

ORIGINAL ARTICLE

EXPLORATION OF CHEMICAL CONTENT AND ANTIBACTERIAL ACTIVITY OF SENDOK LEAVES (*Plantago Major*) USING AL-QUR'AN RECITATION THERAPY

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Abstract Treatment techniques using herbal remedies combined with Qur'anic verses are alternative treatment methods that have been practiced since the time of Prophet Muhammad. One of the medicinal plants used as a traditional herb is the sendok plant (*Plantago major*). Sendok leaves are known to have antibacterial properties that can be used to treat bacterial infections, especially amidst the challenges of bacterial resistance to synthetic antibiotics. The aim of this study is to explore the effect of spiritual methods on enhancing the therapeutic properties of Sendok leaves. After being treated with Qur'anic recitation, the leaves of the plant were analyzed for their chemical content, and bioactivity testing was carried out. The results showed a quantitative difference in the chemical compounds, as determined by GC-MS analysis. Antibacterial testing also revealed an increase in bioactivity, especially against *Staphylococcus aureus* bacteria, in the plants that received Qur'anic recitation treatment.

Keywords Qur'anic therapy · Sendok Leaf · Antibacterial · Chemical content · *Staphylococcus aureus*



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Introduction

The existence of plants in nature, which have many benefits, is a blessing and favor that Allah SWT gives to mankind (Masruri, 2016). The Qur'an is a guide to life, a source of guidance to the truth, and a great mercy for those who truly believe. Allah SWT also revealed the Qur'an as an antidote and cure for diseases, as stated in Surah Al-Isra, verse 82, which means: "And We revealed from the Qur'an a cure and mercy for those who believe, and the Qur'an does not add to the wrongdoers other than harm." The Qur'an is a cure for both physical and non-physical illnesses (Purworejo, 2019). The treatment of physical and non-physical illnesses was practiced during the time of Prophet Muhammad. The Prophet SAW treated sick people by reciting verses of the Qur'an, praying, blowing on both palms, and then massaging the entire body (Kirom, 2018). Surahs from the Qur'an are often used for therapeutic treatment of various diseases, known as ruqyah syar'iyah (Kurniyati et al., 2019). In ruqyah therapy, it can be combined with herbal medicine, called herbal ruqyah. Herbal ruqyah involves using medicinal plants that are combined with the recitation of Qur'anic verses before consumption (Hussein and Qhi, 2015).

Herbal plants are one of the traditional treatments that have long been used due to their therapeutic properties, which can treat various diseases (Li and Weng, 2017). Traditional medicine serves as an alternative treatment to cure diseases and is an effort to increase life expectancy (Sen and Chakraborty, 2017). The development of traditional medicinal plants derived from herbs has shown an increase because they possess good bioactivity to cure diseases with fewer side effects, are easily available, and are affordable (Fitriyah et al.,



2013; Pardede and Koketsu, 2017; Sanuddin et al., 2022). Herbal medicines are made from simplisia, which are dried whole plants or plants that have undergone basic processing (Obat & Makanan, 2010). Herbal plants, especially in tropical regions, are commonly used to treat diseases caused by infections (Sari et al., 2017).

Diseases caused by warm, humid, and dusty air are infectious diseases. These conditions allow bacteria to multiply, and unsanitary environments contribute to this by facilitating the spread of infectious diseases (Sari et al., 2017). Additionally, there have been many changes in the way people live today, including poor dietary choices and increased air pollution, which have led to a rise in various diseases (Kurniasih et al., 2019). Various infectious diseases can be treated using antibiotics, both from herbal plants as antibacterials and from synthetic antibiotics (Putri, 2019; Gunarti et al., 2020). However, some bacteria have developed resistance to synthetic antibiotics, making alternative treatments derived from herbal plants necessary (Sari et al., 2017).

Herbal plants with the potential to replace synthetic antibiotics include sendok leaves (*Plantago major*). Sendok leaves are considered weeds in plantations or wild plants found in forests, fields, and grassy yards, and are traditionally used as a remedy for diarrhea (Lau and Sunarti, 2018). The secondary metabolite compounds found in sendok leaves, such as flavonoids, tannins, and alkaloids, have the potential to address diarrhea, dysentery, and infections caused by various bacteria (Sinaga, 2019). In addition to the potential therapeutic effects of these secondary metabolites, the recitation of the Qur'an over herbal plants may also play a role in helping to cure diseases.

