The Bioavailability Prediction and Screening Phytochemicals of Sansevieria Trifasciata Leaves Extract

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Abstract. Leaves and rhizomes of Sansevieria trifasciata are used to treat some infectious diseases and have anti-diabetes potential. Active compounds and their bioavailability are not known yet. This study aimed to identify phytochemical compounds of Sansevieria trifasciata leaves and their orally bioavailability by absorption, distribution, metabolism, and excretion (ADME) evaluation. Leaves were obtained from the Tropical Biopharmaca Research Center, IPB University. After drying in an oven (38±2°C) for seven days and pulverized, the powder leaves macerated in 5 ml 100% methanol/g. After five days, extracts were filtered and evaporated using the rotary evaporator system. A bioactive test was carried out by mixing extracts with a reagent to screen alkaloids, flavonoids, saponin, steroids, triterpenoids, tannins, and phenolic compounds. Samples were injected into GC-MS using column (HP5), fused silica tubing 30 m long (0.25 mm I.D) filled with acetonitrile. Sansevieria trifasciata bioactive was analyzed using the Swiss-ADME tool to check their bioavailability. The qualitative screening showed the presence of main plant compounds. The GC-MS analysis presented phytol, stigmasterol, linoleic acid, oleic acid, stearic acid, and palmitic acid. The SwissADME showed bioavailability phytochemicals of Sansevieria trifasciata not orally available according to Lipinski's rules using SwissADME. It indicated that extract of Sansevieria trifasciata has promising potential as an alternative medicine compound.

Keywords. Bioactive compounds, GC-MS analysis, The Swiss-ADME, Phytol, Stigmasterol

1 Introduction

Sansevieria trifasciata, plants belong to the Agavaceae group, commonly found in Indonesia. Traditionally the leaves and rhizomes of Sansevieria trifasciata are used to treat some respiration diseases, food poisoning, toxemia coughs, snake and insect bites [1]. A decoction of the leaves of Sansevieria trifasciata of the Laurentii variety was reported have anti-diabetic activity in alloxan-induced experimental animals, indicates the potential bioactive in this plant can be used to lowering blood glucose levels, and increase pro-insulin secretion by pancreatic cells [2]. However, information on.

bioactive compounds in Sansevieria trifasciata that act as antidiabetics is still limited. The results of the analysis through Gas Chromatography-Mass Spectrophotometry (GC-MS) that has been carried out previously [3], and also LCMS is still new to suspect bioactive substances that act as antidiabetics in Sansevieria trifasciata leaves [4].

Based on several previous studies, Sansevieria trifasciata plant contains many bioactive compounds such as pregnane-glycoside, steroidal saponins, and non-steroidal saponins, alkaloids, flavonoids, glycosides, terpenoids, and tannins [5]. Plants or phytochemical compounds that show hypoglycemic activity consider alternatives to synthetic hypoglycemic agents [6], because natural ingredients are easy to obtain, inexpensive, and less side effects. One of the most promising is the Sansevieria family in many variations. Previously, the Sansevieria family has been using has a good effect on several health problems other than diabetes. Sansevieria roxburghiana was to have anti-oxidant and anti-diabetic effects [7][8]. Sanseveria ehrenbergii is an anti-neoplastic agent [9], Sansevieria trifasciata has activity as an analgesic and antipyretic effects [5], and the ethanolic extract of its leaves contains anti-allergic and anti-anaphylactic properties [10]. In addition, compounds of the Sansevieria senegambica rhizome have the potential for hypoglycemic, hypolipidemic, anti-anemic, immune modulating, and cardiac protection based on flavonoid gas chromatographic analysis [11]. Bioactive in the form of Protochatechuic Acid plays a role in suppressing cardiomyopathy in diabetes condition via stimulation glucose metabolism, suppressing oxidative stress, and inhibiting inflammation [12].

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Several studies have shown bioactive analysis through GC-MS and LCMS on species S. rhoxburghiana and S.trifasciata as potential medicinal plants [3,13]. Research in the search for antidiabetic agents continues. One of the studies carried out is by using the molecular docking method, the bioavailability of the drug candidate should be evaluated before carrying out the molecular docking test. The evaluation of medicine candidates is carried out by drug-likeness properties analysis, absorption, distribution, metabolism, and excretion (ADME). The ADME is a crucial parameter for discovering new medicine. Bioavailability is the level and rate at the active moiety bioactive compounds enter the circulation system and reach the site of action [14]. Bioavailability is evaluated according to the rule of five of Lipinski. A bioactive compound is classified as bioavailable if had H-bond donors no more than 5, H-bond acceptors less than 10, molecular mass less than 500 dalton, a partition co-efficient log P-value lower than 5 and rotatable bonds lower than 9 [15].

