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Contents

Volume 11, January 01

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1. Study Protocol: A Randomised Controlled Trial on Effectiveness of a Worksite Health Intervention on Common Musculoskeletal Problems and Work-Related Quality of Life (WRQoL) among Female Workers in the Garment Manufacturing Sectors 1
A. Santham Lilly Pet, Timsi Jain, Bobby Joseph, Pethuru Devadason, Gayathri M
2. Health of the Elderly in India: A Socio-Legal Study 7
Arti, J.K. Mittal
3. General Awareness of Diabetes Mellitus among a Hospital Population in Chennai: A Survey 12
Sridhar M., Abilasha Ramasubramanian
4. Vitamin D Deficiency in Rural Area of Gautam Buddh Nagar: An Observational Study 16
Vijay Deepak Verma, Ajai Kumar Garg, Suresh Babu, Ashish Satyarathi
5. Identifying the Status of Menstrual Hygiene Management 20
Amrita Shilpi, Rajasree Roy, Gobina, Spriha Roy
6. Effect of Strengthening of Scapular Stabilizers in Treatment of Rounded Shoulder Posture in Dental Students 27
Ankita M. Patil, Sayali Gijare
7. Elder Abuse in Indian Setting—A Misconception or a Reality— A Deductive Analysis 31
Anusha Rashmi, Linda Sequeira, Prianka Shashi Kumar, Rashmi
8. A Study on Women Entrepreneurs Dealing Through Stress 35
Archana R.V., K. Vasanthi Kumari
9. Effect of Bilateral Scapular Muscles Strengthening on Dynamic Balance in Post Stroke Individuals 38
Arpan Dhoka, G. Varadharajulu
10. In Vitro Antibacterial and Anticancer Study of Bioactive Compounds Isolated from Punica Grantum Peel.. 45
Arunava Das, J. Bindhu, M. Bharath, Nithin Johnson, M. Jeevanantham
11. A Study on Utilization of Primary Health Care Services among the People Residing in a Semi-Urban Area 53
B. Charumathi, D. Jayashri, S. Manisha, Aadithya, C. Hemanthkumar, Timsi Jain
12. An Empirical Relationship between Stress and Job Performance: A Study with Private School Teachers 57
** D.S. Premalatha, S. Subramanian*

XX

261. Antibacterial Effect of the Combination of Probiotic Milk and Calliandra Honey against Streptococcus Mutans that Causes Tooth Cavities 1402
Uswatun Chasanah, Isnaeni, Nuzul Wahyuning Dyah
262. Reproductive Health Behavior of Street Youth Guided by Karya Putra Indonesia Mandiri Foundation in Central Jakarta Region 1407
Prihayati, Hansrizka Raisna, Ridwan Amiruddin, Owildan Wisudawan B.
263. Trend of Malaria Cases in Maluku Province 2012-2016 1411
Prisilia Oktaviyani, Budi Hartono, Ranti Ekasari
264. A Qualitative Study: Perceptions of Premarital Sexual Behavior among Teenage Girls..... 1419
Mia Fatma Ekasari, Eros Siti Suryati, Raden Siti Maryam, Ahmad Jubaedi, Rosidawati, Tien Hartini, Santun Setiawati
265. Hazard and Risk Analysis by Implementing Hiradc Method in the Laboratory of Medical-Surgical at Faculty of Nursing Universitas Airlangga..... 1424
Radhia Maya R.P., DaniNasirul H., PutriAyuni Alayyannur, Tjipto Suwandi, Rizky Agung Firnando
266. A Three-Years Survival Rates of Chronic Myeloid Leukemia Patients with Targeted Therapy 1430
Rani Silondae, Tutik Harjianti, Sahyuddin Saleh, Syakib Bakri, A. Makbul Aman, Hasyim Kasim, Haerani Rasyid
267. The Effect of Alkaloid Extract of Teucrium Polium L. Against Some Pathogenic Bacteria of Urinary Tracts and on Pyelonephritis Induced in Rats 1444
Rawa'a A. Kushaish, Bushra A.M. AL-Salem, Mouayed A. Hussein
268. A Study of Complications of Infants of Diabetic Mothers in Babylon Teaching Hospital for Maternity and Pediatrics..... 1449
Rebee Mohsin Al-Ithary
269. The Relationship between Obesity and Dyslipidemia in Adolescents 1455
Ria Qadariah Arief, Ridwan Amiruddin, Syamsiah Russeng, Citra Kesumasari, Nurhaedar Jafar, Ummu Salamah, Nugrahaeni
270. The Individual Factor and the Quality of Building's Physical Environment in Correlation with the Occurrence of Sick Building Syndrome (SBS) on Employees of PT. Telkom Jember 1459
Rizki Adi Sulistyanto, Ragil Ismi Hartanti, Prehatin Trirahayu Ningrum, Abdul Rohim Tualeka
271. Public Knowledge on Over the Counter Analgesics at Private Pharmacy Store in Makassar City Indonesia..... 1464
Rizqi Nur Azizah, Hendra Herman
272. Effect of Different Levels of Coriandrum Sativum and Piper Nigrum and their Interaction on Production, Biochemical Parameter, Liver Enzymes, TSH and Growth Hormone for Broiler Chickens ... 1468
S.G. Hussein, H.Q. Baker
273. Parental Style and its Relation to Adolescents' Self-Concept and Depression 1474
Safaa Mohammed Zaki, Manal Hassan Abo Elmagd, Nagat Farouk Abo Elwafa

