TOTAL TANNIN TOTAL SAPONIN AND TOTAL ALKALOID CONTENTS OF DRIED SEEDS OF SOYA BEANS *(Glycine max)* AND SESAME SEEDS *(Sesamum indicum).*

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CERTIFICATION

This is to certify that this project work was carried out by KOLAWOLE PRAISE ORINAME with matriculation number BMS201424, of the Department of Medical Biochemistry, School of Basic Medical Sciences, University of Benin, Benin City, in partial fulfillment of the requirements for the award of Bachelor of Sciences (B.Sc) degree in Medical Biochemistry.

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DEDICATION

This work is dedicated firstly to God Almighty for the strength and wisdom to carry out this work.

This project is lovingly dedicated to my beloved parents, Mr and Mrs Kolawole, whose unconditional love, prayers and sacrifices have been the foundation of everything. Your unwavering support and patience continue to inspire me.

To my amazing guardians, Mr and Mrs.Stephen, I appreciate all the prayers, discipline and profound upbringing you've instilled in me. You've been a solid rock for me all through this journey.

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This work is not just a reflection of my efforts but also of the love and strength you all have poured into me. From the depths of my heart, I dedicate this project to you my family, my pride and forever my source of inspiration.

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TABLE OF CONTENTS

ABSTRACT

The study examined the total tannin total saponin and total alkaloid contents of dried seeds of soya beans *(glycine max)* and sesame seeds *(sesamum indicum).*

Exactly 1.0 g of the powdered soybean and sesame seed samples was weighed separately and dissolved in 50 mL of cool, boiled distilled water in a 100 mL beaker. The contents were transferred into a 100 mL standard flask, and the beaker was rinsed three times with about 10 mL of the same distilled water to ensure complete transfer. The volume of the flask was then made up to the 100 mL mark with distilled water. The flask was corked, inverted four times for proper mixing, and allowed to stand. The final extract solution had a concentration of approximately 10,000 µg/mL (stock), and was used for subsequent phytochemical screening and quantitative analyses.

Qualitative phytochemical screening was carried out to identify the presence of bioactive compounds such as tannins, saponins, and alkaloids, using the standard procedures described by Tiwari et al. (2001) with minor modifications.A 2.0 mL portion of each extract was evaporated to dryness, and the residue was dissolved in 5 mL of 2 mol/dm^3 hydrochloric acid (HCl). The solution was filtered, and the filtrate was divided equally into two test tubes. To the first test tube, a few drops of Mayer's reagent were added, while the second received Wagner's reagent. The appearance of a yellowish precipitate in the first tube and a reddish-brown precipitate in the second tube confirmed the presence of alkaloids.sThe study evaluated the total tannin, saponin, and alkaloid contents of dried seeds of Glycine max (soybean) and Sesamum indicum (sesame). Thus, this study provided a scientific basis supporting the nutritional and medicinal importance of soybean and sesame seeds. Their phytochemical richness underscores their usefulness in developing nutraceuticals and plant-based formulations for disease prevention and health promotion.Based on the findings of this research, the following recommendations are made: increased utilization of sesame seeds, encouragement of soybean consumption further research, pharmaceutical and industrial exploration,government and institutional support.

CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

Plants play a fundamental role in sustaining human life by serving as sources of food, shelter, medicine, and raw materials for industrial use. Over the years, scientific interest has expanded from the nutritional value of plants to the bioactive compounds they contain commonly referred to as phytochemicals. These phytochemicals are non-nutritive substances that possess significant physiological effects, often contributing to the health-promoting, antioxidant, antimicrobial, and anti-inflammatory properties of plant-based foods (Harborne 1998; Trease and Evans 2002).