Besides these, there are several factors that also play a role in the restriction of oral bioavailability of drugs or metabolites. These are the stability by reason of pH level in the gastric and colon, metabolism by microflora in the gastrointestinal tract, the solubility of molecules, rate of absorption across to gastrointestinal wall, mechanism of efflux, and metabolic effects in the first pass [16]. However, assessing the bioavailability of compounds only based on their physicochemical characters is not accurate. In oral drug-likeness experiments, active compounds with a highly probability range of Physicochemical parameters able to use as an oral medicine [15].

One off the in-silico test methods to see ADME is the SwissADME software that has been developed to see or screen faster, less time consuming, without testing using experimental animals. The SwissADME is a accurate alternative online tool for drug design research with natural or synthetic materials [17]. This tool assists in the expansion of a new drug based on pharmacokinetics and bioavailability in a future experiment. The analysis of drug-like properties is generally carried out based on the Lipinski rule (rule of five), and the prediction of ADME can provide information about oral bioavailability, cell permeable, metabolism, elimination, and toxicity of the pharmacokinetic and pharmacodynamic characteristics of a drug molecule. However, information on bioavailability, toxicity levels, and analysis of drug similarity properties of Sansevieria trifasciata is still limited and even unknown. Therefore, this study aims to determine the kind of bioactive of Sansevieria trifasciata through GC-MS analysis and its potential bioavailability with the parameters in SwissADME.

2 Material and Methods

2.1 Materials

Fresh leaves of Sansevieria trifasciata were collected from the Tropical Biopharmaca Research Center, Bogor Agricultural Institute, Bogor, Indonesia. After drying in an oven (38±2°C) for 7 days, the leaves were grindered and kept at room temperature in a dry and dark condition until analysis.

2.2 Cold Maceration

Pulverized leaf material in amounts of 100 g were put in a flask, and 5ml 100% methanol/gr material was added to the flask. This flask was shaken at room temperature for 5 days in dark condition. Then the extracts were filtered and on part was of extract was divided over several vials (for storage), whereas the other parts were evaporated using the rotary evaporator system. The dried extracts were kept in a closed flask and stored at -20°C until further analysis.

2.3 Qualitative Screening Phytochemical

Several tests with a reagent were done to screening the presence of phytochemicals in methanol Sansevieria extract such as alkaloids, flavonoids, saponin, steroids, triterpenoids, tannins and phenolic [18].

2.4 Gas Chromatography–mass Spectrometry (GC-MS)

The phytochemicals profile of the Sansevieria trifasciata extract was screened using Gas Chromatography-Mass Spectrometry GCMS (Agilent 6980N), with a The GC-MS column (HP5MS, J&W Scientific) was a fused silica tubing of 30 m long and diameter 0.25 mm I.D. A total of 1 mL of S trifasciata extract was injected into the GC-MS. Samples were subjected to GC-MS.) filled with acetonitrile. Samples were analyzed with a program following the standard method using the instrument Agilent 6980N in The Laboratory Department of Pharmacy, Universitas Airlangga, Surabaya, Indonesia. The maximum temperature of the column at 250 - 280°C, and the total running time was 45.0 minutes. The chemical structure profile screening compared with the mass spectrum in the reference database Wiley 7.0 version.

2.5 Computational Analysis (ADME)

Analysis of bioavailability via SwissADME follows several steps. In the first step, the researcher should access the PubChem server (https://pubchem.ncbi.nlm.nih.gov/) to get a code canonical SMILE, molecular formula, and molecular weight of each compound. The second step is to predict their ADME through the SwissADME by drawing or copying past canonical SMILES from the Pubchem website and running it online in the SwissADME website [17].

3 Results and Discussion

3.1 Results

The color of the extract after evaporation was green dark, probably reflecting the color chlorophyll (which has a high concentration in Sansevieria leaves). The extraction method was cold maceration using the polar solvents methanol at room temperature for 5 days. This method is commonly used for extraction of plant compounds, as polar solvents are able to bind bioactive plant compounds better than other solvents. Duration of extraction influences the final concentration of plant compounds [19].

