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ANTIARRHYTHMIC EFFECT OF BARK AQUEOUS EXTRACT OF *ISOBERLINIA TOMENTOSA* ON RABBIT ECG

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ABSTRACT

Isoberlinia Tomentosa is a pharmacopoeia plant used in traditional medicine to treat heart disease and arterial hypertension. This study was carried out to evaluate the pharmacological effects of an trunk bark aqueous extract of *Isoberlinia tomentosa* (Isobt) on cardiac arrhythmia in rabbits. Results showed that atropine did not significantly ($p>0.05$) affect Isobt-induced bradycardia. On induced arrhythmia, Isobt significantly ($p<0.001$) reduced its duration by 96.6%, with an Arrhythmia Reducing Concentration 50 (RC_{50}) of 11.57 mg/kg B.W. Administered prior to arrhythmia induction, the extract reduced the duration by 89.1%, with an RC_{50} of 15.07 mg/kg B.W. *Isoberlinia tomentosa* therefore acts via β-adrenergic receptors as a beta-blocker to reduce cardiac activity. These results justify its use in the treatment of heart disease and hypertension.

KEYWORDS: *Isoberlinia tomentosa*, electrocardiogram, arrhythmias, beta-blockers.

1. INTRODUCTION

Medicinal plants have a reputation for total safety, generally based on a long tradition of use, which largely explains their use.[1] In Africa, according to the WHO, some 80% of the population of developing countries, due to poverty and lack of access to modern medicine, depend essentially on medicinal plants for their primary health care.[2] However, several reports around the world have revealed serious side effects recorded following the use of medicinal plants.[3] Thus, around the world studies are being initiated on these medicinal plants in order to lay scientific foundations for their uses. With this in mind, numerous studies are being undertaken on plants involved in the traditional treatment of heart disease. These include *Hibiscus sabdariffa* (Malvaceae).[4] and *Mimosa invisa* (Fabaceae).[5] The WHO estimates

that 17.7 million deaths are attributable to cardiovascular disease, representing 31% of all deaths worldwide. Of these deaths, 7.4 million are thought to be due to coronary heart disease and 6.7 million to stroke[6]

Thus, in this study, *Isoberlinia tomentosa* (Fabaceae), a plant used in traditional medicine for the treatment of various pathologies including hypertension and heart disease in the northern region of Côte d'Ivoire. In this study, the bark aqueous extract of Isoberlinia tomentosa will be administered before and after induction of arrhythmia with Isoprenalin, in order to verify its effects on the rabbit electrocardiogram.

2. MATERIALS AND METHODS

MATERIAL

Plant

The plant consists of *Isoberlinia tomentosa* (Fabaceae) bark collected in the town of Doropo in the period January 2023. It was identified at the National Floristic Center (NFC) of the Felix HOUPHOUET-BOIGNY University in comparison with the herbarium UCJ009434 of this Centre.

Animals

The rabbits used belong to the species *Oryctolagus cuniculus* (Leporidae). They come from various breeding farms in Abidjan (Ivory Coast). They were acclimatized for a week at the UFR Biosciences animal house at the Felix HOUPHOUET-BOIGNY University. Only rabbits weighing 2 kg or more are used for pharmacological tests. Animal care and handling comply with ethical requirements for scientific purposes, in accordance with international guidelines on ethics in animal experimentation (DIRECTIVE 2010/63/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of September 22, 2010 on the protection of animals used for scientific purposes) applied to the Biology and Health Laboratory of the Felix HOUPHOUET-BOIGNY University.[7]

Physiological and pharmacological substances

As physiological solution, we used NaCl 9 ‰ for dissolution and dilution of the extract and pharmacological substances. The pharmacological substances used in this work are Heparin Choay (5000 IU) (Sanofi, France) an anticoagulant. Thiopental Inresa (Neon Laboratory Limited, India) for animal anesthesia. Atropine a cholinergic antagonist. Isoprenalin cloridrato monico manufactured in (Aguettant, France) for induced arrhythmia.

METHODS

Preparation of the bark aqueous extract of *Isoberlinia tomentosa*

To prepare the aqueous extract of *Isoberlinia tomentosa*, 100 g dried bark powder is placed in 2 L distilled water and macerated for 24 h under magnetic stirring. The macerate is filtered first on white cloth (poplin), then three times on absorbent cotton and once on Whatman n°2 filter paper. The filtrate collected is oven-dried (Thermo SCIENTIFIC VT 6060 M Y6, Germany) at 40°C for 72 hours. The dry bark aqueous extract of *Isoberlinia tomentosa* (Isobt) is brown in color.

Study of effect of Isobt on rabbit ECG

Animal preparation

The method used is that of Abo.[8] The rabbit is anesthetized by injection into the lateral marginal vein with thiopental at a concentration of 0.5 g/mL, depending on the animal's body weight. The saphenous vein is catheterized for injection.

The armpits of the two forelimbs and the groin of the two hind limbs of the rabbit are shaved and cleaned with 90° ethyl alcohol. These shaved areas were coated with a conductive gel (Ultrasound gel KONIX, USA) and four electrodes were placed on them.

Study of the interaction of *Isoberlinia tomentosa* bark aqueous extract and Atropine on the ECG

In this study, atropine doses of 5 10^{-7}; 5 10^{-5} and 5 10^{-3} mg / kg B.W. were pre-administered to rabbits before the single Isobt dose of 30 mg / kg B.W.

The ECG resulting from this interaction was recorded on paper using a CAM CHIM (China) cardiograph.

Study of the post- and pre-treated antiarrhythmic effect of bark aqueous extract of *Isoberlinia tomentosa* on the ECG

In these studies, a single dose of Isoprenalin of 0.1 µg / kg B.W. is prepared in 9 ‰ NaCl according to the modified method of Ayenon.[9] For the pretreated arrhythmia, increasing doses of the extract of 1; 5; 10; 15; 20; 30 mg / kg B.W. are administered individually 10 seconds before the single dose of Isoprenalin during the corresponding ECG recording.