Among the broad range of phytochemicals found in plants, tannins, saponins, and alkaloids have received notable attention. These compounds are known for their wide biological and pharmacological activities. Tannins are polyphenolic compounds with the ability to bind and precipitate proteins, alkaloids are nitrogen-containing organic bases with strong physiological actions, while saponins are glycosides characterized by their foaming properties and diverse medicinal effects (Edeoga et al., 2005; Singh et al., 2018). Their combined presence in edible seeds contributes not only to nutritional quality but also to potential therapeutic effects.

Legumes and oilseeds such as soybean (Glycine max) and sesame (Sesamum indicum) are important dietary components rich in these phytochemicals. Soybean is well known for its high protein and oil content, providing essential amino acids and unsaturated fatty acids that support growth and health (Afolabi, 2020). Beyond its nutritional benefits, soybean also contains tannins, saponins, alkaloids, flavonoids, and phenolic acids that serve as antioxidants and metabolic regulators (Mbah and Eme, 2017). Sesame, on the other hand, is one of the oldest cultivated oilseed crops, highly valued for its flavor, stability, and health-promoting lignans such as sesamin and sesamol (Adeola and Oseni, 2020). Like soybean, sesame also contains substantial levels of phytochemicals that enhance its biological and medicinal significance (Obasi et al.,2010).

The importance of tannins in plant-based foods lies in their dual role. At moderate levels, tannins exhibit antioxidant, antimicrobial, and anticarcinogenic properties, contributing to disease prevention and overall well-being (Bhat et al.,2014). However, in excessive amounts, tannins may act as anti-nutritional factors by binding to dietary proteins, minerals, and digestive enzymes, thereby reducing nutrient bioavailability (Osagie and Eka 1998). Similarly, saponins and alkaloids, though beneficial at low concentrations, can also exhibit toxicity at high doses. This delicate balance between benefit and toxicity underscores the need for quantitative determination of these compounds in commonly consumed food sources such as soybean and sesame.

The increasing global shift toward plant-based nutrition and functional foods has heightened the demand for scientific evaluation of plant phytochemicals (Ali et al.,2021). Understanding the tannin, saponin, and alkaloid composition of soybean and sesame seeds is therefore crucial in assessing their nutritional quality, safety, and potential for industrial and pharmaceutical use. Several studies have compared the proximate and mineral composition of these seeds, but fewer have focused specifically on their total phytochemical contents, especially in dried seed samples. Drying is known to influence the concentration of bioactive compounds due to moisture loss and enzymatic inactivation, which may increase extractable phytochemicals (Oladipo and Adeyeye, 2019).

In this study, dried seed samples of soybean and sesame were analyzed for their total tannin, total saponin, and total alkaloid contents. The results showed that sesame contained higher levels of these compounds — tannin (20.926 mg/100 g), saponin (20.611 mg/100 g), and alkaloid (8.400 mg/100 g) — compared to soybean with tannin (17.583 mg/100 g), saponin (18.291 mg/100 g), and alkaloid (6.500 mg/100 g). These findings suggest that sesame possesses a richer phytochemical profile, which may contribute to its superior antioxidant and medicinal properties compared to soybean (Olowokere et al.,2021).

Therefore, this research provides scientific data on the comparative levels of tannins, saponins, and alkaloids in these two nutritionally important oilseeds. The findings are expected to guide nutritionists, food technologists, and researchers in optimizing their use for both dietary and industrial purposes.

1.1 JUSTIFICATION OF THE STUDY

Although both soybean and sesame are widely consumed and commercially cultivated in Nigeria, limited attention has been given to the comparative evaluation of their bioactive phytochemical constituents. Given the increasing health awareness and reliance on plant-based diets, understanding their phytochemical composition is necessary for maximizing health benefits and minimizing anti-nutritional effects (Rajeswari and Rao 2011).

Determining and comparing the total tannin, saponin, and alkaloid contents of soybean and sesame will provide valuable insight into their functional food potential, support evidence-based dietary recommendations, and serve as a foundation for further pharmacological and nutritional research.

