
Summary and Conclusion

Reproductive Health issues among women has an alarming increase in the recent years. Among the common reproductive health issues, Polycystic ovarian syndrome is one of the top ranked heterogeneous disorders encompassing reproductive, metabolic and hormonal dysfunction and has higher interrelation to pregnancy complications and pregnancy outcome. In the current era more attention is being given by the medical community for relieving the symptoms and complications related to PCOS among adolescent girls and young women of reproductive age. Medical nutritional treatment aims to reduce insulin resistance, improve fertility, treat hirsutism or acne, restore regular menstruation and prevent endometrial hyperplasia and endometrial cancer. Strong evidences supported that Nutrition Education and use of Dietary Interventions including macro and micro nutrients in the management of PCOS. Dietary intervention is expected to enhance nutritional and health status and to relieve the metabolic, hormonal and physiological symptoms related to PCOS among women. Women in the reproductive age in general, have lower intake of micronutrients (Vitamins and Minerals) compared to the "Recommended Dietary Allowances (RDA)". Various metabolic pathways linked to distinct food types are involved in the regulation and control of ovulation and follicular stimulation. This study was planned with lacunae in the micronutrient intake among women of reproductive age in mind, as well as the potential benefits of supplementing with a micronutrient-dense health mix to alleviate PCOS symptoms. The researcher has launched the current study, "Impact of Nutrition Interventions on symptoms of polycystic ovarian syndrome (PCOS) among women of Reproductive Age (20-45 Years)," with the following particular objectives

Objectives:

- Find out the incidence of PCOS among women in the reproductive age (20-45 years)
- Identification of women having PCOS for collection of data related to socio economic profile, dietary and lifestyle pattern ,nutritional , reproductive, and health status
- Assessment of nutritional status and nutritional knowledge of the selected women
- "Formulation and evaluation of micro nutrient dense health mix powder and nutrition education modules for nutrition interventions" and
- Impact of nutrition interventions on nutritional status, nutrition knowledge of PCOS women.

This chapter emphasized the depth and breadth of knowledge and conceptualization of research findings. It encapsulated the objectives and the hypothesis addressed in the study. Summary and conclusion declared by means of a reflective discussion that the outcomes expected

by the researcher has been achieved .It concise all the formats of the research study and helped to reach an appropriate conclusion to provide concrete and comprehensive understanding of the research study.

The present study consisted of four phases .The first phase, Incidence of Polycystic Ovarian syndrome among the women in the Reproductive age groups (20-45 years), was found out in the hospital where a quick screening of symptoms of PCOS was carried out. Among the selected 810subjects using validated tool Rotterdam criteria (2003), 284 were identified with PCOS. Hence the prevalence of PCOS was confirmed as 35 per cent. Two hundred eight four subjects identified with PCOS were selected for the study on the basis of inclusion and exclusion criteria. Content validated questionnaire was used to collect the data both printed matter and the “*google docs*” and was easily filled by the investigator at the time of interview. The reliability and validity of the tool was assessed before the data collection for the present study.

Second phase was mapping of women for the nutrition interventions. The sample size of 284 was selected for studying the socioeconomic profile, nutritional status , lifestyle pattern of the population as mentioned in the first, second and third objective of the study .Clinical signs of hyperandrogenism, stress scoring and physical activity levels were assessed using validated tools. A total number of 93 participants with PCOS were included in the Quasi Experimental Intervention study to evaluate the Impact of two types of Nutrition Interventions, that is Nutrition supplementation+ nutrition education and Nutrition education alone on the symptoms of PCOS among the participants. The participants were systematically grouped into Experimental I (N=32),Experimental II (N=31) and control group (N=30) based on the inclusion and exclusion criteria.

In the third phase, formulation and evaluation of Micro nutrient dense Health mix powder” was carried out .The acceptability trials were carried out for the selected five variations of health mix powder and evaluated for the selection of the best two combinations according to the grades of acceptance by the selected sensory panel members using 9 point hedonic scale. The highest scored two variations were selected and termed as Formula I and Formula II. Analysis of macro and micro nutrients, microbial count and cost effectiveness of the Health mix powder was carried out for both variations using the standard methods and procedures. Based on the nutrient content, cost effectiveness and sensory evaluation rating Formula II was selected for the supplementation. This phase of the study was also focused on the development and validation of health and nutrition education modules which were tailor made to fulfil the nutritional care and support of the selected PCOS participants.