Antibacterial Effect of the Combination of Probiotic Milk and Calliandra Honey against *Streptococcus Mutans* that Causes Tooth Cavities

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Abstract

Background: *Streptococcus mutans* is a Gram-positive bacterium found in the oral cavity. As a cariogenic bacterium, *Streptococcus mutans* can cause dental caries through its ability to produce an acidic environment that can demineralize tooth structures so that the tooth layer is destroyed.

Objective: To determine the optimal combination of probiotic milk *Lactobacillus paracasei* and calliandra honey which has antibacterial activity in *Streptococcus mutans* bacteria.

Method: This study uses diffusion method on Nutrient Agar media. The study began with an examination of the physical properties of probiotic milk and calliandra honey including color, odor, taste, pH, specific gravity and viscosity. Antibacterial activity was indicated by the diameter of the Zone of inhibition (mm) in the form of clear areas around the well on the media so that containing *Streptococcus mutans* inoculum 0.25 µl/ml.

Result: The combination of probiotic milk *Lactobacillus paracasei* and 50% calliandra honey solution produced the highest activity at a ratio of 8: 2 with Zone of inhibition diameters of 16.40 ± 0.71 mm

Conclusion: The combination of probiotic milk and calliandra honey with 5% concentration and 8: 2 ratio has the highest antibacterial activity against *Streptococcus mutans* that causes tooth cavities

Keywords: *Streptococcus mutans*, antibacterial activity, probiotic milk, *Lactobacillus paracasei*, calliandra honey.

Introduction

Streptococcus mutans is a normal flora in the oral cavity that can turn into a pathogen when there is an excessive number colonies⁽¹⁾. *Streptococcus mutans* is an anaerobic bacterium that is known to produce lactic

acid as part of its metabolism and is able to attach to the tooth surface in the presence of sucrose which causes caries in the teeth⁽²⁾. *Streptococcus mutans* produces lactic acid through a *homo-fermentation* process, forming colonies that are firmly attached to the tooth surface and more acidogenic than other species so that it can cause demineralization of tooth enamel at a critical pH of 5.5. Continuous tooth enamel demineralization will cause dental caries⁽³⁾.

Several studies show that probiotic bacteria have an influence in the ecology of the oral cavity. There are several strains of probiotic bacteria that have a positive effect in reducing the number of *Streptococcus mutans* in the saliva of the human oral cavity, namely the acidogenic class of *Lactobacillus* and *Bifidobacterium*⁽⁴⁾.

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The combination of *Lactobacillus paracasei* and *Bifidobacterium longum* isolates was able to inhibit the growth of *Streptococcus mutans*⁽⁵⁾.

In its development, probiotic bacteria are packaged in a probiotic product with added milk to meet the nutritional needs of these bacteria⁽⁶⁾. Probiotics have proteolytic and lipolytic enzymes that can make milk as a substrate and produce a variety of energy sources⁽⁷⁾.