Aim:

To determine the total tannin, total saponin, and total alkaloid contents of dried seeds of soybean *(Glycine max)* and sesame *(Sesamum indicum)*.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview of Phytochemicals

Phytochemicals are naturally occurring chemical compounds in plants that contribute to their color, flavor, and resistance to diseases. Unlike macronutrients such as carbohydrates, proteins, and fats, phytochemicals are non-nutritive compounds that provide important health-promoting and protective functions (Harborne, 1998). They are broadly classified as primary metabolites (involved directly in growth and metabolism) and secondary metabolites, which include tannins, saponins, alkaloids, flavonoids, and terpenoids (Trease and Evans, 2002).

Secondary metabolites, though not essential for plant survival, play critical roles in plant defense, pollinator attraction, and protection against microbial invasion (Edeoga et al., 2005). In human nutrition, these compounds contribute to antioxidant, anti-inflammatory, and antimicrobial activities, enhancing disease prevention and promoting wellness (Okwu and Emenike, 2006).

The content of these compounds in plants varies with species, maturity, soil condition, and processing methods. Factors such as temperature, drying, and storage influence the chemical stability of these phytochemicals, often determining their bioavailability and effectiveness in food and medicine (Akindahunsi and Salawu, 2005).

2.2 Tannins: Nature, Occurrence, and Significance

Tannins are polyphenolic compounds capable of binding and precipitating proteins, alkaloids, and minerals (Sofowora, 1993). They are generally divided into hydrolysable tannins (esters of gallic acid or ellagic acid) and condensed tannins (flavonoid polymers) (Haslam, 1996). These compounds are widely distributed in the plant kingdom, especially in leaves, barks, fruits, and seeds.

Tannins play an important ecological role by protecting plants from predation and microbial attack. In human nutrition, they exhibit antioxidant, antimutagenic, and antimicrobial properties that contribute to disease prevention (Bhat et al., 2014). For instance, tannins act as free radical scavengers, preventing oxidative damage to cellular components (Adebayo et al., 2011).

However, their anti-nutritional effects cannot be ignored. In high concentrations, tannins form complexes with dietary proteins and digestive enzymes, reducing nutrient absorption and food palatability (Osagie and Eka, 1998). This makes it essential to quantify their levels in edible seeds to ensure they remain within acceptable nutritional limits.

In oilseeds such as soybean and sesame, tannins are found in moderate quantities, contributing to flavor and antioxidant quality. Comparative studies have reported that sesame often contains slightly higher tannin levels than soybean, possibly due to varietal differences and higher phenolic composition (Olowokere et al., 2021).

2.3 Saponins: Structure, Functions, and Applications

Saponins are amphipathic glycosides consisting of a sugar moiety linked to a triterpenoid or steroid aglycone (Okwu, 2004). They are named for their ability to produce stable foam in aqueous solutions — a property that has made them useful in soap, cosmetic, and pharmaceutical formulations.

In plants, saponins function as natural defense compounds against insects, fungi, and pathogens. In humans, they display numerous biological activities, including cholesterol reduction, immune stimulation, anti-cancer, and anti-inflammatory effects (Sparg et al., 2004; Edeoga et al., 2005).

In food science, saponins have been recognized for their bitter taste and emulsifying properties, which influence the flavor and texture of certain foods. Despite their health benefits, saponins can also form complexes with cholesterol and membrane proteins, leading to potential toxicity at very high doses (Francis et al., 2002).

In soybean and sesame, saponins are commonly present in the seed coat and cotyledons. They contribute to the functional and therapeutic qualities of these seeds. Studies have shown that sesame seeds typically contain slightly higher saponin levels than soybean, supporting their traditional use in cholesterol management and liver protection (Adeola and Oseni, 2020).

2.4 Alkaloids: Characteristics and Biological Importance

Alkaloids are nitrogen-containing organic compounds that occur naturally in many plant species. They are often bitter and have significant pharmacological activities, with some serving as the basis for major therapeutic drugs such as quinine, morphine, and atropine (Evans, 2009).

