Effectiveness of Intake of Aloe Vera Juice in Reducing the Symptoms of Poly Cystic Ovarian Syndrome among Reproductive Age Group in Tertiary Care Hospital, Puducherry, India

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KEYWORDS
Aloe vera juice, Reproductive age group, Poly cystic ovary, effectiveness, tertiary care hospital.

ABSTRACT:
Introduction: Polycystic ovarian syndrome is a health disorder that is prevalent among women in the child bearing age. This disease is described by the development of multiple cysts in the ovaries due to inability of follicles to release mature eggs. To evaluate the effectiveness of intake of aloe vera juice in reducing the symptoms of poly cystic ovarian syndrome among reproductive age group. Methods: Polycystic ovarian syndrome is a health disorder that is prevalent among women in the child bearing age. This disease is described by the development of multiple cysts in the ovaries due to inability of follicles to release mature eggs.
Results: The finding shows that the experimental group had significant positive changes in the normal uterine size by 10% to 23.3% and positive changes in the right and left ovaries sizes which can imply that Aloe Vera has therapeutic effect on reproductive health. Post-assessment comparison revealed significant differences in uterus and left ovary sizes between the groups, with p-values of 0.005 and 0.004, respectively.
Conclusion: The study concluded that aloe vera juice is effective in reducing the symptoms of poly cystic ovarian syndrome among reproductive age group. However, the results of this study need to be confirmed with larger samples and longer follow-up studies designed and powered for safety outcomes.

1. Introduction

PCOS is a complex metabolic-endocrine disorder characterized by hormonal dysregulation, insulin resistance and reproductive dysfunction resulting in a number of adverse health outcomes, including infertility, metabolic dysfunction and increased risk of cardiovascular disease.[1]

Aloe Vera is rich with bioactive compounds like vitamins, minerals and enzymes as well as polysaccharides that account for the good health benefits associated. Compounds like acemannan have been shown to suppress the immunomodulatory effects in PCOS which may potentially help at disease management, making the inflammatory processes associated with PCOS less aggressive.[2] Additionally, Aloe Vera has demonstrated anti-inflammatory properties by blocking the cyclooxygenase pathway and thus inhibiting prostaglandin synthesis, a biosynthetic process critical to the management of inflammation and pain.[3]

Other than its anti-inflammatory activities, Aloe Vera juice has shown it has strong antioxidant activity important in combating oxidative stress that is prevalent in women with PCOS.[4] Exacerbation of insulin resistance and promotion of follicular dysfunction through oxidative stress are contributory factors to the pathophysiology of PCOS.

Study shows that Aloe Vera possesses an increased antioxidant status in several biological systems which may help to attenuate the oxidant damage associated with PCOS.[5] PCOS is characterised by insulin insensitivity and this condition must be treated to ease progression of symptoms and avoid potential long-term complications. Other reports suggest that Aloe Vera may be effective to increase insulin sensitivity and reduce blood sugar in diabetic and pre diabetic persons.[6,7]

Systematic review indicated Aloe Vera supplementation reduced fasting blood glucose levels and improved lipid profiles in people with type 2 diabetes.[8] It seems that these findings can similarly apply to women with PCOS, effecting better metabolic outcomes and amelioration of symptoms.

Additionally, it is necessary to consider the function of Aloe Vera in regulation of hormonal levels. Research shows that Aloe Vera can affect hormone secretion: for example, it can affect insulin and possibly androgens as well, which often become imbalanced in PCOS.[9] Animal studies have shown that Aloe Vera has the ability to stimulate folliculogenesis and enhance ovarian function, which at least may enhance the reproductive

outcomes of women with PCOS.[10] This is particularly important as many women with PCOS struggle with fertility issues due to hormonal imbalances.[11]

Consequently, as far as safety is concerned, Aloe Vera juice is safe in moderate doses and studies indicate that in healthy individuals it doesn't cause overt negative liver or kidney function. But quality and preparation of Aloe Vera products are important, since some commercial preparations could add things that take away its health benefits.[12] Therefore, sourcing high-quality, pure Aloe Vera juice is crucial for ensuring its efficacy and safety.

