



Research Article

www.ijrap.net



ANTI FERTILITY AND ANTI IMPLANTATION EFFECT OF GREEN TEA AQUEOUS EXTRACT ON FEMALE WISTAR RATS

Nikita Saraswat *, A.K Rai, Ankita Wal, Khushboo Gaur, Mohd Faisal, Akash Kumar Gupta, Pranay Wal
Pranveer Singh Institute of Technology, Department of Pharmacy, Kanpur, UP, India

Received on: 25/05/16 Revised on: 09/06/16 Accepted on: 28/06/16

*Corresponding author

E-mail: nikita.saraswat07@gmail.com

DOI: 10.7897/2277-4343.074143

ABSTRACT

Green Tea is obtained from the leaves of *Camellia Sinensis* plant. The green Tea comprises of caffeine as a major constituent. A lot has been listed out on the health benefits of drinking Green Tea. The plant belongs to family Theaceae. The aqueous extract (200mg/kg) was orally given to female wistar rats for fifteen days in treated group and saline solution to control group. We maintained five groups each of control and treated so as to get a clear picture and cumulative result of our research. The male rats were kept in each cage in ratio of 2:1 (Male: Female) from day 2-4 and then withdrawn. When the implantation and fertility studies were carried out a decrease in both the activities (Implantation and Fertility) was reported in case of treated group. The parameters of weight was also studied which reflected a increase in case of control group as compared to treated group. When the results were calculated and observed a decrease in implantation and fertility was shown by treated female rats which were on aqueous green tea dosing. The previous studies have been conducted on male wistar rats which proved a decrease in size of gonads thus helping us to aim at the female wistar rats in our research. The control groups showed a total of 16 implants as compared to the treated groups which collectively showed only 9 implants. This made our observation clear that both the fertility and implantation is affected under regular dosing of Green Tea aqueous extract.

KEYWORDS: Estrous cycle, Fertility, implantation, Gestation period, GTE

INTRODUCTION

Tea is a popular beverage which is commonly used all over world. Tea is commonly used in Asian countries like China and Japan which contribute for about 20% of the consumption of tea worldwide.¹ Commercial cultivation of green tea takes place in Asia, Africa and South America².

Green tea is derived from *Camellia Sinensis* a plant of *Theaceae* family. Some researchers have shown a hint of beneficiary uses of green tea extract in treatment of cancer, although the evidences are yet to be shown.³⁻⁵ Green Tea is a treasure from nature to the making as is consumed majorly by the population.⁶

Many effects of green tea have been reported, consumption of green tea reduces risk of cardiovascular diseases, cancer, increases neuroprotective activity, lowers cholesterol levels, increases antibacterial activity, anti viral activity, lowers blood glucose levels, anti oxidant activity. However some side effects have been reported when green tea is consumed regularly and at regular intervals⁷. The researches have proven that black tea consumption reduces heart diseases and stroke risks when consumed three or more cups regularly.⁸⁻¹²

As the cultivation of tea requires humid climate provinces like southern part of China mainland, Northern India slopes, Sri Lanka, Tibet are ideal growing area of tea.

Objective

The objective of this research is to determine anti fertility and anti implantation effect of green tea on female albino wistar rat using aqueous infusion of green tea dosing orally.

MATERIAL AND METHODS

Investigated Samples: Investigated samples were aqueous (infusion) extracts of green tea (*Camellia Sinensis*). The source of drug was from the company GAIA green tea bags. The aqueous extract was prepared after taking 2 grams of green tea from tea bag.

Rats: Ten female albino rats, each weighing 35-100 g, were taken from animal house of PSIT, Kanpur approved by the CPCSEA. The CPCSEA number is 1273/ ac/ 09/CPCSEA. Each rat was kept in a separate cage and monitored for a complete duration of fifteen days.

