

## SPECIMEN FORMAT FOR THESES OF MONTH

Faculty : Biosciences

Department : Biotechnology, Biochemistry and Bioinformatics

Branch/ Area: : Male infertility

Sub Subject Heading: : Heat stress induced male infertility

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Title of the thesis : *In vitro, in vivo* and *in silico* approaches to assess  
the protective effect of *Rosa indica* petals on male  
infertility

(i) In Roman Script

(ii) In roman Script

Nomenclature of Degree: : MSc, MPhil, PhD

Month & Year of Enrolment: : January 2019

Month & Year of Registration: : January 2019

Month & Year of Submission: : March 2023

Month & Year of Award : March 2024

Name of Supervisor : Dr.N.Santhi

Designation of Supervisor : Assistant professor (SG)

Centre/department/school in : Biotechnology  
which research was conducted

University's Name & Address : Avinashilingam Institute for Home science and Higher  
Education for Women

## **Abstract within 300 words:**

Male infertility is a growing concern in India, with an estimated 12-18% of couples facing infertility. The present study analyses the impact of lifestyle and environment on semen parameters and the protective effect of *Rosa indica* petal extracts on heat stress induced male infertility. In the first phase of the study, retrospective data from 299 male participants was analysed. The results showed a significant association between prolonged sitting and semen parameters. The ethanolic extract from dry petals exhibited highest radical scavenging and anti-inflammatory activity. The cytoprotective assay demonstrated the viability of TM3 cell lines at the maximum concentration of 200 µg/ml studied in phase II. In phase III, the male Wistar rats were exposed to heat stress and treated with 200 mg/kg of fresh and dry petals of aqueous and ethanolic extracts, positive control, negative control and control to evaluate its alleviating effect on heat stress induced sperm abnormalities. The results showed a significant difference in testis weight, body weight and substantial contrast in semen parameters between animals in negative control and those treated with extracts. Serum testosterone and the *in vivo* antioxidants were highest in ethanolic extract group compared to negative control. The histopathology of the testis showed an impairment with maturation arrest in the negative control In contrast to extract treated group. Phase IV focused on the identification of phytochemicals in the extracts by GC- MS and HPTLC analysis. 194 compounds identified in phase IV were subjected to molecular docking studies using GLIDE (Schrodinger's module) in phase V to understand their interactions with key target proteins such as COX2, AKT1, StAR, and AR. Among 194 compounds, Kaempferol and 2,4-DTBP present in all the extracts showed interaction with the selected target proteins. Therefore, the present study demonstrates the antioxidant and anti-inflammatory properties of the ethanolic extract of *R.indica* petals and its efficacy in alleviating heat stress-induced semen abnormalities in male Wistar rats.

### **i) Major objectives :**

- Assessing the impact of environmental factors and lifestyle habits on semen parameters
- Evaluating the *in vitro* antioxidant, anti-inflammatory and cytoprotective properties of aqueous and ethanolic extracts obtained from both dry and fresh petals of *R. indica*
- Evaluating the *in vivo* therapeutic effect of aqueous and ethanolic extracts of fresh and dry petals of *R. indica* on male Wistar rats subjected to heat stress

- Identifying the phytochemical constituents of *R. indica* petal extracts and validating their presence
- Conducting an in-silico analysis of the interactions between various phytochemical compounds found in the petal extracts of *R. indica* and specific targets associated with male infertility.

## ii) Hypothesis:

The petals of *Rosa indica* are hypothesised to exhibit a substantial alleviating effect on male infertility induced by heat stress.

## iii) Methodology :

### Phase I

- To study the impact of environmental factors and the lifestyle habits on semen parameters

### Phase II

- To analyse the *in vitro* antioxidant, anti-inflammatory and cytoprotective effect of *R. indica* petal extracts

### Phase III

- To study the *In vivo* studies on the alleviating effect of various extracts of fresh and dry petals of *R. indica* on heat stress-induced male Wistar rats

### Phase IV

- Quantification and validation of phytochemicals of *R. indica* petal extracts

### Phase V

- In silico studies on the interaction of various phytochemicals on selected targets

## iv) Findings:

The present study demonstrates the antioxidant and anti-inflammatory properties of the ethanolic extract of *R.indica* petals and its efficacy in alleviating heat stress-induced semen abnormalities in male Wistar rats.

## **Examiners**

**Internal Examiner :** Dr. Abilash Valsala Gopalakrishnan  
Assistant Professor  
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**External Examiner :** Dr. Krishtian Leisegang  
Associate Professor  
Director of the School of National Medicine  
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