J. Afr. Ass. Physiol. Sci. 8 (2): 149-157, December 2020

Journal of African Association of Physiological Sciences

Official Publication of the African Association of Physiological Sciences
http://www.jaaps.aapsnet.org

Research Article

Anticonvulsant, antiamnesic and anxiolytic activities of methanol leaf extract of *Bambusa vulgaris* (*Poaceae*) in mice

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Keywords:
Bambusa vulgaris, anticonvulsant, antiamnesic, anxiolytic, tannin, Fourier Transform-Infra Red spectra

ABSTRACT

Background: Previous findings have shown that epilepsy can precipitate amnesia and anxiety, among other neuropsychiatric disorders. *Bambusa vulgaris* is used in African traditional medicine against convulsion, amnesia and anxiety but there is scanty scientific basis for these ethnomedicinal claims. Hence, this study investigated the anticonvulsant, antiamnesic and anti-anxiety effects of *Bambusa vulgaris* in mice. **Methods:** The acute oral ingestion of *Bambusa vulgaris* (100, 200 and 400 mg/kg) was investigated using pentylenetetrazole-, and strychnine-induced convulsion; antiamnesic using scopolamine-, and diazepam-induced amnesic models while the anxiolytic effect was assessed using elevated plus maze models. The phytochemical analysis was carried out using standard methods. **Results:** The extract at all the doses used significantly ($p<0.05$) elongated the death latency while at 400 mg/kg the onset of clonic and tonic convulsions were significantly ($p<0.05$) prolonged in pentylenetetrazole-induced convulsion model. The extract at 100, 200 and 400 mg/kg offered 60, 80 and 100% protection respectively in pentylenetetrazole-induced convulsion test. The extract showed no significant ($p>0.05$) effect on strychnine-induced convulsion model ruling out the involvement of strychnine-sensitive glycine receptor in the anticonvulsant effect of the extract. The extract at all the tested doses significantly ($p<0.05$) in a dose dependent fashion ameliorated the amnesia induced by scopolamine and diazepam suggesting antiamnesic effect. *Bambusa vulgaris* at all the tested doses significantly ($p<0.05$) in a dose dependent pattern increased the percentage open arm entries and percentage open arm duration on the open arm of the elevated plus maze as well as reduced the anxiety indices of the experimental mice consistent with anxiolytic effect. The phytochemical quantification of the extract showed abundance of tannins and corroborated by the findings from the Fourier transform infrared spectra of the extract. **Conclusion:** This study therefore concluded that *Bambusa vulgaris* may possess anticonvulsant, antiamnesic and anxiolytic effects and provided scientific proof for its traditional use.

INTRODUCTION

Epilepsy according to the World Health Organisation is a chronic non-communicable brain disorder characterized by seizure, which affect individuals of all age brackets (WHO, 2012; Kolawole *et al.*, 2012). The currently available antiepileptic drugs target GABAergic, serotonergic, noradrenergic and dopaminergic systems involved in inhibitory and excitatory signals in the brain (Kolawole *et al.*, 2012). Unfortunately, these antiepileptic drugs can only abolish seizure in nearly 70% of the patients suffering from epilepsy without complete remission in the remaining 30% of the epileptic patients (Sander, 2004).

Earlier research investigation has indicated that epilepsy can precipitate amnesia (Gallassi, 2006) and anxiety among other neuropsychiatric disorders (Uruaka and Georgwill, 2020).

Anxiety has earlier been described as "a psychological, physiological, and behavioral state induced in animals and humans by a threat to well-being or survival, either

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actual or potential." (Steimer, 2002). It is associated with a wide range of psychiatric conditions such as epilepsy and neurodegenerative disorders (Stein *et al.,* 1990). The major classes of drugs employed in the treatment of anxiety disorder are benzodiazepines and selective serotonin-reuptake inhibitors (SSRIs) (Parek and Chanda, 2006), but the undesirable effects linked with these classes of drugs (Kunovac and Stahl, 1995) have unfortunately limited their use.