The methanol extract was tested with reagent to screen the presence of phytocompounds based on method in [18]. The result of qualitative phytocompounds (Table 1)

Table 1. Qualitative Phytochemicals of Methanol Sansevieria trifasciata leaves extract

Phytocompounds	Results	Conclusion
Alkaloid	Orange, Brown and White deposits (3 reagent)	Positive (+)
Flavonoid	Red color	Positive (+)
Saponin	The presence of stable foam	Positive (+)
Steroid	Violet to Blue/ Green	Positive (+)
Triterpenoid	Red Brown	Positive (+)
Phenol	White Deposits	Positive (+)
Tannin	Brown Green	Positive (+)

After qualitative screening of phytocompound then samples were injected into the Gas chromatography–mass spectrometry (GC-MS), the name of phytochemicals Sansevieria trifasciata can be seen in Table 2.

Table 2. Phytochemicals of Sansevieria trifasciata extract using GC-MS

No	R. Time	Compounds Name	Area %
1	10.96	2,3-Dyhidro-3,5-dihydroxy-6-methyl-4H-pyran-4-one	2.39 %
2	20.74	Methyl-14-methylpentadecanoate	1. 65%
3	21.12	Palmitic Acid	17.16%
4	22.36	Methyl Linoleate	1.31%
5	22.41	Methyl Linolenate	1.59%
6	22.53	Phytol	6.38%
7	22.77	Linoleic Acid	17.12%
8	22.81	Oleic Acid	19.81%
9	22.98	Stearic Acid	4.84%
10	32.93	Stigmasterol	7.57%
11	33.85	(23S)-ethylcholest-5-en-3.beta.-ol	3.78%

Next, observed the general characteristics of the phytochemicals of Sansevieria trifasciata in website Pubchem to get information Pubchem ID, molecular formula, Canonical SMILES, and Molecular weight (Table 3).

Table 3. General Characteristics of the Phytochemicals of Sansevieria trifasciata

No	Name of Molecule	Pub. ID	MF	Canonical SMILES	MW (g/mol or Da)
1	2,3-Dyhidro-3,5-dihydroxy-6-methyl-4H-pyran-4-one	NA	NA	NA	NA
2	Methyl-14-methylpentadecanoate	21205	$C_{17}H_{34}O_2$	CC(C)CCCCCCCCCCCCC(=O)OC	270.5
3	Palmitic Acid	985	$C_{16}H_{32}O_2$	CCCCCCCCCCCCCCCC(=O)O	256.42
4	Methyl Linoleate	5284421	$C_{19}H_{34}O_2$	CCCCCC=CCC=CCCCCCCCC(=O)OC	294.5
5	Methyl Linolenate	5319706	$C_{19}H_{32}O_2$	CCC=CCC=CCC=CCCCCCCCC(=O)OC	292.5
6	Phytol	5280435	$C_{20}H_{40}O$	CC(C)CCCC(C)CCCC(C)CCCC(=CCO)C	296.5
7	Linoleic Acid	5280450	$C_{18}H_{32}O_2$	CCCCCC=CCC=CCCCCCCCC(=O)O	280.4
8	Oleic Acid	445639	$C_{18}H_{34}O_2$	CCCCCCCCC=CCCCCCCCC(=O)O	282.5
9	Stearic Acid	5281	$C_{18}H_{36}O_2$	CCCCCCCCCCCCCCCCCC(=O)O	284.5
10	Stigmasterol	5280794	$C_{29}H_{48}O$	CCC(C=CC(C)C1CCC2C1(CCC3C2CC=C4C3(CCC(C4)O)C)C)C(C)C	412.7
11	(23S)-ethylcholest-5-en-3.beta.-ol	91750025	$C_{29}H_{50}O$	CCC(CC(C)C)CC(C)C1CCC2C1(CCC3C2CC=C4C3(CCC(C4)O)C)C	414.7

Pub ID: Pubchem ID; MF: Molecular formula; MW: Molecular weight, NA:not available

The Physicochemical properties of phytoconstituents/phytochemicals Sansevieria trifasciata shows in Table 4. Because information about molecule 2,3-Dyhidro-3,5-dihydroxy-6-methyl-4H-pyran-4-one is not available in the website Pubchem, we did not provide any more for further characteristics.

Table 4. Physicochemical Properties the Phytocompounds of Sansevieria trifasciata

No	Name of Molecule	Num heav. atoms	Num Arom heav atoms	Frac Csp3	Num. rotatable bonds	Num. H-bond acceptors	Num H-bond donors	Mol React	TPSA ($°A^2$)
1	Methyl-14-methylpentadecanoate	19	0	0.94	14	2	0	85.12	26.3
2	Palmitic Acid	18	0	0.94	14	2	1	80.80	37.3
3	Methyl Linoleate	21	0	0.74	15	2	0	93.78	26.3
4	Methyl Linolenate	21	0	0.63	14	2	0	93.32	26.3
5	Phytol	21	0	0.90	13	1	1	98.94	20.2
6	Linoleic Acid	20	0	0.72	14	2	1	89.46	37.3
7	Oleic Acid	20	0	0.83	15	2	1	89.94	37.3
8	Stearic Acid	20	0	0.94	16	2	1	90.41	37.3
9	Stigmasterol	30	0	0.86	5	1	1	132.75	20.2
10	(23S)-ethylcholest-5-en-3.beta.-ol	30	0	0.93	6	1	1	133.23	20.2