Investigating the chemical composition of herbal plants in combination with Qur'anic therapy is crucial, as there is currently no existing literature that explores this topic. Therefore, this study will explore the potential influence of reciting Qur'anic verses on the chemical composition and antibacterial activity of sendok leaves (*Plantago major*), with a focus on controlling variables such as soil similarity, uniform watering duration, and sendok plants sourced from adjacent soils, while excluding other environmental factors.

Materials and Methods

The materials used in this study include sendok leaves, *Escherichia coli* and *Staphylococcus aureus* bacteria, DMSO, 70% alcohol, dextrose, filter paper, disc paper, aluminum foil, plastic wrap, distilled water, TLC merck, methanol technical, n-hexane technical, and Ethyl acetate technical.

Preparasi sampel

The research method begins with the preparation of plant samples. Soil was collected from the same location, then mixed with compost to create an even soil mixture. This soil mixture was then placed into 50 cm x 50 cm polybags that had been prepared in advance. Sendok plants were taken from the same clump, divided, and planted into two polybags for two treatments. Before receiving treatment, the sendok plants were watered and allowed to grow in the polybags. Once it was confirmed that both sendok plants were healthy and thriving in the polybags, the therapeutic treatment could be applied. For the Qur'anic recitation treatment, the sendok plants were placed in a location with adequate sunlight. Qur'anic verses were recited in front of the plants twice daily, for 20 days, in the morning and evening. The recitation started from Juz 1 and continued to Juz 30, carried out by 20 students under the guidance of Dr. Muyassaroh Al Hafizhoh, the Rector of Al Ittifaqiah Al-Quran Islamic Institute.

Extraction and Chemical Component Testing

Sendok leaves that have undergone two treatments are each taken and finely chopped. A total of 10 grams of sendok leaf powder is then extracted through maceration using methanol as the solvent until the sample is fully submerged. The maceration process is carried out for 2 x 24 hours to ensure complete extraction. The resulting methanol extract is filtered, placed into a glass bottle, and then observed for physical differences, including pH and extract color, between the two treatments. After the observations, the extract is evaporated using a rotary evaporator to obtain a concentrated form (Sari et al., 2017).

The chemical compound identification test on sendok leaf extract was performed using Thin Layer Chromatography (TLC) with methanol as the solvent, applied to a plate using a capillary tube. The eluent for the TLC test was a combination of n-hexane and ethyl acetate solvents, with a gradient of increasing polarity. The second test involved phytochemical screening, which included tests for alkaloids, flavonoids, saponins, terpenoids, steroids, and tannins (Paerdede et al., 2013). Finally, the sendok leaf extract was analyzed for chemical content using Fourier Transform Infrared (FTIR) spectroscopy and Gas Chromatography-Mass Spectrometry (GC-MS).

Antibacterial Test

Antibacterial testing begins with the preparation of media, specifically Nutrient Agar (NA) media, using the method described by Utomo et al. (2018). Next, bacterial suspensions are prepared by diluting *Escherichia coli* and *Staphylococcus aureus* cultures that have been incubated for 24 hours. The suspension is homogenized until the color becomes cloudy. Then, 100 µl of the suspension is taken using a micropipette and transferred into a Petri dish containing NA media. The suspension is evenly spread across the media by performing a zigzag inoculation with an inoculating needle, followed by further distribution using a cotton swab (Ningsih et al., 2017).

Antibacterial testing was performed using the Kirby-Bauer method, also known as the paper disc diffusion method. Sterile paper discs were impregnated with each sendok leaf extract and then allowed to drain. The drained discs were carefully placed onto Nutrient Agar (NA) media inoculated with *Escherichia coli* and *Staphylococcus aureus* bacteria, using sterile tweezers and gently pressing the discs into the media. Each bacterial activity test sample was then incubated at 37°C for 24 hours. This experiment was repeated three times. In this study, two controls were used for comparison: a positive control (tetracycline) and a negative control (DMSO). After the bacterial culture was

treated and incubated at 37°C for 24 hours, the inhibition zones were measured and documented using a caliper.

