

The Effectiveness of Gargling with Siwak Solution and Cinnamon Powder Towards Halitosis in Diabetes Mellitus

Mareta Suci Listari, Istianah, Baiq Nurainun Apriani Idris, Hapipah

STIKES YARSI Mataram, NTB Indonesia

Corresponding author: Hapipah (pey.hapipah15@gmail.com)

ABSTRACT

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia which can cause complications, one of which is halitosis caused by sympathetic and parasympathetic nervous disorders that cause saliva to become thicker or decrease salivary secretion. Using a mouthwash with a solution of siwak and cinnamon can help freshen breath and reduce halitosis. The purpose of the study was to determine the effectiveness of gargling with a solution of siwak and cinnamon powder on reducing the level of halitosis in people with diabetes mellitus in the working area of Karang Pule public health center. This type of research is quasi-experimental with a Two Groups Pretest-Posttest Design approach. The number of samples was 18 people divided into two groups which were selected based on the matched subject ordinal pairing technique. The results of the Paired T-test analysis showed that gargling with a solution of siwak and cinnamon proved to be effective in reducing the level of halitosis with a p value of 0.000 (<0.05) and the results of the T-Independent analysis showed that there was no difference in the effectiveness of gargling with a solution of siwak and cinnamon powder in reducing the level of halitosis with a p value of 0.146. Based on research from siwak and cinnamon solution can be used as a gargle solution to reduce halitosis.

Keywords: Siwak, Cinnamon, Halitosis, Diabetes Mellitus

Received September 3, 2021; Revised October 22, 2021; Accepted November 23, 2021



Journal of Health Science Community, its website, and the articles published there in are licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder disease characterized by an increase in blood glucose (hyperglycemia), caused by abnormalities in insulin secretion, insulin action or both (Tarwoto et al, 2012; Tanto et al, 2014). The International Diabetes Federation (IDF) in 2017, reported that in the world more than 425 million people have diabetes mellitus, and by 2045 it is estimated that the number will be 629 million. The global prevalence of diabetes at the age of 20-79 years is 20%, it is estimated that this number will increase to 592 million people. Indonesia ranks 8th in the country with the most diabetes sufferers after the United States, China, Germany, India, Brazil, Russia and Mexico with an estimated 5 million people with diabetes (IDF, 2017).

Diabetes mellitus in West Nusa Tenggara (NTB) has a prevalence of 1.9%. The national prevalence of diabetes mellitus is 10.9% (based on doctor's diagnosis and blood tests) (Riskseddas, 2018). According to data from the Mataram City Health Service (Dikes) in 2016, there were 1,145 people affected by diabetes mellitus, consisting of 396 men and 749 women. Diabetes mellitus is the second most common in the city of Mataram. From the results of data recapitulation, the public health center occupying the first level that has the most DM sufferers is at Karang Pule Health Center with a total of 382 patients, consisting of 107 men and 275

women. Until now, Karang Pule Health Center still occupies the first level which has the most DM sufferers (Zainatul, 2017). Based on data obtained from the Karang Pule public Health Center in Mataram City in the last 3 years (2015-2017) the number of cases of DM sufferers, namely in 2015 there were 182 people, in 2016 there were 382 people and in 2017 there were 457 people. While the number of people with diabetes mellitus at the Karang Pule Public Health Center in the last 3 months (October-December) in 2018 was 134 people.

Diabetes mellitus is a disease that causes long-term and short-term complications. Short-term complications will occur hypoglycemia, hyperglycemia, ketoacidosis and infection (Atun, 2010). Long-term complications will occur macrovascular complications that can cause heart and blood vessel disease as well as microvascular complications, namely retinopathy (blurred vision), nephropathy (kidney disorders), and neuropathy (nerve disorders or stroke) (Hasdianah, 2012). Neuropathy will cause sympathetic and parasympathetic nervous disorders so that one of the effects that often occurs in the oral cavity is saliva becoming thicker or a decrease in salivary secretion. The decrease in salivary secretion in the mouth will result in a decrease in the buffer in saliva. So that the acid in the mouth and anaerobic bacteria are easy to breed which results in halitosis. Halitosis is a condition of bad breath which is generally in the form of bad breath and if left unchecked can interfere with the patient's activities (Ndraha, 2014).