And the post-treatment arrhythmia study is performed by administering the single dose of Isoprenalin before the same increasing doses of Isobt.

A time interval of 15 minutes is observed between administration series.

Statistical analysis

GraphPad Prism 5.01 (San Diego CA, USA) is used for statistical analysis of results. Results are processed by analysis of variance (Anova), followed by Dunnett's multiple comparison test. The difference between two values is considered significant for ($P < 0.05$). Values are presented as the mean followed by the error on the mean (M ± ESM). This software was used for statistical processing of the various ECG parameters. GraphPad Prism version 5.01 (San Diego CA USA) was used to plot the graphs. ECG graphs and diagrams are XY for curves and column for diagrams.

RESULTS

Effect of bark aqueous extract of *Isoberlinia tomentosa* (Isobt) in interaction with Atropine on rabbit ECG

The amplitude of the P, T waves of the normal recording is 0.31 ± 0.021 mV; 0.11 ± 0.02 mV. After injection of Isobt alone, the amplitude of these waves decreased significantly ($p<0.05$; $p<0.001$) compared with the Normal recording by 41.29% and 23.2%. Administration of Isobt 30 mg / kg B.W. resulted in a significant ($p < 0.05$) lengthening of the PR interval by 10.67%, compared with 130.2 ± 1.6 ms in the normal recording.

On the normal recording, the amplitude of the QRS complex is 0.927 ± 0.1 mV. The 30 mg / kg B.W. dose alone resulted in a significant ($p < 0.01$) decrease in QRS complex amplitude of 67.63% compared with the normal recording. The normal heart rate obtained in this study was 252.4 ± 4.6 bpm, whereas the Isobt dose of 30 mg / kg B.W. alone resulted in a significant ($p < 0.01$) decrease of 14.67%.

When Atropine doses of 5.10^{-7}; 5.10^{-5} and 5.10^{-3} mg / kg B.W. were each administered before Isobt 30 mg / kg B.W., all these parameters did not vary significantly ($p > 0.05$) compared with the variations obtained with the extract alone.

The variations observed in the amplitude of the P and T waves and the PR interval are presented in **Table 1.**

Figures 1, 2 and 3 show recordings of Isobt at a dose of 30 mg / kg B.W. alone and those following pre-administration of Atropine at doses of 5.10-7 mg / kg B.W., 5.10-5 mg / kg B.W. and 5.10-3 mg / kg B.W.

Table 1: Variation of P and T waves and interval in the interaction of 30 mg/kg BW of Isobt and increasing doses of Atropine.

Doses (mg / kg de B.W.)	P Wave (mv)	T Wave (mv)	PR Interval (ms)
Normal	0.31 ± 0.02	0.17 ± 0.01	130.2 ± 1.6
30 mg / kg B.W.	0.18.2 ± 0.01 ***	0.11 ± 0.02**	135.7 ± 1.2 *
Atr 5.10^{-7} mg / kg B.W. puis 30 mg / kg B.W.	0.18 ± 0.02 ***	0.12 ± 0.02**	136.2 ± 1.4 *
Atr 5.10^{-5} mg / kg B.W. puis 30 mg / kg B.W.	0.182 ± 0.02 ***	0.11 ± 0.01**	135.7 ± 1.7 *
Atr 5.10^{-3} mg/ kg B.W. puis 30 mg / kg B.W.	0.185 ± 0.02 ***	0.11 ± 0.01**	137.7 ± 0.7 *

