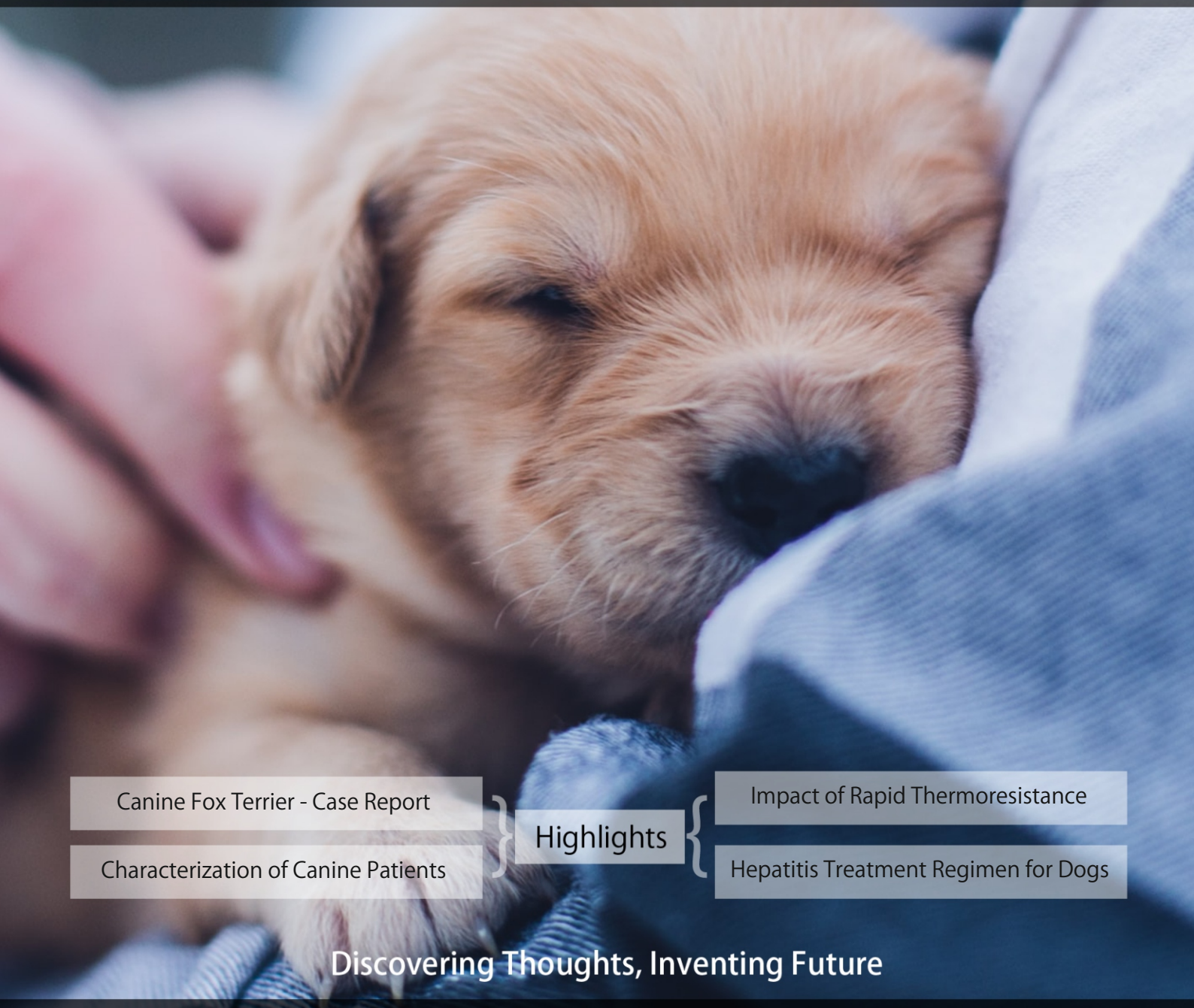
Online ISSN : 2249-4618
Print ISSN : 0975-5888
DOI : 10.17406/GJMRA

Global Journal

of Medical Research: G

Veterinary Science & Veterinary Medicine



Canine Fox Terrier - Case Report

Characterization of Canine Patients

Highlights

Impact of Rapid Thermoresistance

Hepatitis Treatment Regimen for Dogs

Discovering Thoughts, Inventing Future

VOLUME 24 ISSUE 1 VERSION 1.0

Global Journal of Medical Research: G
Veterinary Science and Veterinary Medicine

Global Journal of Medical Research: G
Veterinary Science and Veterinary Medicine
Volume 24 Issue 1 (Ver. 1.0)

Open Association of Research Society

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

Global Journals Inc.

*(A Delaware USA Incorporation with "Good Standing"; **Reg. Number: 0423089**)*

Sponsors: Open Association of Research Society
Open Scientific Standards

Publisher's Headquarters office

Global Journals® Headquarters
945th Concord Streets,
Framingham Massachusetts Pin: 01701,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

Global Journals Pvt Ltd
E-3130 Sudama Nagar, Near Gopur Square,
Indore, M.P., Pin:452009, India

Find a correspondence nodal officer near you

To find nodal officer of your country, please email us at *local@globaljournals.org*

eContacts

Press Inquiries: *press@globaljournals.org*
Investor Inquiries: *investors@globaljournals.org*
Technical Support: *technology@globaljournals.org*
Media & Releases: *media@globaljournals.org*

Pricing (Excluding Air Parcel Charges):

Yearly Subscription (Personal & Institutional)
250 USD (B/W) & 350 USD (Color)

Editorial Board

Global Journal of Medical Research

Dr. Han-Xiang Deng

MD., Ph.D
Associate Professor and Research Department
Division of Neuromuscular Medicine
Davee Department of Neurology and Clinical Neurosciences
Northwestern University Feinberg School of Medicine
Web: neurology.northwestern.edu/faculty/deng.html

Dr. Pina C. Sanelli

Associate Professor of Radiology
Associate Professor of Public Health
Weill Cornell Medical College
Associate Attending Radiologist
NewYork-Presbyterian Hospital
MRI, MRA, CT, and CTA
Neuroradiology and Diagnostic Radiology
M.D., State University of New York at Buffalo,
School of Medicine and Biomedical Sciences
Web: weillcornell.org/pinasanelli/

Dr. Roberto Sanchez

Associate Professor
Department of Structural and Chemical Biology
Mount Sinai School of Medicine
Ph.D., The Rockefeller University
Web: mountsinai.org/

Dr. Michael R. Rudnick

M.D., FACP
Associate Professor of Medicine
Chief, Renal Electrolyte and Hypertension Division (PMC)
Penn Medicine, University of Pennsylvania
Presbyterian Medical Center, Philadelphia
Nephrology and Internal Medicine
Certified by the American Board of Internal Medicine
Web: uphs.upenn.edu/

Dr. Feng Feng

Boston University
Microbiology
72 East Concord Street R702
Duke University
United States of America

Dr. Seung-Yup Ku

M.D., Ph.D., Seoul National University Medical College,
Seoul, Korea Department of Obstetrics and Gynecology
Seoul National University Hospital, Seoul, Korea

Dr. Hrushikesh Aphale

MDS- Orthodontics and Dentofacial Orthopedics.
Fellow- World Federation of Orthodontist, USA.

Santhosh Kumar

Reader, Department of Periodontology,
Manipal University, Manipal

Gaurav Singhal

Master of Tropical Veterinary Sciences, currently pursuing Ph.D in Medicine

Dr. Aarti Garg

Bachelor of Dental Surgery (B.D.S.) M.D.S. in Pedodontics and Preventive Dentistr Pursuing Phd in Dentistry

Sabreena Safuan

Ph.D (Pathology) MSc (Molecular Pathology and Toxicology) BSc (Biomedicine)

Getahun Asebe

Veterinary medicine, Infectious diseases, Veterinary Public health, Animal Science

Dr. Suraj Agarwal

Bachelor of dental Surgery Master of dental Surgery in Oromaxillofacial Radiology.
Diploma in Forensic Science & Oodntology

Osama Alali

PhD in Orthodontics, Department of Orthodontics, School of Dentistry, University of Damascus. Damascus, Syria. 2013 Masters Degree in Orthodontics.

Prabudh Goel

MCh (Pediatric Surgery, Gold Medalist), FISPU, FICS-IS

Raouf Hajji

MD, Specialty Assistant Professor in Internal Medicine

Surekha Damineni

Ph.D with Post Doctoral in Cancer Genetics

Arundhati Biswas

MBBS, MS (General Surgery), FCPS, MCh, DNB (Neurosurgery)

Rui Pedro Pereira de Almeida

Ph.D Student in Health Sciences program, MSc in Quality Management in Healthcare Facilities

Dr. Sunanda Sharma

B.V.Sc.& AH, M.V.Sc (Animal Reproduction, Obstetrics & gynaecology), Ph.D.(Animal Reproduction, Obstetrics & gynaecology)

Shahanawaz SD

Master of Physiotherapy in Neurology PhD- Pursuing in Neuro Physiotherapy Master of Physiotherapy in Hospital Management

Dr. Shabana Naz Shah

PhD. in Pharmaceutical Chemistry

Vaishnavi V.K Vedam

Master of dental surgery oral pathology

Tariq Aziz

PhD Biotechnology in Progress

Contents of the Issue

Global Journal of Medical Research: G
Veterinary Science and Veterinary Medicine
Volume 24 Issue 1 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Evaluating the Impact of Rapid Thermoresistance (RTT) on Membrane and Chromatin Features in Post-Thawed Bovine Semen

By Denise Martins Reis, Augusto Urzedo Pereira Queiroz, Chamberttan Souza Desidério, Amanda Pifano Neto Quintal, Marcelo Emílio Beletti, Bruno Augusto Nassif Travençolo, Guilherme Costa Venturini & André Belico de Vasconcelos

Universidade de Uberaba (UNIUBE)

Abstract- This work aims to evaluate the effects of rapid thermoresistance on the morphofunctional aspects of membranes using flow cytometry, as well as the quality of sperm chromatin using the Toluidine Blue technique, both before and after the thermoresistance test. Six sets of frozen semen from ten bulls were used. The samples were thawed in a water bath at 36°C and separated into two aliquots. The first aliquot, control group (C), was kept in a test tube previously heated to 36°C with subsequent evaluationsusingmicroscopy, cytometry, and chromatin analyses. The second aliquot, experimental group (E), underwent the rapid thermoresistance test (RTT) in a water bath preheated at 46°C for 30 minutes with subsequent evaluations usingmicroscopy, cytometry, and chromatin analyses. For statistical analysis, the paired T test, significance ($P<0.05$), was used.

Keywords: fertility, membranes, sperm cells, thermoresistance.

GJMR-G Classification: NLMC Code: QM

Strictly as per the compliance and regulations of:

Evaluating the Impact of Rapid Thermoresistance (RTT) on Membrane and Chromatin Features in Post-Thawed Bovine Semen

Denise Martins Reis [α], Augusto Urzedo Pereira Queiroz [σ], Chamberttan Souza Desidério [ρ], Amanda Pifano Neto Quintal [ω], Marcelo Emílio Beletti [¥], Bruno Augusto Nassif Travençolo [§], Guilherme Costa Venturini [χ] & André Belico de Vasconcelos [ν]

Abstract- This work aims to evaluate the effects of rapid thermoresistance on the morphofunctional aspects of membranes using flow cytometry, as well as the quality of sperm chromatin using the Toluidine Blue technique, both before and after the thermoresistance test.Six sets of frozen semen from ten bulls were used. The samples were thawed in a water bath at 36ºC and separated into two aliquots. The first aliquot, control group (C), was kept in a test tube previously heated to 36ºC with subsequent evaluationsusingmicroscopy, cytometry, and chromatin analyses. The second aliquot, experimental group (E), underwent the rapid thermoresistance test (RTT) in a water bath preheated at 46ºC for 30 minutes with subsequent evaluations usingmicroscopy, cytometry, and chromatin analyses. For statistical analysis, the paired T test, significance (P<0.05), was used. It was observed that from the results presented, semen samples after the resistance test showed a reduction of approximately 56% for motility and 36% for vigor (P< 0.05) when compared to samples before the test. In the flow cytometry evaluation, a significant difference was observed for all points analyzed (plasma membrane and acrosomal membrane). The results obtained with the Toluidine Blue technique, it can be observed that the RTT does not interfere with the chromatin structure, and this is probably due to the structure of mammal sperm DNA. It was concluded that the rapid thermoresistance test (RTT) alters the structures, mainly acrosomal structures, and has no interference in the chromatin compression structure, and should be considered, in association with other evaluation tests, a complementary parameter in the evaluation of bovine semen quality.

Keywords: fertility, membranes, sperm cells, thermoresistance.

I. Introduction

Artificial insemination with the use of genetically superior animals has been gaining prominence due to the excellent results in the commercialization of cryopreserved bovine semen. Thus, the concern with bull fertility is recurrent among rural producers, as well as scholars who dedicate themselves to sperm analysis to detect changes in sperm cells *(Alquézar-Baeta et al 2019)*.

The fertility potential of male cattle is determined through semen analysis in a set of evaluations. However, for this analysis to be more efficient, it is also necessary to evaluate the internal structure of the sperm in conjunction with the rapid thermoresistance test (RTT) *(Alves et al 2015)*. This can be used to evaluate the fertility of frozen semen, simulating a biological process. One of the possibilities to mimic this condition is to promote thermal stress, under controlled conditions, in a water bath, a situation close to the conditions to which it is exposed in the female genital tract *(Cunha et al 2012)*.

The potential study of RTT is to promote thermal stress in sperm, and in conjunction with flow cytometry and combined with the use of fluorophores, it allows evaluating the integrity of the plasma and acrosomal membrane, as well as the integrity of the DNA, after the induction of stress, providing pre- and post-heating parameters of post-thawed bull semen *(Arruda et al 2007)*. Also adding to the analysis, the Toluidine Blue (TB) technique has been widely used in the study of chromatin changes *(Mello 1982)*.

Therefore, this research aims to evaluate the effects of rapid thermoresistance on the morphofunctional aspects of plasma and acrosomal membranes, as well as on the chromatin quality of post-thawed bull semen, both before and after the rapid thermoresistance test.

II. Materials and Methods

a) Obtaining Bovine Semen Samples

Six batches of frozen semen from ten bulls were used, obtained from Sexing Technologies Repro I.C.M.G.A. Ltda. (Brindes) Use Authorization Protocol 135190833813983 08/11/2019 – CNPJ 23.694.902/0 001-70 – Indaiatuba – SP.Only samples containing at least 30% sperm with progressive motility were used in the study *(CBRA Manual, 2013)*.

b) Sperm Preparation

To carry out the experiment, the samples were thawed in a water bath at 36.8ºC *(CBRA Manual, 2013)* and separated into two aliquots. The first aliquot, control

Author α σ χ ν: Universidade de Uberaba (UNIUBE), Uberaba, MG, Brazil. e-mail: andre.vasconcelos@uniube.br
Author ρ: Universidade Federal do Triângulo Mineiro (UFTM), Uberaba, MG, Brazil.
Author ω: Faculdade Associadas de Uberaba (FAZU), Uberaba, MG, Brazil.
Author ¥ §: Universidade Federal de Uberlândia (UFU), Uberlândia, MG, Brazil.

group (C), was kept in a test tube previously heated to 36.8°C and subsequently evaluated by microscopy, cytometry and chromatin analysis. The second aliquot, experimental group (E), was kept in a water bath at 46°C for 30 minutes to perform the rapid thermoresistance test (RTT) *(Arruda et al 2007, Cunha et al., 2012)*, followed by microscopy, cytometry and chromatin analyses. The experiment was carried out in triplicate and the evaluations were carried out by a single evaluator.

c) Sperm Evaluations

For the microscopic evaluations, a bright field microscope (Nikon eclipse e200) was used. 10 µL of the sample were added between the slide and coverslip, both before and after the thermoresistance test, and sperm motility and vigor were evaluated at 10x magnification, according to Brazilian College of Animal Reproduction *(Manual CBRA, 2013)*.