Then, observed lipophilicity and water solubility characteristics of phytochemical Sansevieria trifasciata (Table 5 and 6)

Table 5. Lipophilicity characteristics of the phytochemicals Sansevieria trifasciata

No	Name of Molecule	iLOGP	XLOGP3	WLOGP	MLOGP	SILICOS-IT	Consensus Log *P* o/w
1	Methyl-14-methylpentadecanoate	4.59	7.20	5.50	4.44	5.67	5.48
2	Palmitic Acid	3.85	7.17	5.55	4.19	5.25	5.20
3	Methyl Linoleate	4.61	6.82	5.97	4.70	6.36	5.69
4	Methyl Linolenate	4.94	6.29	5.75	4.61	6.18	5.55
5	Phytol	4.71	8.19	6.36	5.25	6.57	6.22
6	Linoleic Acid	4.14	6.98	5.88	4.47	5.77	5.45
7	Oleic Acid	4.27	7.64	6.11	4.57	5.95	5.71
8	Stearic Acid	4.30	8.23	6.33	4.67	6.13	5.93
9	Stigmasterol	5.01	8.56	7.80	6.62	6.86	6.97
10	(23S)-ethylcholest-5-en-3.beta.-ol	5.20	9.52	8.02	6.73	7.04	7.30

Table 6. Water solubility characteristics of the phytocompounds Sansevieria trifasciata

No	Name of Molecule	ESOL			Ali			SILICOS-IT		
		Log S	Solub	Class	Log S	Solub	Class	Log S	Solub	Class
1	Methyl-14-methylpentadecanoate	-5.13	2.01e-03 mg/ml; 7.43e-06 mol/l	MS	-7.57	7.20e-06 mg/ml; 2.66e-08 mol/l	PS	-5.64	6.24e-04 mg/ml; 2.31e-06 mol/l	MS
2	Palmitic Acid	-5.02	2.43e-03 mg/ml ; 9.49e-06 mol/l	MS	-7.77	4.31e-06 mg/ml; 1.68e-08 mol/l	PS	-5.31	1.25e-03 mg/ml; 4.88e-06 mol/l	MS
3	Methyl Linoleate	-4.97	3.14e-03 mg/ml; 1.07e-05 mol/l	MS	-7.18	1.94e-05 mg/ml; 6.60e-08 mol/l	PS	-5.37	1.25e-03 mg/ml; 4.25e-06 mol/l	MS
4	Methyl Linolenate	-4.69	5.94e-03 mg/ml; 2.03e-05 mol/l	MS	-6.63	6.85e-05 mg/ml; 2.34e-07 mol/l	Ps	-4.65	6.49e-03 mg/ml; 2.22e-05 mol/l	MS
5	Phytol	-5.98	3.10e-04 mg/ml; 1.05e-06 mol/l	MS	-8.47	9.94e-07 mg/ml; 3.35e-09 mol/l	PS	-5.1	9.06e-04 mg/ml; 3.05e-06 mol/l	MS
6	Linoleic Acid	-5.05	2.49e-03 mg/ml; 8.87e-06 mol/l	MS	-7.58	7.42e-06 mg/ml; 2.64e-08 mol/l	PS	-4.67	5.93e-03 mg/ml; 2.11e-05 mol/l	MS
7	Oleic Acid	-5.41	1.09e-03 mg/ml; 3.85e-06 mol/l	MS	-8.26	1.54e-06 mg/ml; 5.46e-09 mol/l	PS	-5.39	1.14e-03 mg/ml; 4.04e-06 mol/l	MS

No	Name of Molecule	ESOL			Ali			SILICOS-IT		
		Log S	Solub	Class	Log S	Solub	Class	Log S	Solub	Class
8	Stearic Acid	-5.73	5.26e-04 mg/ml; 1.85e-06 mol/l	MS	-8.87	3.80e-07 mg/ml; 1.33e-09 mol/l	PS	-6.11	2.19e-04 mg/ml; 7.71e-07 mol/l	PS
9	Stigmasterol	-7.46	1.43e-05 mg/ml; 3.46e-08 mol/l	PS	-8.86	5.71e-07 mg/ml; 1.38e-09 mol/l	PS	-5.47	1.40e-03 mg/ml; 3.39e-06 mol/l	MS
10	(23S)-ethylcholest-5-en-3.beta.-ol	-8.01	4.03e-06 mg/ml; 9.71e-09 mol/l	PS	-9.85	5.79e-08 mg/ml; 1.40e-10 mol/l	PS	-6.19	2.69e-04 mg/ml; 6.49e-07 mol/l	PS

MS: Moderately Soluble PS: Poorly Soluble

Then pharmacokinetics parameters, druglikeness and medicinal chemistry according to Lipinski rules also evaluated (Table 7, 8 and 9).