The undesirable effect associated with the synthetic anxiolytic drugs (Kunovac and Stahl, 1995) and the inability of the currently available antiepileptic drugs to control epileptic seizure (Stein *et al.,* 1990), coupled with the untoward effects linked to acetylcholineesterase inhibitors used against amnesia (Baradaran *et al.,* 2012) have undoubtedly warranted the search for novel anticonvulsant, antiamnesic and anxiolytic medications probably from medicinal plants.

Bambusa vulgaris, commonly referred to as "Bamboo" (Carey *et al.,* 2009) is a member of the Poaceae family. Bamboo is a large perennial grass dispersed widely from tropical to subarctic zones (Ambika and Rajagopal, 2019) and commonly found in moist places such as the river banks (Khan and Hemalatha, 2015).

The different parts of bamboo such as leaf, shoot, stem and sap are used as medicine in folkloric medicine. In Nigerian folkloric medicine, bamboo is reported to be used in the management of gonorrhea, respiratory diseases, as arbotifacient, as well as an emmenagogue and appetizer (Yakubu and Bukoye, 2009). It is also used in Nigerian traditional medicine as anti-aging and memory enhancer (Elufioye *et al.,* 2012). In Indian folkloric medicine, the leaves are used in the treatment of various inflammatory conditions (Carey *et al.,* 2009). In Chinese ethnomedicine, bamboo is used to ease labor and placenta expulsion (Ambika and Rajagopal, 2019).

The anti-inflammatory (Carey *et al.,* 2009), antioxidant (Goyal *et al.,* 2013), arbotifacient (Yakubu and Bukoye, 2009), antimicrobial and antiproliferative (Ambika and Rajagopal, 2019) activities of *Bambusa vulgaris* have been reported.

This study aimed to investigate the anticonvulsant, antiamnesia and anxiolytic potentials of Bambusa vulgaris in mice upon its use in traditional medicine as anticonvulsant, memory enhancer and anxiolytic agent (Clark *et al.,* 1995; Ogunjimi *et al.,* 2009; Elufioye *et al.,* 2012).

MATERIALS AND METHODS

Plant identification, collection and authentication

Fresh leaves of *Bambusa vulgaris* were collected by Mr M.A Adebayo of the Department of Pharmacognosy, College of Pharmacy, Igbinedion University Okada. The collection was done within the temporary site of the Igbninedion University Campus Okada in Ovia North Eat Local Government of Edo State. The leaves were authenticated by Mr. G. A. Ademoriyo of the Herbarium Unit, Department of Botany, Faculty of Sciences, Obafemi Awolowo University, Ile-Ife and herbarium number IFE-17960 was obtained.

Extraction of plant material

The extraction protocols used in this study was as earlier reported (Velavan, 2015) with mild modification. Briefly, fresh leaves of *Bambusa vulgaris* were collected, shade dried and subsequently ground into powder with mechanical grinder. The powdered material was macerated in 70% methanol for 72 h. The resulting filtrate was concentrated *in vacuo* and subsequently freeze dried to yield 12.6 g (4.2 %) coded BV which was stored in a desiccator prior to use. The extract was dissolved with 3% Tween 80 and made up to the required volume with normal saline and prepared fresh on each day of the experiment.

Experimental animals

Adult male mice of between 18-25 g were purchased from the Central Animal House of the Igbinedion University Okada. The animals were fed with standard animal pellets with water *ad libitum*. The experimental guidelines followed in this research investigation were as approved and being implemented by the Igbinedion University Animal Ethical Committee which are in line with the internationally accepted principles for Laboratory Animal Use and Care (Waldegrave, 1986).

Drugs

Diazepam (DZP) (Roche, Basel, Switzerland); Pentylenetetrazol (PTZ), Strychnine (SCN), Scopolamine hydrobromide (SCOP), Piracetam (PIRAC), Tween 20 (Sigma Chemicals Co, St. Louis, Missouri, U.S.A.); Phenobarbitone (May and Baker, United Kingdom); and normal saline (Unique Pharmaceutical Limited, Lagos, Nigeria).