* : P < 0.05 ; ** : P < 0.01 ; *** : P < 0.001

n = 3

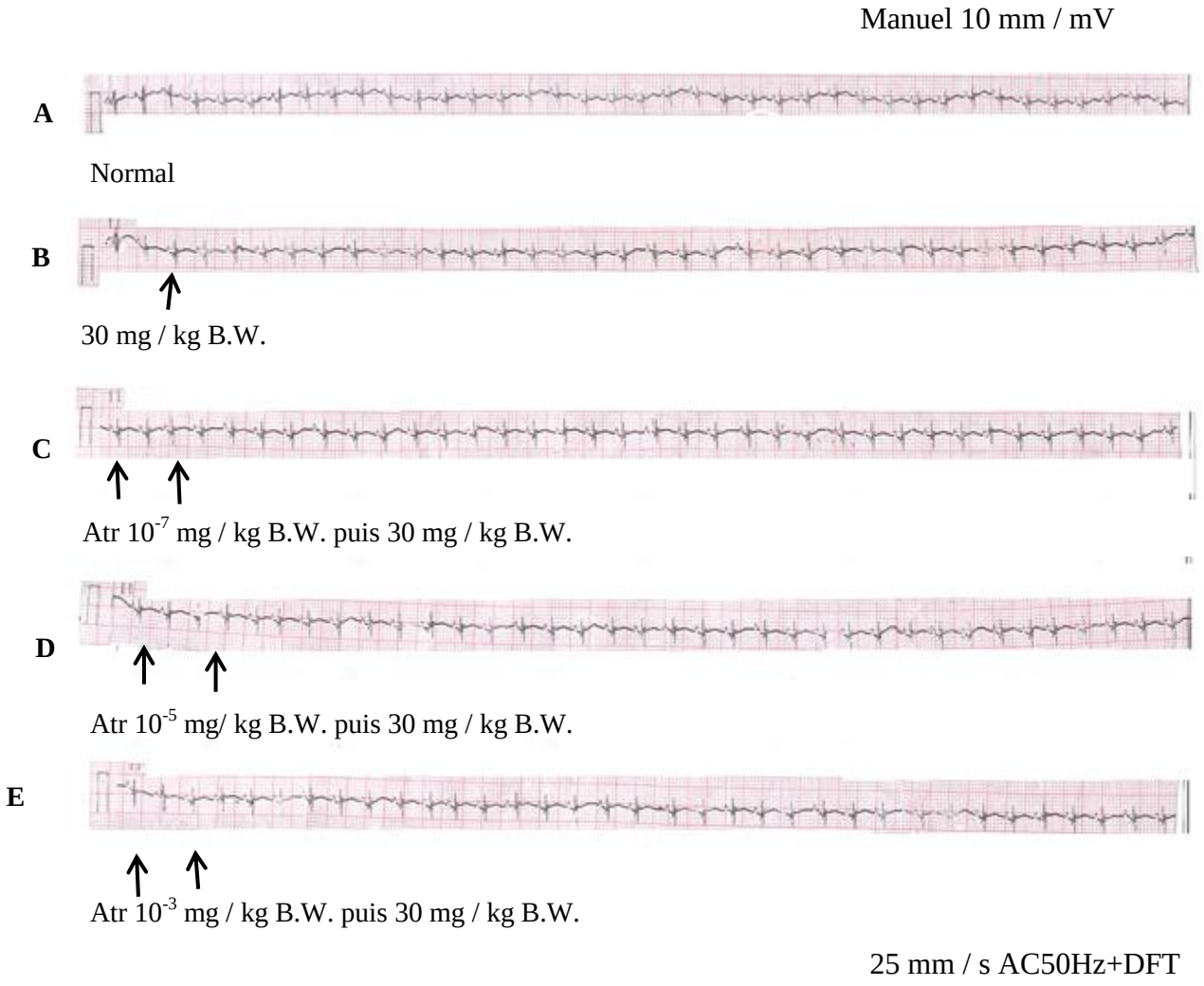

Figure 1: Recording of the interaction of 30 mg/kg BW of Isobt with increasing doses of Atropine.

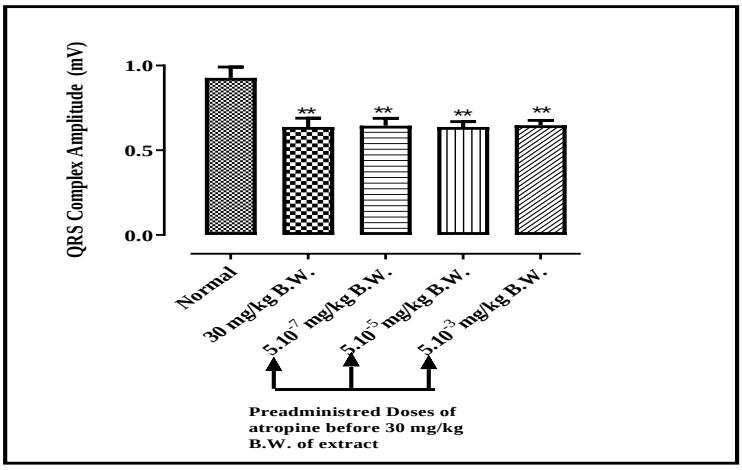

Figure 2: Variation in QRS complex amplitude during the interaction of 30 mg/kg BW of Isobt and increasing doses of Atropine.

***: P < 0.01 Compared to Normal*
n = 3

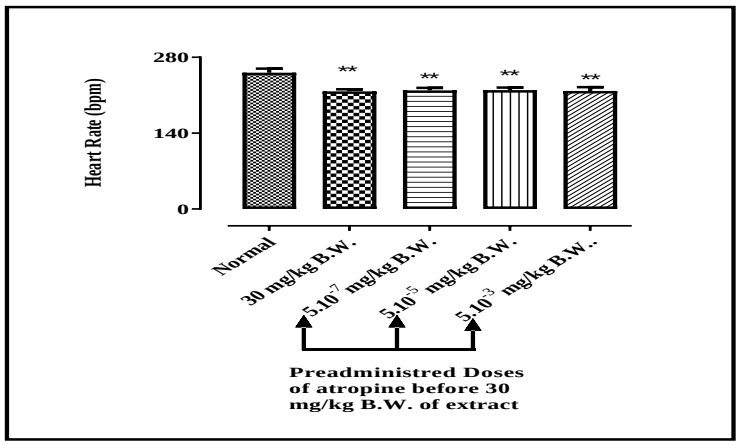

Figure 3: Heart Rate variation during the interaction of 30 mg/kg BW of Isobt and increasing doses of atropine.

***: P < 0.01 Compared to Normal*
n = 3

Effect of Isobt on Isoprenalin-induced arrhythmia

Anti-arrhythmic effect of Isobt on P and T wave and PR interval

Figure 4 shows the recording demonstrating the dose-response effect of Isobt on Isoprenalin-induced arrhythmia. The normal ECG from this series of experiments shows that the amplitude of the P and T waves and the duration of the PR interval are 0.147 ± 0.005 mV; 0.079 ± 0.006 mV and 114 ± 2.449 ms respectively.

When Isoprenalin 0.1 µg / kg B.W. is injected alone, these ECG parameters are significantly reduced ($p < 0.05$; $p < 0.001$) compared with normal recording. P and T wave amplitude and PR interval duration obtained were 76.19%; 73.41% and 24.12%.

Isobt doses of 20 and 30 mg / kg B.W. administered 5 seconds after the Isoprenalin dose resulted in a significant increase ($p < 0.05$; $p < 0.01$) in P and T wave amplitude and PR interval duration compared with Isoprenalin alone. The greatest variations were obtained with the 30 mg / kg B.W. dose and were 128.57%; 89.10%; 28.32% for P and T waves and PR interval duration respectively. Variations in P and T waves and PR interval are shown in **Table 2.**

Table 2: ECG parameter values in the treated patient after induction of arrhythmia with Isoprenalin.