Based on the review literature, there are limited study done on aloe vera juice in reducing the symptoms of poly cystic ovarian disease. To fill this research gap, the study aims to assess effectiveness of intake of aloe vera juice in reducing the symptoms of poly cystic ovarian syndrome among reproductive age group.

2. Material and Methods

A quantitative research approach was adopted for the present study. The true experimental research design was adopted for the present study. The sample size was estimated as 60 using $n=4pq/d^2$ based on prevalence 3.7%[13] and 5% margin error. The samples of reproductive age group with poly cystic ovarian disease who fulfills the criteria during the period of study (experimental group 30 and control group 30). The study was conducted at tertiary care hospital, , Puducherry. The study was approved by the Institutional ethical committee (ECR/685/Inst/PY/2014/RR-21).

The inclusion criteria for the study encompass women of reproductive age, specifically between 13 and 45 years, who have been diagnosed with polycystic ovarian disease (PCOD) and are currently attending the gynecology outpatient department at tertiary care hospital, Puducherry

The exclusion criteria for the study include women who are currently undergoing hormonal treatments or fertility medications, pregnant or lactating women, individuals diagnosed with thyroid disorders, hyperprolactinemia, or other endocrine disorders.

Modified Poly Cystic Ovarian Disease Assessment Checklist which is used to assess the level of symptoms of poly cystic ovarian disease among reproductive age group. Tools were evaluated by five experts from Obstetrics and Gynecological Department. The suggestions given by the experts were incorporated and the tool was finalized

STATISTICAL ANALYSIS

SPSS (Statistical Package for Social Sciences) version 26 was employed to analyze quantitative data, including the mean and standard deviation (SD). Baseline characteristics were compared with those at the end of the dosing period. Both parametric and non-parametric tests were utilized for data processing.

Data Collection procedure

The sample was selected based on the inclusion criteria using a simple random sampling technique. Written consent was obtained from participants (women of reproductive age diagnosed with polycystic ovarian disease). The study intervention and its benefits were thoroughly explained to the participants. Participants (women with polycystic ovarian disease) were instructed regarding the administration of aloe vera juice intake as part of the intervention. On the first day, a pre-assessment was conducted using a checklist to evaluate the severity of symptoms related to polycystic ovarian disease. On the same day, aloe vera juice was administered to the participants. The intervention continued from day 1 through day 30. On the 31st day, a post-assessment was conducted using the same checklist to evaluate the level of symptoms. A comparison will be made between the pre-intervention symptom levels (assessed on day 1) and the post-intervention symptom levels (assessed on day 31).

3. Result

Demographic and obstetrical variables

Table 1 showed that the majority of reproductive age women with polycystic ovarian disease (PCOD) in both experimental and control groups were aged 13-23 years, predominantly Hindu, and resided in rural areas. Most

had completed high school, were married, followed a mixed diet, and had a family income above ₹10,000. A significant portion were unemployed, with a smaller number working in the private sector.

Table 1: Demographic and obstetrical Variables among reproductive age group with poly cystic ovarian disease

SL. NO	DEMOGRAPHIC VARIABLES	CONTROL GROUP		EXPERIMENTAL GROUP		CHI-SQUARE	P VALUE
1	Age	N	%	N	%		
	13-23 years	16	53.3	14	46.7	0.3851	0.494 NS
	24-30 years	9	30	6	20		
	31-37 years	4	13.3	8	26.7		
	38-45 years	1	3.4	2	6.6		
2	Religion						
	Hindu	27	90	29	96.7	1.071	0.306 NS
	Christian	0	0	0	0		
	Muslim	3	10	1	3.3		
	Others	0	0	0	0		
3	Education						
	Illiterate	3	10	2	6.7	3.493	0.322 NS
	High school	12	40	11	36.7		
	Higher secondary	10	33.3	6	20		
	Graduate-post graduate	5	16.7	11	36.7		
4	Marital status					.6172	0.300 NS
	Married	16	53.3	19	63.3		
	Unmarried	14	46.7	11	36.7		
	Not applicable	0	0	0	0		
5	Area of residence					0.0981	0.500 NS
	Urban	7	23.3	6	20		
	Rural	23	76.7	24	80		
6	Nutritional pattern					2.352	0.309 NS
	Vegetarian	2	6.7	0	0		
	Non-vegetarian	1	3.3	2	6.7		
	Both	27	90	28	93.3		
7	Family monthly income					7.652	0.055 NS
	Rs.4000-6000	5	16.7	10	33.3		
	Rs.6000-8000	6	20	5	16.7		
	Rs.8000-10000	8	26.7	1	3.3		
	Above Rs.10000	11	36.6	14	46.7		
8	Occupation					1.911	0.385 NS
	Un –employee	17	56.7	19	63.3		
	Private employee	12	40	8	26.7		
	Government employee	0	0	0	0		
	Self –employee	1	3.3	3	10		