The impact that occurs if people with diabetes mellitus do not cope with changes in their mouth, it will cause more severe oral diseases such as gingivitis and periodontitis. Several things can be done to reduce the level of halitosis, namely by brushing teeth, flossing using dental floss, chewing gum, and using mouthwash, both synthetic and herbal, which usually helps freshen breath (Ramadhan 2010). Based on research conducted by Chyntia, et al (2016) regarding "Differences in Saliva pH before and after gargling with siwak solution in patients with diabetes mellitus" conducted at the age of 51-60 years, it was found that all respondents after being given gargling treatment with siwak solution were mostly pH The respondent's saliva turned neutral with the Wilcoxon test results obtained a value of <0.005 , meaning that there was a significant difference between the pH of the saliva before and after gargling with the siwak solution. Another study conducted by Putri (2014) on "The Benefits of Consuming a Mixed Solution of Honey and Cinnamon Powder on Reducing Halitosis Levels", from the results of statistical tests using Paired T-test obtained $v < 0.05$, meaning that there is an effect in consuming a mixture of solutions honey and cinnamon against halitosis reduction.

Based on a preliminary study conducted by researchers in the Jempong area of Mataram City on 10 DM patients with interview techniques, 4 out of 10 DM patients knew about changes in their mouths, while 6 DM patients did not know about changes in their mouths. One way that DM sufferers do in dealing with changes in their mouth is by brushing their teeth using toothpaste twice a day when taking a shower in the morning and evening. Of the 10 people who suffered from DM said that they had never rinsed their mouth using a solution of siwak or a solution of cinnamon powder. While the results of interviews with health workers at the Karang Pule Health Center, health workers did not know the benefits of gargling with siwak solution and cinnamon powder solution. So that gargling using a solution of siwak and a solution of cinnamon powder has never been recommended by health workers in the area. Health workers advise DM patients, if they experience changes in their mouth or breath odor, they should brush their teeth twice a day, after eating and before going to bed.

Research conducted by Ismail (2014) said that siwak contains natural minerals that can kill and inhibit bacterial growth, erode plaque, prevent cavities and maintain gums. Siwak contains natural substances needed to nourish and polish teeth. In addition, cinnamon also contains essential oils that are useful in inhibiting the growth of bacteria that cause halitosis (Noviano et al, 2016). Based on this description, the purpose of this study was to determine the effectiveness of gargling with a solution of siwak and a solution of cinnamon powder to reduce

the level of halitosis in people with diabetes mellitus in the Karang Pule Community Health Center.

METHODS

The design of this study used a quasi-experimental with a two groups pre-post test design, observations were made before the intervention (pretest) and after the intervention (post test) were carried out to determine the changes that occurred after the intervention was given. The population in this study were people with diabetes mellitus in the working area of the Karang Pule Public Health Center with a sample of 18 people who were divided into 2 groups. Sampling used non-probability sampling with matched subject ordinal pairing (MSOP) techniques that met the inclusion and exclusion criteria. The independent variable in this study was a solution of siwak and cinnamon solution and the dependent variable was halitosis in patients with Diabetes Mellitus. This research was conducted in the working area of the Karang Pule Public Health Center in November 2018. The data were analyzed univariately and bivariately. Univariate analysis was conducted to obtain a general description of the respondent's characteristics including age, gender, duration of suffering from DM and the level of halitosis. Bivariate analysis was used to test the effectiveness of gargling with a solution of siwak and a solution of cinnamon powder to decrease the level of halitosis with a T-independent statistical test.

RESULTS

Table 1. Characteristic Distribution of Respondents in Group A and Group B with Diabetes Mellitus at Karang Pule Public Health Center

Respondents Characteristics	Group A		Group B	
	Frequency	%	Frequency	(%)
Age				
a. 30-45 years old	1	11,1	2	22,2
b. 46-60 years old	7	77,8	6	55,6
c. 61-75 years old	1	11,1	1	22,2
Gender				
a. Male	0	0	0	0
b. Female	9	100	9	100
Long Suffering DM				
a. 5-6 years	5	55,6	5	55,6
b. 7-8 years	4	44,4	4	44,4

Based on table 1, it can be seen that the characteristics of respondents based on age are mostly 46-60 years old with 7 people (77.8%) in group A and 6 people (55.6%) in group B. The female sex with the duration of DM was mostly 5-6 years as many as 5 people (55.6%) in groups A and B.