Doses Isobt en mg / kg B.W.	P Wave (mv)	T Wave (mv)	PR Intervalle (ms)
Normal	0.147 ± 0.005	0.079 ± 0.006	114 ± 2.449
Iso 0.1 µg / kg B.W.	0.035 ± 0.008 ***	0.021 ± 0.0030 ***	86.5 ± 4.481 **
Iso 0.1 µg / kg B.W. puis 1 mg / kg B.W. Isobt	0.042 ± 0.011	0.022 ± 0.0032	102.2 ± 4.131
Iso 0.1 µg / kg B.W. puis 5 mg / kg B.W. Isobt	0.05 ± 0.009	0.025 ± 0.004	104.7 ± 4.553
Iso 0.1 µg / kg B.W. puis 10 mg / kg B.W. Isobt	0.06 ± 0.012	0.028 ± 0.0039	105.2 ± 5.121
Iso 0.1 µg / kg B.W. puis 15 mg / kg B.W. Isobt	0.062 ± 0.022	0.031 ± 0.0037	106 ±5.986
Iso 0.1 µg / kg B.W. puis 20 mg / kg B.W. Isobt	0.01 ± 0.016 $*_1$	0.048 ± 0.0038 $*_1$	107.7 ± 4.905
Iso 0.1 µg / kg B.W. puis 30 mg / kg B.W. Isobt	0.012 ± 0.008 $**_1$	0.055 ± 0.002 $**_1$	111 ± 2.799 $*_1$

****: (P < 0.001): compared to normal recording*
**1: (P < 0.05); **1 (P < 0.01): compared to the effect of Isoprenalin 0.1 µg/kg BW alone*

Antiarrhythmic effect of Isobt on heart rate

The diagram in **Figure 5** shows the effect of Isoprenalin alone and increasing doses of Isobt on Isoprenalin-induced changes in heart rate.

The normal rabbit ECG in this study gives a heart rate of 285.5 ± 5.4 bpm. The dose of Isoprenalin produced a significant ($p < 0.01$) 18.82% increase in heart rate when injected alone, compared with normal heart rate.

Doses of 15; 20 and 30 mg / kg B.W. significantly ($P < 0.001$) decrease the heart rate obtained with Isoprenalin. Thus, the heart rate value is 35.51; 41.34 and 51.73%.

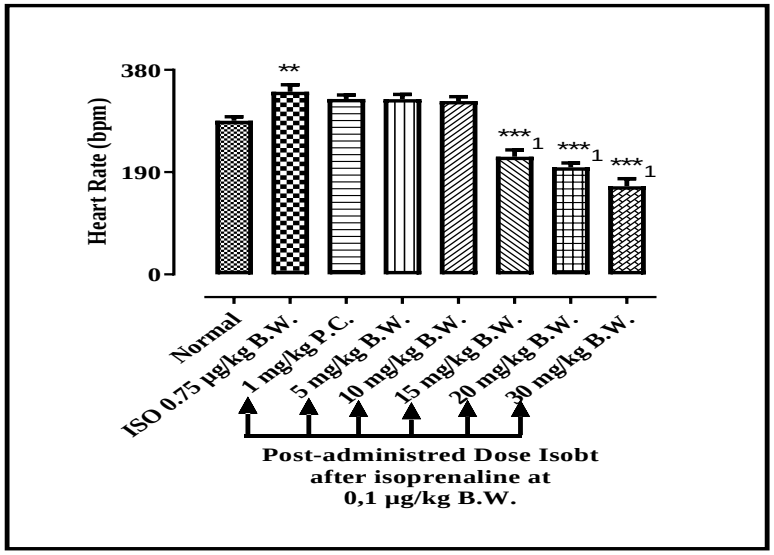

Figure 5: Heart Rate variation in rabbits following Isobt treatment of Isoprenalin-induced arrhythmia.

***: P < 0.01; compared to normal ECG*
****1: P < 0.001: compared to the effect of Isoprenalin*

Antiarrhythmic effect of Isobt on QRS complex amplitude

QRS complex amplitude decreases significantly ($p < 0.001$) with Isoprenalin by 76.90% compared with the normal amplitude of 0.485 ± 0.02 mV. Isobt doses of 20 and 30 mg / kg B.W., administered after Isoprenalin, resulted in a significant ($p < 0.05$; $p < 0.01$) increase in QRS complex amplitude compared with the effect of Isoprenalin alone. The increases in QRS complex were 81.81% and 123.21% respectively.

The variations in QRS complex amplitude obtained are shown in the diagram in **Figure 6**.

Effect of Isobt on duration of Isoprenalin-induced arrhythmia

At a single dose of 0.1 µg / kg B.W., Isoprenalin induced an arrhythmia lasting 64.81 ± 4.41 s (n = 3). When this dose of Isoprenalin was followed, 10 s later, by Isobt from 1 to 30 mg / kg B.W., the duration of the arrhythmia induced by Isoprenalin decreased significantly ($p < 0.01$; $p < 0.001$) from 0.16 ± 2.06% to 92.18 ± 4.35% compared with the duration of the arrhythmia induced by Isoprenalin alone.

A graphical representation of the effects of Isobt on induced arrhythmia is shown in Figure 6. In the presence of Isobt, the 50% Reducing Concentration (RC_{50}) of the duration of arrhythmia induced by Isoprenalin is 11.173 ± 0.577 mg/kg B.W.

All the variations observed in this study are shown on the record in **Figure 7**.