* significant ($p < 0.05$)

The study revealed that Regarding obstetrical Variables majority of the participants in two groups made their first menstrual cycle after the age of 14, possessed normal menstrual blood loss and protracted cycles longer than 30 days. Most of the respondents got married at 20-25yrs, weighed normal, had NO parental history of PCOD, and had symptoms for lesser than a year. There was a high percentage of participants from both groups who reported that they had never use oral contraceptive or had been exposed to non-pharmacological therapy. Besides, most of them had no concomitant medical conditions.

Biophysical parameter

(Table 2) In the control group, pre-assessment results showed 3.3% with a normal uterus size and 96.7% with an abnormal size, which improved slightly post-assessment to 10% normal and 90% abnormal. For the right ovary, 6.7% had a normal size pre-assessment, increasing to 10% post-assessment. The left ovary showed 6.7% normal pre-assessment, but this dropped to 3.3% post-assessment, indicating minimal improvement. Overall,

slight improvements were noted in the uterus and right ovary sizes, while the left ovary size remained mostly unchanged.

Table 2: Biophysical parameter chart of reproductive age group with poly cystic ovarian disease in Experimental group

Characteristics		Experimental group			
		Pre-assessment		Post assessment	
		n	%	n	%
Uterus size	Normal	3	10	7	23.3
	Abnormal	27	90	23	76.7
Right side ovary size	Normal	1	3.3	5	16.7
	Abnormal	29	96.7	25	83.3
Left side ovary	Normal	1	3.3	4	13.3
	Abnormal	29	96.7	26	86.7

(Table 3) In the experimental group, the pre-assessment of uterus size showed 10% of participants with a normal size and 90% with an abnormal size, which improved post-assessment to 23.3% normal and 76.7% abnormal. For the right ovary size, 3.3% had a normal size pre-assessment, increasing to 16.7% post-assessment, while the abnormal size decreased from 96.7% to 83.3%. Similarly, the left ovary size showed 3.3% normal and 96.7% abnormal in the pre-assessment, improving to 13.3% normal and 86.7% abnormal post-assessment. These results indicate a notable improvement in the sizes of the uterus and both ovaries post-assessment in the experimental group.

Table 3: Biophysical parameter chart of reproductive age group with poly cystic ovarian disease in Control group

Characteristics		Control group			
		Pre-assessment		Post assessment	
		n	%	n	%
Uterus size	Normal	1	3.3	3	10
	Abnormal	29	96.7	27	90
Right side ovary size	Normal	2	6.7	3	10
	Abnormal	28	93.3	27	90
Left side ovary	Normal	2	6.7	1	3.3
	Abnormal	28	93.3	29	96.7

Assessment level of Uterus size, right side ovary size and left side ovary size

(Table 4) The pre-assessment comparison of uterus and ovary sizes between the control and experimental groups showed no significant differences. For uterus size, the t-value was 1.027 with a p-value of 0.038, for the right ovary size, the t-value was -0.584 with a p-value of 0.242, and for the left ovary size, the t-value was 0.982 with a p-value of 0.21. All results indicate no statistically significant differences between the groups.