In the cytometric evaluations, a flow cytometer (FACSC alibur™) was used to detect the integrity parameters of the plasma (propidium iodide /1.5 mM) and acrosomal (Fitc-PNA/1.125 g/mL) membranes. A 560 nm short pass dichroic mirror,green fluorescence (FL1) was collected using a 515 meter545 nm bandpass filter. Red fluorescence (FL3) was collected through a 650 nm long-pass filter, after 640 nm filtering. long pass filter. The sheath/sample was placed on "low" andadjusted to a flow rate of 100 cells per second when analyzing a sample with a concentration of 1.25 x105 sperm/mL. Data acquisition from 15,000 cells was collected in list modeusing BD Cell Quest Pro software version 4.0 (Becton Dickinson®, San Jose, CA, USA)as described by *(Vasconcelos et al 2017).*

For chromatin analysis, the protocol as reported by Beletti and collaborators *(2005)* was followed. For this, the smear technique was performed on the samples taken at the two moments (before and after the thermoresistance test). They were fixed with absolute alcohol: acetic acid: 3:1, for one minute and afterwards immersed in 70% alcohol for three minutes. With this, four slides of each sample were made, which were later kept in 4N hydrochloric acid for 25 minutes, followed by washing in distilled water. After this procedure, the slides were kept at room temperature (dry) followed by the addition of three to four drops of Toluidine blue and covered with a coverslip. For the analysis, a microscope (Leica DM500) coupled to an image capture system (Leica ICC50) with a 100X oil-immersion objective in an optical microscope coupled to the camera was used, from which 30 to 50 images were obtained of each prepared slide.

The images obtained were light blue in color when they presented normal chromatin condensation, a variation from light blue to dark blue when the chromatin was moderately decondensed and a variation from dark blue to violet when the chromatin was highly decondensed.In view of this, to avoid the subjectivity of the chromatin alteration evaluations, sperm head segmentation was used, developed in MATILAB and executed with Octave software. The system performs the reading of the sperm according to the color present (light blue to magenta), making it possible to define the chromatin compaction index *(Beletti et al 2005).*

Statistics

For statistical analysis, the program GraphPad prism 6.0[5] was used. Fisher's and Student-Newman-Keuls tests were used to analyze progressive sperm motility, sperm with plasma and acrosomal membranes integrity and analyze chromatin expressed as means and standard deviation (SD) (three repetitions), test at 5% significance ($P<0.05$).

III. Results

The semen samples before the rapid thermoresistance test showed mean values of 37.5% for motility and 2.5 for vigor. These values were within the range established by the Brazilian College of Animal Reproduction, with references of 30% and 3 for motility and vigor, respectively. However, after the rapid thermoresistance test, a significant drop ($P<0.05$) in motility (16.5%) and vigor (1.6) was observed, with a reduction of approximately 56% and 36% for motility and vigor, respectively (Figure 1). According to Cunha et al. (2012), bovine semen after being subjected to rapid thermoresistance test (RTT) should show a decrease in straight, progressive sperm motility and sperm vigor.

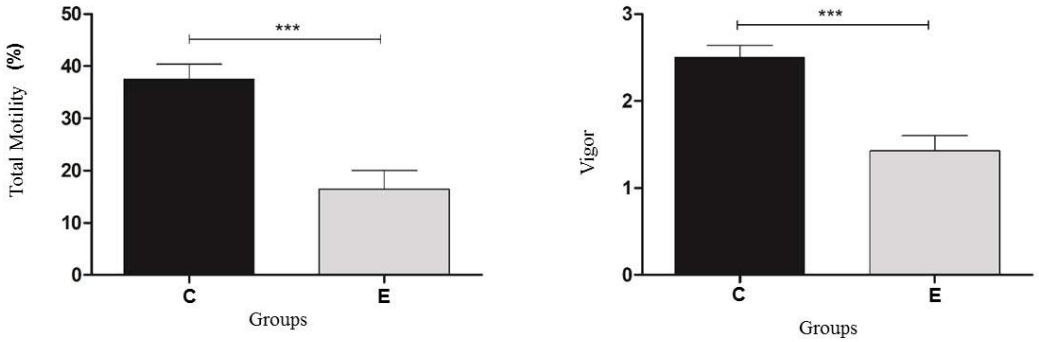


Figure 1: Result of the mean and standard deviation of the total motility and vigor of bovine sperm samples, after thawing (36°C) Control Group (C) and after the rapid thermoresistance test (46°C/30min), Experimental Group (E) Statistical significance ($P < 0.05$)

For the flow cytometry analysis, the correspondence of red, IP (FL3 fotodetector), green and Fitc-PNA (FL1 Fotodetector) fluorescence was observed. The sperm that fluoresced in red were classified as having non-intact plasma membranes and those that fluoresced in green had a reacted outer acrosomal membrane.

The results of thermoresistance test the Control (C) and experimental (E) Groups. Q1 (IP positive) percentage of sperm with reactive plasma membrane; Q2 (IP positive /PNA positive) percentage of sperm with reactive plasma and acrosomal membranes; Q3 (PNA positive) percentage of sperm with intact plasma and acrosomal membranes; Q4 (IP negative/PNA negative). The program Cell Quest was used for this analysis (Figure 2).

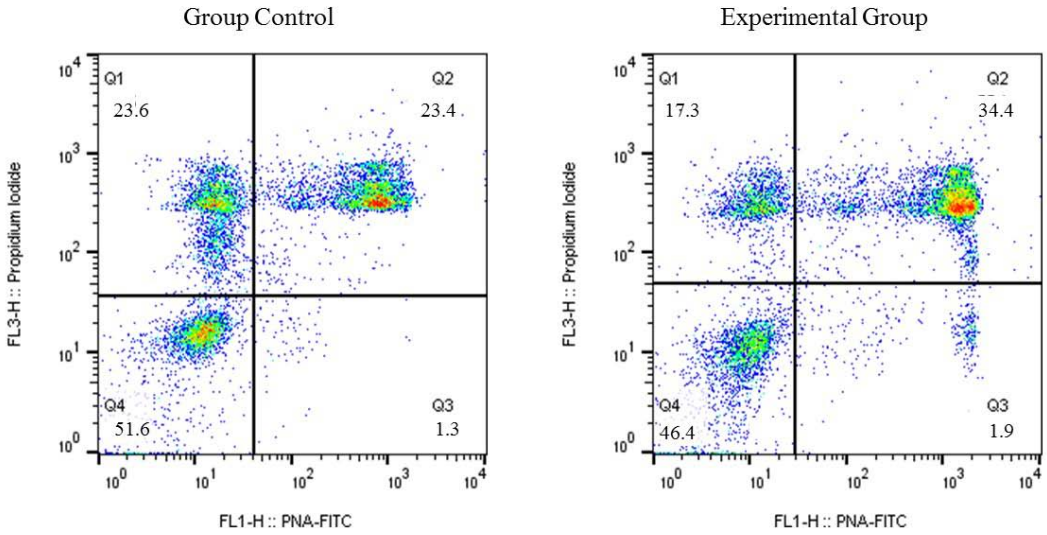


Figure 2: Graphic representation of spot distribution of bovine sperm marking, post-thawing, from Control and Experimental groups, marked with: Q1 - Propidium iodide (PI); Q2 - double marking of propidium iodide (IP) and Fic – PNA; Q3 – Fitc-PNA; Q4 without marking (viable sperm)

Before the thermoresistance test (Control Group), it was observed that the sperm were less reactive to the markings. Because of this condition, the values of the control group (pre-test) were higher than the cells from the experimental group (post-test) in regard to the plasma membrane Q1 (23.6% *vs* 17.3%) and the number of viable Q4 cells (51.6% *vs* 46.4%), respectively. For the Q2 double marking evaluation, higher percentages were observed for the experimental group (34.4%) when compared to the control group (23.4%); a result also observed in the Q3 group evaluations (1.4% *vs* 1.9%).In the flow cytometry analysis, a significant difference ($P<0.05$) was observed for all points analyzed for both the plasma membrane and the acrosomal membrane. (Figure 3).

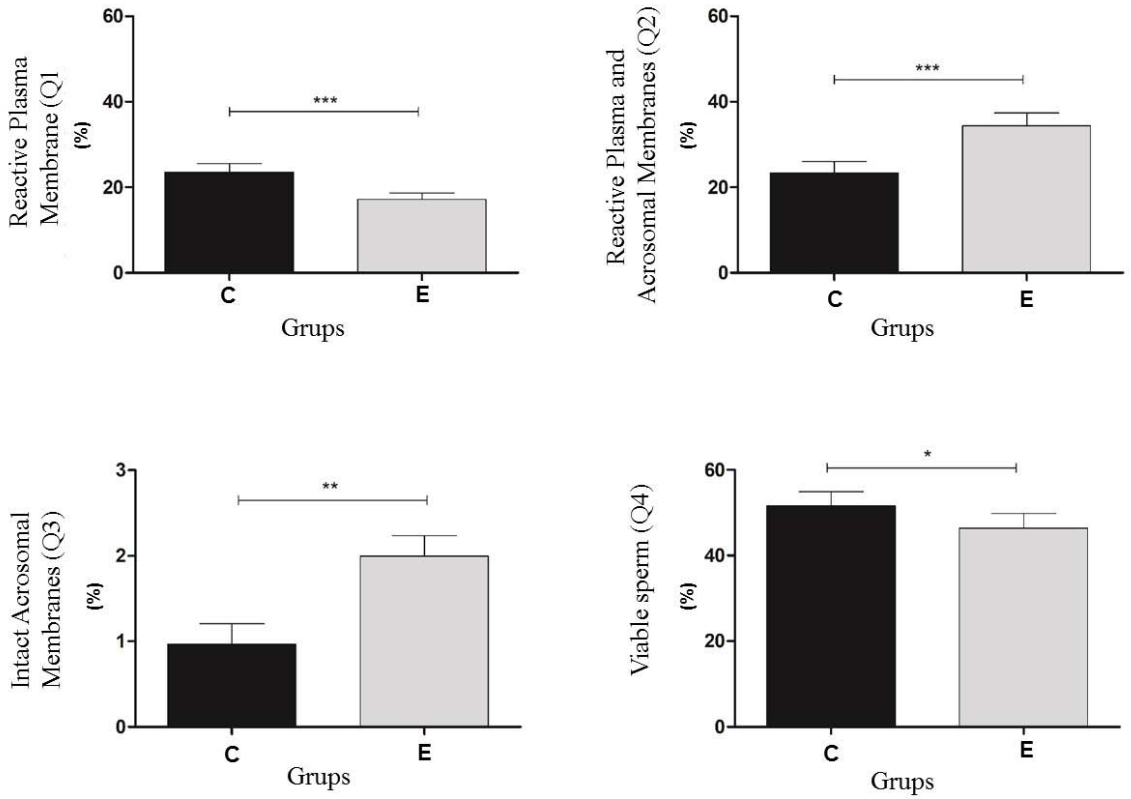


Figure 3: Experimental analysis of the flow cytometry tests of the Control (C) and experimental (E) Groups. Q1 (IP positive) percentage of sperm with reactive plasma membrane; Q2 (IP positive /PNA positive) percentage of sperm with reactive plasma and acrosomal membranes; Q3 (PNA positive) percentage of sperm with intact plasma and acrosomal membranes; Q4 (IP negative/PNA negative) percentage of sperm with reactive acrosomal membrane. Statistical significance ($P < 0.05$)

Sperm membranes perform numerous functions that are related to cellular metabolism and the maintenance of motility and training in sperm. Therefore, the loss of membrane integrity, as seen in figure 2 and figure 3, indicates a change in the maintenance of cellular homeostasis, directly observed in the decrease in sperm motility (figure 1)

From the decompaction and heterogeneity analyses, all sperm were averaged, both before and after the thermoresistance test. As shown in Figure 4, it was observed that there was no significant difference ($P > 0.05$) regarding the two evaluated points.

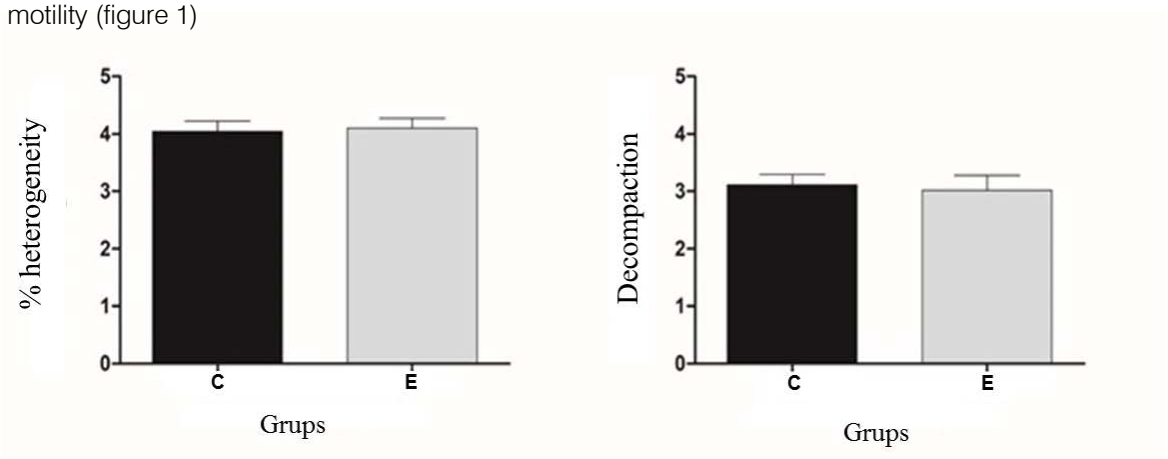


Figure 4: Experimental analysis of chromatin heterogeneity and decompaction of Control (C) and Experimental (E) Groups. No statistical difference ($P > 0.05$)

The result may be related to the physiological aspect of nuclear differentiation that occurs during spermatogenesis, as in the condensation of sperm chromatin, somatic DNA histones are replaced by protamines (P1), compacted structures (toroid or donut).

IV. Discussion

During fertilization, sperm capacitation, acrosomal reaction and fusion with the ovum are events that require functional and intact plasma and acrosomal membranes. The cryogenics process injures the sperm, decreasing their viability. Aware of the extreme need for sperm to maintain good viability in order to obtain high fertility in a herd, the use of techniques in the field of reproduction biotechnology has intensified, being identified as extremely important tools for genetic improvement programs and efficiency in the production of animal products *(Coutinho et al 2010).*

The importance of applying additional techniques to evaluate semen batches before commercialization is evident, as it contributes to the quality control of the ejaculate, thus resulting in a better fertility rate and herd productivity *(Celeghini et al 2017).*

In this study, the effects of the rapid thermoresistance on the morphofunctional aspects of plasma and acrosomal membranes were evaluated through flow cytometry, as well as through chromatin quality, using the Toluidine Blue technique.

Semen samples taken before the rapid thermoresistance test presented values with greater significance in relation to those taken after the rapid thermoresistance test (RTT), possibly due to the time and temperature at which the sperm were kept. This may have led to a drop in sperm viability with changes in membrane structures, mainly the acrosomal structure. This aspect was observed in the flow cytometry analysis since the sperm were more reactive to the plasma and acrosomal membrane markings after the RTT.

The hypothesis for this result is established since, with the temperature increase, there is a structural change in the membrane's biochemical components, in addition to the promotion of an increase in the sperm's metabolic rate. It is known that the membrane is flexible, composed of lipids and proteins, and that it possesses self-sealing characteristics and ion channels defined by transmembrane proteins, which selectively act on solutes through active and passive transport *(Flesh & Gadella 2000).* Thus, the temperature increase can somehow act on ATP-dependent ion channels, such as the sodium/potassium ATPase pump and calcium ion channels, promoting instability in both membranes, and rather, greater reactivity to markers, Q2 quadrant. (PI Positive/PNA Positive).

Another point that corroborates this discussion is that in the experimental group (post-thermoresistance test), quadrant Q3 (PNA positive) showed an increase in the number of reactive sperm, which indicated a possible spontaneous capacitation induced by temperature.

Sperm capacitation is a physiological process that can be induced by several factors, such as variation in hydrogen potential and in intracellular ionic concentration. In addition, it is possible, given the results of the present study, that this sperm capacitation could also be related to the temperature used in the RTT. This is because the temperature can change the fluidity of the plasma membrane, which would promote an increase in metabolism and consequently greater motility, though for a very short period due to the availability of nutrients and oxygen in the medium *(Yanagimachi1994; Flesh F.M. & Gadella 2000).*

However, according to the results obtained with the Toluidine Blue technique, it can be observed that RTT does not interfere with the chromatin structure. This is probably due to the DNA structure of mammalian sperm, which have a basic unit of protamine toroid. Thus, after the interaction of these protamines with the sperm chromatin, it becomes an inert and highly stable structure, mainly due to the interaction of the protamine's amine residues with the phosphate groups of the DNA strands *(Hamilton et al 2016)*, which could promote greater DNA stability regarding temperature changes.