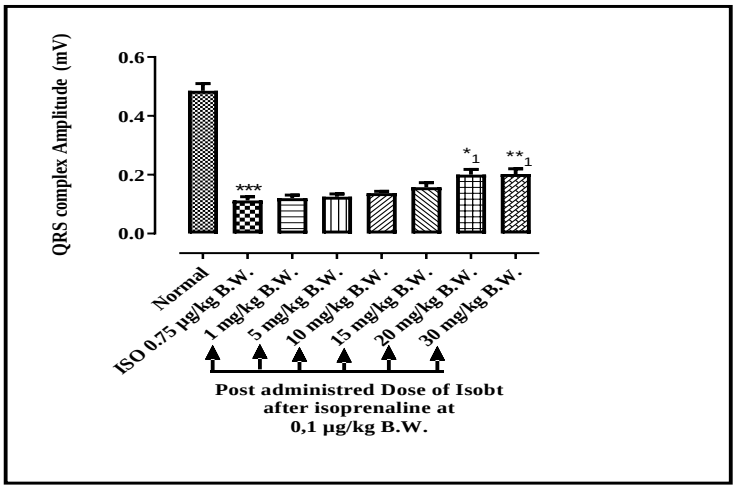

Figure 5: Change in QRS complex amplitude in rabbits following Isobt treatment of Isoprenalin-induced arrhythmia.

****: P < 0.01; compared to normal ECG*

**1: P < 0.05; **1: P < 0.001: compared to the effect of isoprénaline*

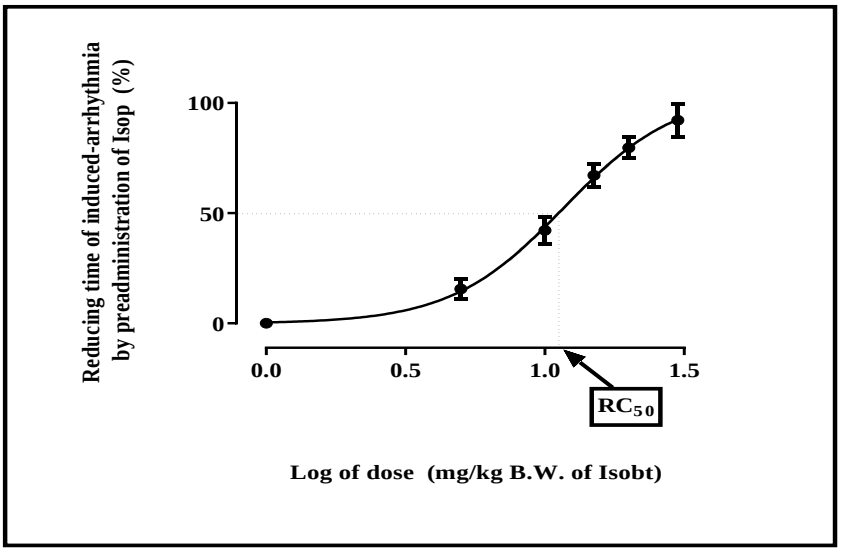

Figure 6: Percentage reduction in the duration of arrhythmia induced by Isoprenalin in pre-administration.

