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Nutrition education intervention for women with polycystic ovarian syndrome

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Abstract

Dietary and lifestyle modification play an important role in the management of PCOS. Nutrition education intervention play critical role to bring in these changes, but very few women with PCOS are receiving nutrition education. Knowledge related to this condition among women is also unknown. The purpose of this study is to assess nutrition knowledge, impart nutrition education, to study the impact and explore their relationship with socio-economic status. Case-control study design was followed. The results reveal significant positive correlation between nutrition knowledge at baseline of respondents and education of parents. Respondents demonstrated poor nutrition knowledge at baseline. There was significant increase in knowledge, attitude, practice scores from baseline to 90th day in spite of the reduction from 45th to 90th day. This implies that programs targeting nutrition education and behavior modification are needed to improve the management and mitigation of PCOS-related symptoms among women.

Keywords: Education intervention, Lifestyle modification, Nutrition knowledge, PCOS, Socio-economic status

Introduction

Polycystic ovary syndrome (PCOS) is an endocrine disorder and the leading cause of female infertility worldwide (Afiquah-Alleng *et al.*, 2017) ^[1]. It was first described by Irving. F. Stein and Michael. L. Leventhal in 1935 and is also termed a “Stein-Leventhal” syndrome. PCOS has highly variable global prevalence (2.2% - 26%), 116 million women worldwide are affected by this condition (Kabel, 2016). The highest prevalence is reported in US, Canada, Mexico, European countries (Afiquah-Alleng *et al.*, 2017) ^[1]. In India the prevalence rate is about 10 per cent (Vidya Bharathi *et al.*, 2017) ^[2]. Few community-based surveys have reported the prevalence rate up to 70 per cent (Ahmadi *et al.*, 2013) ^[3].

PCOS is observed in women of reproductive age, which leads to reproductive, hormonal and metabolic abnormalities. Due to the presence of insulin resistance, PCOS increases the risk of chronic diseases like type 2 diabetes, hypertension, lipid disorders, cardiovascular diseases and malignancies such as breast and endometrial cancer. Despite being considered a “lifestyle” disease, PCOS has received scant attention in the social science literature. In India, media accounts citing prominent doctors have expressed concern that the syndrome affects a growing number of urban middle-class Indian women.

PCOS is on an increasing trend and a holistic approach is required for its management. As per studies, the first line of intervention for women with PCOS is lifestyle modification that includes dietary modifications, increased physical activity and weight management along with medications which were found to be effective in preventing the cardio-metabolic risk factors. Considering the individual’s risk profile and treatment goals would help in managing this condition effectively. Studies suggest that nutrition education can help disseminate information on healthy diet and nutrition. To bring about a positive change in the attitude of people towards PCOS, nutrition, healthy eating, good lifestyle pattern can be adopted.

Educational program that provides general information about the lifestyle modification can be included for women with PCOS to encourage them for effective management of the condition which can also improve their quality of life.

Methodology

Locale of the study

The study was conducted in Kempegowda Institute of Medical Sciences (KIMS), affiliated to Rajiv Gandhi University of Health Science, Jayanagar, Bengaluru under the supervision of

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gynaecologists and dietician of the hospital.

Selection of the subjects

For the present study young women in the age group of 18-25 years were considered. Those who reported at least one Rotterdam criteria were classified as symptomatic and were further diagnosed for other symptoms. Women with classic PCOS (characterized by clinical hyperandrogenism, anovulation and ovarian cysts) and normandrogenic PCOS (characterized by anovulation and ovarian cysts) were considered along with age matched women without PCOS (those who did not exhibit at least two PCOS characteristics) as control.

The total sample size was 150 with 50 members in each group

- i. Classic PCOS group (CP) with Anovulation, Hyperandrogenism and Polycystic ovaries
- ii. Normandrogenic PCOS group (NP) with Anovulation and Polycystic ovaries and
- iii. Control group (CN) without hyperandrogenism and Polycystic ovaries.