Table 7. Pharmacokinetics parameters of the phytocompounds Sansevieria trifasciata

No	Name of Molecule	GI absorp	BBB permeant	P-gp substrate	CYP1A2 inhibitor	CYP2C19 inhibitor	CYP2C9 iinhibitor	CYP2D6	CYP3A4	Log Kp (Skin Permeation) (cm/s)
1	Methyl-14-methylpentadecanoate	High	Yes	No	Yes	No	No	No	No	-2.84 cm/s
2	Palmitic Acid	High	Yes	No	Yes	No	Yes	No	No	-2.77cm/s
3	Methyl Linoleate	High	No	No	Yes	No	Yes	No	No	-3.25 cm/s
4	Methyl Linolenate	High	Yes	No	Yes	No	Yes	No	No	-3.62 cm/s
5	Phytol	Low	No	Yes	No	No	Yes	No	No	-2.29 cm/s
6	Linoleic Acid	High	Yes	No	Yes	No	Yes	No	No	-3.05 cm/s
7	Oleic Acid	High	No	No	Yes	No	Yes	No	No	-2.60 cm/s
8	Stearic Acid	High	No	No	Yes	No	No	No	No	-2.19 cm/s
9	Stigmasterol	Low	No	No	No	No	Yes	No	No	-2.74 cm/s
10	(23S)-ethylcholest-5-en-3.beta.-ol	Low	No	No	No	No	No	No	No	-2.07 sm/s

Table 8. Druglikeness rule and Bioavailability score of the phytocompounds S. trifasciata

No	Name of Molecule	Lipinski	Ghose	Veber	Egan	Muegge	Bioavailability score
1	Methyl-14-methylpentadecanoate	Yes; 1 violation: MLOGP>4.15	Yes	No; 1 violation: Rotors>10	Yes	No; 1 violation: XLOGP3>5	0.55
2	Palmitic Acid	Yes; 1 violation: MLOGP>4.15	Yes	No; 1 violation: Rotors>10	Yes	No; 1 violation: XLOGP3>5	0.85
3	Methyl Linoleate	Yes; 1 violation: MLOGP>4.15	No; 1 violation: WLOGP>5.6	No; 1 violation: Rotors>10	No; 1 violation: WLOGP>5.88	No; 1 violation: XLOGP3>5	0.55
4	Methyl Linolenate	Yes; 1 violation: MLOGP>4.15	No; 1 violation: WLOGP>5.6	No; 1 violation: Rotors>10	Yes	No; 1 violation: XLOGP3>5	0.55
5	Phytol	Yes; 1 violation: MLOGP>4.15	No; 1 violation: WLOGP>5.6	No; 1 violation: Rotors>10	No; 1 violation: WLOGP>5.88	No; 2 violations: XLOGP3>5, Heteroatoms<2	0.55
6	Linoleic Acid	Yes; 1 violation: MLOGP>4.15	No; 1 violation: WLOGP>5.6	No; 1 violation: Rotors>10	No; 1 violation: WLOGP>5.88	No; 1 violation: XLOGP3>5	0.85
7	Oleic Acid	Yes; 1 violation: MLOGP>4.15	No; 1 violation: WLOGP>5.6	No; 1 violation: Rotors>10	No; 1 violation: WLOGP>5.88	No; 1 violation: XLOGP3>5	0.85
8	Stearic Acid	Yes; 1 violation: MLOGP>4.15	No; 1 violation: WLOGP>5.6	No; 1 violation: Rotors>10	No; 1 violation: WLOGP>5.88	No; 2 violations: XLOGP3>5, Rotors>15	0.85
9	Stigmasterol	Yes; 1 violation: MLOGP>4.15	No; 3 violations: WLOGP>5.6, MR>130, #atoms>70	Yes	No; 1 violation: WLOGP>5.88	No; 2 violations: XLOGP3>5, Heteroatoms<2	0.55
10	(23S)-ethylcholest-5-en-3.beta.-ol	Yes; 1 violation: MLOGP>4.15	No; 3 violations: WLOGP>5.6, MR>130, #atoms>70	Yes	No; 1 violation: WLOGP>5.88	No; 2 violations: XLOGP3>5, Heteroatoms<2	0.55