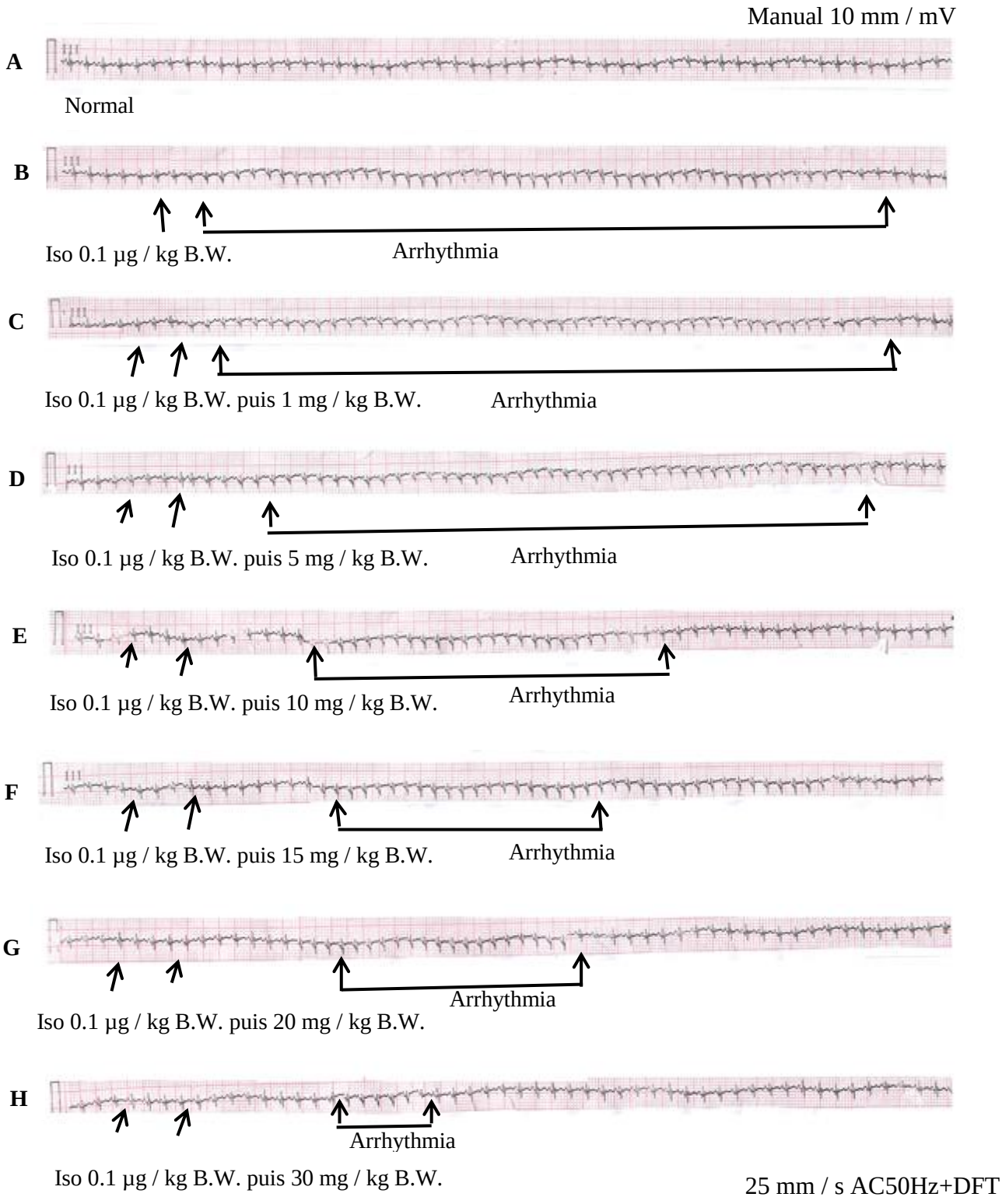

Figure 7: Effect of bark aqueous extract of *Isoberlinia tomentosa* on arrhythmia induced with Isoprenalin as pre-treatment.

Preventive effect of *Isoberlinia tomentosa* bark aqueous extract on Isoprenalin-induced arrhythmia

Preventive effect of Isobt on P and T wave and PR interval

The normal ECG from this series of experiments indicates that P and T wave amplitude and PR interval duration are 0.2 ± 0.013 mV; 0.073 ± 0.007 mV and 115.2 ± 4.8 ms respectively.

When Isoprenalin 0.1 µg / kg B.W. is injected alone, these ECG parameters are significantly reduced ($P < 0.05$; $P < 0.001$) compared with normal recording. P and T wave amplitude and PR interval duration obtained were 70%; 62.65% and 21.70%.

Only the 20 and 30 mg / kg B.W. doses administered before the Isoprenalin dose resulted in a significant increase ($P < 0.05$; $P < 0.01$) in P and T wave amplitude and PR interval duration compared with Isoprenalin alone. The variations are 81.66%; 86.36%; 22.72% respectively for the 30 mg / kg B.W. dose. The variations obtained on P and T waves and PR interval are presented in **Table 3.**

Table 3: ECG parameter values in patients treated with Isobt before Isoprenalin injection.

Doses Isobt en mg / kg B.W.	P Wave (mv)	T Wave (mV)	PR Interval (ms)
Normal	0.2 ± 0.013	0.073 ± 0.007	115.2 ± 4.8
Iso 0.1 µg / kg B.W.	0.06 ± 0.022 ***	0.028 ± 0.003 ***	90.2 ± 3.2 **
1 mg / kg B.W puis 0.1 µg / kg B.W.	0.09 ± 0.014	0.029 ± 0.002	102.3 ± 5.1
5 mg / kg B.W puis 0.1 µg / kg B.W.	0.11 ± 0.013	0.031 ± 0.0026	104.5 ± 3.5
10 mg / kg B.W puis 0.1 µg / kg B.W.	0.12 ± 0.010	0.033 ± 0.004	106.8 ± 3.3
15 mg / kg B.W puis 0.1 µg / kg B.W.	0.13 ± 0.020	0.034 ± 0.003	107.8 ± 3.8
20 mg / kg B.W puis 0.1 µg / kg B.W.	0.14 ± 0.018 *$_1$	0.038 ± 0.005 *1	108.5 ± 4.6
30 mg / kg B.W puis 0.1 µg / kg B.W.	0.145 ± 0.018 **$_1$	0.041 ± 0.004 **$_1$	110.7 ± 4.4 *$_1$

****: (P < 0.001): compared to normal recording*
**1: (P < 0.05); **1 (P < 0.01): compared to the effect of Isoprenalin 0.1 µg/kg BW alone*

Antiarrhythmic preventive effect of Isobt on heart Rate

The diagram in **Figure 8** shows the effect of Isoprenalin alone and increasing doses of Isobt on Isoprenalin-induced changes in heart rate.

The normal rabbit ECG in this study gives a heart rate of 295.5 ± 7.2 bpm. The Isoprenalin dose produced a significant ($p < 0.01$) increase in heart rate of 14.55% compared with normal. Doses of 20 and 30 mg / kg B.W. resulted in a significant ($p < 0.05$; $p < 0.01$) decrease in heart rate compared with Isoprenalin of 22.25 and 27.83%.

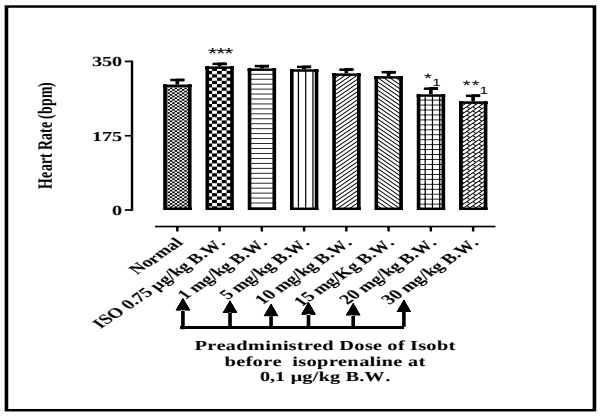

Figure 8: Heart Rate variation in rabbits pretreated with increasing doses of Isobt before arrhythmia induction by Isoprenalin.
****: P < 0.01; compared to normal ECG*
**1: P < 0.05; **1: P < 0.001: compared to the effect of Isoprenalin*

Anti-arrhythmic preventive effect of Isobt on QRS complex amplitude

The variations obtained in QRS complex amplitude are shown in the diagram in **Figure 9**.