V. Conclusion

It can be concluded that the rapid thermoresistance test (RTT) alters the structures, mainly the acrosomal structure, and does not interfere with the structure of chromatin compaction, and should be considered, in association with other evaluations, as a complementary parameter in evaluating bovine semen quality.

Acknowledgements

Universidade Federal de Uberlândia (UFU) for the support given during the research and the Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG) for granting the financial resources.

Declaration of Interest: The authors report no conflicts of interest. The authors alone are responsible for the content of the paper.

References Références Referencias

1. ALQUÉZAR-BAETA C., GIMENO-MARTOS S., MIGUEL-JIMÉNEZ S., SANTOLARIA P., YÁNIZ J., PALACÍN I., CASAO A., CEBRIÁN-PÉREZ J. A., MUIÑO-BLANCO T., PÉREZ-PÉ R..Open CASA: A new open-source and scalable tool for sperm quality analysis. *PLOS Computational Biology* 15(1): 2019. DOI:10.1371/journal.pcbi.1006691.

2. ALVES M.B.R., OLIVEIRA M.L., LANÇONI R., FLOREZ-RODRIGUES S.A., CELEGHINI E.C.C., ARRUDA R.P., ANDRADE A.F.C.. Investigando a compactação e a fragmentação não induzida do DNA espermático: refinamento da avaliação espermática – parte 1. Revista Brasileira de Reprodução Animal 39(2): 263-269, 2015.
3. ARRUDA R.P., ANDRADE A.F.C., PERES K.R., RAPHAEL C.F., NASCIMENTO J., CELEGHINI E.C.C. Biotécnicas aplicadas à avaliação do potencial de fertilidade do semen equino. Revista Brasileira de Reprodução Animal 31(1): 8-16, 2007.
4. BELETTI M.E., COSTA L.F., GUARDIEIRO M.M. Morphometric features and chromatin condensation abnormalities evaluated by toluidine blue staining in bull spermatozoa. Brazilian *Journal of Morphological Sciences* 22(2): 85-90, 2005.
5. CELEGHINI E.C.C., ARRUDA R.P., RODRIGUEZ S.A.F., SANTOS F.B., ALVES M.B.R., OLIVEIRA B. M. M. Impacto da qualidade do sêmensobre a fertilidade a campo embovinos. *Revista Brasileira de Reprodução Animal* 41(1): 40-45, 2017.
6. MANUAL PARA EXAME ANDROLÓGICO EAVALIAÇÃO DE SÊMEN ANIMAL/Colégio Brasileiro de Reprodução Animal, 3, ed, - Belo Horizonte: CBRA 2013.Disponível em: www.cbra.org.br.
7. COUTINHO L.H., ROSÁRIO M.F., JORGE E.F. Biotecnologia animal. *Estudos Avançados* 24(70): 123-147, 2010. DOI: 10.1590/S0103-40142010000300009.
8. CUNHA E.R., SILVA C.G., MARTINS C.F. Estudo comparativo dos testes de termo-resistência rápido, lento e fisiológico em sêmen criopreservado bovino importado. In: 49ª Reunião Anual da Sociedade Brasileira de Zootecnia Sociedade Brasileira de Zootecnia (Brasília, Brazil). pp. 1-3, 2012.
9. HAMILTON, T.R.S., CASTRO L.S., DELGADO J.D., ASSIS P.M., SIQUEIRA A.F.P.S., MENDES C.M., GOISSIS M.D., O-BLANCO T.M., PEREZ J.A.C., NICHI M., VISITIN J.V., ASSUMPÇÃO M.E.O.Induced lipid peroxidation in ram sperm: semen profile, DNA fragmentation and antioxidant status. *Reproduction* 151(4): 379-390, 2016.
10. FLESH F.M., GADELLA B.M. Dynamics of the mammalian sperm plasma membrane in the process of fertilization. *Biochimica et Biophysica Acta* 1469:197-235,2000.
11. MELLO M.L.S. Induced metachromasia in bull spermatozoa. *Histochemistry* 74(3): 387-392, 1982.
12. VASCONCELOS A.B., ZANDONAIDE J.B.Z., FERNANDES SOBRINHO, A.L.F.,SILVA B.O., QUINTAL P.N.Q. A comparative study of three different dyes evaluating the physical integrity of the plasma membrane of cryopreserved bovine spermatozoa. *Veterinária. Notícias* 23(1): 13-22, 2017.
13. YANAGIMACHI R. Mammalian fertilization. *The physiology of reproduction*189-317, 1994.

Global Journal of Medical Research: G
Veterinary Science and Veterinary Medicine
Volume 24 Issue 1 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Characterization of Canine Patients with Heart Disease based on Age at the Pet`a Vet Veterinary Clinic in Guatemala City, Guatemala

By Estephan Mendez De Leon, Carlos de Leon & Renzo Ricardo Ayala
Universidad San Carlos de Guatemala

Abstract- In this study, the clinical records of canine patients seen at the Pet`a Vet veterinary clinic in Guatemala between 2018 and 2020 were analyzed with the aim of investigating heart disease in dogs in the region. From a total of 1215 records reviewed, 825 cases of heart disease were identified, with chronic mitral valve disease being the most frequent. A higher incidence was observed in males and in Schnauzer breed dogs. In addition, the majority of diagnosed patients were found to be 9 years of age or older. These results provide valuable information on the epidemiology of canine heart disease in Guatemala, which may be useful to improve its diagnosis and clinical management.

Keywords: *canine heart disease, chronic mitral valve disease, dogs, guatemala.*

GJMR-G Classification: *NLM: SF992.H4*

Characterization of Canine Patients with Heart Disease based on Age at the Pet`a Vet Veterinary Clinic in Guatemala City, Guatemala

Caracterización de Pacientes Caninos con Cardiopatías en Función de la Edad en la Clínica Veterinaria Pet`a Vet de Ciudad de Guatemala

Estephan Mendez De Leon [α], Carlos de Leon [σ] & Renzo Ricardo Ayala [ρ]

Abstract- In this study, the clinical records of canine patients seen at the Pet`a Vet veterinary clinic in Guatemala between 2018 and 2020 were analyzed with the aim of investigating heart disease in dogs in the region. From a total of 1215 records reviewed, 825 cases of heart disease were identified, with chronic mitral valve disease being the most frequent. A higher incidence was observed in males and in Schnauzer breed dogs. In addition, the majority of diagnosed patients were found to be 9 years of age or older. These results provide valuable information on the epidemiology of canine heart disease in Guatemala, which may be useful to improve its diagnosis and clinical management.

Keywords: canine heart disease, chronic mitral valve disease, dogs, guatemala.

Resumen- En la clínica veterinaria Pet`a Vet, especializada en cardiología y neumología, situada en la ciudad de Guatemala, se llevó a cabo un análisis exhaustivo de las fichas clínicas de todos los pacientes atendidos entre 2018 y 2020, con el objetivo de recopilar información estadística sobre las enfermedades cardíacas en perros. Los datos obtenidos permitieron realizar una caracterización detallada de las cardiopatías en la población canina guatemalteca. De un total de 1215 fichas clínicas revisadas, se identificaron 825 casos de cardiopatías en perros, lo que representa el 99% de los pacientes evaluados. La enfermedad cardíaca más común fue la enfermedad crónica de la válvula mitral, diagnosticada en el 66% de los casos. Además, se observó que aproximadamente 7 de cada 10 pacientes con sospecha de enfermedad cardíaca fueron confirmados con algún tipo de cardiopatía. En cuanto al sexo de los pacientes, se encontró que los machos presentaron una mayor incidencia, representando el 53% de los casos, mientras que las hembras constituyeron el 47%. Sin embargo, la diferencia entre sexos fue mínima. La raza con mayor prevalencia de cardiopatías fue el Schnauzer. Esta tendencia podría relacionarse con la popularidad de esta raza en la región. Además, se observó que al menos 9 de cada 10 pacientes diagnosticados con alguna cardiopatía pertenecían a una raza específica. Se evidenció una mayor frecuencia de cardiopatías en perros de edad avanzada, siendo los grupos de 9 a 12 años y 13 años en adelante los más afectados. De hecho, aproximadamente 7 de cada 10 pacientes diagnosticados con cardiopatía tenían 9 años o más. Estos hallazgos proporcionan una visión significativa sobre la epidemiología de las cardiopatías en la población canina de Guatemala, lo que puede contribuir a una mejor comprensión y manejo de estas enfermedades en la práctica clínica veterinaria.

Palabras clave: cardiopatías caninas, enfermedad crónica de la válvula mitral, perros, Guatemala.

Abstract- At the veterinary clinic Pet`a Vet, specializing in cardiology and pneumology, located in Guatemala City, an exhaustive analysis of the clinical records of all patients seen between 2018 and 2020 was carried out, with the aim of compiling statistical information on heart disease in dogs. The data obtained allowed a detailed characterization of heart disease in the Guatemalan canine population. From a total of 1215 clinical records reviewed, 825 cases of heart disease in dogs were identified, representing 99% of the patients evaluated. The most common heart disease was chronic mitral valve disease, diagnosed in 66% of the cases. In addition, it was observed that approximately 7 out of 10 patients with suspected heart disease were confirmed to have some type of heart disease. Regarding the sex of the patients, it was found that males presented a higher incidence, representing 53% of the cases, while females constituted 47%. However, the difference between sexes was minimal. The breed with the highest prevalence of heart disease was the Schnauzer. This trend could be related to the popularity of this breed in the region. In addition, it was observed that at least 9 out of 10 patients diagnosed with heart disease belonged to a specific breed. There was evidence of a higher frequency of heart disease in older dogs, with the groups aged 9 to 12 years and 13 years and older being the most affected. In fact, approximately 7 out of 10 patients diagnosed with heart disease were 9 years of age or older. These findings provide significant insight into the epidemiology of heart disease in the canine population of Guatemala, which may contribute to a better understanding and management of these diseases in veterinary clinical practice.

Keywords: canine heart disease, chronic mitral valve disease, dogs, guatemala.

I. Introducción

La cardiología veterinaria en Guatemala y en Centroamérica se configura como una disciplina especializada dentro del ámbito de la Medicina Veterinaria, orientada al estudio exhaustivo del sistema

Author α σ ρ: Universidad San Carlos de Guatemala.
e-mail: mendezestephan@gmail.com

cardiovascular en animales. Para hacerlo, se fundamenta en las premisas y conocimientos adquiridos en distintas áreas del saber. Al abordar específicamente las cardiopatías en poblaciones caninas, se torna esencial identificar las patologías más recurrentes, considerando variables como la raza, la edad y el sexo, aspectos de gran relevancia debido a sus implicaciones tanto en la medicina preventiva como en las enfermedades asociadas a procesos infecciosos o degenerativos que puedan vincularse con el entorno. Las condiciones ambientales y los agentes etiológicos, variables según la región, ejercen un papel determinante en la aparición de las patologías cardíacas en las poblaciones caninas de Guatemala, lo que subraya la necesidad prioritaria de discernir su contribución en este contexto.

Diversos estudios de caracterización de enfermedades cardiacas en poblaciones caninas, llevados a cabo en distintas latitudes, han concluido que los pacientes de edad avanzada (7 años o más) presentan una mayor susceptibilidad a desarrollar estas enfermedades. Dentro de este grupo, los pacientes seniles exhiben una mayor propensión o riesgo a padecer enfermedades adquiridas, mientras que los jóvenes son más propensos a enfermedades congénitas. Además, se observa una predisposición a ciertas cardiopatías según el sexo del animal. Este tipo de tipificaciones en poblaciones caninas proporcionan al médico veterinario clínico una guía para identificar una etiología altamente probable (Pereira et al., 2014).

Actualmente, no se dispone de información local que describa la frecuencia de las cardiopatías en las poblaciones caninas según su edad en Guatemala. La ausencia de datos específicos para este país impide determinar si existen factores predisponentes que inciden en la prevalencia de cardiopatías específicas en las poblaciones caninas de la región. Entre estos posibles factores predisponentes podrían mencionarse la influencia genética y enfermedades parasitarias como la enfermedad del gusano del corazón. En el presente estudio, se clasificaron a los pacientes caninos con cardiopatías utilizando la clasificación del Colegio Americano de Medicina Interna Veterinaria (ACVIM, por sus siglas en inglés), en función de la enfermedad diagnosticada. Ante la carencia de estudios locales especializados en cardiología veterinaria, surge la necesidad de llevar a cabo investigaciones descriptivas en este campo.

El estudio actual puede sentar las bases para investigaciones posteriores más amplias que busquen explicar las características idiosincráticas o autóctonas de las cardiopatías en Guatemala. Es crucial generar información local sobre estas patologías. Ejemplos de otras caracterizaciones incluyen enfermedades dermatológicas y óseas, así como casos sospechosos de Distemper, que constituyen puntos de partida para el desarrollo de perspectivas futuras en medicina veterinaria preventiva y clínica cotidiana. Los resultados y conclusiones de este estudio pueden servir como fundamento teórico para investigaciones posteriores en medicina veterinaria con especialización en cardiopatías en perros.

II. Materiales y Métodos

a) Materiales

Recurso humano

- Médicos Veterinarios
- Personal de apoyo en Clínica
- Estudiante de investigación

Recursos físicos

- Hospital veterinario
- Fichas clínicas
- Registros médicos
- Computadora
- Hojas
- Programas de cómputo y análisis de datos

b) Métodos

En el Hospital Pet`a Vet especializado en cardiología veterinaria en Guatemala, se llevó a cabo una recopilación exhaustiva de expedientes clínicos correspondientes al periodo comprendido entre 2018 y 2020. Esta recopilación se centró específicamente en pacientes caninos. Los datos obtenidos fueron posteriormente tabulados y analizados, tomando en consideración variables como la especie, el grupo etario, el sexo, la raza y el diagnóstico de cada paciente. Una vez completado el proceso de recopilación y tabulación, se realizó una minuciosa revisión comparativa con información proveniente de estudios previos y revisión bibliográfica.

Durante esta investigación retrospectiva, se recopiló información de tres años consecutivos (2018-2020), examinando los expedientes clínicos de pacientes caninos diagnosticados con cardiopatías y atendidos en el mencionado hospital especializado en cardiología veterinaria. Los pacientes fueron clasificados inicialmente por especie y posteriormente por grupos etarios. Una vez completada esta clasificación, se procedió al análisis detallado de los resultados y a su discusión en profundidad (Ver Cuadro No. 1).

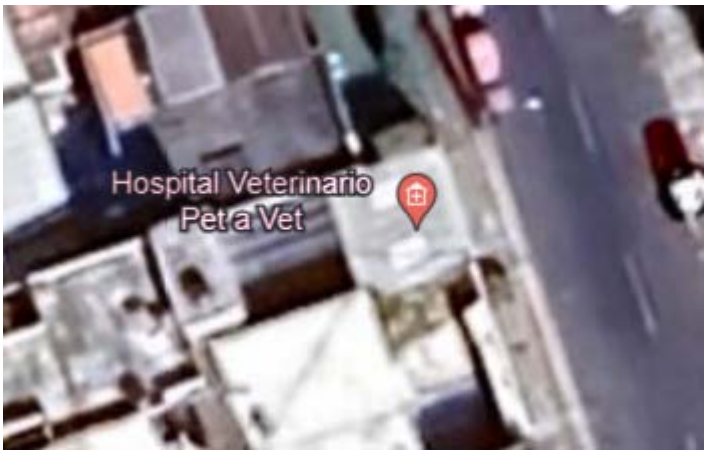
Cuadro No. 1: Pasos de la Metodología

c) Antecedentes del Hospital

El Hospital Veterinario Pet`a Vet cuenta con una trayectoria clínica de 15 años, destacándose por su especialización en Cardiología, Neumología y evaluación preanestésica veterinaria. Ofrece servicios de alta calidad destinados al cuidado y diagnóstico de los perros.

d) Ubicación

El presente estudio se llevó a cabo en el Hospital Veterinario Pet`a Vet, situado actualmente en la 2 calle B 13-44 zona 15, Tecún Uman.



e) Grupos Etarios

Para la recopilación de datos se agruparon las edades por grupos (Ver Tabla No. 1). Estos grupos etarios nos permitieron el análisis de las edades en las poblaciones caninas y así se pudo determinar el grupo etario que más frecuente manifestaba las enfermedades cardiacas, si en pacientes jóvenes o seniles. Algunos autores reportan en sus estudios que la mayor frecuencia de cardiopatías en edades avanzadas (Mucha, 2007) (Detweiler & Patterson, 1965) (Pereira et al., 2014).