Table 2. Distribution of Respondents Based on the level of halitosis in Group A and Group B with Diabetes Mellitus at Karang Pule Public Health Center

Halitosis	Group A			Group B		
	Frequency	%	Mean	Frequency	(%)	Mean
a. Level 3	3	33,3	3,67	3	33,3	3,67
b. Level 4	6	66,7		6	66,7	
Total	9	100		9	100	

Based on table 2, it can be seen that the number of respondents in group A and group B with the highest level of halitosis is with a score of 4 (66.7%), with an average of both group A and group B 3.67.

Table 3. Distribution of respondents based on the level of halitosis before and after gargling with a solution of siwak and cinnamon on people with diabetes mellitus at the Karang Pule Public Health Center.

No	Variable	Min	Max	Mean	SD
1.	Halitosis Level with Siwak Solution				
	Pretest	3	4	3,56	0,52
	Posttest	1,43	2,43	1,98	0,27
2.	Halitosis Level with Cinnamon Powder				
	Pretest	3	4	3,56	0,52
	Posttest	1,86	2,71	2,17	0,25

Based on table 3, the average value of the level of halitosis before gargling with siwak solution was 3.56 and SD 0.52, while the average value of the halitosis level after gargling with siwak solution was 1.98 and SD 0.27. The average value of halitosis level before gargling with cinnamon solution was 3.56 and SD was 0.52, while the average value of halitosis level after gargling with cinnamon solution was 2.17 and SD 0.25.

Table 4. Analysis of the effect of gargling with a solution of siwak and cinnamon on the level of halitosis in people with diabetes mellitus at the Karang Pule Public Health Center

No	Variable	Min	SD	P Value
1.	Halitosis Level with Siwak Solution			
	Pretest	3,56	0,52	0,000
	Posttest	1,98	0,27	
2.	Halitosis Level with Cinnamon Powder			
	Pretest	3,56	0,52	0,000
	Posttest	2,17	0,25	

Based on table 4, the results of the Paired T-test average value of halitosis after gargling with siwak solution 1.98 SD 0.27 and value 0.000. While the average value of halitosis after gargling with cinnamon solution was 2.17, SD was 0.25 with value 0.000. The value of the siwak and cinnamon solution obtained is smaller than 0.05, which means that there is a significant effect of the siwak and cinnamon solution on the decrease in the level of halitosis in Diabetes mellitus.

Table 5. Comparison of the level of halitosis before and after gargling with a solution of siwak and cinnamon in people with diabetes mellitus at the Karang Pule Public Health Center

No	Variable	Mean	Diff	SD	Diff	P Value
1.	Halitosis Level with Siwak Solution					
	Pretest	3,56	1,57	0,52	0,25	
	Posttest	1,98		0,27		
2.	Halitosis Level with Cinnamon Powder					0,146
	Pretest	3,56	1,38	0,52	0,27	
	Posttest	2,17		0,25		

Based on table 5, the results of the independent T-test showed that the average difference in the level of halitosis after being given the siwak solution was 1.57 with an SD difference of 0.25. While the difference in the average level of halitosis after being given a cinnamon solution was 1.38 with an SD of 0,27. The value obtained was 0.146, meaning that there was no significant difference in the average halitosis score between respondents who rinsed their mouth with a solution of siwak and cinnamon solution.

DISCUSSION

1. Effect of Gargling with Siwak and Cinnamon Solution

The results showed that there was a difference in the level of halitosis between before and after gargling with a solution of siwak and cinnamon solution in prolans participants at the Karang Pule Health Center in 2019, as indicated by the results of the average decrease in the level of halitosis after gargling with a solution of siwak, which was 1.98 and a solution of cinnamon. ie 2.17. With a value of value 0.000 (<0.05), then there is a significant effect of gargling with a solution of siwak and cinnamon on reducing the level of halitosis in prolans participants at the Karang Pule Health Center. The results of the researcher's observations, the overall respondent is female. The decrease in the level of halitosis in this study was caused by a solution of siwak and cinnamon, where respondents regularly rinsed their mouth with a solution of siwak and cinnamon twice a day for one week with a duration of 30 seconds. However, the level of halitosis decreased unequally every day because respondents sometimes consumed food and drinks that could affect the occurrence of an increase in halitosis.