QRS amplitude decreased significantly ($p < 0.001$) with Isoprenalin compared with the normal amplitude of 0.68 ± 0.03 mV. QRS amplitude is 66.17% with Isoprenalin alone.

Doses of 20 and 30 mg / kg B.W. of Isobt administered before 0.1 µg / kg B.W., result in a significant increase ($p < 0.05$; $p < 0.01$) in QRS complex amplitude compared with the effect of Isoprenalin alone. The QRS complex reached values of 43.47% and 52.17% respectively.

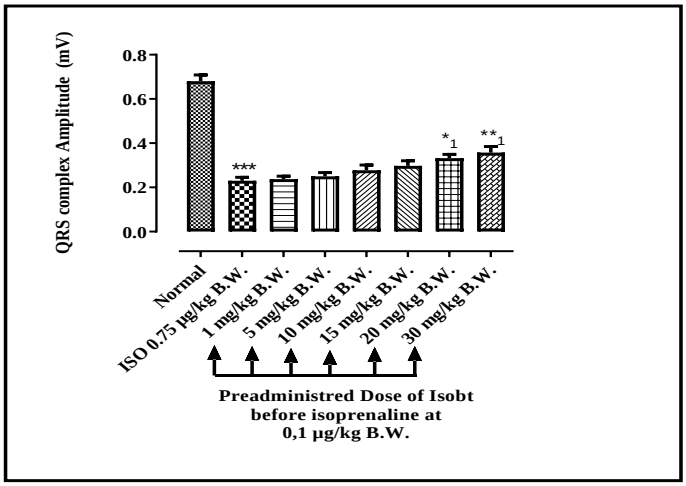

Figure 9: Variation in QRS complex amplitude with Isobt in prevention of Isoprenalin-induced arrhythmia.
****: P < 0.01; compared to normal ECG*
**1: P < 0.05; **1: P < 0.001: compared to the effect of isoprénaline*

Preventive effect of Isobt on the duration of Isoprenalin-induced arrhythmia

The graphical representation of Isobt's effects on induced arrhythmia, for 3 experiments, is shown in **Figure 10**. At a single dose of 0.1 µg / kg B.W., Isoprenalin induced an arrhythmia of 64.2 ± 8.5 s (n = 3). When the same dose of Isoprenalin (0.1 µg / kg B.W.) was followed 10 s later by Isobt in the concentration range 1 to 30 mg / kg B.W., the duration of arrhythmia induced by Isoprenalin was significantly reduced ($p < 0.01$; $p < 0.001$) from 0.07 ± 1.8% to 87.32 ± 3.5% compared with the duration of arrhythmia induced by the Isoprenalin dose.

In the presence of Isobt, the 50% Reducing Concentration (RC_{50}) of the duration of arrhythmia induced by Isoprenalin is 15 ± 0.577 mg/kg B.W. The effects on the ECG are shown on the recording in **Figure 11.**

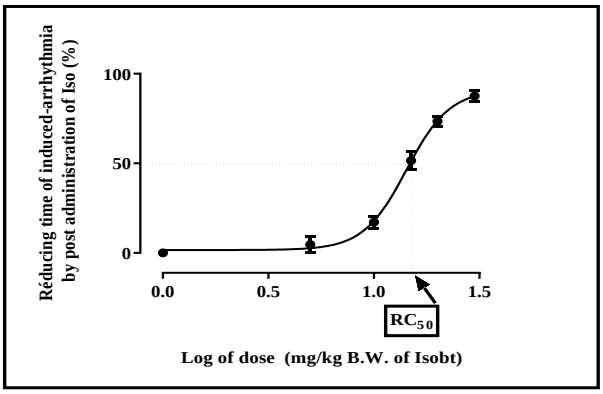

Figure 10: Percentage reduction in the duration of arrhythmia induced by Isoprenalin in pretreatment with Isobt.