Tabla No. 1: Modelo de grupos etarios

Raza o Grupo	Grupos Etarios: Edad en Años				
	0-1	1-4	5-8	9-12	13+

III. Resultados y Discusión

Se examinaron un total de 1215 pacientes caninos sospechosos de padecer alguna enfermedad cardíaca desde enero de 2018 hasta diciembre de 2020. De estos, el 68% (825 casos) presentaron hallazgos compatibles con cardiopatía, mientras que el 32% restante (390 casos) mostraron resultados normales. Dentro de este último grupo de pacientes normales, se incluyeron evaluaciones preanestésicas. Es importante destacar que, de cada 10 pacientes sospechosos de una patología cardíaca, al menos 7 pudieron ser confirmados (Ver Figura No. 1).

En un estudio previo realizado por Calderón, se describe que solo un 2% (260 casos) de los pacientes caninos estudiados presentaban cardiopatía en comparación con la muestra general (Calderón et al., 2014).

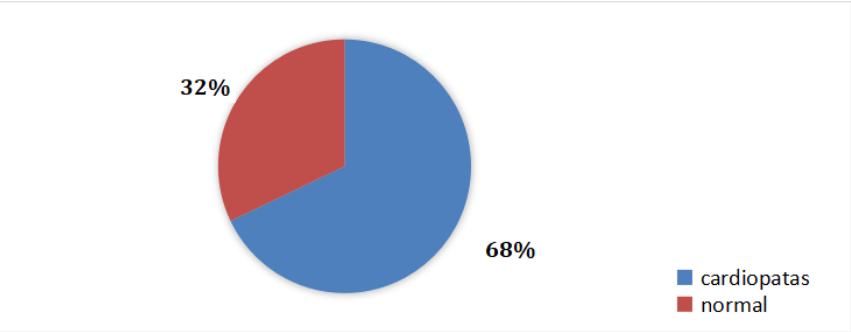


Figura No. 1: Cardiópatas vs normales. Elaboración propia, 2021

En el estudio se evidenció que el 99% de los casos de enfermedades cardíacas correspondían a perros, totalizando 816 casos. En términos generales, la mayoría de los pacientes caninos se situaban en el rango de edad de 9 a 12 años y mayores, tal como fue reportado previamente por Pereira (2014) en poblaciones caninas, lo cual se refleja en la Figura 2.

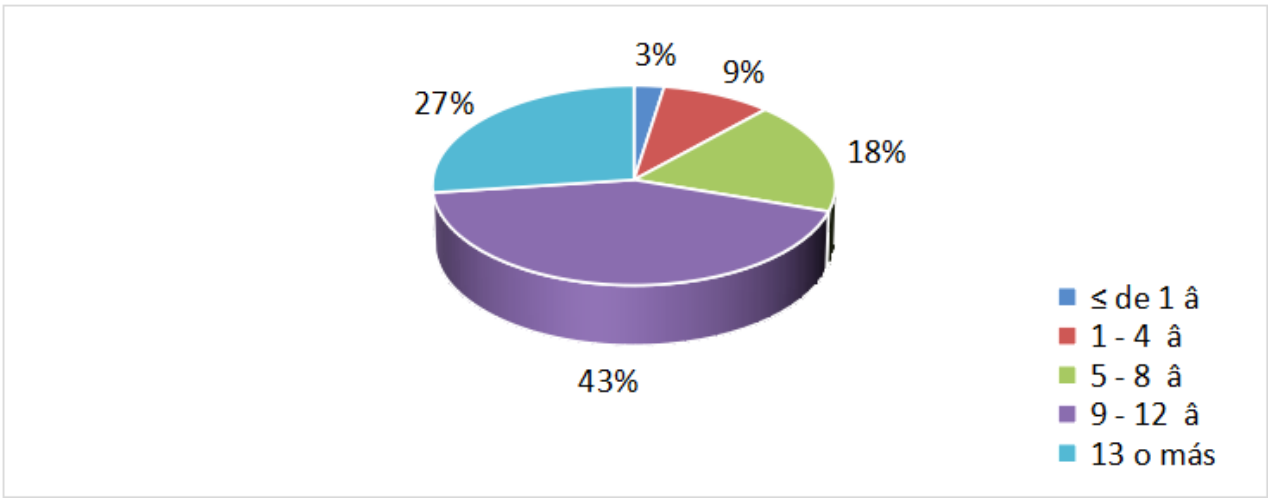


Figura No. 2: Grupo etario de pacientes enfermos en general. Elaboración propia, 2021

En caninos menores de un año, según lo descrito por Patterson (1968), el 86% de los casos (18 ejemplares) presentan una raza definida, mientras que solo el 14% (3 casos) carece de definición racial. Por otro lado, en caninos de 9 a 12 años, tal como lo han señalado Detweiler y Patterson (1965), se observa un incremento en la prevalencia de cardiopatías caninas en consonancia con la edad. Este patrón ha sido corroborado por Calderón, Dávila y Gavidia en (2014), así como por Pereira (2014), quienes encontraron una casuística similar en sus estudios. Específicamente, los grupos de edad entre 9 y 12 años, y aquellos mayores de 12 años, exhibieron una mayor propensión a desarrollar enfermedades cardíacas en comparación con otros grupos etarios.

La Figura No. 3 muestra un aumento progresivo en la frecuencia de cardiopatías en caninos a medida que aumenta la edad.

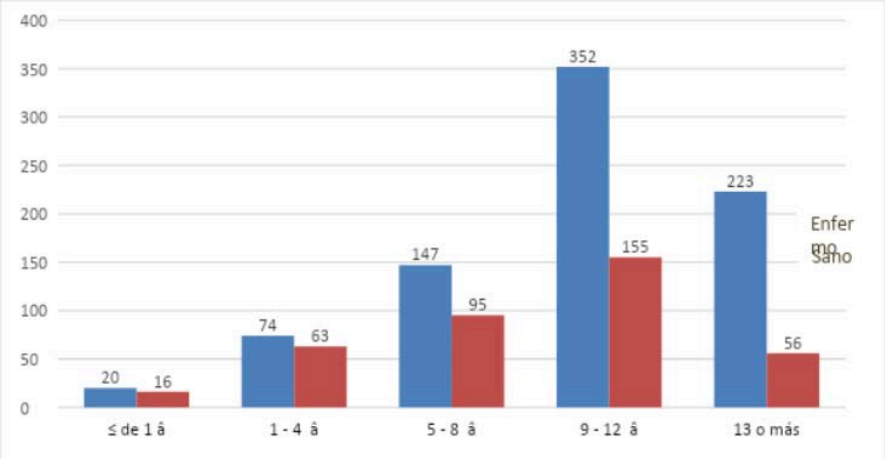


Figura No. 3: *Grupo etario de pacientes caninos sanos vs enfermos*

En la población canina examinada, se identificaron ciertas tendencias relevantes en relación con las cardiopatías. Entre las razas estudiadas, el Schnauzer y el French Poodle mostraron la mayor incidencia de estas enfermedades, destacando el Schnauzer como la raza más afectada. Además, se observó que los machos presentaban una mayor predisposición a desarrollar cardiopatías en comparación con las hembras.

El análisis por grupos etarios reveló que los perros de 9 a 12 años tenían la frecuencia más alta de casos, seguidos por aquellos de 13 años o más, lo que sugiere un aumento en la prevalencia de cardiopatías con la edad. Las enfermedades más comunes fueron la enfermedad valvular mitral, seguida de la hipertensión pulmonar postcapilar asociada a valvulopatías y la cardiomiopatía fenotipo dilatada.

En cuanto a las cardiopatías congénitas, se encontró que representaban el 2.42% de los casos en perros, una cifra menor en comparación con el 11% observado en gatos. Basándose en datos de diferentes países, se sugiere realizar consultas cardiológicas para perros a partir de los 7 años de edad.

Se recomienda incrementar el número de casos clínicos examinados, especialmente en la población felina. Además, es esencial evitar la reproducción de razas con antecedentes de cardiopatías congénitas y hereditarias en perros. También se destaca la importancia de descartar la presencia de enfermedad renal crónica en perros con enfermedad crónica de la válvula mitral, según lo señalado por Martinelli (2016).

References Références Referencias

1. Bonagura, J. D., & Lehmkuhl, L. B. (2006). Cardiomyopathy. In *Saunders manual of small animal practice* (3ra ed., Vol. 2). Elsevier.
2. Buchanan, J. W. (2013). The history of veterinary cardiology. *Journal of Veterinary Cardiology*, *15*(1), 65-85.
3. Calderón, K., Dávila, R., & Gavidia, C. (2014). Casuística de enfermedades cardiacas en caninos de la clínica de animales menores de la Facultad de Medicina Veterinaria, Universidad Nacional Mayor de San Marcos, durante el periodo 2007-2009. *Revista de Investigaciones Veterinarias del Perú*, *25*(3), 399-405.
4. Detweiler, D. K., & Patterson, D. F. (1965). The prevalence and types of cardiovascular disease in dogs. *Annals of the New York Academy of Sciences*, *127*(1), 481-516.
5. Ettinger, S. J., Feldman, E. C., & Côté, E. (Eds.). (2017). *Textbook of Veterinary Internal Medicine: Diseases of the Dog and the Cat*. Elsevier.
6. Girón Sagastume, G. M. (2017). *Caracterización clínica y de laboratorio de pacientes sugerentes a Distemper canino* [Doctoral dissertation, Universidad de San Carlos de Guatemala].
7. Ibarra, L., Morales, M. A., & Acuña, P. (2003). Aspectos demográficos de la población de perros y gatos en la ciudad de Santiago, Chile. *Avances en Ciencias Veterinarias*, *18*(1-2).
8. Keene, B. W., Atkins, C. E., Bonagura, J. D., Fox, P. R., Häggström, J., Fuentes, V. L., & Uechi, M. (2019). ACVIM consensus guidelines for the diagnosis and treatment of myxomatous mitral valve disease in dogs. *Journal of veterinary internal medicine*, *33*(3), 1127-1140.
9. Klein, B. G. (2014). *Cunningham. Fisiología veterinaria + Evolve*. Elsevier Health Sciences Spain.
10. Lewis, T. W., Wiles, B. M., Llewellyn-Zaidi, A. M., Evans, K. M., & O´Neill, D. G. (2018). Longevity and mortality in Kennel Club registered dog breeds in the UK in 2014. *Canine genetics and epidemiology*, *5*(1), 1-17.
11. Martinelli, E., Locatelli, C., Bassis, S., Crosara, S., Paltrinieri, S., Scarpa, P., & Brambilla, P. (2016). Preliminary investigation of cardiovascular–renal disorders in dogs with chronic mitral valve disease.

Journal of veterinary internal medicine, *30*(5), 1612-1618.

12. Mœise, N. S. (1999). Inherited arrhythmias in the dog: potential experimental models of cardiac disease. *Cardiovascular research*, *44*(1), 37-46.
13. Mucha, C. J. (2007). Degeneración valvular mixomatosa. *REDVET. Revista Electrónica de Veterinaria*, *8*(7), 1-7.
14. Nelson, R. W., & Couto, C. G. (Eds.). (2019). *Small Animal Internal Medicine*. Elsevier.
15. Pereira, D. T. P., da Exaltação Pascon, J. P., Valandro, M. A., Wojahn, L. F., Mistieri, M. L., & Furraer, L. T. L. (2014). Aspectos etiológicos, clínicos e epidemiológicos dos atendimentos realizados pelo serviço de cardiologia veterinária da Unipampa, entre abril de 2012 à agosto de 2014. Estudo retrospectivo. *Anais do Salão Internacional de Ensino, Pesquisa e Extensão*, *6*(1).
16. 16. Reinero, C., Visser, L. C., Kellihan, H. B., Masseau, I., Rozanski, E., Clercx, C., & Scansen, B. A. (2020). ACVIM consensus statement guidelines for the diagnosis, classification, treatment, and monitoring of pulmonary hypertension in dogs. *Journal of veterinary internal medicine*, *34*(2), 549-573.
17. 17. Sánchez Alvarado, M. A. (2019). *Determinación de la prevalencia de Dirofilaria immitis en perros del albergue de la Organización Rescatistas de Corazón, del municipio de San Pedro Sula, Cortés, Honduras en el año 2018* [Doctoral dissertation, Universidad de San Carlos de Guatemala].
18. 18. Tilley, L. P. (2016). *Manual of Canine and Feline Cardiology* (F. W. K. Smith, L. P. Tilley, M. A. Oyama, & M. M. Sleeper, Eds.). Elsevier.

Global Journal of Medical Research: G
Veterinary Science and Veterinary Medicine
Volume 24 Issue 1 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Evolution of Degenerative Myxomatous Mitral Valve Disease in Canine Fox Terrier - Case Report

By Keren Souza, Maryanne Santos & Carlos Carreli

Abstract- Degenerative mitral valve disease (DMVD) consists of progressive degeneration of the mitral valve that can occur either in isolation or in association with the tricuspid valve, leading to incomplete coaptation of its leaflets and subsequent valve regurgitation. It's the most common cardiac condition in small animals, accounting for about 75% of cases of heart disease in dogs, mainly affecting elderly small-breed dogs. Breeds with a genetic predisposition, such as Cavalier King Charles Spaniels and Bull Terriers, tend to develop the disease early. It can be classified into four stages: A, B, C, and D, with B having subdivisions (B1 and B2). Animals in stages A, B1, and B2 are asymptomatic, showing clinical signs only from stage C onwards. The report details the case of a 13-year-old Fox Terrier diagnosed at stage B2 of the disease, progressing to stage C within two years—a cardiologist conducted annual monitoring.

Keywords: *degenerative myxomatous mitral valve disease. pimobendan. pulmonary edema.*

GJMR-G Classification: *NLMC Code:14.280.484, SF991*

Strictly as per the compliance and regulations of:

Evolution of Degenerative Myxomatous Mitral Valve Disease in Canine Fox Terrier - Case Report

Keren Souza [α], Maryanne Santos [σ] & Carlos Carreli [ρ]

Simple Summary- This work aims to report the case of an animal referred to a cardiologist in 2021, being diagnosed with Myxomatous Mitral Valve Disease in stage B2, and demonstrating the evolution of the disease to date.

Abstract- Degenerative mitral valve disease (DMVD) consists of progressive degeneration of the mitral valve that can occur either in isolation or in association with the tricuspid valve, leading to incomplete coaptation of its leaflets and subsequent valve regurgitation. It's the most common cardiac condition in small animals, accounting for about 75% of cases of heart disease in dogs, mainly affecting elderly small-breed dogs. Breeds with a genetic predisposition, such as Cavalier King Charles Spaniels and Bull Terriers, tend to develop the disease early. It can be classified into four stages: A, B, C, and D, with B having subdivisions (B1 and B2). Animals in stages A, B1, and B2 are asymptomatic, showing clinical signs only from stage C onwards. The report details the case of a 13-year-old Fox Terrier diagnosed at stage B2 of the disease, progressing to stage C within two years—a cardiologist conducted annual monitoring.

Keywords: degenerative myxomatous mitral valve disease. pimobendan. pulmonary edema.

I. Introduction

Degenerative myxomatous mitral valve disease (DMVM) is the most common heart disease in small animals, accounting for around 75% of cases of heart disease in dogs [9]. The prevalence of MVD increases markedly with age in small dogs, with up to 85% showing evidence of valve damage by 13 years of age [3].

According to Petrus Gimenes and Mantovani (2019), the proper functioning of the mitral valve is based on the structural and functional performance of six components: the posterior wall of the left atrium, the valve ring, the valve leaflets or cusps, the tendon chordae, the papillary muscles of the left ventricle and the left ventricular wall, each of these components plays an independent and synergistic role, contributing to complex functions that maintain valve competence. Any structural changes in the elements of the mitral apparatus affect valve mechanics, compromising its efficiency.

The disease involves a gradual myxomatous degeneration over time with the disorganization of collagen bundles and a reduction in their content, excess production of glycosaminoglycan that results in a change in the valve structure leading to poor coaptation of the leaflets. Poor coaptation of the leaflets allows regurgitation of the mitral valve, resulting in the murmur characteristic of the disease [7].

According to the latest consensus published by ACVIM in 2019, an echocardiogram (ECHO) and chest x-ray in the absence of ECHO are recommended to diagnose the disease. However, caution should be taken due to the marked variation in thoracic conformation and racial differences in the vertebral cardiac scales. The disease can also be recognized during a screening or routine examination by auscultating a typical heart murmur when there is regurgitation of the mitral valve.