In the fourth phase, Effect of Nutrition intervention on the Nutritional status and monitoring of PCOS symptoms was done.All the selected participants in the Experimental group I(N=32) were properly instructed to consume the Nutrient dense Health mix powder in the morning (15g) and in the evening (15 g) without any wastage for three months. Health mix powder Formula II was provided for the first 15 days of the month with nutrition education .Selected 32 women in the

Experimental group I and 31 women in the Experimental II group were provided Nutrition education. Booklet, leaflets and power point presentation were made and nutrition education sessions were provided as one to one counselling initially. Group discussion was given on the specified day, leaflets, and physical sessions were conducted, those who were noted attended were give online sessions also. In the control group, a total of 30 participants, who were received allopathic medications such as Oral Contraceptive Pills, Metformin Progesterone and Myo inositol for PCOS treatment. Prior to the nutrition intervention programme, anthropometric measurements, biochemical estimation, clinical examination and individual dietary intake by "Food frequency questionnaire and 24 hour recall "method were assessed the nutritional status of the selected participants. In the beginning of nutrition education intervention, specially designed questionnaires were used to evaluate the basic knowledge level and at the end of sessions the questions were reintroduced to assess the knowledge gained on PCOS.

The data was consolidated and analysed with appropriate tools using SPSS version 23 Descriptive measures were analyzed using per cent, Mean and Standard Deviation Categorical variables were compared using the Mc Nemar's χ^2 test and Mc Nemar's odds ratio. Comparison of means performed using independent sample T- test. Effect of interventions was assessed by comparing pre and post values at the end of the intervention using paired t test. One way ANOVA (analysis of variance) was used to find out the statistical significance among participants in three study groups comparison with the baseline data. Determined factors influencing PCOS variables is determined by Repeated measures analysis, where the change overtime for each group was analyzed also difference in rate of change between two groups was also compared. Proportion with high level of symptoms by type of intervention over time was analyzed by considering Kappa of agreement.

Salient Features of the research study are summarized in the following pages

In the present study, the collected data from 284 PCOS subjects reported that majority of the selected subjects (56.7 per cent) were from semi urban areas followed by 33.5per cent from urban areas and rest of them (9.5 per cent) were from rural areas. Among the subjects, 44.8 per cent were Hindus 45.4 per cent were Christians and 9.8per cent were from Islam. It is interesting to note that cent per cent of subjects had a minimum of secondary school education. None of the subjects enrolled in the study were illiterate, or having primary education alone .Majority of the subjects were under graduates (50.7 per cent) , 23 per cent were Post graduates and only 1.3 per cent were Diploma holders and rest of them had higher secondary school education. The present study also revealed that only 40.9 per cent of subjects were employed, meagre per cent involved in business, rest of the selected subjects were either unemployed (42.6per cent) or were students (15.8 per cent). Among the employed, 31.6 per cent were employed in Professional job in various organisations. Regarding the Socio economic status of the subjects, 39 per cent of subjects were from lower middle income family and 33 per cent were from upper middle income family, 17.9 per cent from upper lower income family and 1.7 per cent was from lower income class. About 8.4 per cent of participants were from Upper class income family.

The average age of the selected subjects in the study group was 29.3 ± 7.1 . Among the subjects, 40.1 per cent of subjects were in the age group of 20-25 years, 19 per cent from 26-30 year age group, 17.3 per cent were in the age of 31-35 years and 23.6 per cent were above 35 years of age. BMI classification was computed on the basis of Asian Classification of BMI. Meagre (two) per cent of subjects were Obese grade III or morbid obese category. Among the Subjects 34.5 per cent were Obese II Category and 31.1 per cent were Obese grade I, 13.4 per cent were overweight and 5.6 per cent were underweight category.