Results and Discussion

The process of reciting Qur'anic verses has been carried out by the students of Pondok Pesantren Al Ittifaqiah as an effort to find an increase in the efficacy of herbal medicines. Allah SWT has created the universe and its contents and with all His perfection and has created various kinds of plants as a sign of His power (Faradisa and Fakhruddin, 2021). Humans have an effort to continue to look for sources of healing from various diseases. Allah has revealed the Qur'an which has many virtues, one of which is as a medicine. This research, among others, is an effort to refer to the verse of the Quran that contains the word shifa which in language can mean medicine. The media used in this research are medicinal plants. Some plants have been used as alternative medicine as one of the options in an effort to cure the disease. In fact, sometimes there are diseases that cannot be cured with medical help but one day can be cured with alternative medicine.

In the Qur'an, qauliyah (words) and kauniyah (nature) are explained. In the context of Surah Al-Isra' (17): 82 Allah mentions two verses that have a direct relationship with the way qauliyah and kauniyah the first Allah explains about the benefits of kauniyah verses that have properties or benefits as an antidote to other substances that are negative and substances that are not in accordance with the needs of the body. In this context, medicinal plants that exist in the universe are also called shifa or antidote, which means that the task of the plant or its content serves to neutralize certain conditions that cause imbalances that have an impact on organ disease. This is important because in principle God created his creatures in a fitrah condition which means perfect, stable, complete, balanced and effortless both in terms of structure and function.

On the other hand, Allah also creates, sends down and presents certain things or substances from plants, animals and other organisms that are

useful for maintaining, strengthening and supplying energy, calories, nutrients and others. In order to create stability, peace and comfort in activities so as to avoid vulnerability, injustice and injustice which often cause regret later on. The above verse also explains the importance of providing treatment, service, maintenance of God's creation that we see as something positive, beneficial and has a good impact on the lives of creatures, especially humans. This perspective can then give good treatment to God's creation that we see so that it is very useful in life, one way that we can do is to provide nutrition and suggestions to him, for example by watering plants, cleaning from all diseases and weeds, and providing spiritual nutrition by chanting the holy verses of the Qur'an, praise and conveying hope to him. These treatments can be done to animals or plants and even inanimate objects. This is because in principle, all of God's creations have souls and are able to capture messages from the surrounding environment and many verses of the Qur'an explain about all of God's creations in the heavens and earth from all of their content always praising God.

Plant Extraction Results

The plants that were recited Qur'anic verses were photographed, and their leaves were collected for chemical testing. The leaves from both treatments were harvested while still green and fresh to ensure optimal results. These harvested leaves were then prepared for extraction testing, as shown in Figure 1.



Figure 1 Sendok leaves ready for chemical testing (N (Normal) and R (Ruqyah or recitation of al-qur'an verses))

The extraction method used in this study is the maceration method, as it involves soaking the sample, which breaks the cell wall and cell membrane due to the pressure difference between the inside and outside of the cell. The rupture of the cell membrane allows secondary metabolites to dissolve in the organic solvent, resulting in the extraction of these metabolites. The advantage of this method is that it prevents the degradation of active compounds due to excessive heating. The maceration of sendok leaves yielded a concentrated green extract, indicating the binding of compounds from the leaves. Subsequently, the extract was evaporated to obtain a thick green concentrate.

Chemical Component Test Results

The first test conducted was Thin Layer Chromatography (TLC). TLC is used to qualitatively determine the compound content in sendok leaves. The principle of the TLC test is to separate chemical components based on their absorbance and partition, which are determined by the stationary phase (adsorbent) and mobile phase (eluent). The stationary phase used is a silica gel GF254 TLC plate, which is polar, while the mobile phase consists of a combination of solvents with varying polarity. In this study, the solvent combination used is n-hexane and ethyl acetate in a 6:4 ratio, which ensures good separation of the stain patterns. A good stain pattern is one that effectively separates compounds with different levels of polarity.