Ultrasounds were not carried out on women who did not present with clinical symptoms of PCOS, as was also the case in an Asian community study of PCOS prevalence. There may have been some women in this group who had hyperandrogenism and polycystic ovaries but literature suggests this is likely to be less than 1 per cent of those with PCOS (Kumarapeli *et al.*, 2008).

Socio-economic status

A questionnaire was developed to collect information on age, education, education of the parents, occupation and monthly income of the family and socio-economic status was analysed using modified Kuppaswamy scale (Singh *et al.*, 2017) [5]

Knowledge, Attitude and Practices (KAP)

Knowledge refers to an individual's understanding of the subject, including the intellectual ability to remember and recall information and facts (Marias and Glasuer, 2014) [6]. Questions pertaining to nutrients and sources, precautions, symptoms of PCOS, balanced diet and foods to be taken/avoided by PCOS subjects were included. There were 15 questions in knowledge section. Each had three options. One correct and two incorrect responses. Correct response was given a score of '1' and incorrect responses were given a score of '0'. This way a respondent can score maximum of 15 and minimum of '0' in this section.

Attitudes are emotional, motivational, perceptive and cognitive beliefs that positively or negatively influence the behavior or practice of an individual. Attitudes influence future behavior no matter the individual's knowledge and help explain why an individual adopts one practice and not the other alternative. The terms attitudes, beliefs and perceptions are interchangeable (Marias and Glasuer, 2014) [6]. Statements

related to physical activity, dietary guidelines for obesity, importance of nutrition for PCOS, balanced diet were included. Questions included in the attitude section were related to the attitude and beliefs of the subject regarding PCOS. A total of 15 statements were provided which included both +ve and -ve statements. Attitude score was obtained by summing up the responses of the 15 statements on a Likert scale showing the degree of agreement. The positive response was given a point of 5 while the most negative response was given a point of one. This way a respondent can score maximum of 75 and minimum of 15 in this section.

Practices are the observable actions of an individual that could affect his/her choice. Practice and behavior are interchangeable terms, although practice has a connotation of long-standing or commonly practiced behavior (Marias and Glasuer, 2014) [6]. Dietary practices include consumption of vegetables, fruits and regular habit of performing the physical activity. Questions in the practice section were designed to assess the dietary practices of PCOS subjects. There were 10 open end questions with answers 'Yes' or 'No'. 'Yes' indicated favourable dietary practice and 'No' indicates undesirable dietary practice. Each positive practice was given a score of one and negative response a score of zero with maximum score of 10 and minimum score of zero.

Imparting nutrition education

Development of tools for education intervention included;

1. Flash cards on symptoms of PCOS
2. Leaflet – Focusing on dietary modifications and importance of physical activity (English and Kannada).
3. Booklet – Including history, diagnostic criteria, clinical manifestations, treatment and management practices for PCOS (English and Kannada).

Nutritional counseling

The nutritional counseling was done using developed educational materials for PCOS subjects that included balanced diet, food groups, importance of nutrition in PCOS, management of PCOS symptoms through nutrition. The subjects were given counseling on individual basis weekly for a month minimum of 8 hours. This was followed by assessment to understand the impact. Counseling was given at the time of diagnosis, during their follow-up visits and by personal consultation.

Impact of nutrition education intervention

The KAP (Knowledge, Attitude and Practices) interview schedule was administered to the respondents at the baseline. After this, using the developed tools education intervention was done. Impact study was conducted using the same KAP questionnaire on 45th day and on the 90th day to check the retention of knowledge, change in attitude and continuation of practices among the subjects (Intervention was done from 45th to 90th day). The per cent increase in KAP scores was calculated as follows:

$$\text{Per cent enhancement} = \frac{\text{Knowledge on 45}^{\text{th}} \text{ day} - \text{knowledge before education}}{\text{Total number of respondents}} \times 100$$

The per cent retention in KAP scores was calculated as follows:

$$\text{Per cent enhancement} = \frac{\text{Knowledge on 90}^{\text{th}} \text{ day} - \text{knowledge on 45}^{\text{th}} \text{ day}}{\text{Total number of respondents}} \times 100$$