As an antibacterial agent, probiotic milk and honey have different mechanisms, so that a combination of both can affect both activities. Antibacterial activity of combination probiotic milk *Lactobacillus paracasei* and Calliandra honey in inhibiting the growth of *Streptococcus mutans* are not known, so it needs to be done research to determine the antibacterial activity of the combination of probiotic milk *Lactobacillus paracasei* ATCC BAA52 and Calliandra Honey (*Calliandrachalothyrsus*) against *Streptococcus mutans* in various comparisons⁽⁸⁾. Based on this background, this study aims to determine the combination of probiotic milk *Lactobacillus paracasei* ATCC BAA52 and Calliandra honey (*Calliandrachalothyrsus*) which can provide maximum antibacterial activity against *Streptococcus mutans*.

Material and Method

Materials and Equipments: The materials are Media Nutrient Agar (Oxoid), Agar de Man Ragosa Sharpe (MRS), Calliandra honey from Yogyakarta, milk, NaCl (Merck), Klindamisin, sterile distilled water and membrane filter with a size of 0.22 µm. The equipments are analytical scales, glassware, petri dishes, micro pipettes (Socorex), öse wire, ependorf, vortex (Type 161700 mixer), incubator (Memmert), vernier caliper, colony counter, shaker, refrigerator, picnometer, viscosity ostwald, viscosity Cup and Bob, autoclave (HL-340 series sterile vertical type steam), pH meter (Schott glass mainz CG 842 type), laminar air flow cabinet, lactodensimeter, and spectrophotometer (Thermo Fisher Scientific 5225 Verona Road).

Agar well diffusion method: Test bacteria aged 18-24 hours are suspended into the agar medium at around 45°C. The bacterial suspension is poured into a sterile petri dish. After the agar becomes solid, holes are made with a diameter of 6-8 mm. Into the hole, a solution of the substance is inserted which will be tested for 20 µL of activity, then incubated at 37°C for 18-24 hours⁽⁹⁾.

Results

Table 1: Observation Result of Zone of inhibition diameter of probiotic milk at various concentrations (%) on the growth of mutant *Streptococcus*.

Probiotic milk concentration	Zone of inhibition diameter (mm)
	Mean ± SD
100%	9,92 ± 0,52
80%	9,50 ± 0,36
70%	9,12 ± 0,10
60%	9,07 ± 0,09
55%	9,32 ± 0,08
50%	-
25%	-
Clindamycin 0,01 ppm	32,33±0,47

From these data, it can be seen that the minimum inhibitory concentration is produced by *Lactobacillus paracasei* probiotic milk at a concentration of 55.00%, which results in an average diameter Zone of inhibition of 9.3 ± 0.08 mm and at a concentration of less than 55.00% there is no Zone of inhibition. The minimum inhibitory concentration was produced by probiotic milk *Lactobacillus paracasei* at a concentration of 55% so that for the next combination carried out at the concentration of probiotic milk *Lactobacillus paracasei* ATCC BAA52 was above 55%.

Table 2: Observation result of Zone of inhibition diameter of calliandra honey at various concentration (%) against *Streptococcus mutans*

Calliandra Honey Concentration	Zone of inhibition diameter (mm)
	Mean ± SD
50%	24,42±0,42
40%	23,20±0,12
30%	22,28±0,06
25%	21,18±0,12
12,5%	-
6,25%	-
Clindamycin 0,01 ppm	19,12±0,01

From these data, it can be seen that the minimum inhibitory concentration is produced by calliandra honey at a concentration of 25%, which results in an average diameter Zone of inhibition of 21.18 ± 0.12 mm and a concentration less than 25% there is no Zone of inhibition. Based on the table above, the minimum inhibitory concentration is produced by calliandra honey (*Calliandrachalothyrsus*) at a concentration of 25%, so that the next combination is carried out at the concentration of calliandra honey above 25%.