Examination of clinical profile revealed that around 45 per cent of subjects experienced hirsutism as a clinical sign of hyperandrogenism. Forty eight per cent had Acanthosis nigricans and androgenic alopecia, 41 per cent had acne, more than 60 per cent of subjects had depression, anxiety and mood swings, 38 per cent of subjects had regular menstruation and 62 per cent had irregular menstruation. More than 78 per cent of subjects had regular sleep, only 17.9 per cent of subjects had a mildly elevated BP level (\Rightarrow 130/85mm of hg) and rest of them had normal blood pressure. Around 59.5 per cent of subjects have family history of Diabetes mellitus followed by hypertension (45.4 per cent), thyroid disorders (28 per cent) and Cardio Vascular Diseases (11.6 per cent) Reproductive history revealed that 21 per cent had a family history of PCOS and difficulty in conceiving in their right reproductive age. Around 25 per cent of subjects had family history of amenorrhea.

Carbohydrate, protein, fat intake shown significant difference between mean value and EAR ($p=0.000$). The average intake of micronutrients folic acid, retinol, vitamin D, calcium, magnesium, selenium, zinc, chromium, potassium and sodium had a significant difference compared to EAR ($p=0.00$). Mean Iron intake was significant differed than EAR at ($p=0.046$). Mean intake of vitamin C had no significant difference between the population mean and EAR ($p=0.184$). The mean intake of calcium was only up to 58.5 per cent of EAR. Other micronutrients retinol, zinc potassium was 61 per cent, 72 per cent, 74 per cent respectively and was significantly minimal than EAR. The mean Vitamin D intake was 88 per cent much lesser than the estimated average requirement.

For the commencement of the intervention 93 participants were selected and systematic grouping of the participants into Experimental I Experimental II and Control were carried out. Socio demographic profile of the selected participants showed that about 75 per cent of participants belonged to the age group of 20 and 29 years, one per cent in the 40 and 45 years age group and remaining 24 per cent in the 30 to 39 year group. Among the women 45.4 per cent belonged to Christian community, 44.8 per cent were Hindus, 9.8 per cent were from Islam religion. Majority of the women were married (55 per cent), Forty three per cent of subjects were from lower middle income class only.

The clinical symptoms of the participants revealed that in the Experimental group I, 77.4 per cent of participants presented with hirsutism and 32 per cent of participants were without hirsutism. Seventy five per cent of participants were presented with polycystic ovaries, 37.5 per cent were

presented with increased testosterone levels, 81.2 per cent were presented with menstrual irregularity, and 46.8 per cent were presented with acne. In the Experimental II group 67.7 per cent of participants had hirsutism, 93.5 per cent subjects had ovarian cyst, 25.8 per cent had the problems of increased testosterone level, and 80.6 per cent suffered with menstrual irregularity 61.2 per cent had the acne. In the Control group, 90 per cent of subjects had hirsutism and ovarian cyst, 43 per cent had the increased testosterone level, 86.6 per cent had menstrual irregularity and 63.3 per cent were presented with acne. Most of the participants suffered from moderate stress level. Among the Experimental group I, six per cent of participants had mild stress, 81.2 per cent of participants had moderate stress and 12.5 per cent of participants had severe stress. Experimental II and Control participants had mild stress 6.4 per cent, 10 per cent moderate stress, 67.7 per cent and 66.6 per cent, and severe stress 25.8 per cent, 23.3 per cent respectively

In Experimental group I, 15.6 per cent of participants had menarche before the age of 11 years, 22.5 per cent in the Experimental II group and 26.6 per cent in control group had menarche before the age of 11 years. More than 81 per cent of participants in the Experimental group I, 67.7 per cent in the Experimental group II and 60 per cent in the control group had menarche at the age range of 12- 14 years. Three per cent in Experimental group I, 9.6 per cent in Experimental group II and 13.3 per cent in control group had menarche on and above 15 years