The results of the TLC test in this study showed identical R_f values and similar colors on the spots on the TLC plate. This indicates that the compound content in the sendok leaves treated normally and those treated with the recitation of Qur'anic verses is comparable. In other words, the compounds present in sendok leaves, whether subjected to normal treatment or Qur'anic recitation treatment, are the same. The spots on the TLC plate were identified under UV light at wavelengths of 365 nm and 254 nm, as shown in figure 2 and the R_f results on the TLC test are shown in Table 1.

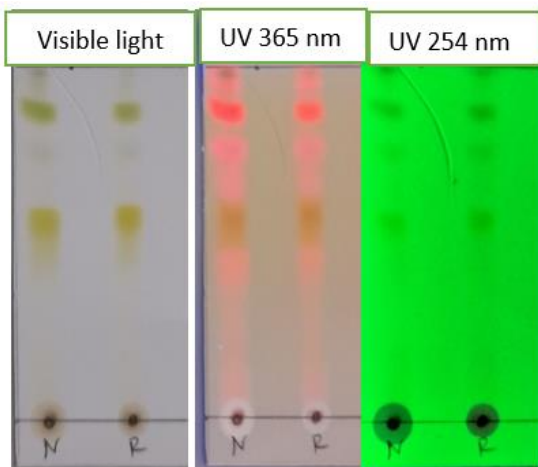


Figure 2 TLC Spot profile at 365 nm UV light (left) and TLC spot profile at 254 nm UV light (right).

Table 1. Rf values in the Sendok Leaf TLC test

No	Rf value 365 nm		Rf value 254 nm	
	Sendok N	Sendok R	Sendok N	Sendok R
1	0,62	0,62	0,62	0,62
2	0,7	0,7	-	-
3	0,72	0,72	0,72	0,72
4	0,76	0,76	0,76	0,76
5	0,82	0,82	0,82	0,82

Description: N (Normal) and R (Ruqyah or recitation of al-qur'an verses)

Qualitative tests were conducted to determine the compound content in sendok leaves using Thin Layer Chromatography (TLC). More polar compounds are strongly retained on the stationary phase because the stationary phase is polar, resulting in a low Rf value. Small Rf values in both polar and non-polar eluents indicate that the compounds in the stain are more strongly absorbed by the silica gel, causing the stain to appear at the bottom. This suggests that the stain has greater polarity due to the hydrogen bond between the compound and the silica gel (Forestryana and Arnida, 2020). The TLC test results show that the compounds in the ethanol extract of sendok leaves consist of both semi-polar and polar compounds. This is evident from the Rf values on the TLC plate, where many high Rf values above 0.5 were observed using a solvent combination of n-hexane and ethyl acetate in a 6:4 ratio.

The next test is the phytochemical test as a preliminary stage which aims to provide an

overview of the class of compounds contained in the sample under study. The study was conducted by looking at the reaction of color testing with the selection of solvents and extraction methods such as sendok plants in this study. In this study used 96% methanol solvent can attract secondary metabolites such as tannins, polyphenols, polyacetylene, flavonols, terpenoids, steroids, alkaloids and saponins. The results of phytochemical testing of sendok leaves can be seen in Table 2.

Table 2. Phytochemical Test Results of Sendok Leaf Extract

Test Type	Test Result of Normal Treatment Extract	Test Result of Extract Treatment of Recitation of the Qur'an	Positive Test Result Changes
Flavonoid	(+)	(+)	Yellow in Color
Alkaloid	(-)	(-)	Yellow color and white precipitate formed
Tanin	(+)	(+)	Blackish Green
Steroid/Terpenoid	(+)	(+)	Purple in color
Saponin	(-)	(-)	Foam Forms

The next test was conducted using an FT-IR spectroscopy instrument. FT-IR testing is a fast, simple, and non-destructive analysis technique that provides information on all chemical properties present in the sample. Based on the FT-IR test results shown in Figure 3, it can be observed that the FT-IR spectra for normal sendok leaves exhibit the presence of O-H group stretching vibrations at a wave number of 3347.20 cm^{-1} , C-H groups at wave numbers 2922.35 cm^{-1} and 1361.15 cm^{-1} , C=C groups at a wave number of 1600.38 cm^{-1} , and C-O groups at a wave number of 1035.30 cm^{-1} . The FT-IR spectra for sendok leaves that were recited Qur'anic verses (Figure 3) also showed absorption in the same regions: O-H groups at a wave number of 3343.07 cm^{-1} , C-H groups at wave numbers 2920.29 cm^{-1} and 1375.59 cm^{-1} , C=C groups at a wave number of 1600.26 cm^{-1} , and C-O groups at a wave number of 1031.17 cm^{-1} .