Results and Discussion

Socio-economic class

Revised Kuppaswamy’s socio-economic scale was used to arrive at socio-economic class of the respondents. Most of the respondents belonged to lower middle class (46% in CP, 46% in NP, 44% in CN group). Statistical analyses showed that there was no significant difference between the groups with respect to socio-economic class though there was a significant difference with respect to monthly family income. This is mainly because Kuppaswamy’s scale considers three factors like education, occupation of the family head and monthly

income of the family to arrive at socio-economic class. Earlier studies have reported that the prevalence of PCOS was observed more in higher socio-economic group (Malik *et al.*, 2014) [7] which is in contrary to the finding of our study where the PCOS subjects belonged mostly to lower middle class. The reason might be, in higher socio-economic group due to increased affordability to medical facilities PCOS diagnosis is more compared to lower socio-economic status. It is evident from the current findings that PCOS is prevalent in all socio-economic classes of the society (Table 1).

Table 1: Socio-demographic profile of the subjects

(N = 150)

Variables	Categories	CP (n = 50)		NP (n = 50)		CN (n = 50)		χ ²
		No.	%	No.	%	No.	%	
Age (years)	18 – 20	10	20.00	13	26.00	16	32.00	2.69 ^{NS}
	21 – 23	25	50.00	23	46.00	18	36.00	
	24 – 25	15	30.00	14	28.00	16	32.00	
Education	Profession or honours	0	0.00	0	0.00	0	0.00	9.66 ^{NS}
	Graduate or post graduate	6	12.00	15	30.00	17	34.00	
	Intermediate or post high school diploma	23	46.00	18	36.00	14	28.00	
	High school certificate	7	14.00	7	14.00	10	20.00	
	Middle school certificate	8	16.00	5	10.00	7	14.00	
	Primary school certificate	0	0.00	0	0.00	0	0.00	
	Literate	0	0.00	2	4.00	0	0.00	
Illiterate	6	12.00	3	6.00	2	4.00		
Education of the parents								
Education of the father	Profession or honours	3	6.00	2	4.00	4	8.00	1.12 ^{NS}
	Graduate or post graduate	12	24.00	12	24.00	10	20.00	
	Intermediate or post high school diploma	14	28.00	11	22.00	13	26.00	
	High school certificate	9	18.00	12	24.00	12	24.00	
	Middle school certificate	4	8.00	6	12.00	4	8.00	
	Primary school certificate	3	6.00	4	8.00	2	4.00	
	Literate	3	6.00	2	4.00	4	8.00	
Illiterate	2	4.00	1	2.00	1	2.00		
Education of the mother	Graduate or post graduate	7	14.00	7	14.00	8	16.00	3.45 ^{NS}
	Intermediate or post high school diploma	16	32.00	12	24.00	16	32.00	
	High school certificate	8	16.00	12	24.00	12	24.00	
	Middle school certificate	6	12.00	4	8.00	3	6.00	
	Primary school certificate	2	4.00	5	10.00	5	10.00	
	Literate	4	8.00	6	12.00	2	4.00	
Illiterate	7	14.00	4	8.00	4	8.00		

CP – Classic PCOS, NP – Normandrogenic PCOS, CN – Control, NS – non- significant,

Variables	Categories	CP (n = 50)		NP (n = 50)		CN (n = 50)		χ ²
		No.	%	No.	%	No.	%	
Family type	Nuclear	42	84.00	44	88.00	40	80.00	1.19 ^{NS}
	Joint	08	16.00	06	12.00	10	20.00	
Family size	Small	17	34.00	21	42.00	19	38.00	2.06 ^{NS}
	Medium	22	44.00	23	46.00	21	42.00	
	Large	11	22.00	6	12.00	10	20.00	