Structurally, alkaloids are classified based on the heterocyclic ring that contains nitrogen, and their biosynthesis is linked to amino acids such as tryptophan, lysine, and tyrosine (Okwu and Emenike, 2006).

In plants, they serve protective roles against herbivores and pathogens. In humans, alkaloids exhibit analgesic, anti-malarial, anti-hypertensive, and antimicrobial properties (Singh et al., 2018). However, excessive intake of alkaloids can lead to toxicity, including neurological and gastrointestinal disturbances (Sofowora, 1993).

Soybean and sesame both contain alkaloids in moderate quantities. Research indicates that sesame seeds tend to have higher alkaloid levels than soybean, a trend attributed to genetic variation and environmental factors during seed development (Olowokere et al., 2021). These alkaloids, in trace amounts, may enhance the medicinal potential of sesame seed extracts.

2.5 Factors Affecting Phytochemical Composition in Seeds

The concentration of phytochemicals in plants can be affected by several factors such as genetic makeup, maturity stage, climatic conditions, soil type, post-harvest handling, and processing methods (Akindahunsi and Salawu, 2005). For instance, drying significantly influences the levels of tannins, saponins, and alkaloids by altering the enzymatic activity responsible for their synthesis and degradation (Oladipo and Adeyeye, 2019).

Similarly, seed variety and cultivation environment also play major roles. Soybean varieties grown in tropical regions may exhibit lower tannin and alkaloid contents due to high moisture and temperature stress, whereas sesame seeds, being more drought-tolerant, often accumulate higher phytochemical concentrations (Ali et al., 2021).

2.6 Comparative Studies on Soybean and Sesame Seeds

Several comparative studies have highlighted the nutritional and phytochemical differences between soybean and sesame seeds. While soybean is richer in protein and essential amino acids, sesame has higher oil and phytochemical content (Mbah and Eme, 2017).

The present research found that sesame seeds exhibited higher levels of total tannin (20.926 mg/100 g), total saponin (20.611 mg/100 g), and total alkaloid (8.400 mg/100 g) compared to soybean with tannin (17.583 mg/100 g), saponin (18.291 mg/100 g), and alkaloid (6.500 mg/100 g). These findings align with earlier observations that sesame's denser lipid matrix enhances the retention of non-polar secondary metabolites (Adeola and Oseni, 2020).

Such comparative evaluation provides a clearer understanding of how both seeds contribute differently to nutrition, health, and industrial use.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Collection of Samples

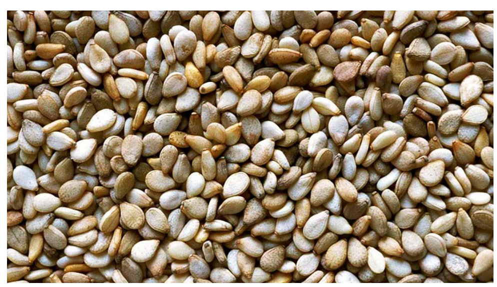
The dried seeds of Glycine max (soybean) and Sesamum indicum (sesame) were purchased from a local market in Benin metropolis, Edo State. The seeds were sorted to remove debris and damaged seeds.

3.1a Reagent/ Chemicals

Analytical grade reagents and solvents were used throughout the study, including methanol, ethanol, sulphuric acid, acetic acid, sodium carbonate (Na_2CO_3), Folin–Denis reagent, vanillin, ammonium hydroxide, and Mayer's and Wagner's reagents. Distilled water was used for all solution preparations.

3.1b Equipments

The equipment used included an analytical weighing balance, beakers, conical flasks, pipettes, graduated cylinders, Whatman No.1 filter paper, water bath, and a UV–Visiblespectrophotometer (Jenway 6100, Essex, U.K.).