The main symptoms that the animal presents when it reaches the advanced stage of the disease are Exercise intolerance, dry cough, decreased appetite, difficulty breathing, and syncope, which are findings associated with a worse prognosis in affected dogs [6].

According to the classification system for treating dogs with DMVM, published by Atkins et al. 2019, described below (Table 1) [9], there are four primary stages of the disease.

Table 1: Four preliminary stages of degenerative myxomatous mitral valve disease

Stages	Description
Stage A	Identifies patients at high risk of developing heart disease but who do not yet have identifiable structural changes in the heart.
Stage B	Identifies patients with structural heart disease but who have never developed clinical manifestations of heart failure. This stage is divided into:
	B1: Asymptomatic patients who do not present radiographic or echocardiographic evidence of cardiac remodeling in response to valve disease.

Author α σ: Graduating in Veterinary Medicine – Una – Pouso Alegre/MG – Brazil. e-mail: kerencristina90@hotmail.com
Author ρ: Internship supervisor, Veterinary Cardiologist - Pouso Alegre/MG – Brazil.

	B2: Asymptomatic patients who present hemodynamically significant mitral valve regurgitation, evidenced by radiographic and echocardiographic findings of left heart enlargement.
Stage C	Patients with previous or current clinical symptoms of heart failure associated with structural changes in the heart.
Stage D	Patients with end-stage heart disease with signs of heart failure who are refractory to mainstay therapy require particular or advanced treatment strategies to remain comfortable regardless of the presence of the disease.

Source: Petrus; Gimenes; Mantovani - Treatise on cardiology of dogs and cats

This work aims to report the case of an animal referred to a cardiologist in 2021, diagnosed with Myxomatous Mitral Valve Disease in stage B2, and demonstrate the evolution of the disease to date.

II. Case Report

A Fox Terrier dog male, 13 years old, neutered, weighing 12 kg, was treated at the Veterinary Clinic Animal Medical Center (AMC) in Pouso Alegre - MG, Brazil, and was sent for cardiological evaluation. He consulted a general practitioner due to complaints of intense tremors, where a chest x-ray was requested. During this examination, an increase in the cardiac silhouette was observed in a topography corresponding to the left atrium, resulting in the patient being referred to a specialist.

In the anamnesis, the owners reported that the animal never had coughs, syncope, or convulsions, just tremors since it was a puppy. On physical examination, a grade 3/6 murmur was heard in the mitral focus, normal heart, and respiratory rates, systemic arterial hypertension (180mmHg), and normal-colored mucous membranes.

An echocardiogram (ECHO) (Figure 1) showed a thickened mitral valve and enlarged heart chambers. At first was prescribed Pimobendan PO at a dose of 0.25 mg/kg BID, continuous use, and requested to return in 30 days.

Upon return, the owners reported that the animal was more active and was not quickly tired. His pressure had already decreased from 180 mmHg to 160 mmHg, and he continued using pimobendan.

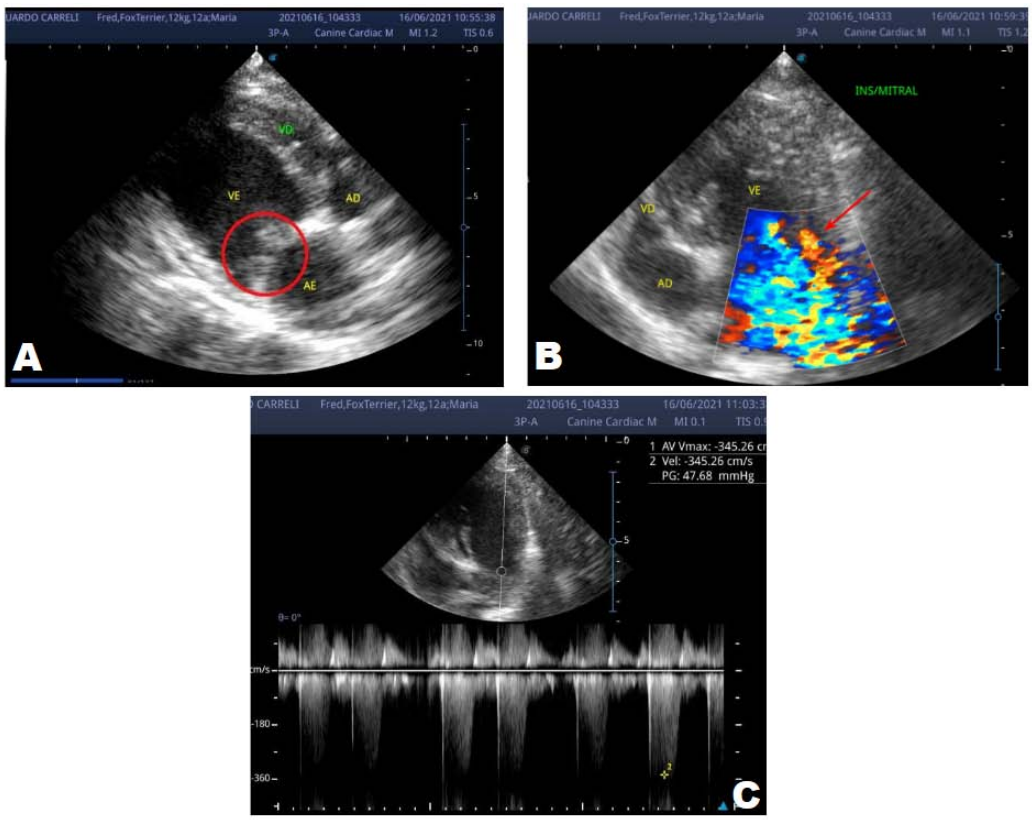


Figure 1: Echocardiogram 2021: Thickened/degenerated mitral valve (A); Observed in Doppler mode, significant mitral valve insufficiency (B); Hemodynamic assessment - Mitral regurgitation gradient: 3.45 m/s / 47.68 mmHg; enlargement of left cardiac chambers; left ventricular diastolic dimension above normal limits was observed

One year later, the animal returned for a new evaluation, repeating the ECHO (Figure 2), which showed the progression of the increase in the left atrium. The electrocardiogram (ECG) (Figure 3) shows baseline sinus arrhythmia with the presence of a premature ventricular complex (Figure 4). Owners report drowsiness, hyporexia, and syncope. However, they did not present tiredness or cough. Blood pressure was 80 mmHg.

Due to the arrhythmia, Sotalol was prescribed at a dose of 25 mg/kg PO, BID for continuous use, and Omega 3 PO at a dose of 600 mg/kg SID became necessary, and pimobendan continued.

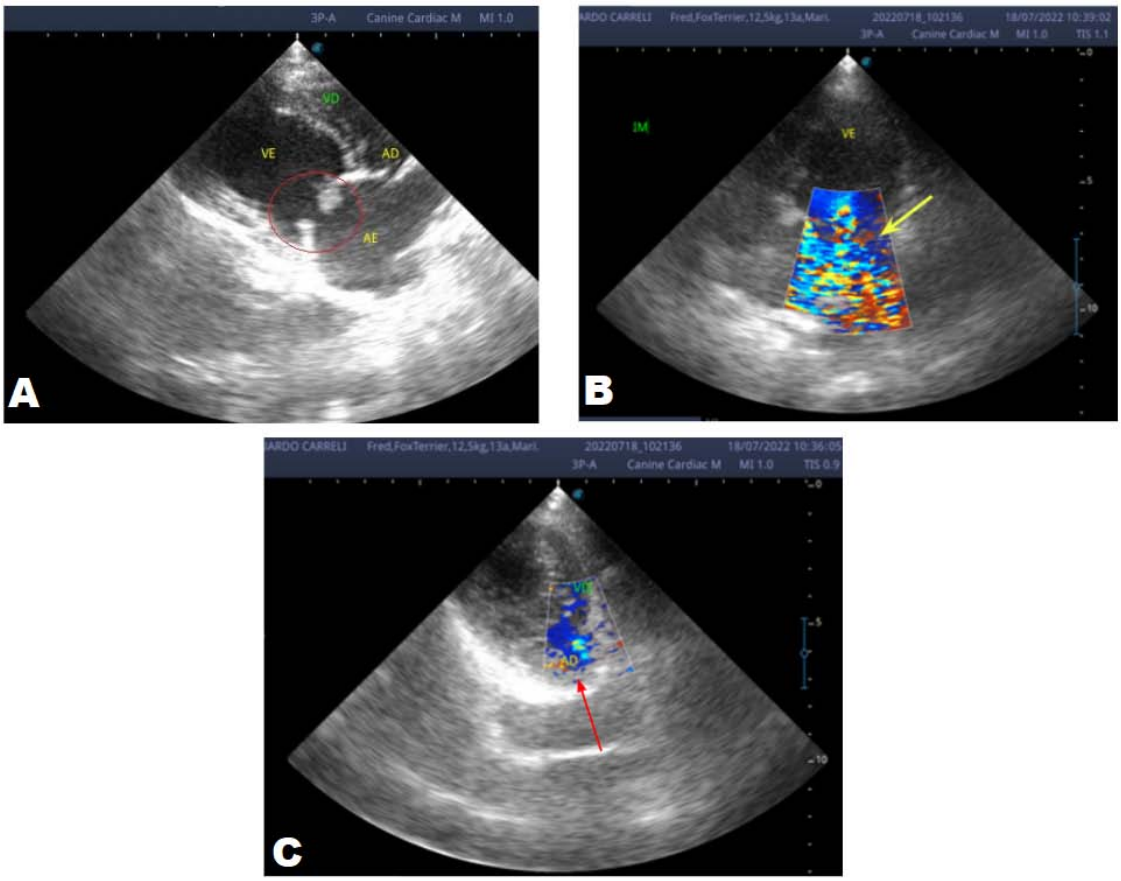


Figure 2: Echocardiogram (2022): observed increase in the left atrium and ventricle; thickened/degenerated mitral valve (A); observed in a Doppler study, turbulent systolic flow within the left atrium, characterizing significant mitral valve insufficiency (B); systolic turbulent flow within the right atrium, representing mild tricuspid valve insufficiency (C); hemodynamic assessment - maximum velocity gradient mitral regurgitation: 3.51 m/s /49.22 mmHg; observed left ventricular diastolic dimension above normal limits with normal systolic function parameters, characterizing systolic dysfunction; preserved diastolic function

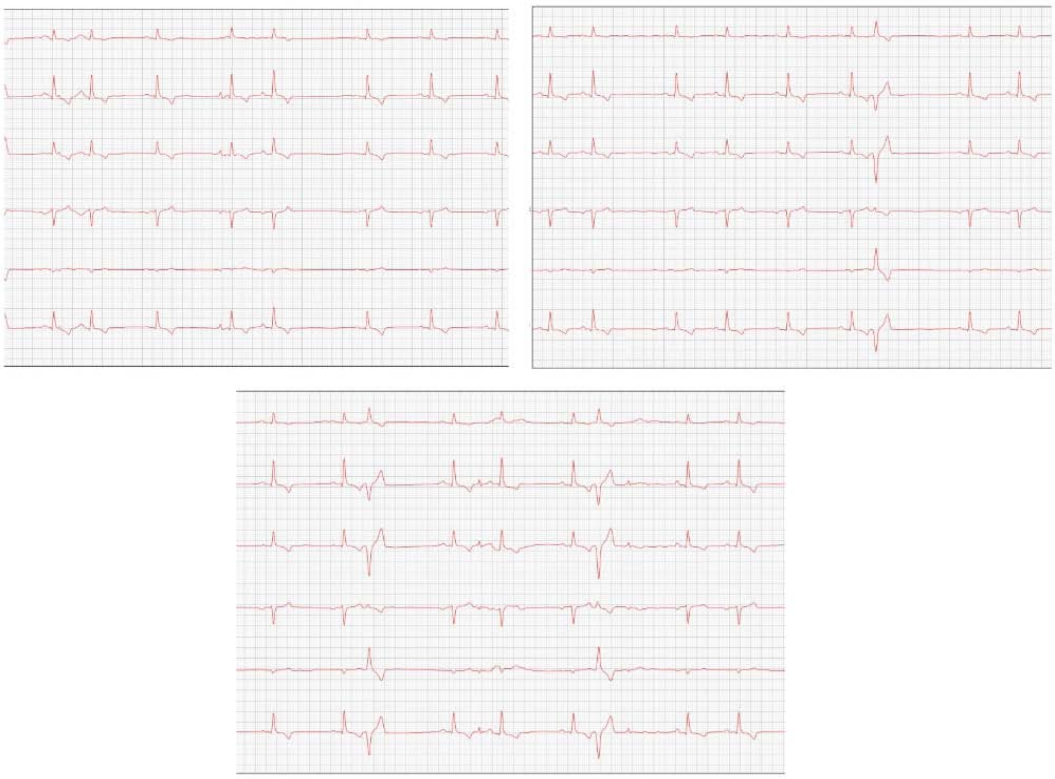


Figure 3: Electrocardiogram (2022)

Table 2: Electrocardiographic report (2022)

Observed parameters	Observed parameters	Observed parameters
QRS axis: 67.07 °	QT Interval: 210 ms	Duration of T: 54 ms
P axis: 58.01 °	PR Interval: 108 ms	QRS duration: 72 ms
Amplitude of S: -0.06 mV	R amplitude: 2.26 mV	Minimum HR: 49 bpm
PR Segment: 52 ms	P amplitude: 0.22 mV	Average HR: 95 bpm
ST segment: 84 ms	T amplitude: -0.74 mV	Maximum HR: 297 bpm
Duration of P: 56 ms		

Comments

Baseline sinus arrhythmia.

The QRS axis is within normal limits for the species. Episodes of the premature ventricular complex were observed.

An increase in the P wave and QRS complex duration was observed, suggesting atrial and left ventricular overload.

Ventricular repolarization disorder was observed due to the rise in the amplitude of the T wave (> 25% of the R wave), which is compatible with electrolyte changes and myocardial hypoxia.

Conclusions: Baseline sinus arrhythmia with the presence of premature ventricular complex

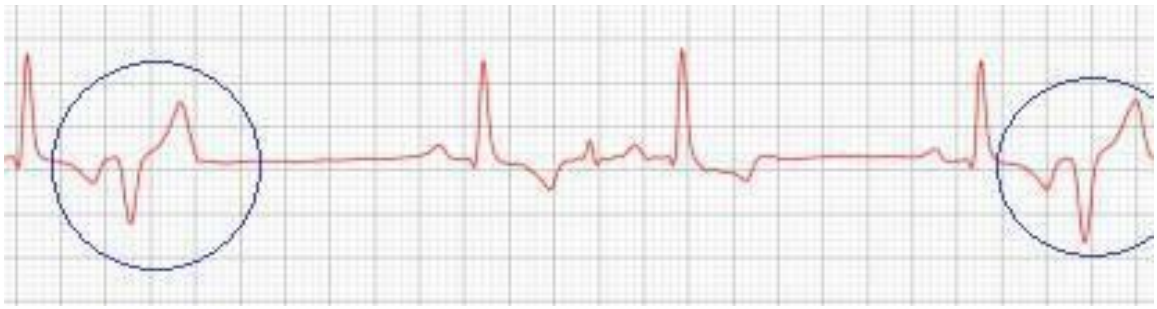


Figure 4: Electrocardiographic tracing (2022): showing episodes of premature ventricular complex (circles)

At the beginning of 2023, the patient returned to repeat the cardiological evaluation. During the anamnesis, the Guardian reported that the patient did not present episodes of syncope and remained stable during this period, continuing the previously adopted treatment.