Table 9. Medicinal Chemistry properties of Sansevieria trifasciata

No	Name of Molecule	Pains	Brenk	Leadlikeness	Synthetic accessibility
1	Methyl-14-methylpentadecanoate	0 alert	0 alert	No; 2 violations: Rotors>7, XLOGP3>3.5	2.53
2	Palmitic Acid	0 alert	0 alert	No; 2 violations: Rotors>7, XLOGP3>3.5	2.31
3	Methyl Linoleate	0 alert	1 alert: isolated_alkene	No; 2 violations: Rotors>7, XLOGP3>3.5	3.18
4	Methyl Linolenate	0 alert	1 alert: isolated_alkene	No; 2 violations: Rotors>7, XLOGP3>3.5	3.10
5	Phytol	0 alert	1 alert: isolated_alkene	No; 2 violations: Rotors>7, XLOGP3>3.5	4.30
6	Linoleic Acid	0 alert	1 alert: isolated_alkene	No; 2 violations: Rotors>7, XLOGP3>3.5	3.10
7	Oleic Acid	0 alert	1 alert: isolated_alkene	No; 2 violations: Rotors>7, XLOGP3>3.5	3.07
8	Stearic Acid	0 alert	0 alert	No; 2 violations: Rotors>7, XLOGP3>3.5	2.54
9	Stigmasterol	0 alert	1 alert: isolated_alkene	No; 2 violations: MW>350, XLOGP3>3.5	6.21
10	(23S)-ethylcholest-5-en-3.beta.-ol	0 alert	1 alert: isolated_alkene	No; 2 violations: MW>350, XLOGP3>3.5	6.30

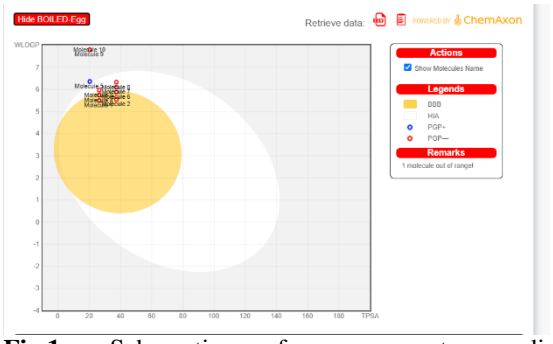

Fig.1. Schematic of assessment prediction gastrointestinal absorption (HIA) and Brain permeant (BBB) using BOILED-Egg

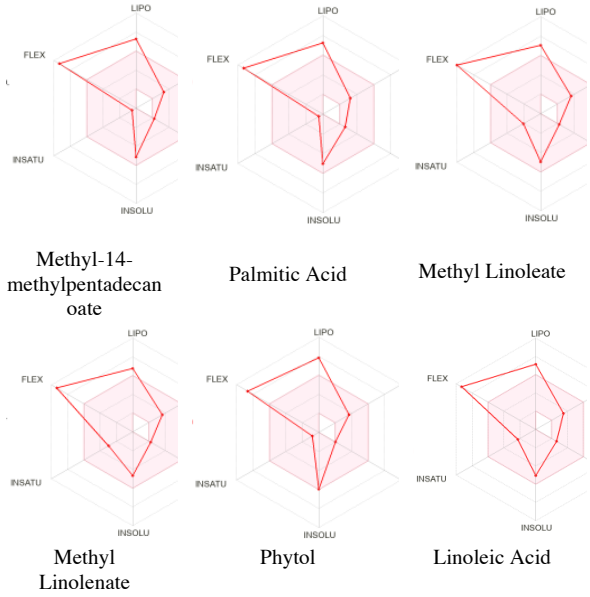

Fig.2. Schematic diagram of Bioavailability Radar *Sansevieria trifasciata* compounds