¹. The spectrum analysis results for both samples are shown in Figure 3.

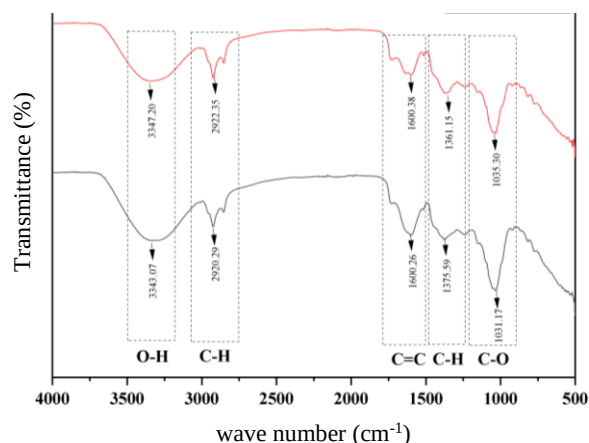


Figure 3 FTIR Spectrum Results of Normal Sendok Leaves (red) and Sendok Leaves read with Quranic Verses (black).

The results of this FTIR test state that the characteristics of the functional groups that appear between normal Sendok leaves and sendok leaves that recite Qur'anic verses have no difference. The results of the quantitative test of sendok leaf extract can be done using the Gas Chromatography-Mass Spectrometry (GC-MS) instrument can be seen in Figure 4. In GC, there is a process of separating the mixture of compounds into single compounds which then enter MS to detect the type of compound based on the fragmentation pattern (Fadillah et al., 2020).

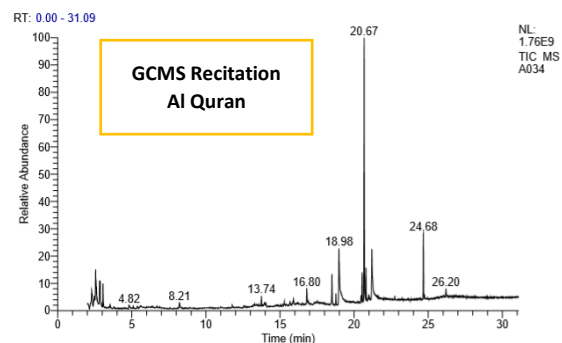
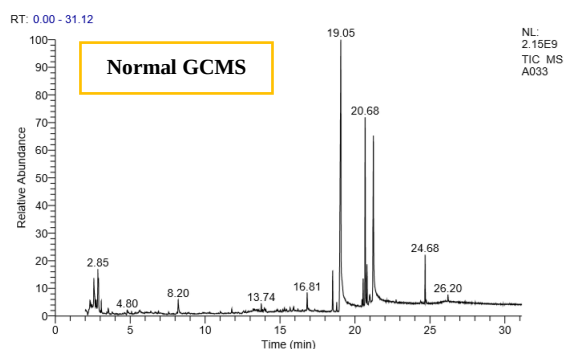


Figure 4. GCMS Measurement Results of Sendok Leaf Extract

Based on the GC-MS results of the two treatments above, it shows that the methanol extract of normal sendok leaf and recited verses of the Qur'an each have the same 5 chemical compounds but have different concentrations. The process of separating compounds in the column occurs where non-polar compounds will be retained longer in the column with a longer retention time compared to polar compounds.