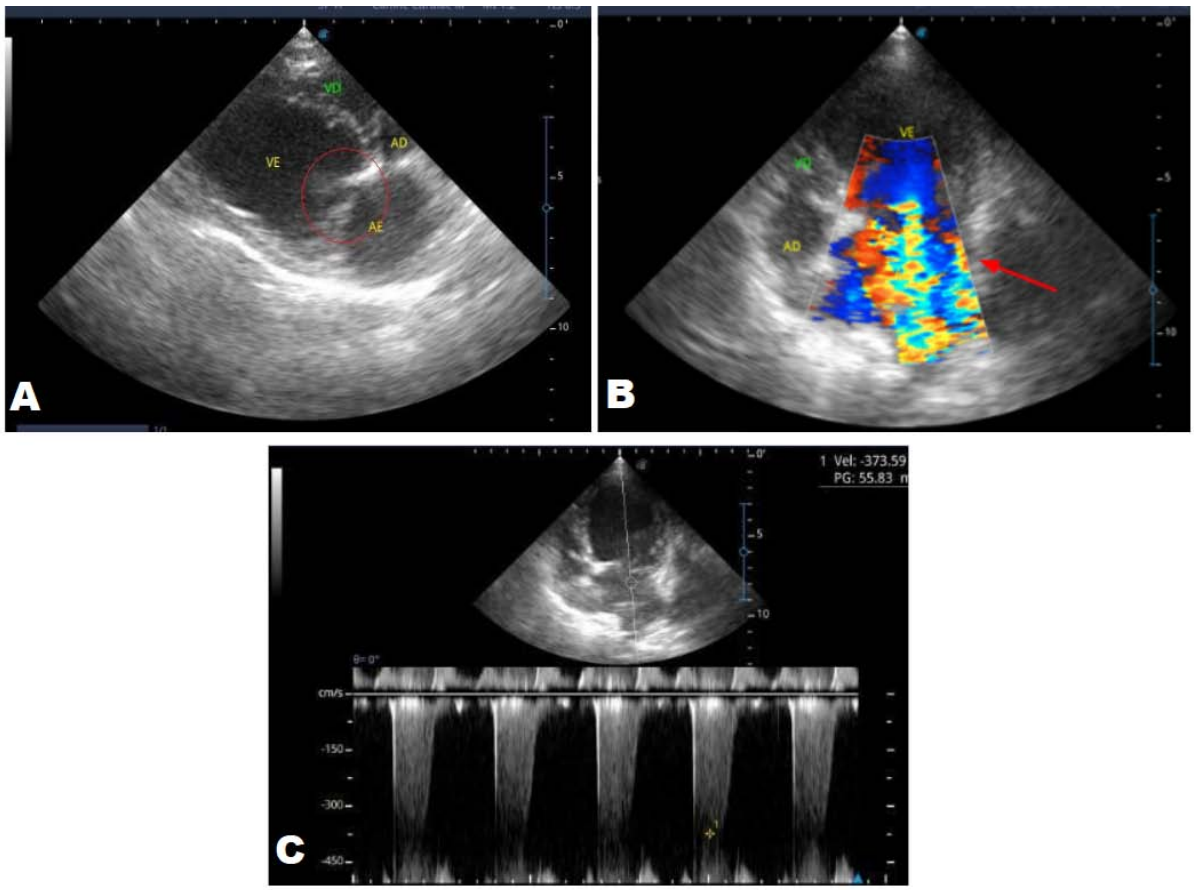


Figure 5: Echocardiogram (January/2023): observed increase in the left atrium and ventricle; thickened/degenerated/prolapsed mitral valve (A); observed in Doppler study, systolic turbulent flow within the left atrium characterizing severe mitral valve insufficiency (B). Hemodynamic assessment - Maximum velocity gradient mitral regurgitation: 3.74 m/s / 55.83 mmHg: Observed left ventricular diastolic dimension above standard limits, with normal systolic function parameters, characterizing systolic dysfunction; preserved diastolic function

After eight months, the patient returned with a worsening condition, repeated ECHO (Figure 6) and ECG (Figure 7), where diastolic dysfunction and worsening of the arrhythmia were observed. Amiodarone 8.7 mg/kg orally was prescribed, replacing Sotalol, one tablet BID, and Furosemide (Lasix) 1.7 mg/kg orally was prescribed every 12 hours. Pimobendan was continued. After a week, a reassessment was carried out, and the ECG demonstrated stability in the arrhythmia (Figure 8).

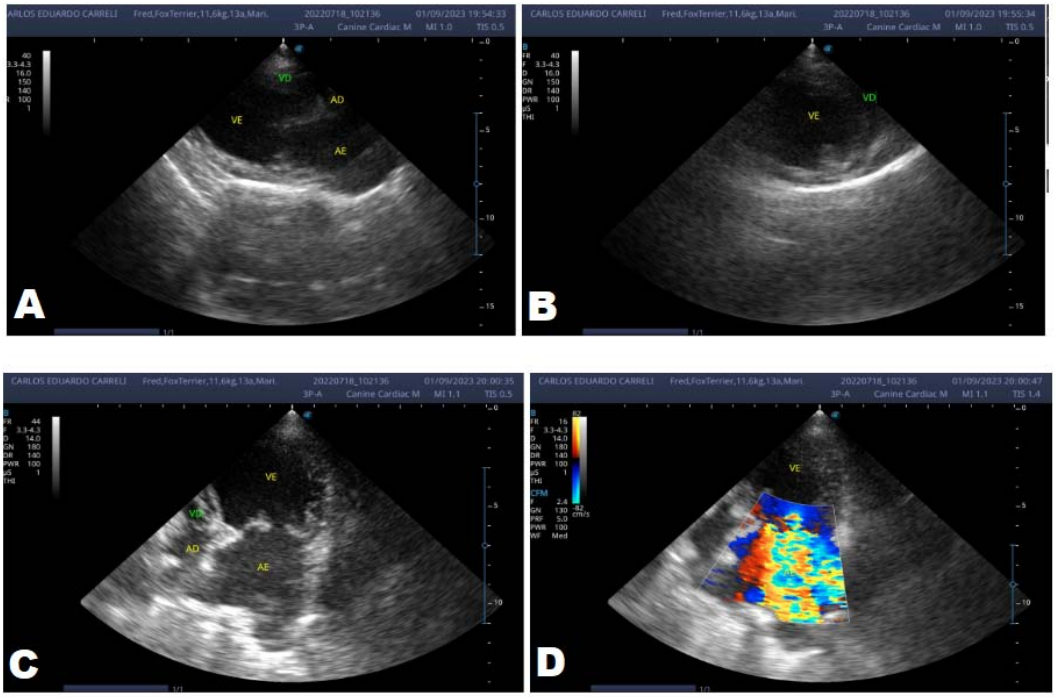


Figure 6: Echocardiogram (September/2023): significant enlargement of the left heart chambers observed; observed in a Doppler study, systolic turbulent flow within the left atrium characterizing significant mitral valve insufficiency; Observed left ventricular diastolic dimension above standard limits, with normal systolic function parameters, indicating systolic dysfunction; A left ventricular filling pattern of the E>A wave type and an increased E/A ratio were observed, characterizing diastolic dysfunction (restrictive or pseudo-restrictive pattern)

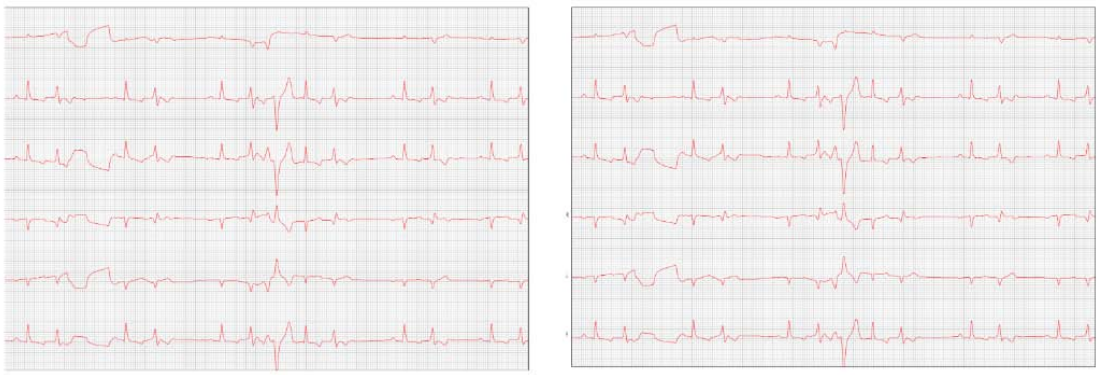


Figure 7: Electrocardiogram (September/2023)

Table 3: Electrocardiographic report (September/2023)

Observed parameters	Observed parameters	Observed parameters
Minimum HR: 71 bpm	T duration: 68 ms	S amplitude:: -0.01 mV
Average HR: 125 bpm	QT interval: 196 ms	T amplitude: -0.32 mV
Maximum HR: 400 bpm	ST segment: 56 ms	P axis: 83.89 º
P duration:: 48 ms	P amplitude: 0.29 mV	QRS axis: 81.32 º
QRS duration:: 72 ms	R amplitude: 1.69 mV	PR Interval: 104 ms

Comments:

Sustained ventricular bigeminy with clusters of ventricular trigeminy and sinus arrhythmia.

Duration and amplitude of the P wave and QRS complex with values within normal limits for the patient's species, size, and age.

Normal electric axis.

Normal T wave.

Presence of polymorphic premature ventricular extrasystoles, isolated in pairs, in triplets, and at times organized into ventricular bigeminy and trigeminy.

Nothing else is worth noting during the 4 minutes and 41 seconds of monitoring.

Conclusions: Sustained ventricular bigeminy with clusters of ventricular trigeminy and sinus arrhythmia.

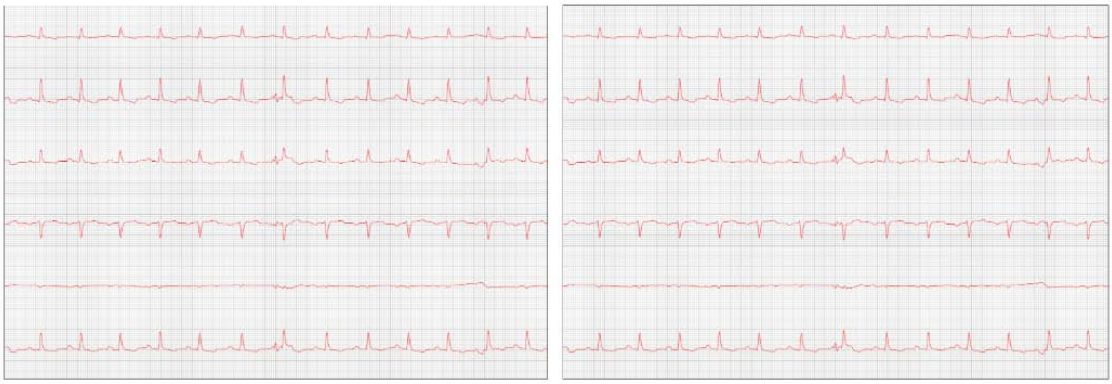


Figure 8: Reevaluation of the electrocardiogram (September/2023)

III. Discussion

In the reported, he was asymptomatic, and the echocardiographic examination showed enlargement of the left heart chambers, thickened and degenerated mitral valve (Figure 1), left ventricular diastolic dimension above normal limits. , with normal systolic function parameters, characterizing systolic dysfunction. The thickening and degeneration of the mitral valve indicates its insufficiency, and the other changes represent diastolic dysfunction.

Diagnosed with degenerative myxomatous mitral valve disease, treatment with pimobendan began. According to Boswood *et. al*. (2016), its mechanism of action includes a positive inotropic combination and balanced vasodilation caused by calcium sensitization and phosphodiesterase inhibition, as a result, the effects of pimobendan may consist of increased cardiac output (CO), myocardial contractility and decreased preload and afterload.

In 2022, the animal returned for annual exams one year after the diagnosis. The ECHO showed an increase in the left atrium and ventricle, thickened/degenerated mitral valve (Figure 2), preserved diastolic function, and low probability of pulmonary hypertension; the ECG detected an increase in the duration of the P wave and the QRS complex (Figure 3), suggestive of atrial and left ventricular

overload, baseline sinus arrhythmia with the presence of a premature ventricular complex.

In most cases, cardiac arrhythmias are not clinically relevant unless they are associated with heart disease or cause an extreme change in heart rate, being very slow, fast, or irregular. [10]. When choosing a medication for treatment, one must consider some things, such as clinical status, associated cardiac or systemic comorbidities, and drug association [13]. Class III antiarrhythmics block potassium channels, preventing a new action potential from occurring before complete repolarization, causing a prolongation of this potential and the refractory period [5].

Sotalol was prescribed to control the arrhythmia presented by the animal with DMVM. According to Treseder et al. (2019), Sotalol is an antiarrhythmic agent commonly used in human and veterinary medicine to control ventricular and supraventricular arrhythmias. Its antiarrhythmic properties are well established and are attributed mainly to the blockade of potassium channels with concomitant non-selective β-adrenergic blockade.

In 2023, the animal returned and repeated only the ECHO (Figure 5), where no significant changes were observed during this period, except for a structural change in the mitral valve, identifying a prolapse and increase in the left ventricular diastolic dimension, with systolic function parameters, characterizing systolic dysfunction; diastolic function remained preserved.

Petrus, Gimenes, and Mantovani (2019, p. 156) report that mitral valve prolapse is a common complication that generally occurs with the progression of MVD. As MVD progresses, mitral valve regurgitant flow increases, promoting volume overload in the left atrium, with an increase in filling pressures in the left heart chambers. There is also progressive cardiac remodeling, characterized by eccentric hypertrophy, initially in the left atrium and, later, in the left ventricle. Systolic dysfunction occurs in the advanced stages of MVD, which culminates in hemodynamic changes and progressive diastolic dysfunction of the left ventricle, affecting general cardiac performance and determining the appearance of congestive heart failure syndrome.

In the same year, eight months later, the patient returned with a worsening condition, presenting pulmonary edema. The animal's condition progressed to stage C with these changes, requiring repeat echocardiographic and electrocardiographic examinations.

The ECHO (Figure 6) showed an increase in the cardiac chambers and diastolic dysfunction compared to the previous exam. The ECG (Figure 7) revealed polymorphic premature ventricular extrasystoles. Due to this change, Sotalol was replaced by amiodarone.

Amiodarone is also a class III antiarrhythmic, being the most indicated in these cases as it is considered broad spectrum and can be used in supraventricular and ventricular arrhythmias [5]. However, its use should be reserved for cases where the animal no longer responds to sotalol treatment due to its various side effects [10]. Its most common adverse effects are liver changes, causing an increase in the concentration of gastrointestinal and enzymes, such as vomiting, diarrhea, and anorexia [11]. Usually, these effects are dose-dependent and reversible if their supply is interrupted at the beginning of clinical manifestations [10].

For pulmonary edema, furosemide (Lasix) was prescribed. Furosemide is a loop diuretic widely used in veterinary clinics. The Food and Drug Administration (FDA) has approved furosemide to treat conditions with volume overload and edema secondary to exacerbation of congestive heart failure, liver failure, or renal failure, including nephrotic syndrome [4]. Its mechanism of action is to inhibit the tubular reabsorption of sodium and chloride in the proximal and distal tubules and in the thick ascending loop of Henle, inhibiting the sodium chloride cotransport system, resulting in excessive excretion of water along with sodium, chloride, magnesium, and calcium [4].

One week later, the patient returned for a reevaluation of the ECG (Figure 8), demonstrating stability in the arrhythmia.

In 2023, there were some complications regarding the patient's treatment. The owner reported that he was no longer able to administer the medications as recommended, providing pimobendan every 24 hours or at a longer interval. Regarding other medications, it was said that the animal accepted it more quickly but could not administer it at the correct time, which may justify the worsening of the condition in a short period. The animal is currently stable and continues to receive monitoring.

IV. Conclusion

Myxomatous mitral valve degeneration is a progressive disease responsible for the most significant number of heart diseases in small animals. We observed that the time for the disease to progress from stage B2 to C was two years, with correct monitoring and treatment reducing its progression over a while. Medications were essential in this case to keep the animal's condition stable.