Spectrophotometric phytochemical estimation

The tannin content, total flavonoids, total phenols and total alkaloids in BV were estimated as earlier reported in literature (Akinpelu *et al.,* 2019a).

Spectroscopic analyses of BV

The extract was scanned at the wavelength range of 200-900 nm to obtain the UV-VIS spectrum of BV using UV spectrophotometer. The FT-IR spectrum of BV was obtained after mixing the extract with the spectra-grade potassium bromide (KBr) in the ratio of 1:100 and

pressed into pellet. The pellet was immediately introduced into the sample holder of Perkin Elmer Spectrophotometer. The Spectrophotometer was operated in the range 4000 – 300 cm^{-1} to detect the spectra data of the different functional groups present in the extract (Akinpelu *et al.,* 2019a).

General experimental design

Adult male albino mice were randomly sorted into five experimental groups (n=5). Group-I (negative control) mice received 3% Tween 80 in normal saline (10 mL/kg, p.o.). Group II-IV mice received BV (100, 200 or 400 mg/kg, p.o.), while Group-V received intraperitoneal injection of positive control drug such as piracetam (200 mg/kg, p.o.) for scopolamine and diazepam-induced amnesia; diazepam (1 mg/kg, i.p.) for anxiolytic and PTZ-induced convulsion experiments, while phenobarbitone (30 mg/kg, i.p.) was used as positive control drug in strychnine-induced convulsion model.

Anticonvulsant tests

Pentylenetetrazole (PTZ)- induced

One hour post oral ingestion of BV (100, 200 and 400 mg/kg) or half an hour post intraperitoneal treatment with diazepam (1 mg/kg), mice in all groups I-V mice were injected with the chemoconvulsant agent PTZ (85 mg/kg, i.p.). Immediately after the intraperitoneal injection of PTZ, each mouse was gently put in an observation cage and observed for 30 minutes duration for the onset of clonic, tonic convulsions and death time which were recorded with cut off time of 30 minutes and the mice that survived beyond 30 minutes were considered protected (Swinyard *et al.*, 1989; Akinpelu *et al.,* 2018).

Strychnine (SCN)-induced convulsion

The experiment was carried out as above for PTZ-induced convulsion except that strychnine (4 mg/kg, i.p.) was used as chemoconvulsant (Swinyard *et al.,* 1989) and phenobarbitone (30 mg/kg, i.p.) as positive control drug in this model (Akinpelu *et al.,* 2018).

Antiamnesic tests

Scopolamine-induced amnesia

Thirty minutes after oral ingestion of normal saline (10 mL/kg) in group I, BV (100, 200 and 400 mg/kg, p.o.) in groups II-IV and piracetam (200 mg/kg, p.o.) in group V, scopolamine (1 mg/kg) was intraperitoneally injected to each mouse in groups I-V, thirty minutes after scopolamine injection, each mouse was observed on Y-maze (40 x 3 x 12) with angles of 120^0 between each of the three arms and the sequence of arms visited on consecutive choices in 8 minutes was recorded. The number of triads was recorded as 'percentage alternation' which indicates the assessment of short-term memory (Sarter *et al.,* 1988; Akinpelu *et al.,* 2020), according to this equation: An alternation is defined as an entry into all three arms on consecutive choices% Alternation = [(Number of alternations)/ (Total arm entries -2)] x 100.

Diazepam-induced amnesia

The experiment was carried out as above for scopolamine-induced amnesia, but diazepam (1 mg/kg, i.p.) was administered to induce amnesia instead of scopolamine (Akinpelu *et al.,* 2020).

Anxiolytic test

Elevated plus maze (EPM):

The test was conducted as recently carried out and reported in literature (Akinpelu *et al.,* 2019a). After the respective oral ingestion with BV or intraperitoneal administrations with piracetam, each mouse was singly placed in the central square of the EPM facing one of the open arms and the number of entries into the open arm and the time spent on the open arm were noted with a stopwatch and recorded manually for a period of 5 minutes.