Table 3: ZOI diameter observation of Combination of Probiotic Milk and calliandra Honey to Streptococcus mutans

Combination (Probiotic: Honey)	Zone of Inhibition Diameter (mm)			Mean ± SD
	1st Replication	2nd Replication	3rd Replication	
1 : 9	9,20	10,00	11,00	10,07±0,74
2 : 8	12,35	13,00	13,15	12,83±0,35
3 : 7	11,40	12,35	13,00	12,25±0,66
4 : 6	12,35	13,10	13,10	12,85±0,35
5 : 5	12,35	13,25	14,10	13,23±0,71
6 : 4	13,30	14,00	14,00	13,77±0,33
7 : 3	12,30	12,35	12,35	12,33±0,02
8 : 2**	15,40**	16,80**	17,00**	16,40±0,71**
9 : 1	15,00	15,20	16,10	15,43±0,48
Calliandra Honey	15,40	15,00	14,90	15,10±0,35
Probiotic milk	14,60	13,60	12,00	13,40±1,84
Clindamycin	21,00	21,00	21,00	21,00±0,00

From these data, it can be seen that the maximum ZOI diameter is produced by a combination of *L. paracasei* probiotic milk and calliandra honey at a ratio of 8: 2 which results in a diameter of the Zone of inhibition greater than the other comparison which is 16.40 ± 0.71 mm. The maximum antibacterial activity is indicated by the combination of *Lactobacillus paracasei* probiotic

milk and 50% calliandra honey at a ratio of 8: 2 which has the largest Zone of inhibition diameter, then one-way anova statistical test (attachment 10) to determine the difference in diameter significance the average zone of inhibition (ZOI) between each group is presented in Table 4.

Table 4: Differences in ZOI Diameter mean value of Combined Zone of Probiotic *L. paracasei* and Calliandra Honey against *S. mutans* according to HSD Test

Kel	1:9	2:8	3:7	4:6	5:5	6:4	7:3	8:2	9:1	M	S	K
1:9		2,77*	2,18*	2,78*	3,17*	3,70*	2,27*	6,33*	5,37*	5,03*	3,33*	10,93*
2:8	2,77*		0,58	0,02	0,40	0,93	0,50	3,57*	2,60*	2,26*	0,57	8,17*
3:7	2,18*	0,58		0,60	0,98	1,52*	0,08	4,15*	3,18*	2,85*	1,15	8,75*
4:6	2,78*	0,02	0,60		0,38	0,92	0,52	3,55*	2,58*	2,25*	0,55	8,15*
5:5	3,17*	0,40	0,98	0,38		0,53	0,90	3,17*	2,20*	1,87*	0,17	7,77*
6:4	3,70*	0,93*	1,52*	0,92	0,53		1,43*	2,63*	1,17*	1,33*	0,37	7,23*
7:3	2,27*	0,50*	0,08	0,52	0,90	1,43*		0,97*	3,10*	2,77*	1,07	8,67*
8:2	6,33*	3,57*	4,15*	3,55*	3,17*	2,63*	4,07*		0,97	1,30*	3*	4,60*
9:1	5,37*	2,60*	3,18*	2,58*	2,20*	1,67*	3,10*	0,97		0,33*	2,03*	5,57*
M	5,03*	2,26*	2,85*	2,25*	1,87*	1,33*	2,77*	1,30*	0,33		1,70*	5,90*
S	3,33*	0,57	1,15	0,55	0,17	0,37	1,07	3*	2,03*	1,70*		7,60*
K	10,93*	8,17*	8,75*	8,15*	7,77*	7,23*	8,67*	4,60*	5,57*	5,90*	7,60*	

Description: Yellow - Significant different ($p < 0,05$), White - No significant different ($p > 0,05$), M - 50% calliandra honey, S - 100% probiotic milk, K - Positive control (Clindamycin 0.01ppm)

Based on Table 4, it is known that there are differences

in the average diameter of the ZOI according to Tukey-HSD for a ratio of 8: 2 with other ratio except 9: 1. But the optimal ratio is also determined by the diameter of the zone of inhibition (ZOI) which is the largest among

the other ratio. So the optimal ratio is shown by the combination of probiotic milk *Lactobacillus paracasei* and Calliandra honey in a ratio of 8: 2.

Table 5: ZOI diameters of Probiotic Milk *Lactobacillus paracasei* and Calliandra honey (*Calliandracalothyrsus*) combination against *Streptococcus mutans*

Concentration of Probiotic and Calliandra Honey Combination (8: 2)	ZOI diameter against <i>Streptococcus mutans</i> (mm)
	Mean ±SD
100%	17,13±0,23
50%	12,86±0,15
40%	11,03±0,55
Clindamycin 0,01 ppm	36,00±0,00

From these data, it can be seen that the minimum inhibitory concentration of *Streptococcus mutans* is produced by a combination of probiotic milk *Lactobacillus paracasei* and calliandra honey with a ratio of 8: 2 at a concentration of 40.00% which is equal to 11.03 ± 0.55 mm and at concentrations less than 40.00% there is no zone of inhibition that generated.