Preparation of Green tea extract (GTE)

Green tea was collected from market. Composition of green tea was epicatechin (EC) 1.55%, epigallo catechin gallate (EGCG) 9.00% as specified by the company GAIA on their product description. Then we weighed 2 gm of green tea packed it in tea bag, 100 ml water taken in a beaker and subjected to heating plate to make it lukewarm. Infused tea bag in lukewarm water was kept for 10 minutes and then the mixture was shaken occasionally. After 10 minutes tea bags are removed and pressed for complete extraction and the green tea aqueous extract was prepared by infusion method daily for dosing. A dose of 200mg/kg of green tea was given orally to treated group rats. According to OECD guidelines a drug of 1.2 ml was administered daily to an animal of 120 gm and respectively all the groups were treated the same way.

Methodology

Two groups were maintained of adult female albino wistar rats weighing around 100 gm. Then all rats were kept in separate cages. Now we examined estrous cycle stage by taking vaginal smear at noon for five consecutive days. Then 5 rats for control

group and 5 for treated groups were selected, out of these with regular cycle and pro estrous stage and kept in separate cages. The dosing was setup for duration of fifteen regular days. At the day first in the afternoon the first dose of test drug (green tea aqueous extract) was administered orally, after two days four male rats are kept with each female rat.¹³ Vaginal smear are taken for sperm count on the second day and in the afternoon the second dose of test drug is given. This procedure is again repeated on the third day. Same procedure was repeated for the control group in which saline was orally administered regularly. After taking the vaginal smear the male rat are removed on the 2 day. From 4th and 7th day test drug is given in the morning. Control rats are given the vehicle (saline) only.¹³ The test drug

(green tea aqueous extract) was given daily for duration of fifteen days to test group. Now the number of implants was counted in both groups when the rats were sacrificed on fifteenth day.

RESULT

The weight of wistar rats was monitored daily in both the control and treated groups and it was found that the weight in treated group increased moderately as compared to the control group where there was tremendous increase in weight.



Figure 1: Weighing of Female rat every day before dosing commences



Figure 2: Male rats added to cages of each female rats of nearly same weight



Figure 3: Dosing of Cage number 5 Animal (Treated)



Figure 4: Cages maintained at PSIT, Laboratory

S.No	Treated (in grams)					Control (in grams)				
	Days	T1	T2	T3	T4	T5	C1	C2	C3	C4
1	42.4	36.1	43.6	43.6	42.5	81.1	82.2	81.6	82.6	81.3
2	43.4	36.4	44.5	44.1	42.9	82.4	82.8	81.9	83.1	81.9
3	45.5	36.8	44.9	44.5	43.5	82.6	83.1	82.1	84.6	82.5
4	47.8	37.2	45.1	45.4	43.9	82.9	83.7	82.6	84.9	83.6
5	51.0	38.2	46.4	46.1	44.1	84.2	84.6	82.9	85.6	84.5
6	52.6	38.6	46.9	46.9	44.9	85.4	85.1	83.9	85.7	85.6
7	53.02	38.8	47.5	47.8	45.5	87.6	85.8	84.1	86.2	86.7
8	55.2	40.1	47.9	48.2	46.3	89.7	86.1	84.5	87.2	87.4
9	56.2	40.6	48.6	48.9	47.6	92.2	86.4	84.9	88.3	88.6
10	56.4	41.2	50.1	49.5	48.6	93.6	87.6	85.6	89.2	89.9
11	56.9	42.3	51.6	50.9	49.5	94.2	88.6	86.9	90.3	90.5
12	57.5	43.2	51.9	51.6	50.6	95.6	89.1	87.1	91.5	91.5
13	58.2	44.8	52.9	52.3	51.9	96.5	89.9	87.6	92.1	92.5
14	59.2	45.6	53.6	52.9	52.6	97.6	90.5	88.9	93.5	93.6
15	59.9	48.9	53.9	54.6	53.5	99.9	90.9	89.5	94.4	94.1



Figure 5: Gradual increase in weight in case of Treated group and rapid increase of Weight in case of Control group