Occupation	Profession	3	6.00	5	10.00	4	8.00	11.11 ^{NS}
	Semi-profession	6	12.00	6	12.00	7	14.00	
	Clerical, Shop-owner	6	12.00	6	12.00	9	18.00	
	Skilled worker	19	38.00	7	14.00	16	32.00	
	Semi-skilled worker	9	18.00	15	30.00	11	22.00	
	Unskilled worker	7	14.00	11	22.00	3	6.00	
Family income (Rs.)	>41430	3	6.00	5	10.00	4	8.00	11.28*
	20715-41429	11	22.00	9	18.00	16	32.00	
	15536-20714	19	38.00	14	28.00	23	46.00	
	10357-15535	9	18.00	17	34.00	5	10.00	
	6214-10356	8	16.00	5	10.00	2	4.00	
Socio-economic class	Upper	3	6.00	5	10.00	4	8.00	5.86 ^{NS}
	Upper middle	14	28.00	9	18.00	19	38.00	
	Lower middle	23	46.00	23	46.00	22	44.00	
	Upper lower	10	20.00	13	26.00	5	10.00	

CP – Classic PCOS, NP – Normandrogenic PCOS, CN – Control, * - Significant at 5 per cent, NS – non-significant

Table 2: Perception of the subjects about PCOS

Variables	Category	CP (n = 50)		NP (n = 50)		CN (n = 50)	
		No.	%	No.	%	No.	%
Familiar of PCOS condition	Yes	18	36.00	17	34.00	12	24.00
	No	17	34.00	13	26.00	20	40.00
	Not sure	15	30.00	20	40.00	18	36.00
Time since diagnosis (duration in months)	3	24	48.00	32	64.00	0	0.00
	6	12	24.00	8	16.00	0	0.00
	12	8	16.00	5	10.00	0	0.00
	>12	6	12.00	5	10.00	0	0.00
	Not applicable	0	0.00	0	0.00	50	100.00
Worry/concern on diagnosis [@]	Irregular/ unpredictable menstruation	42	84.00	27	54.00	0	0.00
	Hair growth	12	24.00	5	10.00	0	0.00
	Weight gain	32	64.00	19	38.00	0	0.00
	Acne	15	30.00	14	28.00	0	0.00
	Difficulty conceiving	42	84.00	35	70.00	0	0.00
	Not applicable	0	0.00	0	0.00	50	100.00
Source of awareness	Print media	12	24.00	5	10.00	7	14.00
	Radio	3	6.00	0	0.00	1	2.00
	Television	6	12.00	6	12.00	5	10.00
	Internet	8	16.00	13	26.00	5	10.00
	Gynaecologist	15	30.00	20	40.00	6	12.00
	Other health professional	3	6.00	4	8.00	21	42.00
	Friends and family	3	6.00	2	4.00	5	10.00
Treatment undergone [@]	Allopathy	14	28.00	10	20.00	0	0.00
	Ayurveda	7	14.00	0	0.00	0	0.00
	Homeopathy	6	12.00	2	4.00	0	0.00
	Diet	3	6.00	4	8.00	0	0.00
	Exercise	6	12.00	13	26.00	0	0.00
	None	28	56.00	0	0.00	50	100.00
Improvement on therapy	Yes	8	16.00	6	12.00	0	0.00
	No	14	28.00	8	16.00	0	0.00
	Not applicable	0	0.00	0	0.00	50	100.00
Diet + Exercise can control PCOS	Yes	10	20.00	18	36.00	20	40.00
	No	5	10.00	12	24.00	9	18.00
	Not sure	35	70.00	20	40.00	21	42.00

PCOS related information as perceived by the subjects was recorded and is shown in Table 2.

CP - Classic PCOS, NP – Normandrogenic PCOS, CN – Control, @ - multiple responses.

The results show that, the subjects familiar of PCOS on diagnosis and were unaware for the condition on diagnosis, the biggest concerns expressed were, unpredictable menstruation, difficulty conceiving and weight gain (84%, 85% and 64% in CP group respectively). Source of awareness about PCOS condition was found be gynaecologist (40% in NP and 30% in CP) among women with PCOS. Among the

control group, it was other health professionals (42%). Other than these, internet and television were found to be the source of information. Forty-four per cent of the women in CP group were on treatment for PCOS and chose allopathy. 28 per cent of CN women said there was no improvement on therapy. 70, 40 and 42 per cent in CP, NP and CN group respectively said that they are unsure whether diet and exercise can control PCOS. Whereas, 40 per cent in CN group believed that diet and exercise can control PCOS.