Discussion

From these results, it was found that probiotic milk *Lactobacillus paracasei* and calliandra hone had antibacterial activity against *Streptococcus mutans* at a minimum inhibitory concentration (MIC) of 55% and 25%. Calliandra honey has smaller MIC than probiotic *Lactobacillus paracasei* milk which is 25%, so it can be assumed that Calliandra honey is more potent in inhibiting the growth of *Streptococcus mutans* than *Lactobacillus paracasei* probiotic milk⁽¹⁰⁾.

From these results, it can be seen that with a decrease in concentration from 100% to 60% of *Lactobacillus paracasei* probiotic milk, there was a decrease in the diameter of the inhibition zone, although at 55% concentration of probiotic milk *Lactobacillus paracasei* increased. The results also showed that *Lactobacillus paracasei* probiotic milk was able to inhibit the growth of *Streptococcus mutans* at the lowest concentration of 55% with inhibitory zone diameters of 9.32 ± 0.08 mm, because at concentrations below 50% no inhibition zones were produced.

Based on the research that has been done, the ZOI diameter of probiotic milk *Lactobacillus paracasei* at a concentration of 100% is 9.92 ± 0.52 mm, while at a

concentration of 50%; 25% and 12.5% do not produce inhibition zones. So that the test is continued at a concentration of 80%; 70%; 60% and 55% are produced in succession of inhibitory zone diameters of 9.50 ± 0.36 mm; 9,12 ± 0,10 mm; 9.07 ± 0.09 mm and 9.32 ± 0.08 mm.

Furthermore, the antibacterial activity of a combination of probiotic milk *Lactobacillus paracasei* and calliandra honey was carried out to the growth of *Streptococcus mutans*. In this study, testing was done with agar diffusion method because in the process it is simple, inexpensive and able to test various types of microorganisms and antibacterial agents with easy results of interpretation techniques⁽¹¹⁾.

According to Ghabanchi in his research, antibacterial activity was shown by the presence of an inhibition zone (mm) in the form of a clear area around the well. The inhibition zone shows that *Streptococcus mutans* are not resistant to the test solution⁽¹²⁾. As a positive control used in testing this antibacterial activity is clindamycin, because the antibiotic is known to be sensitive to gram-positive, facultative anaerobes and has been shown to inhibit the growth of oral bacteria, especially *Streptococcus mutans*⁽¹⁰⁾.

Based on the research by Bhushan and Chachra (2010), it was said that some probiotic bacteria act as bacteriocin or like inhibitors specifically preventing the growth of cariogenic bacteria, having the ability to protect teeth and affect the growth of supragingival plaques. Adhesion reduction can be an effective way to reduce cariogenic bacteria such as *Streptococcus mutans*⁽¹³⁾.

The effect of osmotic pressure from honey is related to saturated solutions of sugar with water content usually only around 15-21% of its weight. Solids in honey, 84% is a mixture of monosaccharides namely fructose and glucose⁽¹⁴⁾. The strong interactions between sugar molecules produce water molecules that are not enough for microorganisms. Microorganisms will lose water from this osmosis process and will become dehydrated, so it can kill these microorganisms. Gluconic acid is the most dominant acid⁽¹⁵⁾. This acid is the result of enzymatic changes in glucose by the glucose oxidase enzyme, which bees secreted from the hypopharyngeal gland becomes a balance between gluconic acid and gluconolactone⁽¹⁶⁾.

Conclusions

Based on the results of the study, it can be concluded that the MIC of probiotic milk *Lactobacillus paracasei* ATCC BAA52 against *Streptococcus mutans* was 55%. While the MIC of calliandra (*Calliandraca lothyrus*) honey against *Streptococcus mutans* is 25%. The combination of probiotic milk *Lactobacillus paracasei* ATCC BAA52 and Calliandra honey (*Calliandraca lothyrus*) can provide maximum activity against *Streptococcus mutans* in a ratio of 8: 2. The combination MIC of probiotic milk *Lactobacillus paracasei* ATCC BAA52 and Calliandra honey (*Calliandraca lothyrus*) against *Streptococcus mutans* was 40%.