The open arm avoidance index interpreted as level of anxiety (Trullas and Skolnick, 1993) is calculated as

$$\frac{(100 - (\%\ \text{time in open arm} + \%\ \text{entries into open arm})}{2}$$

Statistical analysis

Results are expressed as mean ± S.E.M and analysed using one-way analysis of variance (ANOVA), followed by Dunnett's post hoc analysis. GraphPad InStat® Biostatistics software (GraphPad Software, Inc., La Jolla, USA) was employed as the statistical tool. The level of significance for all tests was set at $p < 0.05$ compared to the control group.

RESULTS

Effect of Bambusa vulgaris on PTZ-induced convulsion model

The extract at 100 and 200 mg/kg showed significant ($p<0.05$) prolongation of death time and offered 60 and 80% protection respectively compared to the control which offered 0% protection. The extract at 400 mg/kg significantly ($p<0.05$) elongated the onset of clonic, tonic convulsions, death latency and offered 100% protection. The result is presented in Table 1.

Effect of Bambusa vulgaris on SCN-induced convulsion model

The extract at all the doses used elongated the onset of clonic, tonic convulsions and death time but not

Table 1: Effect of BV on PTZ-, and SCN-induced convulsions in mice.

Treatment Dose (mg/kg)	Onset of convulsion (s) clonic	tonic	Death latency	% protection
Control (10 mL/kg) + PTZ	59.6 ± 4.4	245.2 ± 50.1	310.2 ± 54.1	0
DZP + PTZ	1800.0 ± 0.0*	1800.0 ± 0.0*	1800.0 ± 0.0*	100
BV (100) + PTZ	89.6 ± 3.5	704.8 ± 275.4	1246.4 ± 339.7*	60
BV (200) + PTZ	93.0 ± 8.2	457.0.0 ± 34.7	1535.2 ± 264.8*	80
BV (400) + PTZ	167.0 ± 27.3*	1027.6 ± 324.0*	1800.0 ± 0.0*	100
Control (10 mL/kg) + SCN	126.8 ± 3.6	141.6 ± 6.9	151.2 ± 8.5	0
PHENO (30) + SCN	294.4 ± 17.0	1013.2 ± 336.6	1060.0 ± 314.4	50
BV (100) + SCN	166.0 ± 19.9	179.6 ± 19.0	192.0 ± 19.4	0
BV (200) + SCN	179.6 ± 16.1	200.0 ± 21.3	227.8 ± 22.6	0
BV (400) + SCN	163.0 ± 9.5*	180.0 ± 9.21*	288.0 ± 4.4*	0

Values are Mean ± SEM, ANOVA; one-way analysis of variance followed by Dunnett's post hoc Test, n=5, *p<0.05 compared to control (ANOVA; Dunnett's post hoc test).

significant (p>0.05) from the control treated mice. No protection was as well offered at the the tested doses. However, Phenobarbitone (30 mg/kg, i.p., a positive control drug) significantly (p<0.05) prolonged the onset of clonic, tonic convulsions, death latency and offered 50% protection. The result is presented in Table 1.

Effects of BV on percentage alternation in scopolamine-induced amnesia on Y-Maze task.

Scopolamine significantly (p<0.05) lowered the percentage correct alternation on Y-maze when compared to the control treated control group. However, BV significantly (p<0.05) and in a dose dose dependent pattern increased the reduced alternation induced by Scopolamine when compared to the Scopolamine treated control group. Piracetam, a positive control drug significantly (p<0.05) reversed the reduced alternation induced by Scopolamine in mice. The result is presented in Fig. 1 (Panel A).

Effects of BV on percentage alternation in Diazepam-induced amnesia in Y-Maze task.