Impact of education intervention on KAP

Table 3: Impact of education intervention on knowledge of PCOS among the subjects

(N=150)

Group	Test	Knowledge score			Paired 't' test
		Mean ± SD	Mean (%)	SD (%)	
CP (n = 50)	Baseline	6.02 ± 2.97	40.13	19.82	21.06**
	45 th day	10.78 ± 2.45	71.87	16.35	
	Enhancement	4.76 ± 1.60	31.73	10.65	10.98**
	90 th day	9.42 ± 2.30	62.80	15.36	
	Reduction	1.36 ± 0.88	9.07	5.83	
NP (n = 50)	Baseline	7.04 ± 2.89	46.93	19.24	16.63**
	45 th day	10.82 ± 2.58	72.13	17.23	
	Enhancement	3.78 ± 1.60	25.20	10.72	9.54**
	90 th day	9.32 ± 2.43	62.13	16.19	
	Reduction	1.5 ± 1.11	10.00	7.41	
CN (n = 50)	Baseline	5.48 ± 2.34	36.53	15.61	19.70**
	45 th day	10.50 ± 1.84	70.00	12.29	
	Enhancement	5.02 ± 1.80	33.47	12.01	11.34**
	90 th day	8.94 ± 1.78	59.60	11.85	
	Reduction	1.56 ± 0.97	10.40	6.48	

CP – Classic PCOS, NP – Normandrogenic PCOS, CN – Control, ** - Significant at 1 per cent

Table 4: Impact of education intervention on attitude towards PCOS among the respondents

(N=150)

Group	Test	Attitude score			Paired 't' test
		Mean ± SD	Mean (%)	SD (%)	
CP (n = 50)	Baseline	42.96 ± 9.48	57.28	12.64	21.15**
	45 th day	60.68 ± 6.85	80.90	9.13	
	Enhancement	17.72 ± 5.92	23.63	7.90	13.64**
	90 th day	56.48 ± 7.22	75.31	9.63	
	Reduction	4.2 ± 2.18	5.60	2.90	
NP (n = 50)	Baseline	48.28 ± 9.21	64.37	12.27	17.40**
	45 th day	63.70 ± 8.19	84.93	10.92	
	Enhancement	15.42 ± 6.26	20.56	8.35	12.15**
	90 th day	58.62 ± 8.41	78.16	11.22	
	Reduction	5.08 ± 2.95	6.77	3.94	
CN (n = 50)	Baseline	37.76 ± 9.22	50.35	12.29	18.93**
	45 th day	55.92 ± 7.18	74.56	9.57	
	Enhancement	18.16 ± 6.78	24.21	9.04	13.97**
	90 th day	49.88 ± 8.51	66.51	11.34	
	Reduction	6.04 ± 3.05	8.05	4.08	

CP – Classic PCOS, NP – Norm androgenic PCOS, CN – Control, ** - Significant at 1 per cent

Table 3, 4 and 5 indicate the knowledge scores at baseline, 45th day and 90th day. Enhancement of scores on 45th day and reduction of scores on 90th day were calculated. The tables show that there was significant increase in KAP scores from baseline to 45th day and the reduction of KAP scores from 45th day to 90th

day was also significant. In spite of the reduction in scores from 45th day to 90th day, there were improvements in KAP scores from baseline to 90th day. And the results were found to be statistically significant at 1 per cent level.