This study is in line with research conducted by Chyntia, et al (2016) regarding "Differences in Saliva pH before and after gargling with siwak solution in patients with diabetes mellitus" with the results of respondent data analysis after being given gargling treatment with siwak solution, most of the respondents' saliva pH changed to neutral with the Wilcoxon test results obtained a value of <0.005, meaning that there is a significant difference between the pH of saliva before and after gargling with siwak solution. This study was also supported by Syamsiah (2018) on "The Differences in Gargling Siwak Extract Solution (*Salvadora Persica*) Against Saliva Secretion of the Oral Cavity of Elderly with Hypertension (HT), Diabetes Mellitus (DM) and Do not Have Systemic Diseases". the average salivary secretion in hypertension is 1.185 mL/5 minutes with a probability value of 0.000, the average salivary secretion for diabetes mellitus is 1.358 mL/5 minutes with a probability value of 0.000, the average salivary secretion has no systemic disease 1.057 mL/5 minutes with a probability 0.000 <0.05 which means that gargling using a 25% siwak extract solution can increase salivary secretion in patients with hypertension, diabetes mellitus, and do not have systemic diseases.

The results of this study are also supported by Putri (2014) regarding "The Benefits of Consuming a Mixed Solution of Honey and Cinnamon Powder on Reducing Halitosis Levels", from the results of statistical tests using Paired T-test obtained value <0.05 , meaning that there is an influence in consuming mixture of honey and cinnamon solution to reduce halitosis. This study is also in line with research conducted by Dedy (2015) on "The Effectiveness of Cinnamon Bark Extract (*Cinnamomum Burmanii*) Against Reducing Volatile Sulfur Compounds (VSCs) Levels in Halitosis Patients, the results obtained are that there is a significant difference in the decrease in VSCs levels after Gargling using cinnamon bark extract (*Cinnamomum burmanii*) and 2% concentration of cinnamon bark extract (*Cinnamomum burmanii*) was the most effective in reducing the levels of VSCs.

Ismail (2014) conducted research on siwak wood and reported that siwak contains natural minerals that can kill and inhibit bacterial growth, erode plaque, prevent cavities and maintain gums. Siwak contains natural substances needed to nourish and polish teeth. These substances function to clean, purify, prevent bleeding, damage and kill germs. Siwak wood also contains trimethylamine, salvodarin, sulfur, vitamin C, sterols and flavonoids (Abdullah, 2011). Cinnamon (*Cinnamomum burmannii*) is widely known as one of the most popular herbs and also as a spice. Cinnamon has a characteristic that is spicy, slightly sweet and also warm. The composition of cinnamon bark contains essential oils, tannins, resins and mucus. Cinnamon essential oil is very effective in inhibiting the growth of several bacteria including *B. cereus*, *S. aureus*, *E. coli*, *P. aeruginosa* and *Klebsiella* sp. Bacterial inhibition with cinnamon essential oil is caused by active compounds such as cinnamaldehyde and cinnamic acid (Noviano et al, 2016). The results of this study indicate the use of natural ingredients as solutions that can reduce the level of halitosis in DM patients as a substitute for chemical-based solutions that have been chosen by the community. One of them is by using a solution of siwak and cinnamon as a solution to reduce the level of halitosis.

2. Comparison of the Differences in the Effectiveness of Gargling with Siwak and Cinnamon Solutions on Reducing Halitosis Levels

The results showed that the difference in the average level of halitosis after gargling with siwak solution was 1.57 with a difference of SD 0.25. While the difference in the average level of halitosis after gargling with cinnamon solution was 1.38 with a difference of SD of 0.27 and value of 0.146, meaning that there was no significant difference in the average halitosis score between respondents who gargled with siwak solution and cinnamon solution. The results of the researcher's observations, respondents sometimes consume food and drinks that can affect the occurrence of an increase in halitosis scores, so that the level of halitosis decreases that is not the same every day. The decrease in the level of halitosis in this study was caused by a solution of siwak and cinnamon. All prolans participants are women. Respondents regularly gargle with a solution of siwak or cinnamon which is done 2 times a day for one week with a duration of 30 seconds. In this case, it is supported by statements from respondents that their breath feels fresh. This study is in line with Nila's research (2015) on "The Effect of Gargling with Siwak Extract Solution (*Salvadora persica*) on the pH of Oral Saliva" which shows the average pH of saliva before being given a solution of siwak extract is 6.56 and the pH of saliva after being given a solution of siwak extract is 7.4 with p value 0.000.