The impact of the nutrition intervention on anthropometric measurements using paired sample t test showed that there is a significant decrease in weight, BMI, waist circumference, hip circumference, body fat, and visceral fat levels ($p < 0.001$). In the nutrition intervention for Experimental group I, the mean weight loss throughout the three-month period was 4.7kg. The reduction in BMI, TSF, waist, hip, and body fat measurements was 1.9 kg/m², 1.5 mm, 1.55 in., 1.08 in., and 1.54 per cent respectively. However, there was no discernible difference in the chosen subjects' body water ($p=0.968$) and waist hip ratio ($p=0.324$). The Experimental II group's weight, BMI, TSF, and body fat values showed a decline of 1.9 kg, 1 kg/m², 0.54 cm, and 0.72 cm, respectively, between pre and post values ($p < 0.001$). Waist circumference ($p=0.640$), hip circumference ($p=0.541$), and body water ($p=0.682$) of the subjects did not alter significantly between before and after the intervention. With the exception of waist hip ratio ($p=0.004$), none of the biometric variables changed among the Control group. Before the nutrition interventions started, it may have been because they used drugs continuously and often. There was no discernible decrease in weight, BMI, waist, hip, body fat, body water, or visceral fat following the pharmaceutical intervention in the control group ($p > 0.05$).

There was no discernible difference between the Experimental I and Experimental II group in terms of weight, TSF, body water, or visceral fat, according to a comparison of the effectiveness of nutrition interventions between the study groups by the 't' test. After the nutrition intervention, there was no discernible difference in weight, TSF, waist circumference, hip circumference, waist hip ratio, body fat per cent, body water, or visceral fat between the Experimental I and Control group. BMI was significantly different between the Experimental I and Control groups ($p=0.0228$). Between

the participants in the Experimental I and Experimental II groups, there was a significant difference in body fat per cent ($p=0.0268$), hip circumference ($p=0.0154$), and waist circumference ($p=0.015$).

The difference in means of weight between the Experimental group I and Experimental group II group was ($MD=2.8274$) ($p=0.000$), Experimental group I and control was ($MD=4.9$) ($p=0.000$) Experimental group II and control group was ($MD=2.099$) ($p=0.012$). The highest difference was seen between Experimental group I and Control. The Mean difference in BMI of the participants of study groups were ($M=1.88$ $SD=1.07$) for Experimental group I, $M=1.003$, $SD=1.270$ for Experimental II and ($M=-.100$, $SD=1.304$) for Control group. The highest difference was in the Experimental I and Control group. The mean difference in waist circumference between the groups was significant for Experimental group I and II ($MD=1.41$) ($p=0.00$), and for Experimental I and control ($MD=1.53$) ($P=0.000$), but was insignificant between Experimental II and Control ($MD=0.12$) ($p=0.93$). Highest difference was between Experimental I and Control. Significant difference in Hip circumference ($M=1.084$, $SD=1.088$) between Experimental I and Experimental II ($M=0.167$, $SD=1.510$) was observed, also the mean difference was significant ($MD=0.92$) ($p=0.014$) for Experimental I and II. Whereas the difference was not significant between Experimental II and Control ($M=-.176$, $SD=1.558$). The mean difference in body fat per cent in Experimental I ($M=1.53$, $SD=1.179$) differed significantly from Experimental II ($M=0.719$, $SD=0.834$) and Control group ($M=0.264$, $SD=1.117$). No significant difference was seen between Experimental II and Control ($p>0.05$) The mean waist-hip ratio, total skin fold thickness, visceral fat, and body water were not significant between any of the intervention groups ($p>0.05$).

Since BMI, Body weight, Waist Circumference change, body fat per cent were not normally distributed Kruskal wallies test was also used for comparing the differences in change of BMI, Body weight, Waist Circumference, Body fat across the three groups. It was statistically significant with p value of weight change =0.0001, BMI Change =0.001, Waist Circumference change =0.001 and Body fat change =0.009

According to the ANOVA results, there was a significant difference in cholesterol ($F_{2,90}=5.814$, $P=0.004$) triglycerides ($F_{2,90}=2.97$, $P=0.05$), Cholesterol to HDL ratio ($F_{2,90}=4.26$, $p=0.017$) and Testosterone levels ($F_{2,90}=9.509$, $p=0.000$) between the three intervention groups. The mean cholesterol difference between control group and Experimental group I was remarkably significant ($p=0.003$). There was a significant difference in the TG values between Experimental I ($M=17.218$, $SD=46.873$) and Control ($M=-7.56$, $SD=45.37$). Cholesterol to HDL ratio was significantly lower in Experimental Group I when compared to Control group with significant difference of ($M= -.1233$, $SD =0.948$). For testosterone, there was a significant difference between the Experimental group I and II ($p=0.002$) and also between Experimental group I and Control group ($p=0.000$). But there was none ($p=0.864$) between the Experimental II and Control groups. Total cholesterol, the Triglyceride to HDL ratio, and total testosterone levels were all significantly decreased in the Experimental group I. The results of the paired sample t test showed that haemoglobin levels within the group increased significantly ($M=.1531$, $SD=.997$).