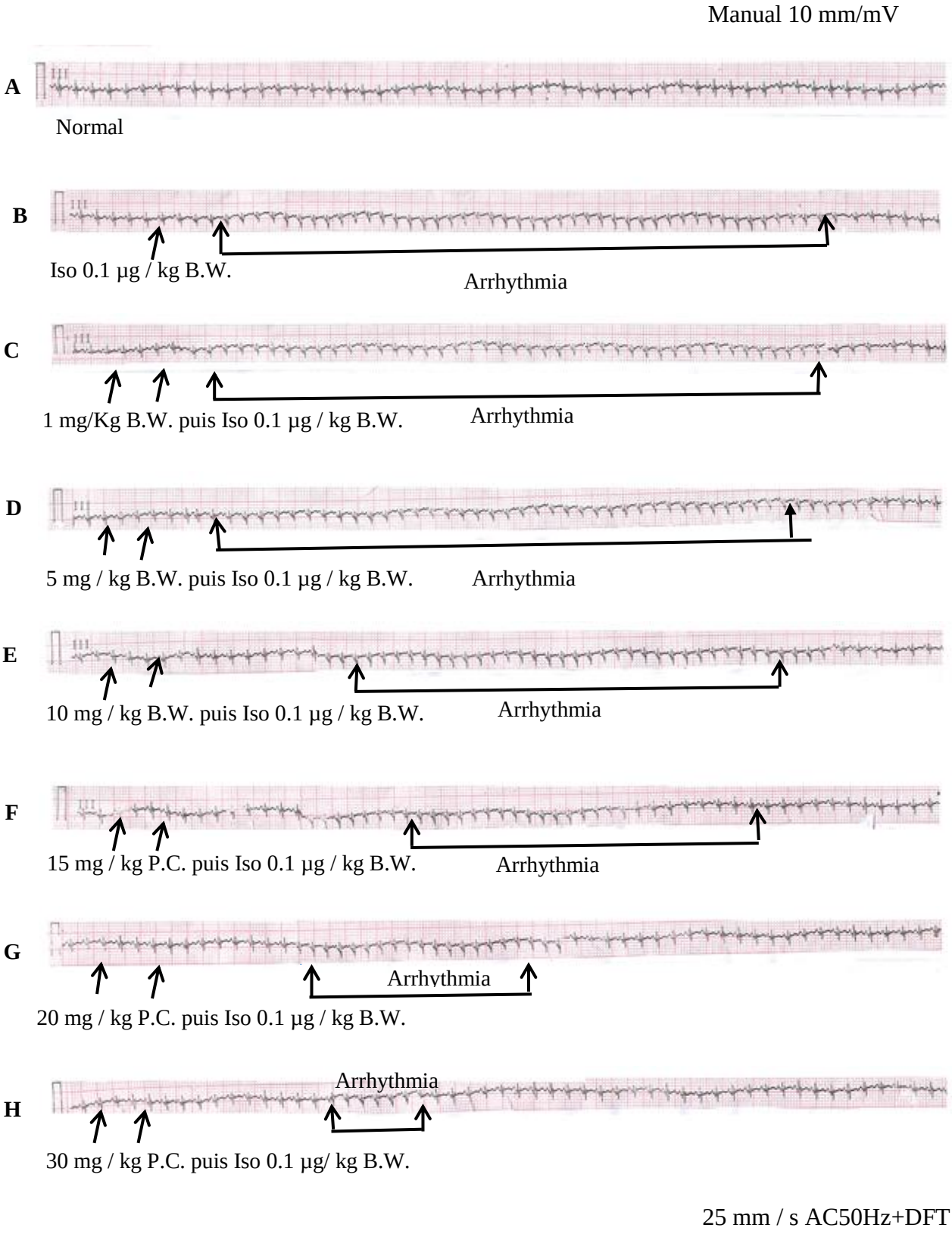

Figure 11: Recording of the preventive effect of the bark aqueous extract of *Isoberlinia tomentosa* on arrhythmia induced with Isoprenalin.

DISCUSSION

This study was carried out on Isoberlinia tomentosa aqueous bark extract to assess its effect on normal ECG and Isoprenalin-induced arrhythmia. In this study, Isobt produced a progressive and steady decrease in heart rate (HR), followed by a slight decrease in P-wave and QRS amplitudes. Isobt is cardioinhibitory and bradycardic at doses above 30 mg/kg B.W. It also has no appreciable impact on the transmission of electrical impulses from the atria to the ventricles (PR interval). Thus, Isobt, which does not cause conduction disturbances in the cardionic system, is suggested as a pure anti-arrhythmic that causes sinus bradycardia.[10]

Administration of atropine in increasing doses of 10^{-7}, 10^{-5} and 10^{-3} mg/kg B.W. before Isobt had no effect on Isobt-induced bradycardia on rabbit ECG. This result differs from that obtained with *Mirabilis Jalapa*.[11] This suggests that Isobt does not contain cholinomimetic substances and/or does not act via cholinergic receptors. Indeed, as atropine is a cholinergic antagonist, its binding to cholinergic receptors would inhibit the activity of all cholinomimetics. In our case, the aqueous extract of Isoberlinia tomentosa bark retains its bradycardia-inducing effect even in the presence of atropine.

Induction of arrhythmia by Isoprenalin (sympathomimetic agent) at a single dose of 0.1 µg / kg B.W. shows an increase in heart rate (tachycardia), with changes in the amplitude of the P and T waves of the QRS complex. Isoprenalin (a sympathomimetic agent) is often used experimentally or clinically to induce atrial fibrillation.[12] Similarly, the amplitudes of the P wave and the QRS complex decrease while the heart rate of rabbits increases when they receive a dose of Isoprenalin. Our results are in line with those of Ayenon.[9] Indeed, according to his work, increasing doses of Isoprenalin led to a reduction in the amplitude of P and T waves and the QRS complex, and an increase in heart rate with the onset of atrial fibrillation at a dose of 0.1 µg/kg B.W. Isoprenalin. Isoprenalin is a beta-1 agonist which increases atrioventricular conduction velocity and myocardial contractile force by lowering the myocardial excitability threshold. Isoprenalin also induces tachycardia with arrhythmia, often of the ventricular type.[13]

This cardiac abnormality gradually diminishes following intravenous injection of increasing doses of Isobt ranging from 1; 5; 10; 15; 20 mg / kg B.W., with heart rate returning to normal. At a dose of 30 mg / kg B.W., arrhythmia hardly sets in. The aqueous extract of *Isoberlinia tomentosa* bark reduces and therefore cancels out the arrhythmia induced by Isoprenalin. This shows that Isobt opposes β1-adrenergic receptor activation. The extract therefore contains beta-blocker substances. Beta-blockers reduce heart rate (negative chronotropic effect), myocardial contractility (negative inotropic effect), cardiac output and atrioventricular conduction velocity (negative dromotropic effect).[14,15] Like beta-blockers, Isobt may also reduce the transmission of nerve impulses to the heart. Finally, according to Camm.[16] arrhythmia suppression by beta-blockers is common. Whether administered before or after Isoprenalin, Isobt significantly ($p < 0.001$) reduces induced arrhythmia. The suppression of these arrhythmias by Isobt shows that Isobt is adrenolytic and confirms its antagonistic effect.

CONCLUSION

This study was conducted to assess the potential pharmacological effects of the aqueous extract of *Isoberlinia tomentosa* bark (Fabaceae) on ECG and arrhythmia. Pharmacological studies of this extract have shown it to be a cardiomoderator through its bradycardia-inducing action, and an antiarrhythmic agent through its beta-blocker effect. The effects of *Isoberlinia tomentosa* (Isobt) aqueous extract highlighted in this study would justify the use of this plant in traditional medicine for the treatment of cardiac pathologies.

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