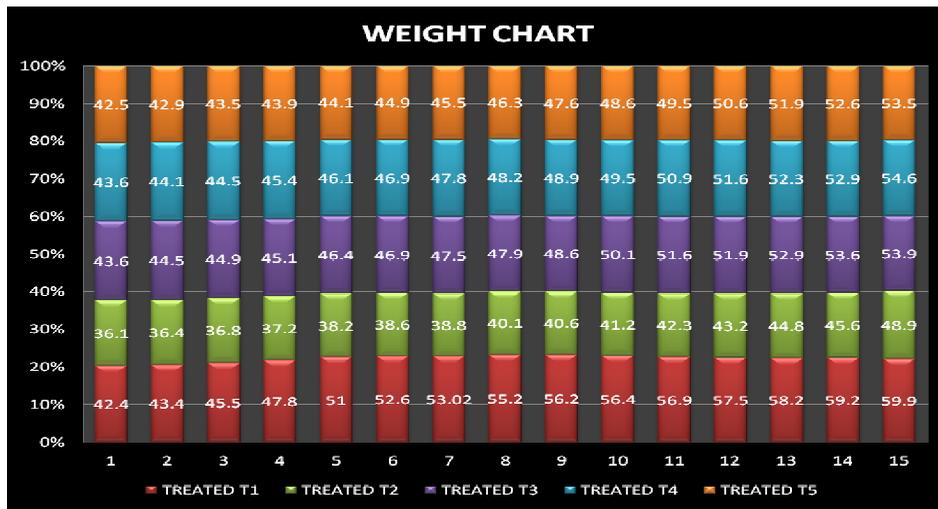


Figure 6: Moderate increase in weight in Treated group animals

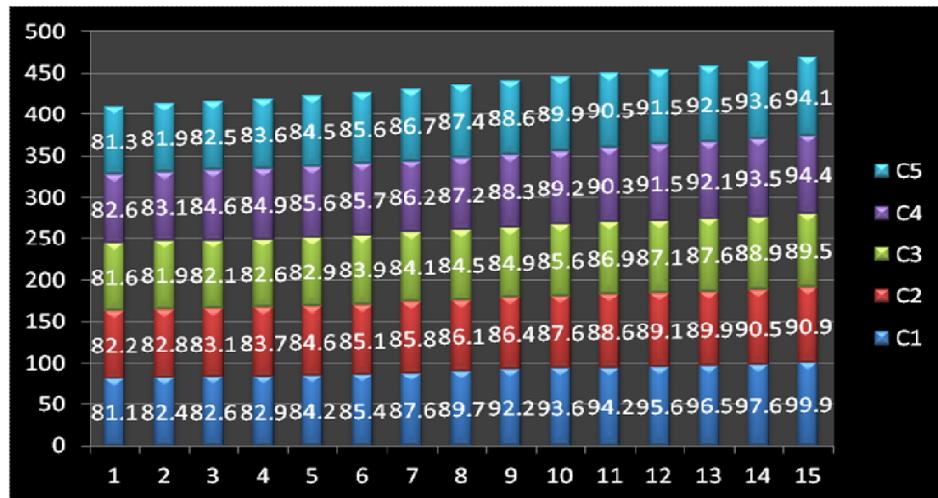


Figure 7: Rapid increase in weight in Control group animals

Table 1: Anti Fertility activity was calculated¹³ as:

	CONTROL	TREATED
Total number of Implants	16	9
Total rats showing fertility	4	3

The fertility rate is calculated¹³ as following:

Fertility rate = numbers of animals showing not implantation / Total number of animals × 100

Decrease¹³ in fertility of treated rats = (% of fertility of control rats) - (% of fertility of treated rats)

As the results reflected we observed a decrease in fertility rate in case of green tea treated animals as compared to the control group.

Implantation activity was calculated as = Number of implants in control group – Number of implants in treated group / Number of implants in control group × 100

The implantation rate was reduced by 43.75% in case of treated animals when compared to the control group. Thus green tea extract treated animals were showing a rapid decrease in implantation rate as compared to the saline dosed animals.