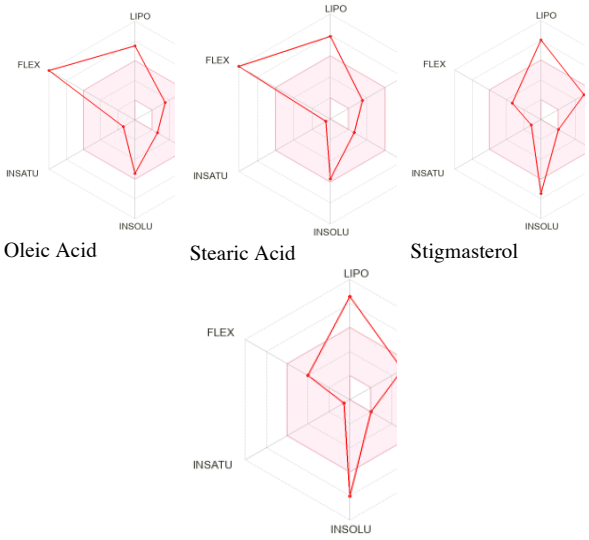

Fig.3. Schematic diagram of Bioavailability Radar *Sansevieria trifasciata* compounds

Sansevieria trifasciata has been widely used in traditional medicine for a long time, in line with research that states that Sansevieria trifasciata leaf is commonly used to treat bronchitis, asthma, food poisoning, toxemia coughs, snake bites, and insect bites [1]. The qualitative phytochemical test of the mother-in-law's aloe leaf extract showed positive results for the presence of several chemical compounds in Table 1 that can use as medicinal ingredients, including alkaloids, flavonoids, phenols, and tannins. Previous research mentions that plants contain phytochemicals such as flavonoids, alkaloids, and tannins that can play a role in traditional medicine because of the content that acts as an antioxidant [5].

The results of phytochemical analysis of Sansevieria trifasciata leaf extract through GC-MS also showed several compounds thought to play a role in controlling several degenerative diseases. Data Table 2 shows the

GC-MS test obtained the presence of several compounds or bioactive that can affect the metabolic process. Yumna's study showed phytol compounds that are presumed to have potential as antidiabetic [3][4]. Linoleic Acid is bioactive that has biological activity in regulating glucose homeostasis and reducing insulin resistance. A compound with the name (23S)-ethylcholest-5-en-3.beta-ol is presumed to have antiatherosclerosis and anti-diabetic effects and can inhibit cholesterol biosynthesis through sterol-reductase inhibition, lower blood cholesterol, reduce the concentration of reactive oxygen species (ROS), inhibit cell apoptosis. Meanwhile, the presence of Stigmasterol is thought to act as an anti-cancer, lowering cholesterol levels, anti-osteoarthritis, and antidiabetic [20][21]. It attracts the attention of researchers who are looking for natural ingredients as medicinal ingredients.

Nowadays, research in modern pharmacy in developing and discovering a new medicine has to engage with an assessment of bioactive phytochemicals, molecule dynamics, and their ability to a binding target site in bioactive form. The candidate's new drug assessment usually needs to be associated with in-vitro, in-vivo also human clinical tests that are expensive and high risk. The computational study in drug development encourages the prediction of ADME. This software estimates toxicity compounds rapidly and complements variety data of the required experimental approach.

In the present study, we evaluated the potent phytochemicals of Sansevieria trifasciata using the SwissADME web tool to get information about the ADME properties. The software SwissADME is online and available at http://www.swissadme.ch not need a high cost and quick results and is easy for beginners or non-experts in drug design [17]. A total of 10 potent phytoconstituents of Sansevieria trifasciata results from analysis using GC-MS were analyzed using the SwissADME web tool. Before using the SwissADME, we had to find canonical SMILES of phytochemicals of Sansevieria trifasciata. The SwissADME will provide several parameters: general characteristics, physicochemical properties, lipophilicity, water solubility, pharmacokinetic parameters, drug-likeness rule, bioavailability score, medicinal chemistry, and BOILED-Egg. The BOILED-Egg is schematic or imaging presentation of compounds ability through pass gastrointestinal by passive absorption, penetration to the brain, and bioavailability radar for drug-likeness compounds evaluation [22].

According to Lipinski rules (RO5), a bioactive compound if had a molecular mass less than 500 Da or 500 g/mol, partition coefficient (LogP) ≤ 5, number of H-bond acceptors (HBA) should be less than 10, and the number H-bond donors (HBD) less than 5, and rotatable bonds less than 9 can be classified as a potential candidate a new drug. We can see in Table 3, that all the phytochemicals of Sansevieria trifasciata had a molecular weight lower than 500. All general characteristics of the phytochemicals had HBD <5, and HBA <10 (Table 4). However, the required number of rotatable bonds less than 9 does not fulfill almost all phytochemicals, except Stigmasterol and (23S)-ethylcholest-5-en-3.beta-ol had a number of rotatable bonds of 6 and 5.