The potential metabolite compounds found in sendok leaf extract are 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6methyl compounds ($C_6H_8O_4$ with RT 8.20), methyl ester ($C_{17}H_{34}O_2$ with RT 18.50), n-Hexadecanoic acid ($C_{16}H_{32}O_2$ with RT 19.05), Phytol ($C_{20}H_{40}O$ with RT 20.68), Octadecanoic acid (Formula $C_{18}H_{36}O_2$ with Retention Time (RT) 21.22). A summary of the composition of compounds in the sendok leaves of both treatments can be seen in Table 3.

Table 3. Overall summary of GC-MS analysis results of secondary metabolite compounds of normal sendok leaf extract and sendok leaf extract after reciting verses from the Qur'an

RT	Compound N	Compound R	%Area N	%Area R
8,20	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl (C ₆ H ₈ O ₄)	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl (C ₆ H ₈ O ₄)	1,86	1,48
18,51	Hexadecanoic acid, methyl ester (C ₁₇ H ₃₄ O ₂)	Hexadecanoic acid/ methyl ester (C ₁₇ H ₃₄ O ₂)	2,75	3,55
19,05	n-Hexadecanoic acid (C ₁₆ H ₃₂ O ₂)	n-Hexadecanoic acid (C ₁₆ H ₃₂ O ₂)	40,44	15,91
20,68	Phytol (C ₂₀ H ₄₀ O)	Phytol (C ₂₀ H ₄₀ O)	11,41	25,24
21,22	Octadecanoic acid (Formula C ₁₈ H ₃₆ O ₂)	Octadecanoic acid (Formula C ₁₈ H ₃₆ O ₂)	17,64	11,64

In this quantitative test, it can be seen that the sendok leaves treated normally and the sendok leaves treated with the reading of the Quran have the same type of chemical compounds. This is also supported by qualitative tests of phytochemical tests, TLC and FTIR. However, there is a difference in the composition of the compounds given normal treatment and the treatment of reading the Quran. There are several compounds that have a significant decrease in composition in the treatment of reading the Quran and there are also those that experience a significant increase in composition. Several compounds that experience a significant decrease in composition from normal treatment are chemical compounds at RT 21.22 and RT 19.05 which are n-hexadecanoic acid and Octadecanoic acid compounds. If analyzed, the content of compounds that experience a decrease in composition when the verses of the Qur'an are read is a group of fatty acid compounds. Where the compounds that are fatty acids are in the category of unsaturated fatty acids. Hexadecanoic acid, better known as palmitic acid, while octadecanoic acid is better known as stearic acid. Both are saturated fatty acids that are naturally found in various natural materials such as plants and animals. In normal amounts, fatty acids have good functions for the body. However, in high amounts, excessive consumption of saturated fatty acids such as palmitic acid can increase LDL cholesterol levels (bad cholesterol) in the blood. High LDL cholesterol can cause plaque buildup on artery walls, which increases the risk of heart disease and stroke. Consumption of foods high in saturated fats, including palmitic acid, is associated with an increased risk of obesity.

Obesity itself is a risk factor for a variety of chronic diseases, including cardiovascular disease, diabetes, and some cancers. In addition, the accumulation of high-saturated fat foods, including stearic acid, can contribute to the accumulation of body fat and obesity when consumed in large amounts. Obesity is a risk factor for a variety of diseases, including heart disease and metabolic disorders.

Another compound which, on the other hand, experienced a significant increase in composition was the Phytol compound (C₂₀H₄₀O with RT 20,68). Phytol is a diterpene alcohol that is an essential component of chlorophyll, the pigment found in green plants. Phytol has a variety of benefits that have been identified in scientific studies, but it can also have some negative effects depending on the dose and context in which it is used. Phytol has powerful antioxidant properties, which help fight free radicals in the body. Excess free radicals can damage cells and tissues, contributing to aging and a variety of chronic diseases such as cancer and heart disease. Phytol also has anti-inflammatory effects that can help reduce inflammation. This is beneficial for a variety of inflammatory conditions, such as arthritis and autoimmune disorders. Additionally, Phytol has been shown to have antimicrobial activity against a variety of pathogenic bacteria and fungi. These properties make it a candidate for drug development or as an additive in health products to fight infections.