Diazepam showed significantly (p<0.05) reduction in the percentage correct alternation on Y-maze when compared to the control treated control group. However, BV showed significant (p<0.05) reversal in a dose dependent manner the reduced alternation induced by Diazepam when compared to the Diazepam treated control group. Piracetam, a positive control drug significantly (p<0.05) attenuated the reduced alternation

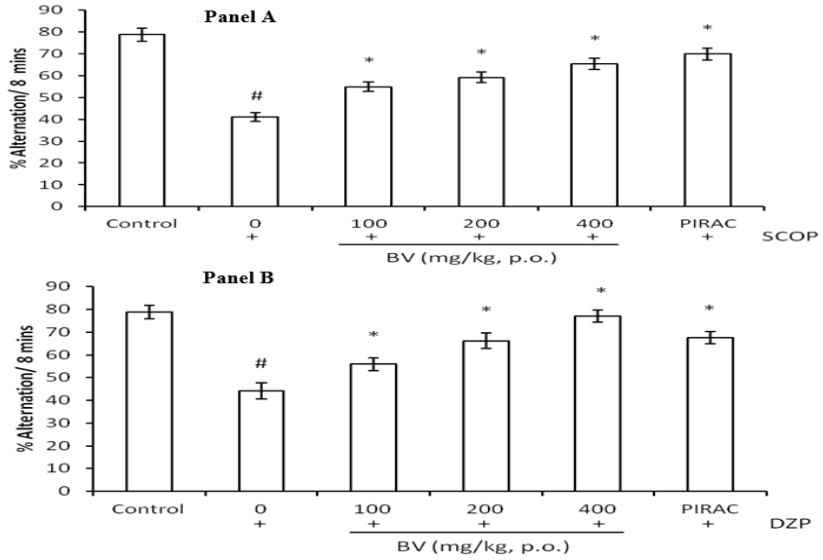


Fig. 1: Effect of *Bambusa vulgaris* on percentage alternation in scopolamine-induced amnesia (Panel A) and diazepam-induced amnesia (Panel B) in mice. Each bar represents Mean ± SEM, n=5. #p<0.05 and *p<0.05 compared to the control and scopolamine scopolamine (Panel A) or diazepam (Panel B) treated mice respectively (ANOVA; Dunnett's post hoc test).

induced by Diazepam in mice. The result is presented in Fig. 1 (Panel B).

Effect of Bambusa vulgaris on percentage open arm entries

The extract significantly (p<0.05) and dose dependently increased the percentage number of entries into the open arm of the elevated plus maze when compared to the control mice. The effect of the extract at 400 mg/kg is comparable to diazepam (1 mg/kg, i.p., a positive control drug). The result is presented in Fig. 2 (Panel A).

Effect of Bambusa vulgaris on percentage open arm duration

The extract of *Bambusa vulgaris* significantly (p<0.05) and dose dependently increased the percentage time

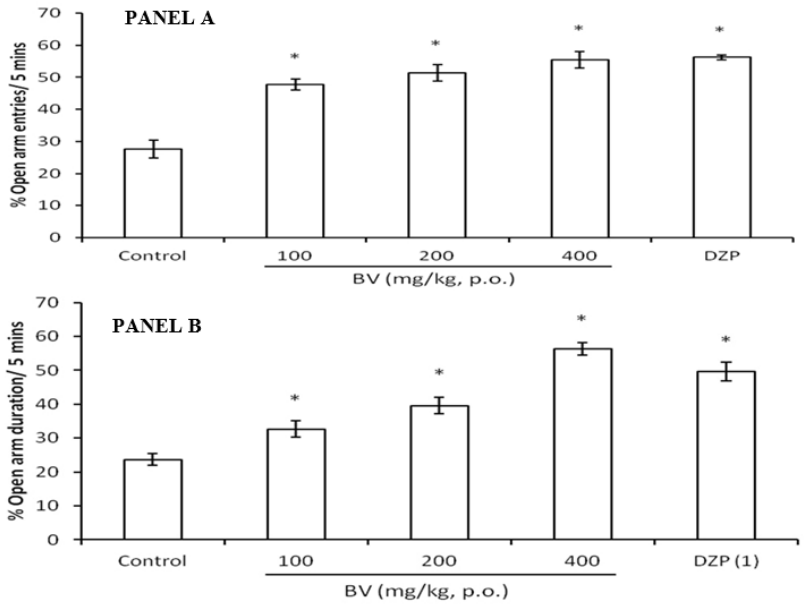


Fig. 2: Effect of *Bambusa vulgaris* on percentage open arm entries (Panel A) and Percentage open arm duration (Panel B) on elevated plus maze. Each bar represents Mean ± SEM, n=5. *p<0.05 compared to the control treated mice.