The lipophilicity prediction on the SwissADME showed in the consensus Log P value. The average Log P value was evaluated with various lipophilicity criteria containing values iLOGP, XLOGP3, WLOGP, MLOGP, and SILICOS-IT (Table 5). The analysis determined that (23S)-ethylcholest-5-en-3.beta-ol is the most lipophilic, whereas palmitic acid is the least lipophile. The water solubility of the small molecules in Table 6 ranged from the highest souibility in water (Methyl Linoleate) to insoluble ((23S)-ethylcholest-5-en-3.beta-ol). Methyl-14-methyl pentadecanoate, Palmitic Acid, Methyl Linoleate, Methyl Linolenate, linoleic acid, oleic acid, and stearic acid predicted a high level of Gastrointestinal absorption. Meanwhile, Methyl-14-methyl pentadecanoate, Palmitic Acid, Methyl Linolenate, and linoleic acid were estimated with a high BBB permeant (Table 7). Phytol, one of the compounds presented in Sansevieria trifasciata that showed as the substrates for the P-gp.

A compound has a great probability as a substrate or non-substrate of P-gp of Cytochrome P 450 isoenzymes when under evaluation in SwissADME model showed positive or negative action says as Yes or No. There are 5 kinds of Cytochrome P450 isoenzyme in the SwissADME software including CYP1A2, CYP2c9, CYP2C19, CYP2D6, and CYP3A4. Phytol returned “Yes” for the P-gp substrate, and all phytochemicals of Sansevieria trifasciata as “No” for the P-gp substrate (Table 7). Almost all phytocompounds returned as inhibitors for the inactivation of CYP isoenzymes. However, phytol, stigmasterol, and (23S)-ethylcholest-5-en-3.beta-ol) action as non-inhibitors for CYP1A2. All Sansevieria trifasciata compounds act as non-inhibitors for CYP2C19, CYP2D6, and CYP3A4. However, all molecules returned as inhibitors CYP2C9, except methyl-14-methyl pentadecanoate, stearic acid, and (23S)-ethylcholest-5-en-3.beta-ol. The skin permeability coefficient (Log Kp) is prediction of permeant molecule, if value the Log Kp more negative it means less skin permeant [23]. Among the phytoconstituents of the Sansevieria trifasciata, Methyl linolenate (-3.62) is the lowest permeant compound, and (23S)-ethylcholest-5-en-3.beta-ol (-2.07) is highly permeant respectively (Table 7).

The Druglikeness in the SwissADME section showed a diverse range of properties based on the rule of five different filters. The Lipinski filter is the pioneer rule-of-five from Pfizer implemented with the Veber filter (GSK), Egan (Pharmacia), Muegge (Bayer), and Ghose filter (Amgen) methods. Multiple predictions let on consensus views or a selection method that fits with the specific needs of the end-users. All the compounds of Sansevieria trifasciata fullfilled the filtered rule required in the SwissADME, and the violation shown minimum. The SwissADME interpretation did not post any PAINS alert. Brenk considered small compounds and less hydrophobic, that not determined by Lipinski's rule of 5 [24]. Among the compounds of Sansevieria trifasciata examined, seven molecules disregard the Brenks rule and all the compounds failed the Leadlikeness criteria.

The evaluation of passive gastrointestinal absorption (HIA) and brain penetration (BBB) showed by the BOILED-Egg schema. The compounds were categorized for a high probability of absorption by the Gastrointestinal tract (GIT) when drawn in the white area. However, the yellow section (yolk) is for high brain permeant. In addition, the points are colored in blue, predicted as active inhibitors by the P-gp, and red as non-substrate of the P-gp. The Bioavailability radar estimates much compounds of Sansevieria trifasciata show more flexibility and lipophilicity (Figures 2 and 3), and Stigmasterol and (23S)-ethylcholest-5-en-3.beta-ol show more flexibility and high saturation (Figure 3). It can predict that phytochemicals of Sansevieria trifasciata are not orally bioavailability. A molecule state as orally bioavailable when not to liphophilic, small molecules, polar, not too flexible. Sravika et al. in their publication state that molecule orally bioavailaibility when score of Lipophilicity: XLOGP3 not less than -0.7 and no more than+5, molecular weight should be in ranged at 150 and 500 g/mol, polarity showed by TPSA no more than 130Å2, soluble showed by log S value no more than 6, saturation fraction of carbons in the sp3 not less than 0.25, and flexibility no more than 9 rotatable bonds [25].
The phytochemicals arising from plants that disrupt modified metabolism develop as potential candidate medicine in drug discovery and development.
Phytochemicals of Sansevieria trifasciata from the GC-MS database show no oral bioavailability. Based on these studies, need further research to analyze extract with other tools such as LC-MS or LC-HRMS to get more kinds of bioactive compounds in the chromatograph.

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