The determined factors influencing PCOS variables was analysed using repeated measures analysis. The change over time was significant for the following variables in Experimental group I such as Weight, BMI, TSF, WC, HC, Body fat, Visceral fat ($P < 0.001$). Biochemical parameters such as "Total Cholesterol, Triglycerides, Cholesterol to HDL ratio, Testosterone and Acne score had shown significant change overtime ($p < 0.05$) in Experimental Group I. Experimental group II had shown significant change over time for the following variables such as Weight, BMI, TSF, Body fat, Visceral fat, HDL ($P < 0.05$). In Control group none of the variables had shown significant change over time ($p > 0.05$). The following characteristics, including weight ($p = 0.000$), BMI ($p = 0.003$), TSF ($p = 0.000$), WC ($p = 0.03$), HC ($p = 0.007$), body fat ($p = 0.002$), and visceral fat ($p = 0.03$), were compared across Experimental groups I and II. There was a significant difference in the rate of change for weight ($p < 0.001$), BMI ($p < 0.001$), TSF ($p = 0.002$), WC ($p < 0.001$), HC ($p = 0.000$), body fat ($p = 0.000$), visceral fat ($p = 0.001$), total cholesterol ($p = 0.004$), triglycerides ($p = 0.04$), and cholesterol to HDL ratio ($p = 0.004$) between the Experimental group I and Control group.

Proportion with high level of symptoms by intervention overtime was analysed using kappa of agreement (as the opposite agreement). The change overtime had shown that the per cent of participants who had remained with high level of symptoms even after the Intervention. Regarding menstrual cycle, the kappa of agreement over time for Experimental group I showed that the proportion of women who had remained with irregular menstrual cycle after the intervention was few. There was a significant reduction in of menstrual irregularity (9.1 times) compared to Experimental group II. The change over time for Experimental group I was slight, kappa 0.1 (-0.005-0.2) and moderate for Experimental group II Kappa 0.6 (0.3-0.9). The change over time for the two groups were found to be significantly different ($p < 0.001$). The proportion of women who had remained with irregular menstrual cycle in Control group was fair, kappa 0.3 (0.03-0.5). The change seen over time for Experimental group I and control group were not statistically significant ($p = 0.2$). The proportion of women who had remained with high testosterone value was substantial for experimental group I kappa: 0.7 (-0.4-0.96), where as in experimental group II every one remained the same. For Control group Kappa had shown a substantial agreement, kappa 0.7 (0.3-1.0). The change over time was also not significant ($p = 0.5$). For hirsutism, acne and BMI the change over time was not statistically significant between the groups

The regularisation of the menstrual cycle showed that there was no statistically significant difference in the regularity of the menstrual cycle between groups at baseline. Participants in the Experimental group I had a 4.3 times higher chance of experiencing regular periods (OR: 4.33 CI 1.385-13.552) compared to the control group and a 9.1 times higher chance of experiencing regular periods compared to Experimental group II (OR: 9.1, CI 2.84-29.146).

Physical activity also demonstrated a significant difference ($p < 0.001$) with a mean rise of ($M = 5.03$, $SD = 8.27$) = 0.0017), and the acne score demonstrated a significant increase ($M = 5.56$, $SD = 13.4$) ($p = 0.026$). According to the previous score, the intervention group was driven to reach its objectives, in contrast to the Experimental II and Control groups, who did not see a discernible rise

in their levels of physical activity. There was no discernible difference in the hirsutism scores before and after therapies. The mean decrease in the stress score was (MSD 4.218856), (MSD 6.357.3191), (MSD 3.1 5.54), (MSD 3.1 5.54), (MSD 3.1 5.54), (MSD 3.1 5.54), (MSD 3.1 5.54), (MSD 3.1 5.54) Between the participants in the Experimental II and Control groups, there were no appreciable differences in the prevalence of hirsutism or acne.