Table 2: Quantitative phytochemical analysis of methanol leaf extract of *Bambusa vulgaris*

Tannin content	243.35 ± 9.10 mg of GAE /g of extract
Total flavonoid content	120.11 ± 4.70 mg QE/g extract
Total phenols	27.25 ± 0.65 mg GAE/g extract
Total Alkaloid content	3.52 ± 0.08 mg of AE/g of extract

Values are means of triplicate determination ± Standard deviation; where AE is atropine equivalent, GAE is gallic acid equivalent, QE is quercetin equivalent and AE is atropine equivalent respectively.

spent on open arms of the elevated plus maze when compared to the control mice. The effect of the extract at 400 mg/kg is comparable to diazepam (1 mg/kg, i.p., a positive control drug). The result is presented in Fig. 2 (Panel B).

Effect of Bambusa vulgaris on open arm avoidance index (OAAI)

The extract showed at least a ten-point reduction in anxiety index of open arm avoidance index in a dose dependent manner when compared to the control treated mice. The effect of the extract at 400 mg/kg is comparable to diazepam (1 mg/kg, i.p., a positive control drug). The result is resented in Fig. 3.

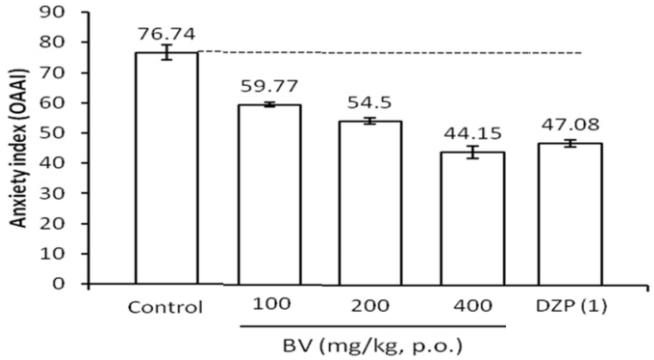


Fig. 3: Effect of *Bambusa vulgaris* on anxiety index on elevated plus maze. Each bar represents Mean ± SEM, n=5. If the anxiety index is at least 10 point less than the vehicle treated control group, the sample is anxiolytic, conversely if the anxiety index is at least 10 points greater than the vehicle treated control group, then the sample is anxiogenic.

Result of quantitative phytochemical quantification of Bambusa vulgaris

The result showed that Tannin content > total flavonoids > total phenols > total alkaloids. The result is presented in Table 3.

UV-VIS Spectrum Peak values of BV

The UV-VIS spectrum of BV showed absorption peaks at 209.0, 296.5, 349.0, 490.0, 496.5, 556.5, 604.0, 663.5, 680.5, 691.0, 718.0, 725.0, 732.5, 752.5, 760.5, 766.5,

Table 3: FTIR profile of methanol leaf extract of *Bambusa vulgaris*

Frequency (Wave number cm^{-1}) BV	Frequency (Wave number cm^{-1}) Reference	Functional group	References
3302.4	3500 - 3200	O-H stretch	(Theivandran *et al.*, 2015)
2944.6	3000 - 2800	C-H stretch	(Akinpelu *et al.*, 2019a)
2832.8	2850 - 2815	C-H stretching	(Akinpelu *et al.*, 2019a)
1636.3	1650 - 1600	C=O stretch	(Hemmalakshmi *et al.*, 2017)
1449.9	1510 - 1450 ring stretch	C=C-C aromatic (Arockia *et al.*, 2017)	
1397.8	1410 – 1310	O-H bend alcohol	(Hemmalakshmi *et al.*, 2017)
1338.8	1360 – 1210	C-H sretch	(Hemmalakshmi *et al.*, 2017)
1110.7	1110.7	C-O stretch	(Senthilkumar *et al.*, 2017)
1017.6 C-OH stretches	1019 - 1014 (Senthilkumar *et al.*, 2017)	C-O, C-N,	
641.1	690 - 550	C-Br stretch	(Lingegowda *et al.*, 2012)

797.5, 837.5, 849.0, 863.0 and 888.5 nm and the absorption of 3.776, 0.681, 0.463, 0.027, 0.021, 0.010, 0.005, 0.010, 0.010, 0.003, 0.002, 0.002, 0.001, 0.005, 0.007, 0.004, 0.003, 0.003, 0.005, 0.006 and 0.004 respectively (Fig. 4).