This research was supported by Putri (2014) on "The Benefits of Consuming a Mixed Solution of Honey and Cinnamon Powder for Reducing Halitosis Levels" from the statistical test results obtained changes in the level of halitosis were carried out before and after consuming a mixture of honey solution and cinnamon powder with a value of value

0.000 . According to Abdullah (2011), there are several benefits of siwak, namely making the mouth fragrant, strengthening gums, overcoming cavities, removing dyes and stains on teeth because they contain chlorine, whitening teeth because they contain silica, helping food digestion and removing phlegm. Likewise with cinnamon which has several benefits, namely as an antibacterial, making fresh breath, as an antioxidant, and anti-cancer.

CONCLUSION

There was a significant effect of siwak and cinnamon solution on decreasing the level of halitosis in prolanis participants with a value of 0.000. There was no difference in the comparison of the effectiveness of gargling with a solution of siwak and a solution of cinnamon powder on the decrease in the level of halitosis of respondents who were given a solution of siwak and a solution of cinnamon with p value of 0.146.

REFERENCES

- Allorerung, Desy L dkk. (2016). *Hubungan antara Umur, Jenis Kelamin, dan Tingkat Pendidikan dengan Kejadian Diabetes Melitus Tipe 2 di Puskesmas Ranotana Weru Kota Manado Tahun 2016*
- American diabetes Association (ADA).(2012). *Standar of medical care in diabetes*.
- American diabetes Association (ADA).(2015). *Standar of medical care in diabetes*.
- Atun, M. (2010). *Diabetes Melitus Memahami, Mencegah dan Merawat Penderita Penyakit Gula*. Bantul : Kreasi Wacana.
- Ariwansa, Dedy. (2015). *Efektifitas Ekstrak Kulit Kayu Manis (Cinnamomum Burmanii) Terhadap Penurunan Kadar Volatile Sulphur Compunds (Vscs) Pada Penderita Halitosis*.
- Chyntia Adha Purnama Sari, Mugi Hartoyo, & Wulandari M. (2016). *Perbedaan pH Saliva Sebelum dan Sesudah Berkumur dengan Larutan Siwak Pada Pasien Diabetes Melitus Di RSUD Dr. H Soewondo Kendal.Semarang : JIKK*.
- Dahlan, Sopiudin. (2015). *Statistik untuk Kedokteran dan Kesehatan*. Jakarta : Epidemiologi Indonesia.
- Dahlan, Sopiudin. (2016). *Besar sampel dalam penelitian kedokteran dan kesehatan*. Jakarta : Epidemiologi Indonesia.
- Gendruwati, Fitri. (2018). *Tanaman Ajaib*. Jakarta : Pustaka Makmur.
- Hasdianah. (2012). *Mengenal Diabetes Melitus Pada Orang Dewasa Dan Anak-Anak Dengan Herbal*. Jakarta : Nuha Medika.
- Internasional Diabetes federation (IDF) (2017). IDF Atlas eighth Edition, Internasional Diabetes federation 2017.*

Kasuma. (2015). *Pengaruh Berkumur dengan Larutan Ekstrak Siwak (Salvadora persica) Terhadap pH Saliva*. Sumatera : JSFK

Ismail, A Darout. (2014). *The Natural Toothbrush "Siwak" and The Oral Health*. Saudi Arabia : Int.J.LifeSc.Bt & Pharm.Res, Vol.3,No.3.

Laili, Choirum, Nisa & Triastuti, R. (2014). *Aktivitas Antibakteri Kulit Kayu Manis (Cinnamomum Burmanni) dengan cara Ekstraksi yang Berbeda terhadap Escherichia Coli dan Staphylococcus Aureus*. Surakarta. Universitas Muhammadiyah Surakarta.

Lubis, M. (2014). *Manifestasi Diabetes Melitus dalam rongga mulut*.

Merlyn, Sinaga, Hiswan, & Jemadi. (2011). *Karakteristik Penderita Diabetes Melitus dengan Komplikasi yang Dirawat Inap Di Rumah Sakit Vita Insani Pematangsiantar Tahun 2011*.

Muti'q bin Abdullah. (2011). *Sehat dengan Siwak*. Solo : Aqwamedika.

Ndaraha, S. (2014). *Diabetes Melitus Tipe 2 dan Tatalaksana Terkini*. Jakarta : FKU Krida Wacana.

Nila, Kusuma, Tiara, Adzakiyah, & Indrawati, Lipoeto. (2015). *Pengaruh Berkumur dengan Larutan Siwak (Salvadora persica) terhadap pH Saliva Rongga Mulut*. Sumatera Barat : Jurnal Sains Farmasi & Klinis, Vol, 1, No, 1.