References Références Referencias

1. Al-Mosawi, A. *Pharmacological Treatment of Chronic Symptomatic Premature Ventricular Contractions: An Educational Article and Expert Opinion.* Journal of Medical and Clinical Studies.; 6; 2582-0869, 2023. Doi https://doi.org/10.36266/JMC S/ 192
2. Boswood, A, et al. *Effect of Pimobendan in Dogs with Preclinical Myxomatous Mitral Valve Disease and Cardiomegaly: The EPIC Study—A Randomized Clinical Trial.* Journal of Veterinary Internal Medicine,

30, 1765-1779, 2016. Doi https://doi.org/10.1111/jvim.14586.
3. Keene, BW, Atkins, CE, Bonagura, JD, et al. *ACVIM consensus guidelines for the diagnosis and treatment of myxomatous mitral valve disease in dogs.* J Vet Intern Med.; 33: 1127–1140, 2019. https://doi.org/10.1111/jvim.15488.
4. Khan, Tahir; Patel, Roshan; Siddiqui, Abdul. *Furosemide.* Study Guide from StatPearls Publishing, Treasure Island, 2018.
5. Larsson, Maria Helena Matiko Akao. *Medicamentos antiarrítmicos*. In: SPINOSA, Helenice de Souza; Górniak, Silvana Lima; Bernardi, Maria Martha. Farmacologia: Aplicada à medicina veterinária. 7. ed. Rio de Janeiro: Guanabara Koogan Ltda, 6, 382-388, 2023.
6. Menciotti, Giulio; Borgarelli, Michele. *Review of diagnostic and therapeutic approach to canine myxomatous mitral valve disease.* Journals Veterinary Sciences, 4, 2017. Doi https://doi.org/10.3390/vetsci4040047.
7. McNair AJ, Markby GR, Tang Q, MacRae VE, Corcoran BM. *TGF-β phospho antibody array identifies altered SMAD2, PI3K/AKT/SMAD, and RAC signaling contribute to the pathogenesis of myxomatous mitral valve disease*. Front Vet Sci. Oct 16;10:1202001, 2023. doi: 10.3389/fvets.2023.1202001.
8. Pinkos A, Stauthammer C. *Degenerative Valve Disease: Classification, Diagnosis, and Treatment of Mitral Regurgitation.* Today's Veterinary Practice, 2021.
9. Petrus, Lilian; Gimenes, André; Mantovani, *Matheus. Degeneração mixomatosa Valvar.* In: LARSSON, Maria. Tratado de cardiologia de cães e gatos. 9, 155-170, 2019.
10. Riviere, Jim E.; Papich, Mark G. Adams Booth. *Farmacologia e Terapêutica Veterinária.* Rio de Janeiro, Grupo GEN, 2021.
11. Tárraga, Kátia Mitsube. *Medicamentos antiarrítmicos*. In: SPINOSA, Helenice de Souza; Góniak, Silvana Lima; Bernardi, Maria Martha. Farmacologia: Aplicada à medicina veterinária. 6. ed. Rio de Janeiro: Grupo GEN. 6, 503-512, 2017.
12. Treseder, J.R.; LeBlanc, N.L. Scollan, K.F. *Inotropic and chronotropic effects of sotalol in healthy dogs.* Journal of Veterinary Cardiology. 25,14-24. 2019. Doi https://doi.org/10.1016/j.jvc.2019.07.001
13. Yamaki, Fernanda Lie; Pessoa, Rebecca Bastos; Larsson, Maria Helena Matiko Akao. Sistema cardiovascular: Arritmias cardíacas. In: Jericó, Márcia Marques; Neto, João Pedro de Andrade; Kogika, Márcia Mery. Tratado de medicina interna de cães e gatos. 2. ed. Grupo GEN. 14, 1212-1237, 2023.

This page is intentionally left blank

Global Journal of Medical Research: G
Veterinary Science and Veterinary Medicine
Volume 24 Issue 1 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Effectiveness of the use of DAFS-25 in the Standard Hepatitis Treatment Regimen for Dogs

By Poberezhets E. P. & Rodionova T. N.
Astrakhan Tatishchev State University

Abstract- The article provides a study on the effectiveness of the drug DAFS-25 in the standard hepatitis treatment regimen for dogs. The study was conducted in a veterinary clinic «Alabai», Astrakhan, based on the treatment of dogs of the Caucasian wolfhound breed from Kangly kennel. Key indicators of liver status in dogs were taken in the study: alkaline phosphatase (ALP), ALT, AST, ALB (albumin), (TB) total bilirubin, (TP) total protein; in the process of treatment, based on the results of the biochemical rapid analyzer Seamaty 120VP, animals were divided into three groups (one control and two experimental groups) by analyzing their state. Fifteen dogs aged 3-6 were reviewed in the study, the average weight of animals was 65 kg. Biochemical analysis was carried out at the beginning of the study, on the twentieth day and after the end of therapy. The standard treatment regimen was used in the control group and the drug DAFS-25 was added into the standard treatment regimen of experimental groups at a dose of 1.6 mg/kg (104 mg/head) in the second group and 4.8 mg/kg (312 mg/head) in the third group.

Keywords: drug, DAFS-25, hepatitis, caucasian wolfhound, treatment regimen.

GJMR-G Classification: NLMC Code: E05.393.805

Strictly as per the compliance and regulations of:

Effectiveness of the use of DAFS-25 in the Standard Hepatitis Treatment Regimen for Dogs

Эффективность Применения Препарата Дафс-25 В Стандартной Схеме Лечения Гепатитов У Собак

Poberezhets E. P. [α] & Rodionova T. N. [σ]

Реферат- **Вданной статье предоставляется исследованиепо изучению эффективности применения препарата ДАФС-25 в стандартной схеме лечения гепатитов у собак.Исследование проводилось в ветеринарной клинике «Алабай» г. Астрахань на основе лечения собак породы кавказский волкодав питомника «Канглы». При исследовании были взяты основные показатели состояния печени у собак: щелочная фосфатаза (ALP), ALT, AST,ALB (альбумины), (TB)общий билирубин, (TP) общий белок,впроцессе лечения по результатам биохимического экспресс анализатора Seamaty 120VP, анализируя состояние животных, их распределил их на три группы – однаконтрольная и две опытные. В изучении было обследовано 15 собак, от 3 до 6лет, средний вес животных 65 кг. Биохимический анализпроводили в начале исследования, на двадцатый день и после окончания терапии. В контрольной группе применялась стандартная схема лечения, а в опытных в стандартную схему лечения был добавлен препарат ДАФС-25в дозах 1,6 мг/кг (104 мг/гол) - вторая группа и 4,8 мг/кг (312 мг/гол) - третья группа. Летальных исходов в период исследования не было. Для исследования был взят препарат ДАФС-25 так как он обладает выраженными антиоксидантными свойствами, благоприятно влияет на организм животных от негативных факторов внешней среды, восполняет недостачу селена в организме животных. Благоприятно влияет на состав крови, улучшает обменные процессы всего организма. В результате лечения общее состояниеживотных которые получали терапию пришло к физиологической норме, биохимические показатели взятие в конце терапии нормализовались, что свидетельствовало о полном выздоровлении собак. Исследования показали, эффективность применения препарата в второй и третьей опытных группах, что позволяет предложить данный препарат ДАФС-25 как альтернативу в лечении заболеваний печении и гепатитов другимгепатопротекторным препаратам.**

Ключевые слова: препарат, ДАФС -25, гепатит, кавказский волкодав, схема лечения.

Author α: graduate student of FSBEI HE Astrakhan Tatishchev State University (ORCID 0009-0001-1575-5743).
e-mail: Petrovnaalena86@gmail.com
Author σ: professor, Doctor of Biological Sciences, FSBEI HE Saratov State Vavilov Agrarian University (ORCID-0000-0003-2444-5269)

Abstract- The article provides a study on the effectiveness of the drug DAFS-25 in the standard hepatitis treatment regimen for dogs. The study was conducted in a veterinary clinic «Alabai», Astrakhan, based on the treatment of dogs of the Caucasian wolfhound breed from Kangly kennel. Key indicators of liver status in dogs were taken in the study: alkaline phosphatase (ALP), ALT, AST, ALB (albumin), (TB) total bilirubin, (TP) total protein; in the process of treatment, based on the results of the biochemical rapid analyzer Seamaty 120VP, animals were divided into three groups (one control and two experimental groups) by analyzing their state. Fifteen dogs aged 3-6 were reviewed in the study, the average weight of animals was 65 kg. Biochemical analysis was carried out at the beginning of the study, on the twentieth day and after the end of therapy. The standard treatment regimen was used in the control group and the drug DAFS-25 was added into the standard treatment regimen of experimental groups at a dose of 1.6 mg/kg (104 mg/head) in the second group and 4.8 mg/kg (312 mg/head) in the third group. There were no lethal outcomes during the study period. The drug DAFS-25 was taken for the research, as it has strong antioxidant properties, positively affects the animals' body from negative environmental factors, fills selenium deficiency in the body of animals. It positively affects the composition of the blood, improves metabolic processes of the whole organism. As a result of treatment, the general condition of the animals who received therapy came to the physiological norm, biochemical parameters taken at the end of therapy returned to normal, which indicated a complete recovery of the dogs. Studies have shown the efficacy of the drug in the second and third experimental groups, which allows to suggest the drug DAFS-25 as an alternative to other hepatoprotective drugs in the treatment of liver diseases and hepatitis.

Keywords: drug, DAFS-25, hepatitis, caucasian wolfhound, treatment regimen.

I. Введение/Introduction

В последнее время в ветеринарной практике у собак встречаются очень часто болезни печени. Одно из самых распространенных заболеваний печени является гепатит. Гепатит –это воспалительные заболевания печени, в результате чего орган не выполняет свои основные функции (вывод токсинов из организма, обмен веществ, усвоение витаминов и микроэлементов), и это приводит к ослаблению организма, нарушению работы других органов и систем, интоксикации. Причины возникновения гепатитов у собак

различен. Алиментарный гепатит является одним из часто встречающихся заболеваний в ветеринарной практике. Возникновение заболевания напрямую зависит от нерационального питания, которое приводит к нарушению функционального состояния печени, обмена веществ и в целом на организм животного. Процент смертельных исходов составляет 30-40%.[1] В результате разнообразия патоморфологических изменений при гепатите у собак как правило отмечают пат изменения в желчном пузыре и печени, а так же желтушность слизистых[1].

I. Introduction

Recently in veterinary practice, liver diseases are common in dogs. Hepatitis is one of the most common liver diseases. Hepatitis is an inflammatory liver disease as a result of which the organ does not perform its basic functions (removal of toxins from the body, metabolism, assimilation of vitamins and trace elements) and this leads to a general weakening of the body, violations in the work of other organs and systems, intoxication. The causes of hepatitis in dogs are different. Nutritional hepatitis is one of the most common diseases in veterinary practice. The occurrence of the disease directly depends on malnutrition, which leads to a violation of the functional state of liver, metabolism and generally the whole organism of an animal. The percentage of deaths is 30-40%. As a result of the diversity of pathomorphological changes with hepatitis in dogs pathological changes in the gall bladder and liver, as well as yellowing of mucous membranes are usually noted.

II. Материалы и Методы Исследования/Materials and Methods of Research

Исследования проводились с апреля по май 2023 года, в рамках ветеринарной клиники «Алабай» и питомника кавказских волкодавов «Канглы» в г. Астрахань.В результате работы было сформировано три группы по пять собак в каждой группе, в возрасте от 3 до 6 лет, весом 65кг. Всего в работе было обследовано 15 собак.Распределение больных животных по группам имело случайный характер. Группы были выделены на основании схем лечения. Первая (контрольная)группа животных получали лечение по стандартной схеме, которая включала препараты 5%раствор глюкозы 8мл/кг, гептрал 400мг на гол, мильгамма 2мл на гол ,0,9% растворNaCl 10мг/кг. Вторая(опытная)группа так же получала стандартное лечение, но в схему был добавленселеноорганический препарат ДАФС-25 в дозе 1,6 мг/кг (104мг/гол). Третья группа (опытная) гдеживотные получали лечение по той же схеме, что и вторая с добавлением селеноорганическогопрепарата ДАФС-25 в дозе 4,8 мг/кг (312 мг/гол).

III. Результаты Исследований/Research Results

На момент исследования у собак отмечались четко выраженные клинические признаки гепатита, температура тела повышалась до 40 градусов, при осмотре было выявлено бледность слизистых оболочек ротовой полости, десен и склеры глаз, у некоторых животных отмечалась незначительная желтушность, желудочно-кишечный тракт нарушен (понос, а у некоторых животных кал содержал непереваренную пищу), снижение аппетита, угнетение общего состояния собак, периодическая рвота. При пальпации отмечалась болезненность в области печени. При УЗИ диагностике увеличение печени, края неровные, повышение эхогености.[5]
Для оценки влияния препарата ДАФС-25 производили забор крови в начале исследования, на седьмой день и в конце опытанатощак. Биохимический анализ крови проводился на экспресс анализаторе Seamaty 120VP. Для наглядности и подтверждения диагноза были взяты наиболее информативные биохимические показатели крови: щелочная фосфатаза (ALP), ALT,AST, общий билирубин (TB) , альбумины (ALB), общий белок (TP).[4].

В начале исследования после забора крови полученные показатели были усреднены и представлены в таблице1

Таблица 1: Биохимические показатели крови собак в начале исследования

Обозначения	Показатели	Норма	1 группа (контрольная группа)	2 группа опытная (ДАФС-25 в дозе 104 мг/гол)	3 группа опытная (ДАФС-25 в дозе 312 мг/гол)
ALB	Альбумины ,г/л	22-39	17±1,20*	19±1,50*	20,6±1,51*
TB	Общий билирубин, мкмоль/л	0,9-10,6	11,7±0,23*	13,4±0,25*	11,5±0,23*
TP	Общий белок, г/л	50-100	43±2,11*	46±2,08*	47±2,09*
ALP	Щелочная фосфатаза, ед/л	10,6-100,7	111,8±3,22*	115,2±3,25	110,3±3,20*
ALT	АЛТ, ед/л	8,2-57,3	67±2,24*	65,3±2,22*	68,8±2,24*
AST	АСТ, ед/л	8,9-48,5	55,3±2,12*	57,9±2,13*	58,2±2,13*

Примечание: * $p<0,05$ относительно физиологической нормы*

При исследовании крови собак больных гепатитом в начале лечения отмечается понижение альбуминов у контрольной группы на 29,41% по отношению физиологической нормы, в опытных (второй и третьей) на 15,79%-6,80%, снижение общего белка у контрольной первой группы на 16,28%, а второй и третьей опытных групп на 8,70% -6,38% от нормы. Повышение показателей АСТ и АЛТ, АСТ на 14,02% в контрольной группе, а у опытных 19,38-19,59%, АЛТ повысился на 16,93% в первой группе, второй и третьей на 13,96%-18,67%относительно физиологической нормы крови. Показатель щелочной фосфатазы крови был увеличен у первой контрольной на 11,02%, у опытных 14,20% - 9,53% по отношению нормы. Уровень общего билирубина у всех собак был повышен относительно физиологической нормы на 10,38% первая группа и на 22,64% -8,49%.

Повторное исследование крови собак больных гепатитом проводилось на двадцатый день лечения у всех групп

Таблица 2: Биохимические показатели крови собак на двадцатый день исследования

Обозначения	Показатели	1группа (контрольная)	2группа опытная (ДАФС-25в дозе 104 мг/гол)	3группа опытная (ДАФС-25 в дозе 312 мг/гол)
ALB	Альбумины, г/л	18,5±1,21	20,8±1,23*	21,7±1,24*
TB	Общий билирубин, мкмоль/л	10,9±0,11	10,7±0,10*	10,6±0,10*
TP	Общий белок, г/л	45±2,08	47±2,09*	49±2,11*
ALP	Щелочная фосфатаза, ед/л	101,3±3,21	65,3±2,22*	63,7±2,23*
ALT	АЛТ, ед/л	58,2±2,13	52,6±2,12*	51,8±2,10*
AST	АСТ, ед/л	52,4±2,10	50,7±2,08*	49,2±2,02*

*Примечание: * $p<0,05$ относительно результатов анализов первой контрольной группы*

При взятии биохимических анализов крови на двадцатый день после начала лечения было отмечено, что показатели были значительно понижены в второй и третьей группах относительно первой. Щелочная фосфатаза была ниже на 59,03%-55,85%, показатель АЛТ был снижен на 12,36%-10,65%, АСТ понизился 5,69%-2,56%, общий билирубин так же был снижен на 2,83%-1,87%. Отмечено повышение альбуминов у второй и третьей группах на 12,43%- 17,30% по отношению к контрольной первой группе. Общий белок так же повысился 4,44%-8,89% по отношению к первой группе.

Таблица 3: Биохимические показатели крови собак по окончанию исследования

Обозначения	Показатели	1 группа (контрольная)	2группа опытная (ДАФС-25 в дозе 104 мг/гол)	3группа опытная (ДАФС-25 в дозе 312 мг/гол)
ALB	Альбумины, г/л	23±1,52	25±1,53*	27±1,55*
TB	Общий билирубин, мкмоль/л	8,7±0,21	5,4±0,18*	3,5±0,20*
TP	Общий белок, г/л	51±2,15	58±2,17*	63±2,22*
ALP	Щелочная фосфатаза, ед/л	23,3±1,23	22,5±1,08*	18,4±1,20*
ALT	АЛТ, ед/л	37,8±1.43	35,5±1,40*	33,8±1,42
AST	АСТ, ед/л	24,8±1,22	21,5±1,12*	19,3±1,13*

Примечание: $p<0,05$ *относительно результатов анализов первой контрольной группы*

При повторном взятии крови на биохимические показатели после лечения наблюдались достоверныеизменения в крови.Так щелочная фосфатаза у всех опытных животных снизилась до 18,5 г/л – третьей группы, второй 22,5 ед/л против 23,3 ед/л контрольной группы. Отмеченоснижение ферментов печени у собак второй и третьей групп АЛТдо 33,8 ед/л -35,5ед/л против37,8 ед/лконтрольной группы, АСТ в опытных группах снизилась до 21,5 ед/л во второй группе и до 19,3 ед/л в третьей опытной группе против 24,8 ед/л относительно первой группы. Отмечено снижение общего билирубина у собак опытных групп до 3,5 – 5,4мкмоль/л против 8,7 мкмоль/л контрольной группы. Повысились альбумины до 27 г/л – 25 г/л по отношению к 23 г/л,общий белок до 63 г/л – 58 г/л по отношению к 51 г\л первой контрольной группе.