FTIR spectrum of BV

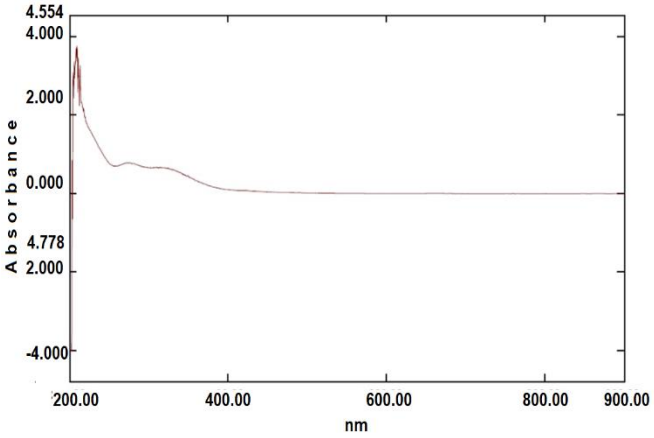
Table 2 revealed the FTIR spectrum of BV which showed characteristic bands at 3302.4, 2944.6, 2832.8, 1636.3, 1449.9, 1397.8, 1338.1, 1110.7, 1017.6 and 641.1 cm^{-1}. The result is presented in Table 4.

DISCUSSION

The present investigation assessed the anxiolytic and anticonvulsant potentials of methanol leaf extract of *Bambusa vulgaris* and the probable phytocompounds responsible for these pharmacological effects. The extract demonstrated anticonvulsant, antiamnesic and anxiolytic effects with tannins being the most abundant phytoconstituents assayed.

The prolongation of the onset of clonic, tonic convulsions and death latency coupled with the varying degree of protection at the tested doses in PTZ-induced convulsion model suggest that the extract may possess anticonvulsant effect. This finding is in consonance with earlier suggestion of medicinal plant agent that showed anticonvulsant effect in PTZ-induced convulsion in mice (Akinpelu *et al.*, 2018).

The anticonvulsant effect of the extract may be acting via GABA$_A$-benzodiazepine receptor neurotransmission since GABAergic pathway is key to the anticonvulsant potential of medicinal agents in PTZ induced convulsion models (Akinpelu *et al.*, 2018).



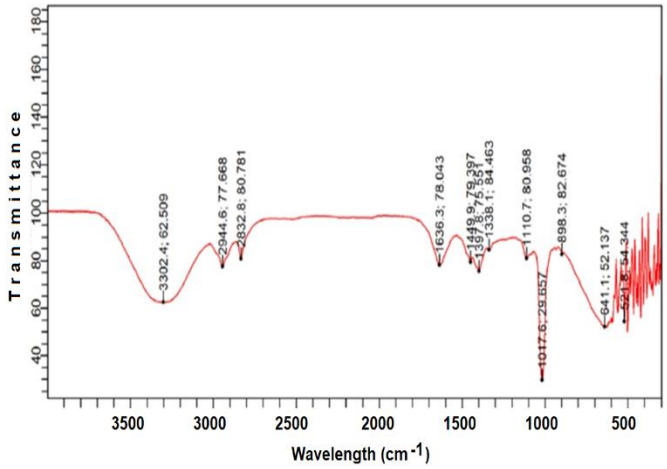


Fig. 4 (Left): UV-VIS spectrum profile of methanol leaf extract of *Bambusa vulgaris*
Fig. 5 (Right): FTIR spectrum profile of methanol leaf extract of *Bambusa vulgaris*