Source: Google Photo

Figure 1: Photographs of dried soybean seeds (Glycine max) and sesame seeds (Sesamum indicum) used for the study.

3.2 Preparation of Samples

Exactly 1.0 g of the powdered soybean and sesame seed samples was weighed separately and dissolved in 50 mL of cool, boiled distilled water in a 100 mL beaker. The contents were transferred into a 100 mL standard flask, and the beaker was rinsed three times with about 10 mL of the same distilled water to ensure complete transfer. The volume of the flask was then made up to the 100 mL mark with distilled water. The flask was corked, inverted four times for proper mixing, and allowed to stand. The final extract solution had a concentration of approximately 10,000 µg/mL (stock), and was used for subsequent phytochemical screening and quantitative analyses.

3.3 Phytochemical Screening

Qualitative phytochemical screening was carried out to identify the presence of bioactive compounds such as tannins, saponins, and alkaloids, using the standard procedures described by Tiwari et al. (2001) with minor modifications.

3.3.1 Detection of Alkaloids

A 2.0 mL portion of each extract was evaporated to dryness, and the residue was dissolved in 5 mL of 2 mol/dm^3 hydrochloric acid (HCl). The solution was filtered, and the filtrate was divided equally into two test tubes. To the first test tube, a few drops of Mayer's reagent were added, while the second received Wagner's reagent. The appearance of a yellowish precipitate in the first tube and a reddish-brown precipitate in the second tube confirmed the presence of alkaloids.s

3.3.2 Detection of Tannin

To 1.0 mL of the extract, 1.0 mL of 1% gelatin solution containing sodium chloride was added. The formation of a white precipitate indicated the presence of tannins.

3.3.3 Detection of Saponins

The foam test was used to detect saponins. About 0.5 g of the extract was mixed with 2.0 mL of distilled water in a test tube, shaken vigorously, and allowed to stand for 10 minutes. The formation of persistent foam indicated the presence of saponins.

3.4 Quantitative Determination of Phytochemicals

Quantitative estimation of total tannin, total saponin, and total alkaloid contents in the soybean and sesame seed extracts was carried out using established colorimetric and gravimetric methods with slight modifications.

3.4.1 Determination of Total Saponin Content

The total saponin content was determined using the vanillin–sulphuric acid colorimetric method as described by Makkar et al. (2007). About 50 µL of the extract was mixed with 250 µL of distilled water, followed by 250 µL of vanillin reagent (prepared by dissolving 800 mg of vanillin in 10 mL of 99.5% ethanol). Then, 2.5 mL of 72% sulphuric acid was added and the mixture was thoroughly mixed. The solution was incubated in a water bath at 60°C for 10 minutes, cooled in ice water, and the absorbance measured at 570 nm using a UV–Vis spectrophotometer. Standard saponin solutions (0–25 ppm) were prepared and treated similarly. The results were expressed as mg/kg of sample.

3.4.2 Determination of Total Tannin Content

The total tannin content was determined by the Folin–Denis colorimetric method as outlined by Singleton and Rossi (1965) and Pearson (1976) with slight modifications. Exactly 0.20 mL of the extract was mixed with 20 mL of 50% methanol and heated in a water bath at 77–80°C for 1 hour. The mixture was filtered using Whatman No.1 filter paper. To 20 mL of the filtrate, 2.5 mL of Folin–Denis reagent and 10 mL of 17% sodium carbonate solution were added. The mixture was allowed to stand for 20 minutes for color development, and the absorbance was measured at 760 nm using a UV–Vis spectrophotometer. Total tannin content was calculated from a tannic acid standard calibration curve and expressed in mg/kg of the sample.