There was a substantial difference between pre-test and post-test scores regarding awareness of PCOS, according to research on the effects of nutrition education on the knowledge levels of Experimental group I and II participants. The average score change between the pre-test and post-test was -6.163.39. Wilcoxon signed rank test results showed a statistically significant positive shift after the education, $Z=-6.876$, $P=0.001$, with a large effect size ($r=0.86$), in order to assess whether participants in the education module had more information of PCOS. The study found that the educational module was successful in raising the study participants' level of knowledge.

Initially ,the intake of Calorie , protein , carbohydrate , fat , saturated fat , fibre , intake was shown a significant increase in their mean values in all the intervention groups compared to EAR($p>0.05$) .The micronutrients “thiamine , riboflavin , niacin , folic acid , vitamin D , Vitamin E , Calcium , potassium ,selenium , sodium ,zinc and Vitamin B6 , omega 3 fatty acids , MUFA” showed a considerable decrease in mean value compared to EAR ($p<0.001$).In the present study Iron , Phosphorus and Vitamin B5 , Chromium were the micronutrients which had the adequate intake compared to EAR. Mean intake of folate was higher compared to EAR .Food intake frequency was assessed using Individual Dietary diversity score and the average score was found to be7.75.About 3.2 per cent of participants consumed 5 food groups, 4.4 per cent consumed 6 food groups,9.7 per cent ,7 food groups ,12.9 per cent 8 food groups , 16.1 per cent of participants consumed 9 food groups and More than 20.4 per cent of participants consumed 10 food groups . More than 21.5 per cent participants consumed 11 foods groups and 11.8 per cent were consumed 12 food groups

There was a significant decrease in the intake of protein and vitamin E between the subjects in all the three types of intervention groups ($p<0.001$) .Calories Carbohydrate, vitamin D , Saturated fatty acid intake decreased significantly in the Experimental I and Experimental II group(<0.05). Calcium intake had reduced in the “Experimental I” and control group ($p<0.001$).The mean intake of thiamine , chromium , copper , Iron , potassium, sodium , zinc , MUFA , Vitamin B6 , Phosphorus and fibre and Omega 3 fatty acid had significantly decreased in the Experimental I group($p<0.001$).Intake of several micronutrients had decreased considerably because , many of the participants had decreased their portions, which in turn resulted in decreased calorie and carbohydrate intake. After the education session the mean intake of calorie($p=0.0011$) , protein($p=0.0158$), carbohydrate($p<.0001$) , vitamin C($p=0.0147$), Vitamin D($p= 0.0232$), Vitamin E($p=0.0057$)and saturated fatty acids($p=0.0248$)has reduced significantly .For those in the control group, the intake of protein, vitamin E , Calcium , Omega 3 fatty acid has reduced to ($p<0.001$).

Between the Experimental I and control group no significant difference was observed in the mean values of Chromium, Iron, Copper, phosphorus and Vitamin B5.

Comparison of effectiveness of Nutrition Intervention between the study groups indicated that Experimental I and II groups who received nutrition education had significantly reduced the intake of calorie, carbohydrate, chromium, sodium and saturated fat ($p < 0.001$). Comparison of Experimental I and control group showed a significant difference in carbohydrate, calorie, niacin, vitamin E, Chromium, Niacin and saturated fatty acid. There was a significant decrease in the intake of protein and vitamin E between the subjects in all the three types of intervention groups ($p < 0.001$). Calories Carbohydrate, vitamin D, Saturated fatty acid intake decreased significantly in the Experimental I and Experimental II group ($p < 0.05$). Calcium intake had reduced in the Experimental I and control group ($p < 0.001$). The mean intake of thiamine, chromium, copper, Iron, potassium, sodium, zinc, MUFA, Vitamin B6, Phosphorus and fibre had significantly decreased in the intervention group ($p < 0.001$). Intake of several micronutrients had decreased considerably because many of the participants had decreased their portions, which in turn resulted in decreased calorie and carbohydrate intake. After the education session the mean intake of calorie ($p < 0.0011$), protein ($p = 0.016$), carbohydrate ($p < 0.0001$), vitamin C ($p = 0.0147$), Vitamin D ($p = 0.0232$), Vitamin E ($p = 0.0057$) and saturated fatty acids ($p = 0.0248$) has reduced significantly.