The amelioration of the amnesia induced by scopolamine and diazepam by the extract suggests that the extract may have antiamnesic effect probably acting via central muscarinic cholinergic and/or GABA$_A$-BDZ receptor neurotransmission to elicit the observed antiamnesic effects. Since scopolamine induces memory impairment via acting as an antagonist action at the central muscarinic cholinergic receptor, while diazepam induces memory deficit either via acting as either agonist or antagonist at the central GABA$_A$-benzodiazepine receptor pathway (GABA$_A$-BDZ) since GABA$_A$-BDZ receptor complex have been earlier reported to control the release of acetylcholine (Vazquez and Baghdoyan, 2003), a neurotransmitter pivotal to learning and

memory (Halsemo et al., 2006). The finding of this study is in accordance to the earlier reports of medicinal plants with antiamnesic effects in mice (Akinpelu *et al.,* 2019a; 2020).

The increase in number of open arm entries and time spent on the elevated plus maze suggest that the extract may have anxiolytic effect since increase in these parameters by medicinal plant has been attributed to an anxiolytic effect in previous report (Akinpelu *et al.,* 2019a). Although it was not part of the objective of this study, but it is of interest to note that methanol leaf extract of Bambusa vulgaris extracted with soxhlet extraction showed anti-anxiety effect at the higher intraperitoneal dose of 400 mg/kg in mice (Kaur et al., 2019), but our study of the methanol leaf extract extracted with cold maceration showed anti-anxiety effect at the three tested doses of 100, 200 and 400 mg/kg via oral route in mice

The extract may be exerting its anxiolytic effect via $GABA_A$-benzodiazepine receptor neurotransmission since elevated plus maze has been reported to be sensitive to agents acting via this pathway (Nutt and Maizia, 2001).

The qualitative phytochemical screening of medicinal plant extracts provides evidence for the existence of phytochemicals in such extracts while phytochemical estimation gives the quantity of each phytochemical in a given plant extract. The quantitative phytochemical quantifications of BV in different extraction solvents have yielded different results. For instance, the aqueous leaf extract of BV have been shown to largely contain alkaloids with flavonoids being the least, whereas the pet ether extract showed the presence of phytosterols and tannins (Yakubu and Bukoye, 2009). Our result of phytochemical estimation of the methanol leaf extract showed tannins to be the most abundant and total alkaloids to be the least and subsequently provide corroborative quantitative data on the qualitative analysis of the methanol leaf extract earlier reported (Coffie *et al.,* 2014).

Earlier report has attributed the UV/vis absorption maxima in the range of 300-350, 330-420, and 400-550 to the existence of flavonoids, phenolic acid and their derivatives and terpenoids respectively (Akinpelu *et al.,* 2019a). Since these absorption UV/vis absorption spectra were also found in BV, it would therefore not be out of place to also suggest that BV contained these phytocompounds. The absorption peaks in UV region 400-420 nm and 600-660 nm may be attributed to quinones and chlorophylls respectively (Bunghez *et al.,* 2013; Akinpelu *et al.,* 2019b).

Earlier report on FT-IR broad absorption spectra in the region of 3550–3100 cm^{-1} has been linked to the OH stretch vibration of benzene nucleus and methylol group of tannin (Rajeswari and Jothiprakasam, 2017). Moreso that BV contained functional groups such as O-H, C-H, C=O, C=O-C aromatic and C-O earlier shown to be present in tannins (Grasel *et al.,* 2015). These functional groups could further support the abundance of tannins and other phenolic compounds quantitatively assayed in the extract.

CONCLUSION

This study concluded that *Bambusa vulgaris* may possess anxiolytic and anticonvulsant effect. This study further concluded that tannin either in additive or synergy with other plant secondary metabolites may be responsible for the observed pharmacological potentials.

ACKNOWLEDGEMENTS

Authors are grateful to Mr. Ademoriyo G.A. of the department of Botany of the Obafemi Awolowo University Ile-Ife for authenticating the plant and Mr Akpan Nya of the Central Animal House of the Igbinedion University, Okada for his assistance.

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