3.4.3 Determination of Total Alkaloid Content

Total alkaloid content was determined using the method of Harborne (1973). About 5 g of each extract was weighed into a 250 mL beaker, and 100 mL of 20% acetic acid in ethanol was added. The mixture was covered and allowed to stand for 2 hours at room temperature. The extract was filtered and concentrated using a water bath to one-quarter of its original volume. Concentrated ammonium hydroxide was then added dropwise until complete precipitation occurred. The precipitate was collected by filtration, washed with

1% ammonia solution, dried, and weighed. Total alkaloid content was calculated using the formula:

Alkaloid (%) = Weight of residue/ weight of sample × 100

The analysis was carried out in triplicate, and results were expressed as mean percentage values.

3.5 Statistical Analysis

All determinations were performed in triplicate, and the results were expressed as mean ± Standard Error of Mean (SEM). Statistical analysis was conducted using SPSS version 25.0 for Windows. The data obtained were subjected to one-way analysis of variance (ANOVA) to determine significant differences between the phytochemical contents of soybean and sesame seed extracts. Significance was accepted at a probability level of $p < 0.05$.

CHAPTER FOUR

4.0 RESULTS

4.1 Results

The results of the quantitative phytochemical analysis of dried seeds of Glycine max (soybean) and Sesamum indicum (sesame) are presented in Table 4.1. The parameter determined include total tannin, total saponin, and total alkaloid contents.

Table 4.1: Total tannin, saponin, and alkaloid contents of dried soybean and sesame seed extracts

Parameter	Sesame (Sesamum indicum)	Soybean (Glycine max)
Total tannin (mg/kg)	20.926 ± 0.013	17.583 ± 0.015
Total saponin (mg/kg)	20.611 ± 0.018	18.291 ± 0.021
Total alkaloid (%)	8.400 ± 0.010	6.500 ± 0.012

From the results, Sesamum indicum (sesame) exhibited higher concentrations of all the phytochemicals measured compared to Glycine max (soybean). The total tannin content of sesame seed (20.926 ± 0.013 mg/kg) was higher than that of soybean (17.583 ± 0.015 mg/kg). Similarly, sesame showed greater total saponin (20.611 ± 0.018 mg/kg) and alkaloid content (8.400 ± 0.010%) as compared to soybean, 18.291 ± 0.021 mg/kg and 6.500 ± 0.012%, respectively.

4.1.1 Detailed Explanation and Biological Significance

The results of this study demonstrate clear differences in phytochemical content between soybean and sesame seeds. A detailed interpretation of these findings is as follows:

1. **Total Tannin Content**

Sesame seeds recorded a significantly higher tannin content (20.926 mg/kg) compared to soybean (17.583 mg/kg).

Tannins are well-known for their:

- strong antioxidant activity,

- ability to scavenge free radicals, and

- metal-chelating properties.

Higher tannin levels in sesame suggest stronger potential antioxidant benefits. This aligns with established reports showing that oil-rich seeds tend to retain more phenolic compounds during storage and processing.

However, high tannin levels may also:

- reduce protein digestibility,

- inhibit digestive enzymes,

- and reduce mineral absorption.

Thus, while sesame may offer enhanced antioxidant potential, its tannin content should be considered in diets heavily dependent on plant proteins—especially in developing regions

.2. Total Saponin Content

The total saponin content followed a similar trend, with sesame (20.611 mg/kg) being higher than soybean (18.291 mg/kg).

Saponins are bioactive glycosides known for their:

- cholesterol-lowering effects,

- immune-modulatory activity,

- antimicrobial properties, and

- ability to promote bile acid excretion.

The modest increase (~2.320 mg/kg difference) in sesame may contribute nutritionally by providing greater cardioprotective potential.

In food science, saponins are also valued for their foaming and emulsifying properties, which may make sesame useful in certain functional food formulations.

3. Total Alkaloid Content

Sesame also showed a higher alkaloid content (8.400%) compared to soybean (6.500%).

Alkaloids—nitrogen-containing compounds—are notable for:

- potent pharmacological effects,

- antimicrobial activities,

- and sometimes toxicological significance.