Table 5: Impact of education intervention on practices to avoid/combat PCOS among the study population

(N=150)

Group	Test	Practice score			Paired 't' test
		Mean ± SD	Mean (%)	SD (%)	
CP (n = 50)	Baseline	3.58 ± 1.26	35.80	12.63	20.87**
	45 th day	7.82 ± 0.83	78.20	8.25	
	Enhancement	4.24 ± 1.44	42.40	14.36	2.78**
	90 th day	7.56 ± 0.93	75.60	9.29	
	Reduction	0.26 ± 0.66	2.60	6.64	
NP (n = 50)	Baseline	3.26 ± 1.02	32.60	10.26	31.91**
	45 th day	8.14 ± 0.70	81.40	7.00	
	Enhancement	4.88 ± 1.08	48.80	10.81	2.674 ^{NS}
	90 th day	7.92 ± 0.90	79.20	8.99	
	Reduction	0.22 ± 0.58	2.20	5.82	
CN (n = 50)	Baseline	6.24 ± 1.24	62.40	12.38	13.29**
	45 th day	8.52 ± 0.54	85.20	5.44	
	Enhancement	2.28 ± 1.21	22.80	12.13	3.05**
	90 th day	8.36 ± 0.69	83.60	6.93	
	Reduction	0.16 ± 0.37	1.60	3.70	

CP – Classic PCOS, NP – Normandrogenic PCOS, CN – Control, ** - Significant at 1 per cent, NS – non-significant

The results are on par with the research findings of D'souza *et al.*, 2013, Dalal *et al.*, 2014 [9] and Shobha *et al.*, 2014 who reported significant increase in knowledge and improvement in practices on exposure to awareness programme. Education

intervention programmes at an early age with focused health care packages can address the issue of inadequate knowledge about PCOS and practices among women. Thereby, helping to avoid future complications.

Table 6: Correlation coefficient of KAP scores with socio-economic profile of the subjects

Variable [@]	Group	Age	Family type	Family size	Occupation	Education	Father's education	Mother's education	Marital status	Income	Socio economic class
Knowledge	CP	-0.030	-0.170	-0.413	0.619*	0.657*	0.687*	0.729*	0.038	0.671*	-0.724*
	NP	0.101	-0.587*	-0.672	0.420	0.810*	0.756*	0.818*	0.106	0.518*	-0.561*
	CN	0.096	-0.319	-0.335	0.450	0.658*	0.599*	0.466	-0.042	0.349	-0.393
Attitude	CP	-0.035	0.031	0.066	0.016	0.005	0.021	0.091	-0.361	0.114	-0.042
	NP	-0.064	0.090	0.092	-0.256	-0.032	-0.180	-0.038	0.099	-0.234	0.197
	CN	0.090	0.260	0.207	0.221	-0.151	-0.044	-0.035	-0.039	0.108	-0.167
Practices	CP	0.024	0.016	0.140	-0.220	-0.099	-0.087	0.093	0.066	-0.102	0.151
	NP	-0.055	0.208	0.290	0.138	-0.373	-0.166	-0.279	-0.133	0.078	-0.010
	CN	-0.275	0.106	-0.041	0.032	0.275	0.201	0.305	0.060	0.131	-0.057

CP – Classic PCOS, NP – Normandrogenic PCOS, CN – Control, @ - KAP scores at baseline, * significant at 5%

Correlation coefficient of KAP scores with socio-economic profile showed that the knowledge of respondents correlated positively with education status of the respondents and their parents (Table 6). This shows that, KAP scores are less influenced by socio-demographic factors except for education of respondents and education of their parents. But, the knowledge level still shows significant positive correlation with socio-economic factors. Similar results are obtained in studies conducted by D'souza *et al.*, 2013 [8], Amasha and Heeba (2014) [10] and Mohamed *et al.*, 2015 [11] where no association was found between socio-demographic variables and KAP of PCOS subjects.

Conclusion

There is lack of awareness and women seem to look at uterus health only from the fertility point of view and are negligent about the treatment and preventive measure to be practiced. Hesitation among the public to talk about menstruation still prevails. Hence, there is need for educating the women about uterus health to lead a healthy life and to encourage them to adopt healthy lifestyle in order to lead a better life. There is need for educating at young age starting from teenagers to change the perception of the society. This can be made a part of their curriculum.

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