Notoatmodjo, S. (2012). *Metodologi Penelitian Kesehatan*. Jakarta : Renika Cipta.

Noviano, B.R, Christi, Mambo, & Jane, Wuisan. (2016). *Uji efek antibakteri ekstrak kulit kayu manis (Cinnamomum Burmannii) terhadap Escherichia Coli dan Streptococcus Pyogenes*. Manado : Jurnal e-Biomedik (EBM), Vol, 4, No, 1.

Perkeni. (2011). *Konsensus Pengelolaan dan Pencegahan Diabetes Mellitus Tipe II di Indonesia*. PB Perkeni : Jakarta.

Perkeni. (2015). *Konsensus Pengelolaan dan Pencegahan Diabetes Mellitus Tipe II di Indonesia*. PB Perkeni : Jakarta.

Pintauli S, & Hamada T. (2008). *Menuju Gigi dan Mulut: Pencegahan dan pemeliharaan*. Medan : USU Press.

Putri. (2014). *Manfaat Mengonsumsi Campuran Larutan Madu dan Bubuk Kayu Manis Terhadap Penurunan Tingkat Halitosis*. Skripsi Fakultas Kedokteran Gigi Universitas Mahasaraswati Denpasar.

Ramadhan, A.G. (2010). *Serba-Serbi Kesehatan Gigi dan Mulut*. Jakarta : Bukune.

Riset Kesehatan Dasar (Riskesdas). (2018). *Badan Penelitian dan Pengembangan Kesehatan Kementerian RI tahun 2018*.

Ryadi dan Sukarmin. (2008). *Asuhan Keperawatan pada Pasien dengan Gangguan Eksokrin dan Endokrin pada Pankreas*.

Sabrina(2015). *Pemanfaatan Ekstrak Batang Siwak (Salvadora Persica) Sebagai Larutan Kumur dengan Penambahan Ekstrak Jeruk Nipis dan Stroberi*

Setiadi . (2010). *Konsep dan Penulisan Riset Keperawatan*, Graha Ilmu: Jakarta.

Smeltzer et al, (2008).*Buku Ajar Keperawatan Medikal-Bedah*. Jakarta : Buku Kedokteran.

Syam, Syamsiah dkk. (2018). *Perbedaan Berkumur Larutan Ekstrak Siwak (Salvadora Persica) Terhadap Sekresi Saliva Rongga Mulut Lanjut Usia Dengan Hipertensi (Ht), Diabetes Melitus (Dm) Dan Tidak Memiliki Penyakit Sistemik Di Panti Sosial Tresna Werdha Gau Mabaji Gowa Tahun 2017*

Sugiono.(2018). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung : ALFABETA

Sondang P, Hamada T. (2008). *Menuju Gigi dan Mulut Sehat*. Medan: USU Press.

Suyono. (2011). *Belajar dan pembelajaran teori dan konsep dasar* . Bandung : Rosdakarya.

Tandra H. (2013). *Life Healthy with Diabetes Mengapa dan Bagaimana*. Yogyakarta: CV Andi Offset

Tanto Chris,Frans Sonia, & Eka P. (2014). *Kapita Selektta Kedokteran Edisi IV*. Jakarta:FKUI.

Tarwoto, Wartonah, Taufiq, & Mulyati. (2012). *Keperawatan Medikal Bedah Gangguan Sistem Endokrin*. Jakarta : Trans Info Media.

Tobing Dkk. (2008). *Care your self diabetes mellitus* , Gramedia pustaka utama. Jakarta.

Wicaksono, (2011). *Situs Pengobatan Donke: Studi Etnomidisin pada Masyarakat Tenggalangi*.

Wijayakusuma. (2008). *Ramuan Herbal Lengkap Taklukan Penyakit*. Jakarta: Pustaka Bunda.

Yanuaris Widagdo & Kristina Suntya. (2015). *Volatile Sulfur Compounds sebagai Penyebab Halitosis*. Denpasar : FKG UNIV Mahasaraswati.

Zainatul, Mardiah (2017). *Pengaruh Spritual Care terhadap Kepatuhan Diet Penderita Diabetes Melitus Tipe 2 di Wilayah Kerja Puskesmas Karang Pule Tahun 2017*. Skripsi S1 Ilmu Keperawatan Stikes Yarsi Mataram.