Although the values observed are within safe ranges for edible seeds, the notable difference suggests sesame may possess stronger bioactive potential. For medicinal or nutraceutical applications, this could be advantageous, but for large-scale dietary intake, such bioactivity must be monitored.

4.1.2 Implications for Nutrition and Food Processing

The higher tannin content of sesame suggests the need for processing methods such as roasting, boiling, fermentation, or soaking to reduce anti-nutritional effects.

The higher saponin levels make sesame potentially more effective in cholesterol-regulating diets.

Alkaloid content, though higher in sesame, remains within edible limits but highlights the importance of balanced consumption.

Overall, these findings emphasize the diverse nutritional and biological properties of soybean and sesame and support their combined use in food formulations to balance protein content with phytochemical benefits.

CHAPTER FIVE

5.0 DISCUSSION AND CONCLUSION

5.1 Discussion

The presence and variation in tannin, saponin, and alkaloid contents between Glycine max and Sesamum indicum indicate distinct phytochemical compositions and potential health implications. These bioactive constituents are secondary metabolites known for their diverse biological activities, including antioxidant, antimicrobial, and anti-inflammatory effects (Harborne, 1973; Makkar et al., 2007).

The higher tannin content observed in sesame seed may be attributed to its higher phenolic composition, which aligns with reports by Adebayo et al. (2018), who found that sesame seeds possess strong antioxidant properties due to abundant phenolic compounds. Tannins are polyphenolic compounds that can form complexes with proteins and minerals, potentially reducing digestibility when consumed in excess, but offering beneficial antioxidant activity at moderate concentrations (Makkar et al., 2007).

The total saponin content was slightly higher in sesame than in soybean. Saponins are natural glycosides known to possess antimicrobial, antifungal, and cholesterol-lowering properties (Okwu, 2004). Their presence in both oilseeds supports their nutraceutical potential. Higher saponin levels in sesame may also enhance its therapeutic value in managing cardiovascular conditions by reducing lipid absorption (Francis et al., 2002).

The total alkaloid content followed a similar trend, being higher in sesame compared to soybean. Alkaloids are nitrogenous compounds known for their pharmacological effects, including analgesic and antimicrobial actions (Trease and Evans, 2002). The higher alkaloid content in sesame suggests that it may possess stronger bioactivity and medicinal properties compared to soybean.

Overall, these results demonstrate that both soybean and sesame seeds are rich sources of bioactive phytochemicals. However, sesame appears to contain these compounds in relatively higher amounts, which could enhance its antioxidant and therapeutic potential. The observed variations may be linked to differences in species, genetic factors, environmental conditions, and oil composition, as previously reported by Hassan et al. (2019).

The statistical analysis showed significant differences ($p < 0.05$) between the phytochemical contents of the two samples, confirming that the variations observed are not due to random experimental error but represent true biochemical differences.

5.2 Conclusion

The study evaluated the total tannin, saponin, and alkaloid contents of dried seeds of Glycine max (soybean) and Sesamum indicum (sesame). The findings revealed that both seeds contain appreciable amounts of these phytochemicals, which are known to possess significant nutritional and pharmacological properties.

The higher concentration of tannins, saponins, and alkaloids in sesame seed suggests its potential as a more potent source of natural antioxidants and therapeutic agents compared to soybean. Both seeds, however, remain valuable for dietary inclusion and can serve as functional foods with benefits for human health.

Thus, this study provided a scientific basis supporting the nutritional and medicinal importance of soybean and sesame seeds. Their phytochemical richness underscores their usefulness in developing nutraceuticals and plant-based formulations for disease prevention and health promotion.

5.3 Recommendations

Based on the findings of this research, the following recommendations are made:

a. Increased Utilization of Sesame Seeds.

b. Encouragement of Soybean Consumption.

c. Further Research.

d. Pharmaceutical and Industrial Exploration.

e. Government and Institutional Support.

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