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Mineral Estimation: In current research study, minerals like phosphorus, calcium and iron were identified. 70.5±0.68 mg/g of calcium, 544.5±1.26 mg/g of phosphorus and 11.6±0.59 mg/g of iron was found in seed powder.

Total Phenolic Content: Total Phenolic Contents (TPC) of raw fenugreek sample was estimated in the range of 45.4±0.02 (GAE/100 g ($p<0.05$).

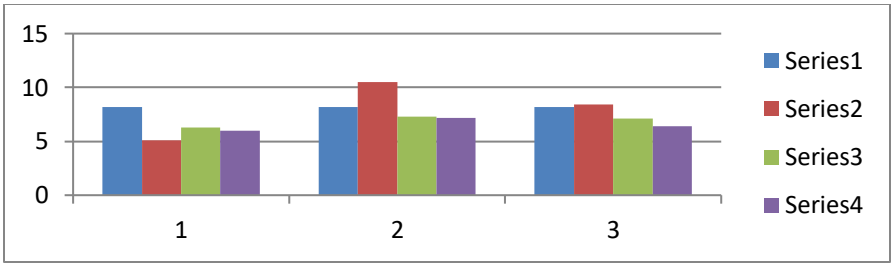
Radical Scavenging Activity: The Radical Scavenging Activity (RSA) by using DPPH radical in the raw fenugreek seeds samples was estimated as20.1±0.70 ($p<0.05$)

Experiment no 2

Effect on follicle stimulating hormone

Following graphical representation shows change in FSH levels. No significant difference was observed in control and experimental groups on completion of treatment as compared to baseline.

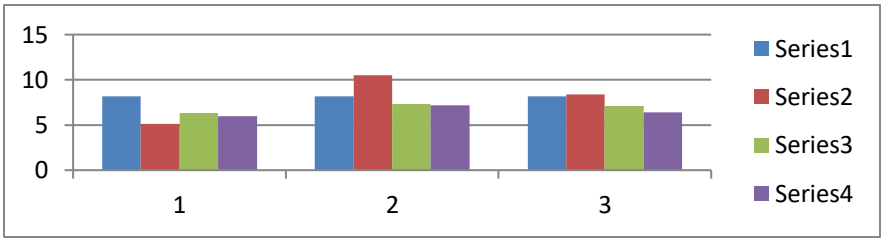
Figure 1:



Effect on luteinizing hormone

Following graphical representation shows change in LH levels. LH levels were decreased in controlled as well as experimental groups. However, decrease in controlled group was more than the experimental groups i.e. T_2 and T_3. After control group desired effect was noticed in the mean value of experimental group 3.

Figure: 2



Changes in ovarian volume

Following graphical representation shows change in ovarian volume (fig 3: left ovary and fig 4: right ovary). By the end of study significant reduction in ovarian volume was noticed in all the three groups. In relation to left ovary, highest effect was noticed in control group and regarding right ovary great effect was noticed in the ovarian volume of subjects in experimental group 3.

Figure: 3

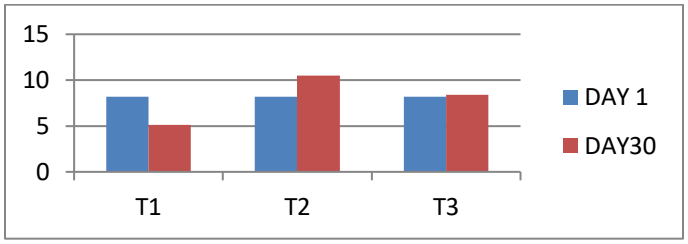
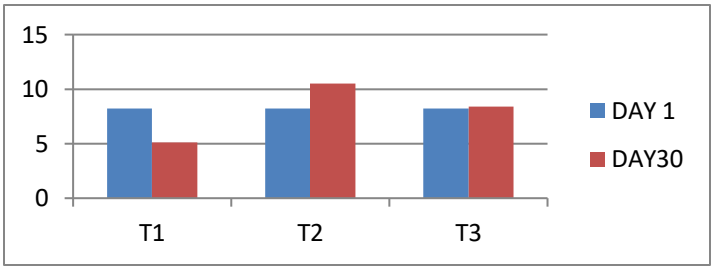


Figure: 4



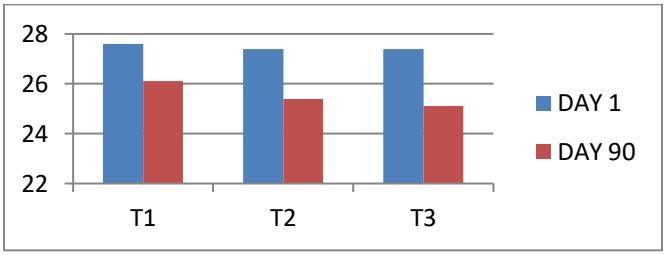
Effect on menstrual regularity

By the end of study 80% patients of controlled group secured normal cycle. In experimental group2, 60%patients had normal whereas in experimental group3 93.3% patients secured the normal menstrual cycle.

Effect on BMI

Following graphical representation shows change in BMI levels. Slight difference in the mean values was observed in all groups by the end of 90 days treatment plan.