The increase and decrease in the composition of chemical compounds that occur in

the sendok leaf plant that undergoes the treatment of reading the Qur'an can be temporarily concluded that the composition of the leaves of the plant that is read the Qur'an is a composition that has many benefits for the body and decreases the composition of compounds that have bad effects on the body. As we see that, the composition that increases is the chemical compound that has more benefits in treatment, while the composition that decreases is the composition that causes bad effects on health, especially fatty acid compounds.

Antibacterial Test Results

The results of the antibacterial activity test of sendok leaf extract using the Kirby-Bauer method against the growth of *Escherichia coli* and *Staphylococcus aureus* bacteria. The results of the antibacterial test can be seen from the inhibition value of the sendok leaf extract against the test bacteria and can be seen in Table 4.

Table 4. Antibacterial test inhibition results

symbol	Inhibition zone diameter (mm)		Control (+)
	<i>S. aureus</i>	<i>E. coli</i>	
N1	4,9	8,5	20,5
N2	5,0	7,8	21,9
N3	4,9	5,3	20,1
Average	4,9	7,2	20,8
R1	10,9	8,2	18,9
R2	10,6	8,5	19
R3	7,9	7,2	21,4
Average	9,8	8,0	19,8

According to Riska and Puguh (2014) if the inhibition zone formed is less than ≤ 5 mm then the inhibition zone response is categorized as weak. If the inhibition zone formed is 6-10 mm, then the inhibition zone response falls into the moderate category, while 11-20 mm falls into the strong category, and ≥ 20 mm falls into the very strong category.

The antibacterial activity of sendok leaf extract can be attributed to the presence of secondary metabolite compounds with antibacterial properties. The metabolites with potential antibacterial effects in sendok leaf extract are identified from the chemical compounds detected in the GC-MS analysis, particularly the phytol content. The GC-MS

results revealed that the phytol compound content in sendok leaves increased in the treatment group that received recitation of Qur'anic verses. This increase in phytol content supports the observed enhancement in antibacterial bioactivity, which also showed a significant increase in the treatment group exposed to the Qur'anic recitation.

The results of the inhibition zone measurements in table 4 show that the administration of sendok leaf extract has an inhibition zone response that is in the moderate category against the growth of *E. coli*, while the growth of the inhibition zone on the growth of *S. aureus* bacteria shows a weak category for normal treatment and the treatment of reciting verses of the Quran shows a moderate category towards strong. Judging from the inhibition power, the two treatments have values that are not much different in testing using *E. coli* bacteria and are in the moderate category. While the treatment of reciting verses of the Quran experienced a significant difference in testing using *S. aureus* bacteria. The inhibition test showed that the antibacterial properties of the treatment of reciting verses of the Quran increased significantly compared to the normal treatment. This indicates that the treatment of reciting the Quran on sendok leaf plants provides an increase in antibacterial activity, especially for *Staphylococcus aureus* bacteria.

Conclusion

Chemical component testing on sendok leaves (*Plantago major*) planted under normal conditions and those treated with recited verses of the Qur'an revealed that both groups contained the same chemical compounds. However, quantitative differences were observed in the levels of these compounds. The study found that the antibacterial activity of sendok leaves (*Plantago major*) against *Staphylococcus aureus* bacteria was higher in the group treated with recited Qur'anic verses compared to the group with normal treatment.

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Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