Курс лечения у собак на момент исследования составил 45 дней. В результате чего на момент окончания лечения у собак экспериментальных групп (контрольной группы) и (в схемах включающих стандартное лечение и ДАФС-25 в дозах 1,6мг/кг (104 мг/гол) и 4,8мг/кг(312 мг/гол)) улучшилось общее состояние животных, аппетит нормализовался, отсутствовала рвота, масса тела пришла в норму, температура тела отсутствовала, что свидетельствовало об активизации обменных процессов в печени. Возобновилась работа желудочно-кишечного тракта, видимые слизистые ротовой полости и склеры глаз были розового цвета. В результате пальпации отсутствовала болезненность в области печени.

IV. Выводы/Conclusions

Прииссследовании использование различных схемлечения показало, что стандартные схемы лечения с добавлением препарата ДАФС-25 обладают более эффективным влиянием на печень. Препарат ДАФС-25 обладает сильными антиоксидантными свойствами и выраженным гепатопротекторным действием при гепатите у собак, о чем свидетельствуют данные исследованийбиохимических показателей и общего состояния животный на момент исследования.

Effectiveness of the use of DAFS-25 in the standard hepatitis treatment regimen for dogs

Список Источников

1. Булудов К.В., Бытова К.С., Саншокова М.К. Изучение влияния селенорганического препарата ДАФС-25 на регенерацию клеток эпителия кожи белых беспородных мышей // Bulletin of Medical Internet Conferences. – 2014. Vol.4.
2. Булудов К.В., Бытова К.С., Саншокова М.К. Изучение влияния селенорганического препарата ДАФС-25 на регенерацию клеток эпителия кожи белых беспородных мышей // Bulletin of Medical Internet Conferences. – 2014. Vol.4.
3. Вахрушева Т.И. Патоморфологические изменения при инфекционном гепатите у собак // Вестник КрасГАУ. 2015. №2. URL: https://cyberleninka.ru/article/n/patomorfologicheski

e-izmeneniya-pri-infektsionnom-gepatite-u-sobak (дата обращения: 27.08.2023).
4. Концевова А.А., Леонтьев Л.Б., Семак А.Э. Диагностика алиментарного гепатита собак с помощью биологически активных точек // Ученые записки КГАВМ им. Н.Э. Баумана. 2016. №1. URL: https://cyberleninka.ru/article/n/diagnostika-alimentarnogo-gepatita-sobak-s-pomoschyu-biologicheski-aktivnyh-tochek (дата обращения: 24.10.2023).
5. Куевда Е.Н., Куевда Н.Н. Этиология, диагностика и лечение гепатоза собак // Известия сельскохозяйственной науки Тавриды. 2015. №3 (166). URL: https://cyberleninka.ru/article/n/etiologiya-diagnostika-i-lechenie-gepatoza-sobak (дата обращения: 30.08.2023).
6. Соболев В.А., Кузьминова Е.В., Семененко М.П., Меньшенин В.В. Гепатотропная терапия при лекарственно-индуцированном поражении печени у животных // Сборник научных трудов СКНИИЖ. 2018. №1. URL: https://cyberleninka.ru/article/n/gepatotropnaya-terapiya-pri-lekarstvenno-indutsirovannom-porazhenii-pecheni-u-zhivotnyh (дата обращения: 30.08.2023).

References Références Referencias

1. Buludov K.V., Bytova K.S., Sanshokova M.K. Study of the effect of the selenium-organic drug DAFS-25 on the regeneration of skin epithelial cells of white mongrel mice // Bulletin of Medical Internet Conferences. – 2014. Vol.4.
2. Buludov K.V., Bytova K.S., Sanshokova M.K. Studying the effect of the selenium-organic drug DAFS-25 on the regeneration of skin epithelial cells of white mongrel mice // Bulletin of Medical Internet Conferences. – 2014. Vol.4.
3. Vakhrusheva T.I. Pathomorphological changes in infectious hepatitis in dogs // Bulletin of KrasGAU. 2015. No. 2. URL: https://cyberleninka.ru/article/n/patomorfologicheskie-izmeneniya-pri-infektsionnom-gepatite-u-sobak (accessed: 08/27/2023).
4. Kontsevova A.A., Leontiev L.B., Semak A.E. Diagnostics of alimentary hepatitis of dogs with the help of biologically active points // Scientific notes of the Bauman KGAVM. 2016. No. 1. URL: https://cyberleninka.ru/article/n/diagnostika-alimentarnogo-gepatita-sobak-s-pomoschyu-biologicheski-aktivnyh-tochek (accessed: 10/24/2023).
5. Kuevda E.N., Kuevda N.N. Etiology, diagnosis and treatment of hepatosis of dogs // Izvestia of agricultural science of Tavrida. 2015. No.3 (166). URL: https://cyberleninka.ru/article/n/etiologiya-diagnostika-i-lechenie-gepatoza-sobak (accessed: 30.08.2023).
6. Sobolev V.A., Kuzminova E.V., Semenenko M.P., Menshenin V.V. Hepatotropic therapy in drug-induced liver damage in animals // Collection of scientific papers of the Russian Academy of Medical Sciences. 2018. No. 1. URL: https://cyberleninka.ru/article/n/gepatotropnaya-terapiya-pri-lekarstvenno-indutsirovannom-porazhenii-pecheni-u-zhivotnyh (accessed: 30.08. 2023).

Global Journals Guidelines Handbook 2024

www.GlobalJournals.org

Memberships

Fellows/Associates of Medical Research Council

FMRC/AMRC Memberships

Introduction

FMRC/AMRC is the most prestigious membership of Global Journals accredited by Open Association of Research Society, U.S.A (OARS). The credentials of Fellow and Associate designations signify that the researcher has gained the knowledge of the fundamental and high-level concepts, and is a subject matter expert, proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice. The credentials are designated only to the researchers, scientists, and professionals that have been selected by a rigorous process by our Editorial Board and Management Board.

Associates of FMRC/AMRC are scientists and researchers from around the world are working on projects/researches that have huge potentials. Members support Global Journals' mission to advance technology for humanity and the profession.

FMRC

Fellow of Medical Research Council

FELLOW OF MEDICAL RESEARCH COUNCIL is the most prestigious membership of Global Journals. It is an award and membership granted to individuals that the Open Association of Research Society judges to have made a 'substantial contribution to the improvement of computer science, technology, and electronics engineering.

The primary objective is to recognize the leaders in research and scientific fields of the current era with a global perspective and to create a channel between them and other researchers for better exposure and knowledge sharing. Members are most eminent scientists, engineers, and technologists from all across the world. Fellows are elected for life through a peer review process on the basis of excellence in the respective domain. There is no limit on the number of new nominations made in any year. Each year, the Open Association of Research Society elect up to 12 new Fellow Members.

To the institution

Get letter of appreciation

Global Journals sends a letter of appreciation of author to the Dean or CEO of the University or Company of which author is a part, signed by editor in chief or chief author.

Exclusive Network

Get access to a closed network

A FMRC member gets access to a closed network of Tier 1 researchers and scientists with direct communication channel through our website. Fellows can reach out to other members or researchers directly. They should also be open to reaching out by other.

Career | Credibility | Exclusive | Reputation

Certificate

Certificate, LoR and Laser-Momento

Fellows receive a printed copy of a certificate signed by our Chief Author that may be used for academic purposes and a personal recommendation letter to the dean of member's university.

Career | Credibility | Exclusive | Reputation

Designation

Get honored title of membership

Fellows can use the honored title of membership. The “FMRC” is an honored title which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., FMRC or William Walldroff, M.S., FMRC.

Career | Credibility | Exclusive | Reputation

Recognition on the Platform

Better visibility and citation

All the Fellow members of FMRC get a badge of "Leading Member of Global Journals" on the Research Community that distinguishes them from others. Additionally, the profile is also partially maintained by our team for better visibility and citation. All fellows get a dedicated page on the website with their biography.

Career | Credibility | Reputation

Future Work

Get discounts on the future publications

Fellows receive discounts on the future publications with Global Journals up to 60%. Through our recommendation programs, members also receive discounts on publications made with OARS affiliated organizations.

Career | Financial

GJ Internal Account

Unlimited forward of Emails

Fellows get secure and fast GJ work emails with unlimited storage of emails that they may use them as their primary email. For example,
john [AT] globaljournals [DOT] org.

Career | Credibility | Reputation

Premium Tools

Access to all the premium tools

To take future researches to the zenith, fellows receive access to all the premium tools that Global Journals have to offer along with the partnership with some of the best marketing leading tools out there.

Financial

Conferences & Events

Organize seminar/conference

Fellows are authorized to organize symposium/seminar/conference on behalf of Global Journal Incorporation (USA). They can also participate in the same organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent. Additionally, they get free research conferences (and others) alerts.

Career | Credibility | Financial

Early Invitations

Early invitations to all the symposiums, seminars, conferences

All fellows receive the early invitations to all the symposiums, seminars, conferences and webinars hosted by Global Journals in their subject.

Exclusive

Publishing Articles & Books

Earn 60% of sales proceeds

Fellows can publish articles (limited) without any fees. Also, they can earn up to 70% of sales proceeds from the sale of reference/review books/literature/publishing of research paper. The FMRC member can decide its price and we can help in making the right decision.

Exclusive | Financial

Reviewers

Get a remuneration of 15% of author fees

Fellow members are eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get a remuneration of 15% of author fees, taken from the author of a respective paper.

Financial

Access to Editorial Board

Become a member of the Editorial Board

Fellows and Associates may join as a member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer.

Career | Credibility | Exclusive | Reputation

And Much More

Get access to scientific museums and observatories across the globe

All members get access to 5 selected scientific museums and observatories across the globe. All researches published with Global Journals will be kept under deep archival facilities across regions for future protections and disaster recovery. They get 10 GB free secure cloud access for storing research files.

ASSOCIATE OF MEDICAL RESEARCH COUNCIL

ASSOCIATE OF MEDICAL RESEARCH COUNCIL is the membership of Global Journals awarded to individuals that the Open Association of Research Society judges to have made a 'substantial contribution to the improvement of computer science, technology, and electronics engineering.

The primary objective is to recognize the leaders in research and scientific fields of the current era with a global perspective and to create a channel between them and other researchers for better exposure and knowledge sharing. Members are most eminent scientists, engineers, and technologists from all across the world. Associate membership can later be promoted to Fellow Membership. Associates are elected for life through a peer review process on the basis of excellence in the respective domain. There is no limit on the number of new nominations made in any year. Each year, the Open Association of Research Society elect up to 12 new Associate Members.

To the institution

Get letter of appreciation

Global Journals sends a letter of appreciation of author to the Dean or CEO of the University or Company of which author is a part, signed by editor in chief or chief author.

Exclusive Network

Get access to a closed network

A AMRC member gets access to a closed network of Tier 2 researchers and scientists with direct communication channel through our website. Associates can reach out to other members or researchers directly. They should also be open to reaching out by other.

Career | Credibility | Exclusive | Reputation

Certificate

Certificate, LoR and Laser-Momento

Associates receive a printed copy of a certificate signed by our Chief Author that may be used for academic purposes and a personal recommendation letter to the dean of member's university.

Career | Credibility | Exclusive | Reputation

Designation

Get honored title of membership

Associates can use the honored title of membership. The “AMRC” is an honored title which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., AMRC or William Walldroff, M.S., AMRC.

Career | Credibility | Exclusive | Reputation

Recognition on the Platform

Better visibility and citation

All the Associate members of AMRC get a badge of "Leading Member of Global Journals" on the Research Community that distinguishes them from others. Additionally, the profile is also partially maintained by our team for better visibility and citation.

Career | Credibility | Reputation

Future Work

Get discounts on the future publications

Associates receive discounts on future publications with Global Journals up to 30%. Through our recommendation programs, members also receive discounts on publications made with OARS affiliated organizations.

Career | Financial

GJ Account

Unlimited forward of Emails

Associates get secure and fast GJ work emails with 5GB forward of emails that they may use them as their primary email. For example,
john [AT] globaljournals [DOT] org.

Career | Credibility | Reputation

Premium Tools

Access to all the premium tools

To take future researches to the zenith, fellows receive access to almost all the premium tools that Global Journals have to offer along with the partnership with some of the best marketing leading tools out there.

Financial

Conferences & Events

Organize seminar/conference

Associates are authorized to organize symposium/seminar/conference on behalf of Global Journal Incorporation (USA). They can also participate in the same organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent. Additionally, they get free research conferences (and others) alerts.

Career | Credibility | Financial

Early Invitations

Early invitations to all the symposiums, seminars, conferences

All associates receive the early invitations to all the symposiums, seminars, conferences and webinars hosted by Global Journals in their subject.

Exclusive

Publishing Articles & Books

Earn 60% of sales proceeds

Associates can publish articles (limited) without any fees. Also, they can earn up to 30-40% of sales proceeds from the sale of reference/review books/literature/publishing of research paper

Exclusive | Financial

Reviewers

Get a remuneration of 15% of author fees

Associate members are eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get a remuneration of 15% of author fees, taken from the author of a respective paper.

Financial

And Much More

Get access to scientific museums and observatories across the globe

All members get access to 2 selected scientific museums and observatories across the globe. All researches published with Global Journals will be kept under deep archival facilities across regions for future protections and disaster recovery. They get 5 GB free secure cloud access for storing research files.

Associate	Fellow	Research Group	Basic
$4800 **lifetime designation**	$6800 **lifetime designation**	$12500.00 **organizational**	APC **per article**
Certificate, LoR and Momento **2** discounted publishing/year **Gradation** of Research **10** research contacts/day **1 GB** Cloud Storage **GJ** Community Access	**Certificate,** LoR and Momento **Unlimited** discounted publishing/year **Gradation** of Research **Unlimited** research contacts/day **5 GB** Cloud Storage **Online Presense** Assistance **GJ** Community Access	**Certificates,** LoRs and Momentos **Unlimited** free publishing/year **Gradation** of Research **Unlimited** research contacts/day **Unlimited** Cloud Storage **Online Presense** Assistance **GJ** Community Access	**GJ** Community Access

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

Before and during Submission

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct,* along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

Policy on Plagiarism

Plagiarism is not acceptable in Global Journals submissions at all.

Plagiarized content will not be considered for publication. We reserve the right to inform authors' institutions about plagiarism detected either before or after publication. If plagiarism is identified, we will follow COPE guidelines:

Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

- Words (language)
- Ideas
- Findings
- Writings
- Diagrams
- Graphs
- Illustrations
- Lectures

- Printed material
- Graphic representations
- Computer programs
- Electronic material
- Any other original work

Authorship Policies

Global Journals follows the definition of authorship set up by the Open Association of Research Society, USA. According to its guidelines, authorship criteria must be based on:

1. Substantial contributions to the conception and acquisition of data, analysis, and interpretation of findings.
2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

Copyright

During submission of the manuscript, the author is confirming an exclusive license agreement with Global Journals which gives Global Journals the authority to reproduce, reuse, and republish authors' research. We also believe in flexible copyright terms where copyright may remain with authors/employers/institutions as well. Contact your editor after acceptance to choose your copyright policy. You may follow this form for copyright transfers.

Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

Declaration of funding sources

Global Journals is in partnership with various universities, laboratories, and other institutions worldwide in the research domain. Authors are requested to disclose their source of funding during every stage of their research, such as making analysis, performing laboratory operations, computing data, and using institutional resources, from writing an article to its submission. This will also help authors to get reimbursements by requesting an open access publication letter from Global Journals and submitting to the respective funding source.

Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Medical Research Paper

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

INDEX

Global Journal of Medical Research

Visit us on the Web at www.GlobalJournals.org | www.MedicalResearchJournal.org
or email us at helpdesk@globaljournals.org

ISSN 9755896