Ethical Clearance: The research process did not involve with human, instead it is only laboratory research of parasites that is in accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice.

Conflict of Interest: The author has not received any conflict of interest so far. It is safe from the conflict

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References

1. Setijanto RD, Puspita AE, Bramantoro T, Wening GRS, Kusumo AD, Rizal MN. Dental communication correlation with felt need profile of dental caries treatment. *J Int Oral Heal*. 2019;11(7):1.
2. Alfath CR, Yulina V, Sunnati S. Antibacterial Effect of Granati fructus Cortex Extract on *Streptococcus mutans* In Vitro. *J Dent Indones*. 2013;20(1):5-8.
3. Kusumaningsih T, Subijanto MS, Indrawati R, Devijanti RR. The level of beta defensin-2 in saliva and its expression in parotid gland epithelial cells after probiotic (*Lactobacillus reuteri*) induction to inhibit *Streptococcus mutans* in caries. *Eur J Dent*. 2016;10(4):556.
4. Chuang L-C, Huang C-S, Ou-Yang L-W, Lin S-Y. Probiotic *Lactobacillus paracasei* effect on cariogenic bacterial flora. *Clin Oral Investig*. 2011;15(4):471-6.
5. Trusalu K, Naaber P, Kullisaar T, Tamm H, Mikelsaar R-H, Zilmer K, et al. The influence of antibacterial and antioxidative probiotic lactobacilli on gut mucosa in a mouse model of Salmonella infection. *Microb Ecol Health Dis*. 2004;16(4):180-7.
6. Li P, Gatlin III DM. Dietary brewers yeast and the prebiotic Grobiotic™ AE influence growth performance, immune responses and resistance of hybrid striped bass (*Morone chrysops* × *M. saxatilis*) to *Streptococcus iniae* infection. *Aquaculture*. 2004;231(1-4):445-56.
7. Widjowati R, Agil M. Chemical constituents and bioactivities of several Indonesian plants typically used in jamu. *Chem Pharm Bull*. 2018;66(5):506-18.
8. Prasetyo R, Safitri E. TOPICAL HONEY TO TREAT AN ABSCESS CAUSED BY STAPHYLOCOCCUS AUREUS: A CASE REPORT. *Southeast Asian J Trop Med Public Health*. 2018;49(5):835-8.
9. Guess WL, Rosenbluth SA, Schmidt B, Autian J. Agar diffusion method for toxicity screening of plastics on cultured cell monolayers. *J Pharm Sci*. 1965;54(10):1545-7.
10. Ghabanchi J, Bazargani A, Afkar MD, Foroshan SB, Ayeen SD. In vitro assessment of anti-*Streptococcus mutans* potential of honey. *Iran Red Crescent Med J*. 2010;12(1):61.
11. Bogdanov S, Jurendic T, Sieber R, Gallmann P. Honey for nutrition and health: a review. *J Am Coll Nutr*. 2008;27(6):677-89.
12. Yudaniayanti IS, Primarizky H, Nangoi L. The effects of honey (*Apis dorsata*) supplements on increased bone strength in ovariectomized rat as animal model of osteoporosis. In: AIP Conference Proceedings. AIP Publishing; 2018. p. 20004.
13. Bhushan J, Chachra S. Probiotics-their role in prevention of dental caries. *J Oral Heal Comm Dent*. 2010;4(3):78-82.
14. Israili ZH. Antimicrobial properties of honey. *Am J Ther*. 2014;21(4):304-23.
15. Mufida L, Setijanto RD, Palupi R, Bramantoro T, Ramadhan C, Ramadhani A. Caries and dental and oral hygiene profile of drug (narcotics and dangerous drugs) users at drug rehabilitation centers. *J Int Oral Heal*. 2019;11(7):6.
16. Ekawati ER, Darmanto W. Lemon (*Citrus limon*) Juice Has Antibacterial Potential against Diarrhea-Causing Pathogen. In: IOP Conference Series: Earth and Environmental Science. IOP Publishing; 2019. p. 12023.

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