Figure: 5



Effect on fasting blood glucose

Following graphical representation shows change in FBG levels. According to results there is no marked difference between the mean values of control group (4.3-4.4) experimental group 2 (4.4-4.4) and experimental group 3 (4.5-4.3) at day 1 and day 90.

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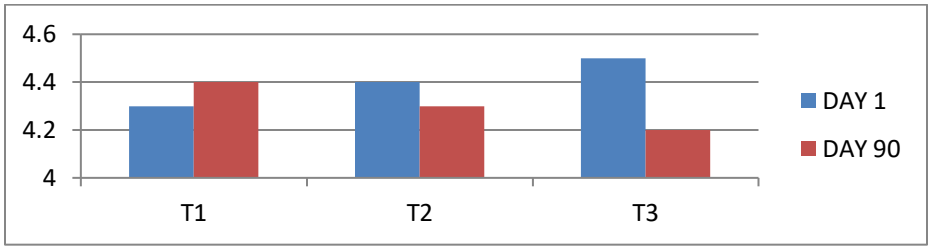
Figure: 6



Discussion

First experiment was based upon the investigation of compositional characteristics of fenugreek seeds. Compositional analysis revealed that fenugreek seeds contain considerable amount of protein and fiber. Mineral estimation of seeds was shown to be rich source of phosphorus and iron. Antioxidant activity was measured by total phenolic content in terms of Gallic acid and radical scavenging activity.

Second experiment was a randomized control blind study was based upon female subjects for 90 days. Levels of treatment were randomized, and with an active-control trial in 3 parallel groups having PCOS. Patients meeting the eligibility criteria were placed in three groups by lottery method. Total 130 patients having PCOS were screened according to selected inclusion exclusion criteria. Among them 103 patients met the required criterion. 2 patients using 10gm of fenugreek seed powder became pregnant during the course of study. Treatment amiability was good and most of the subjects did not record any adverse effects regarding fenugreek seed powder use.

Regarding BMI results for whole groups presented shows slight difference in all groups because diet remained same throughout the study period with slight modification, so not much difference in all group were seen. High BMI leads towards obesity which is the major cause of insulin resistance and patients having pcso are prone to have insulin resistance. Polycystic ovaries have more capacity of causing insulin resistance then obesity (Cresswell *et al*., 2003).

There was no significant difference found in the levels of FSH among the experimental groups, however slight modification was observed in control group. Our results regarding FSH are in agreement with Bashtiana *et al* 2013. Swaroop *et al* demonstrates the effects of fenugreek seed extract on LH and FSH for the period of three months. After giving fenugreek extract for the duration of three months noticed remarkable increase in LH levels on completion of the Furocyst treatment in comparison to baseline and noteworthy increase in follicle stimulating hormone was also observed at the completion of study. Marked decrease in ovarian volume is also documented with zero toxic effects of fenugreek usage.

Concerning luteinizing hormone overall results showed decrease in LH in the entire group that is a good sign for the treatment of PCOS. Increment of the dosage of fenugreek from 10gm may show better results. LH levels are increased in PCOS. One possible clarification for this may be premature activation of LH-induced mitotic arrest, the process that occur at the mid cycle LH surge. Hypersecretion of LH and insulin are important features of PCOS.

In relation to ovarian volume, mean of ovarian volume is 4.9 ± 0.03 cm^3 in premenopausal females and 2.5 ± 0.01 cm^3 in postmenopausal females (Pavlik *et al*., 2000). Extract obtained from fenugreek seeds in combination with metformin didn't had authentic effect on insulin resistance but extract of fenugreek seed along with metformin gave promising results in women with pcos by improving their sonographic results and menstrual cyclicity (Bashtiana *et al*., 2013).

Improvement in menstrual cyclicity and ovulatory function was observed in all groups. Whereas, best results were observed in experimental group using 10mg of fenugreek powder in which 93.3% of patients secured regular menstrual cycle. Our results are in agreement with Bashtiana *et al* (2013). Van Hoff *et al* (2000) in his study declared that in adolescents PCOS is mostly present in association with irregular menstrual cycle, oligomenorrhea or increased levels of androgen and LHD.

PCOS is frequently linked with insulin resistance and defects in insulin secretion. In PCOCS insulin resistance is not only the cause of adrenal and ovarian steroidogenesis, but also release of LH from pituitary gland. (Dunaif 1997). Undue levels of insulin cause ovaries to produce excessive amount of testosterone that in turn causes alopecia, hirsutism and acne. (Kandarakis & Dunaif 2012). Insulin resistance increases the release of LH while disrupting LH:FSH ratio. Reducing insulin resistance can also restore ovulatory menstrual cycles (Dunaif 2008). Generally, about 50% to 70% of patients having PCOS have variable amount of IR. In PCOS patients' risk of type 2 DM is 5- to 10-times higher than usual (Ovalle & Azziz 2002). Medicines, traditional therapies, dietary measures (low cab diet, avoid processed food), exercise and avoiding sedentary lifestyle can help lowering IR.

Conclusion

Overall results revealed that the prolong administration of raw fenugreek seeds in women having pcos was particularly found effective.

Intake of fenugreek seeds for three months had positive effect on regularity of menstrual cycle, maturation of eggs, reducing ovarian volume and infertility.

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