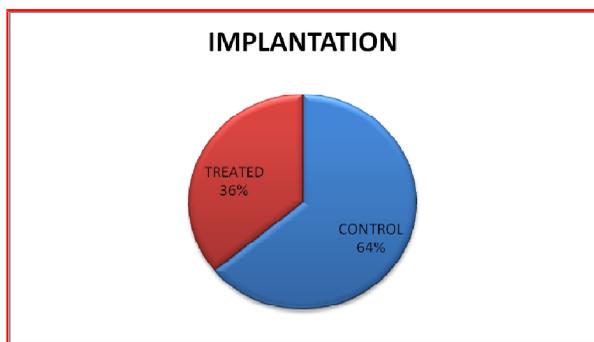


Figure 9: Implantations are more in control groups after dosing as compared to treated groups

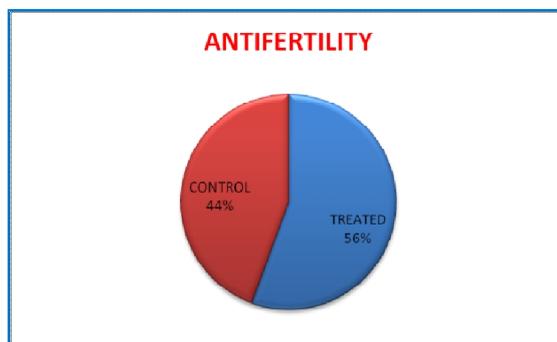


Figure 10: Anti fertility activity is more in treated group as compared to the control group rats

DISCUSSION

A low body weight or less gain in body weight suggests a few or nil implantations. It is well established that the implantation index directly correlates to the number of corpora lutea and indicates blastocyst implantation in the endometrium¹⁴ as well as the normal capacity of reproduction.¹⁵

When the data of animal weight was analyzed a fast increase in weight was observed in case of control group animals. The treated groups were showing a comparatively little increase in weight. But as the weight is not only a parameter of judgment so we studied the number of implants in the female rat. The average numbers of the implantation sites were found to be reduced in treated animals as compared to the one in control groups. The number of pregnant rats out of total 5 control animals was found to be 4. The percentage of fertility was 80% while 3 rats were found pregnant out of 5 in treated group. The percentage fertility was 60%. As per the research conducted 20% decrease in fertility was found. When the control group was given saline drug and treated group given aqueous saline extract 43.75% decrease in implantation was found in the research. Oral aqueous extract of green tea to female rats resulted in a significant decrease (20 %) in the numbers of implantation sites and live births when extract was daily administered to wistar female rats. The screening was carried out using anti fertility methodology. The observations reflected that green tea has induced anti fertility and anti implantation effects. Previous researches carried out on male wistar rats have shown a decrease in size of male gonads with reference to the research we carried the research further. The female rats have also shown a decrease in fertility and implantation.

We have a large number of research papers which say that Green tea causes a decrease in weight of humans as well as

mice¹⁶ which attracts most women but the extract causing decreased implantation and fertility might capture the eyes of people therefore breaking continuous consumption of Green Tea.

CONCLUSION

The research carried out proves that there is a decrease in fertility and implantation rates in female albino rats when green tea extract was administered continuously for duration of fifteen days. Our research further points out that decrease in implantation and fertility further promotes research work which involves the determination of doses which is causing anti fertility and anti implantation activities. Thus we can say that regular consumption of green tea can decrease fertility rates in rats which hint that humans might also be affected due to regular consumption of green tea.

ACKNOWLEDGEMENT

The work was carried due to support of Department Pharmacy, Pranveer Singh Institute of Technology, Kanpur.

