.1.2013.1931>

https://www.google.com/url?Sa=i&url=https%3A%2F%2Fakurat.co%2Fawas-smoking-habits-increase-risk-caries-tooth&psig=aovvaw2gi2_3q1ihvg9qcgatpjr1&ust=1641118024810000&svedc=0fq3ncmp-nkpucfqaadaaaaaabad

<https://www.google.com/url?sa=i&url=https%3A%2F%2Fhealth.detik.com%2Fana-k-dan-teena%2Fd-2316340%2Fini-consequences-if-children-often-snacks-no->

[hat&psig=aovvaw2qtlhpwng6glis51oq3gmd&ust=1641118148464000&source=images&cd=vfe&ved=0casjrxqfwotcldqxoakpucfqaadaaaaaabad](https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.detik.com%2Fnews%2Fhealth%2Fana-k-dan-teena%2Fd-2316340%2Fini-consequences-if-children-often-snacks-no-hat&psig=aovvaw2qtlhpwng6glis51oq3gmd&ust=1641118148464000&source=images&cd=vfe&ved=0casjrxqfwotcldqxoakpucfqaadaaaaaabad)

Astuti, A. K., & Info, A. (2017). Early Children's Healthy Behavior. *Indonesian Journal of Early Childhood Education Studies*, 6(1), 17-21. <https://doi.org/10.15294/ijeces.v6i1.15778>

- Au, K. H., Raphael, T. E., & Mooney, K. C. (2008). What We Have Learned About Teacher Education to Improve Literacy Achievement in Urban Schools. *May*, 159-184.
- Blackstock, F., & Webster, K. E. (2007). Disease-specific health education for COPD: A systematic review of changes in health outcomes. *Health Education Research*, 22(5), 703-717. <https://doi.org/10.1093/her/cyl150>
- Bourassa, K. J., Sbarra, D. A., Caspi, A., & Moffitt, T. E. (2020). Social distancing is a health behavior: County-level movement in the United States during the COVID-19 pandemic is associated with conventional health behaviors. *Annals of Behavioral Medicine*, (ahead of, kaaa049. <https://doi.org/10.1093/abm/kaaa049>
- Bridges, D. R., Davidson, R. A., Odegard, P. S., Maki, I. V., & Tomkowiak, J. (2011). Interprofessional collaboration: three best practice models of interprofessional education. *Medical Education Online*, 16(1), 1-10. <https://doi.org/10.3402/meo.v16i0.6035>
- Creswell, T. (2015). *Mixed Methodology Across Disciplines*. 3-6.
- Dale, R. R., & Borg, W. R. (1965). Educational Research: An Introduction. In *British Journal of Educational Studies* (Vol. 14, Issue 1). <https://doi.org/10.2307/3119062>
- Gitlin, M. C. (2003). Strategic planning, operations management, and fiscal analysis and control: Organizational imperatives. *Pain Medicine*, 4(4), 308-310. <https://doi.org/10.1111/j.1526-4637.2003.03050.x>
- Guével, M. R., & Jourdan, D. (2009). Assessment of a national network: The case of the French teacher training colleges' health education network. *Health Education Research*, 24(3), 430-441. <https://doi.org/10.1093/her/cyn038>
- Gurpinar, E., Alimoglu, M. K., Mamakli, S., & Aktekin, M. (2010). Can learning style predict student satisfaction with different instruction methods and academic achievement in medical education?

- American Journal of Physiology - Advances in Physiology Education, 34(4), 192-196.
<https://doi.org/10.1152/advan.00075.2010>
- Karasimopoulou, S., Derri, V., & Zervoudaki, E. (2012). Children's perceptions about their health-related quality of life: Effects of a health education-social skills program. *Health Education Research*, 27(5), 780-793. <https://doi.org/10.1093/her/cys089>
- Ministry of Education and Culture of the Republic of Indonesia. (2012). *UKS Implementation Guidelines in Schools*.
- Kirby, J., Levin, K. A., & Inchley, J. (2013). Socio-Environmental influences on physical activity among young people: A qualitative study. *Health Education Research*, 28(6), 954-969. <https://doi.org/10.1093/her/cyt085>
- Langford R, Bonell CP, Jones HE, Poulou T, Murphy SM, Waters E, Komro KA, Gibbs LF, Magnus D, Campbell R. (2014). 4. <https://doi.org/10.1002/14651858.CD008958.pub2.www.cochranelibrary.com>
- Lee, A., Wong, M. C. S., Keung, V. M. W., Yuen, H. S. K., Cheng, F., & Mok, J. S. Y. (2008). Can the concept of Health Promoting Schools help to improve students' health knowledge and practices to combat the challenge of communicable diseases: A case study in Hong Kong? *BMC Public Health*, 8, 1-8. <https://doi.org/10.1186/1471-2458-8-42>
- Lestari, F., & Andriani, D. G. (2019). Validation of literacy-based modules in mathematical statistics courses. *Journal of Math Educator Nusantara: Forum for Publication of Scientific Papers in Mathematics Education*, 5(01), 36. <https://doi.org/10.29407/jmen.v5i01.12854>
- Margolis, R. (2013). Educational Differences in Healthy Behavior Changes and Adherence Among Middle-aged Americans. *Journal of Health*

and Social Behavior, 54(3), 353-368.
<https://doi.org/10.1177/0022146513489312>

Mustari, M., Ph, D., Rahman, M. T., & Ph, D. (2014). Education Management. In RajaGrafiKa Persada.

Nutbeam, D. (1997). Promoting health and preventing disease: An international perspective on youth health promotion. *Journal of Adolescent Health*, 20(5), 396-402. [https://doi.org/10.1016/S1054-139X\(97\)00009-8](https://doi.org/10.1016/S1054-139X(97)00009-8)

Of, I. (2015). Original briefs. April, 227-230.

The report, S. (2003). SHORT REPORT promotes school health: the Hong Kong experience in. *Community Health*, 174-177.

Robbins, S. P., Decenzo, D. A., Tucker, M. L., McCarthy, A. M., Benton, D. A., Dubrin, A. J., Coulter, M., York, N., San, B., London, F., Sydney, T., Singapore, T., Mexico, M., Munich, C., Cape, P., Hong, T., & Montreal, K. (2005). Excerpts are taken from: *Fundamentals of Management: Essential Concepts and Applications, Fifth Edition The Human Challenge: Managing Yourself and Others in Organizations, Seventh Edition Coaching and Mentoring Skills Custom Publishing PRINCIPLES OF MANAGEMENT.* www.pearsonhighered.com

Salvi, S., & Salvi, S. (2015). Health Education and Communication. Multiple Choice Questions in *Community Health Nursing*, 79(13), 74-74. https://doi.org/10.5005/jp/books/12538_10

Salfiyadi, T. (2017). Characteristics of Individuals and Workplace Conditions with Job Satisfaction Lecturer Health Polytechnic of Aceh. *Jurnal Ilmiah Peuradeun*, 5(1), 37.
<https://doi.org/10.26811/peuradeun.v5i1.117>

- Silalahi, A. (2018). Development Research and Research & Development in the Field of Education/Learning. Researchgate, June, 1-13. <https://doi.org/10.13140/RG.2.2.13429.88803/1>
- Walsh, S., De Villiers, M. R., & Golakai, V. K. (2018). Introducing an E-learning solution for medical education in Liberia. *Annals of Global Health*, 84(1), 190-197. <https://doi.org/10.29024/aogh.21>