Regarding the demographic details, there was no significant association between socio economic status and types of PCOS. There was significant association between depression and religion, depression and area of residence. Acne had shown significant association with occupation. The correlation between the biochemical and clinical profile of the participants in the three study groups revealed that there was a high significant correlation between .Moderate significant positive correlation existed between Triglycerides and testosterone levels ($p = 0.008$) in Experimental group II. In the Control group mild negative correlation existed between total cholesterol and stress level.

The findings of this research study confirmed that the nutrition supplementation along with nutrition education programme are very effective in improving their nutritional status, biochemical profile and also minimising the consequences of some of the clinical symptoms of PCOS. Education sessions helped the patient in improving physical activity levels and reducing stress. As the results, the quality of life of the participants are improved, which helped to overcome the complications and consequences of PCOS.

RECOMMENDATIONS OF THE STUDY

The recommendation that emerge from the study may be focused on the following aspects

1. Reproductive age Women need to be educated on the importance of reproductive health. The co morbidities and Consequences associated with reproductive health issues like PCOS is invasive and awareness on these aspects help them very much to improve the Nutritional knowledge and Quality of their life.

2. The women community should be made to understand the symptoms and long term complications of PCOS and remedial measures including the role of Lifestyles and Diet modification, Weight management, Stress management and Physical exercise to alleviate the symptoms and complications need to be educated to Adolescent girls and Women of reproductive age.
3. Regular consumption of macro and micro nutrient rich foods in adequate quantity and quality is an effective sustainable way in promoting overall health status including reproductive health in regularising menstrual cycle, minimizing the complications and consequences of reproductive health issues like PCOS of women in reproductive age group.
4. Creating awareness, Stress relieving techniques such as Progressive muscle relaxation and mind relaxation techniques will be effective in reducing stress and anxiety
5. Encouraging daily physical activity for 30 minutes will be helpful in reducing the symptoms of PCOS.
6. The Education Institutions, Government and Nongovernment organisations, banking sectors and so on could arrange health check-up periodically. Nutrition Education sessions on importance of nutritious foods , optimum health especially the Women's health and Reproductive health issues and its effective management is appropriate , feasible and sustainable attempt in alleviating the symptoms of PCOS and in improving health status of the target population.

The present study concluded that the Nutrition Intervention with a combination of Nutrition education, dietary intervention and supplementation of Nutrient Dense Health mix powder is one of the most important and effective strategy for optimum health, good nutritional status and also for enhancing health and nutrition knowledge of the participants. The participants in the Experimental group I had effectively reduced their weight, BMI , body fat , WC, HC , cholesterol levels , Triglyceride levels , cholesterol to HDL ratio, Testosterone levels when compared to the other two groups. Higher rates of regularisation of menstrual cycle was experienced by the Experimental group I than the Experimental group II and Control group

LIMITATIONS OF THE STUDY

- Supplementation period may be extended to six months
- Larger sample size may be studied
- The study did not investigate the serum micronutrient levels, which could be correlated with the symptoms of PCOS.

SCOPE OF THE STUDY

- The magnitude of the signs and symptoms of PCOS experienced by the women will pave the way to know about or explore methods for prevention of this type of reproductive health issues and to promote their reproductive health

- Creating awareness related to the importance of health and reproductive health issue are the need of the hour, since reproductive health issues are emerging very rapidly.
- Diet based approach, suitable physical activities and healthy lifestyle pattern are considered as the sustainable measures for effective management of PCOS to promote and preserve the optimum health and also for prevention of diseases.

A sound and sustainable nutrition intervention programmes including dietary supplementation, education and so on may be very effective in modifying their dietary and lifestyle pattern of young generation for their future quality of lifestyle pattern.