REFERENCES

1. Alastair Hicks, Review of Global Tea Production and the Impact on Industry of the Asian Economic Situation, FAO Regional Office for Asia and the Pacific Bangkok, Thailand, url : <http://www.journal.au.edu/au techno/2001/oct2001/article4.pdf> ;Cited on: 02/05/16
2. Van Wyk BA, Wink M .Medicinal Plants of the World; Timber Press :Portland, USA, 2004; Cited on: 13/05/16
3. Brown MD .Alternative Medical Review .Green tea)*Camellia Sinensis* (extract and its possible role in the

- prevention of cancer, *Alternative Medical review, A Journal of Clinical therapeutics*;1999; 4:360-370;
4. Nakachi K, Matsuyama S, Miyake S, Suganuma M, Imai K . Preventive effects of drinking green tea on cancer and cardiovascular disease :epidemiological evidence for multiple targeting prevention, *Biofactors* 2000; 13:49-54;
 5. Béliveau R, Gingras D .Green tea :Prevention and treatment of cancer by nutraceuticals .*Lancet* 2004; 364:1021-1022
 6. Gomikawa S, Ishikawa Y, Hayase W, Haratke Y, Hirano N, Matuura H, Mizowaki A, Murakami A, Yamamoto M, Effect of ground green tea drinking for two weeks on the susceptibility of plasma and LDL to the oxidation ex vivo in healthy volunteers .*Korean Journal of Medical Science* 2008, 54(1):(E62-72
 7. Sabu M Chackol, Priya T Thambi, Ramadasan Kuttan, Ikuo Nishigaki, Beneficial effects of green tea :A literature review, *Chinese Medicine* 2010, 5:13
 8. Larsson SC, Virtamo J, Wolk A .Black tea consumption and risk of stroke in women and men: .*Annals of Epidemiology* . 2013 Mar; 23(3):(157-60 .31
 9. Arab L, Liu W, Elashoff D .Green and Black Tea Consumption and Risk of Stroke .A Meta-Analysis, *Stroke*, 2009;40(5):(1786-92 Hakim IA, Alsaif MA, Alduwaihy M, Al-Rubeaan K, AlNuaim AR, Al-Attas OS .Tea consumption and the prevalence of coronary heart disease in Saudi adults :Results from a Saudi national study . *Preventive Medicine Journal* 2003; 36(1):(64-70;
 10. Geleijnse JM, Launer LJ, Van der Kuip DA, HofmanA, Witteman JC .Inverse association of tea and flavonoid intakes with incident myocardial infarction :the Rotterdam Study .*The American Journal of Clinical Nutrition* 2002 May;75(5):(880-6
 11. Peters U, Poole C, Arab L .Does tea affect cardiovascular disease? A meta-analysis, *Americal Journal of Epidemiology* 2001; 154(6):(495503
 12. Parmar N.S, Prakash Shiv, Screening methods in Pharmacology, Alpha Science International, 21 December,2006, First Edition
 13. Tafessel G, Mekonnen Y, Makonnen E .Antifertility effect of aqueous and ethanol extracts of the leaves and roots of *Asparagus Africanus* in rats .*African Health Science* 2006; 6 :81-85
 14. Chang CV, Felicio AC, Reis JE, Guerra Mde O, Peters VM . Foetal toxicity of *Solanum lycocarpum* *Solanaceae* (in rats . *Journal of Ethnopharmacology* 2008; 81 :205-209
 15. Ahmed Ahmed, Shehab Naglaa Ahmed. Obesity medical management. *Int. J. Res. Ayurveda Pharm.* 2014;5(1):69-73 <http://dx.doi.org/10.7897/2277-4343.05115>

Cite this article as:

Nikita Saraswat, A.K Rai, Ankita Wal, Khushboo Gaur, Mohd Faisal, Akash Kumar Gupta, Pranay Wal. Anti fertility and anti implantation effect of green tea aqueous extract on female wistar rats. *Int. J. Res. Ayurveda Pharm.* Jul - Aug 2016;7(4):106-110 <http://dx.doi.org/10.7897/2277-4343.074143>

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: IJRAP is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IJRAP cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of IJRAP editor or editorial board members.