References

- Faradisa, E., & Fakhrudin, A. (2021). Beberapa Tumbuhan Obat Di Dalam Al-Quran Ditinjau Dari Perspektif Sains. *Nusantara*, 3(1), 1–19.
- Fitriyah, N., Alfiyanto, M. A., Mulyadi, M., Wahyuningsih, N., Kismanto, J., & Others. (2013). Obat Herbal Antibakteri Ala Tanaman Binahong. *Jurnal Kesehatan Kusuma Husada*.
- Forestryana, D., & Arnida, A. (2020). Skrining Fitokimia Dan Analisis Kromatografi Lapis Tipis Ekstrak Etanol Daun Jeruju (*Hydrolea Spinosa L.*). *Jurnal Ilmiah Farmako Bahari*, 11(2), 113–124.
- Gunarti, R., Putri Luhurningtyas, F., & Retno Karminingtyas, S. (2020). *Kajian Aktivitas Dari Farmakologi Tumbuhan Pepaya (Carica Papaya L) Sebagai Obat Herbal Antibakteri*. Universitas Ngudi Waluyo.
- Hussein, M. A., & Qhi, M. (2015). *Pengobatan Ruqyah Dengan Terapi Kayu Manis*. Adamssein Media.
- Kirom, N. (2018). *Praktik Penanganan Pengobatan Tradisional Kh Amiruddin Mu'in (Studi Analisis Dari Sisi Mistis)*. Skripsi. Surabaya: Universitas Islam Negeri Sunan Ampel Surabaya.
- Kurniasih, E., & Others. (2019). Sosialisasi Bahaya Radikal Bebas Dan Fungsi Antioksidan Alami Bagi Kesehatan. *Jurnal Vokasi*, 3(1), 1–7.
- Kurniyati, M. I., & Others. (2019). *Penggunaan Ayat Al-Qur'an Sebagai Media Pengobatan Penyakit Jasmani (Studi Living Qur'an Pada Praktik Pengobatan Di Yayasan Cikajayaan, Desa Sidamulya Wanareja Cilacap Jawa Tengah)*. Iain.
- Lau, S. H. A., & Sunarti, S. (2018). Studi Tingkat Pengetahuan Penggunaan Daun Sendok (*Plantago Mayor L.*) Sebagai Obat Diare Di Desa Salukanan Kecamatan Baraka Kabupaten Enrekang. *Jurnal Farmasi Sandi Karsa*, 4(6), 23–30.
- Li, F.-S., & Weng, J.-K. (2017). Demystifying Traditional Herbal Medicine with Modern Approach. *Nature Plants*, 3(8), 1–7.
- Masruri, U. N. (2016). Pelestarian Lingkungan Dalam Perspektif Sunnah. *At-Taqqaddum*, 6(2), 411–428.
- Obat, B. P., & Makanan, R. I. (2010). Acuan Sediaan Herbal. *Volume Kelima Edisi Pertama*. Direktorat Obat Asli Indonesia.
- Pardede, A., & Koketsu, M. (2017). Antioxidant and antileukemic activity of chemical components from bark of *Mangifera casturi*. *Comparative Clinical Pathology*, 26, 499–504.
- Pardede, A., Manjang, Y., & Efdi, M. (2013). Skrining fitokimia ekstrak metanol dari kulit batang manggis (*Garcinia cymosa*). *Media Sains*, 6(2), 60–66.
- Purworejo, D. (2019). *Al-Qur'an Sebagai Sarana Pengobatan Alternatif (Studi Living Qur'an Di Pondok Pesantren at Tin)*.
- Putri, F. R. (2019). Integrasi Ilmu Pengetahuan (Sains) Dan Agama Islam. *Wahana Akademika: Jurnal Studi Islam Dan Sosial*, 6(1).
- Sanuddin, M., Andriani, M., Sibuea, L. D., & Salsabila, N. A. (2022). Pemanfaatan Kunyit Sebagai Antioksidan Di Rt O4 Kelurahan Pasir Putih Kecamatan Jambi Selatan Kota Jambi. *Martabe: Jurnal Pengabdian Kepada Masyarakat*, 5(4), 1291–1296.

- Sari, R., Muhani, M., & Fajriaty, I. (2017). Uji Aktivitas Antibakteri Ekstrak Etanol Daun Gaharu (*Aquilaria microcarpa* Baill.) Terhadap Bakteri *Staphylococcus aureus* Dan *Proteus Mirabilis*. *Pharmaceutical Sciences and Research*, 4(3), 4.
- Sen, S., & Chakraborty, R. (2017). Revival, Modernization, and Integration of Indian Traditional Herbal Medicine in Clinical Practice: Importance, Challenges and Future. *Journal Of Traditional and Complementary Medicine*, 7(2), 234–244.
- Sinaga, S. U. L. I. M. (2019). Uji Efek Antibakteri Ekstrak Etanol Daun Sendok (*Plantago Major L*) Terhadap Pertumbuhan Bakteri *Escherichia coli*.