(Table 5) The post-assessment comparison of uterus and ovary sizes between the control and experimental groups in women with polycystic ovarian disease showed significant differences for uterus and left ovary sizes but not for the right ovary. For uterus size, the t-value was 1.385 with a p-value of 0.005, indicating a significant difference. Similarly, the left ovary size had a t-value of 1.401 with a p-value of 0.004, also showing a significant difference. However, for the right ovary size, the t-value was 0.750 with a p-value of 0.133, indicating no significant difference.

Table 4: Comparison of the pre –assessment level of Uterus size, right side ovary size and left side ovary size among reproductive age group with poly cystic ovarian disease

S. NO	Category	Pre- assessment	Mean	SD	'unpaired t ' test	'p' value
1	Uterus size	Control group	1.966	.182	1.027	0.38 (NS)
		Experimental group	1.900	.305		
2	Right side ovary size	Control group	1.933	.253	-.584	.242 (NS)
		Experimental group	1.966	.182		
3	Left side ovary size	Control group	1.731	.412	.982	0.21 (NS)
		Experimental group	1.796	.384		

Table 5: Comparison of the post –assessment level of Uterus size, right side ovary size and left side ovary size among reproductive age group with poly cystic ovarian disease

S. NO	Category	Post- assessment	Mean	SD	Unpaired t -test	'p' value
1	UTERUS SIZE	Control group	1.900	0.305	1.385	0.005* (S)
		Experimental group	1.766	0.430		
2	RIGHT SIDE OVARY SIZE	Control group	1.766	0.305	.750	0.133 (NS)
		Experimental group	1.900	0.379		
3	LEFT SIDE OVARY SIZE	Control group	1.966	0.182	1.401	0.004* (S)
		Experimental group	1.866	0.345		

4. Discussion

The study finding showed that in the control group, pre-assessment showed 3.3% with normal uterus size, increasing to 10% post-assessment, while right ovary normal size improved from 6.7% to 10%. However, left ovary size decreased from 6.7% normal to 3.3%. Slight improvements were noted in uterus and right ovary sizes, but the left ovary size remained mostly unchanged.

This research therefore shows that there was a general change in the size of the uterus and the ovary in the women with polycystic ovarian syndrome (PCOS) who took Aloe Vera juice. The experimental group had significant positive changes in the normal uterine size by 10% to 23.3% and positive changes in the right and left ovaries sizes which can imply that Aloe Vera has therapeutic effect on reproductive health. These results are particularly relevant given the complex hormonal and metabolic disturbances associated with PCOS, which often lead to infertility and other reproductive complications.[13,14]

Pre-assessment comparison between the groups showed no significant differences in uterus and ovary sizes. However, post-assessment comparison revealed significant differences in uterus and left ovary sizes between the groups, with p-values of 0.005 and 0.004, respectively. Further support the hypothesis that Aloe Vera has a positive impact on reproductive health in women with PCOS.[15,16]

The lack of significant improvement in the right ovary size in the experimental group (p-value 0.133) suggests that the effects of Aloe Vera may vary depending on individual physiological responses or the specific characteristics of the ovarian tissue. This finding highlights the need for further research to explore the mechanisms through which Aloe Vera exerts its effects on different reproductive organs and to identify potential factors that may influence its efficacy. Additionally, the study's results underscore the importance of individualized treatment approaches in managing PCOS, as responses to Aloe Vera may differ among patients based on their unique hormonal and metabolic profiles.[17]

The significant improvements in uterine and ovarian sizes observed in the experimental group suggest that Aloe Vera may help address some of the underlying issues associated with this complex disorder. However, further clinical trials are warranted to confirm these findings, establish optimal dosages, and elucidate the mechanisms of action of Aloe Vera in the context of PCOS management. The integration of Aloe Vera into treatment protocols for PCOS may offer a promising avenue for enhancing reproductive health and improving the overall quality of life for affected women. [18,19,20]

5. Limitations

The present study has its own limitations. The small sample size restricts the transfer of the results to the rest of the population. The short duration of the study also may not have substantiated the observation of long-term effects or side effects caused by Aloe Vera juice on PCOD symptoms. There is also a lack of a control group, from which it is difficult to disassociate any improvements to Aloe Vera juice consumption. At the same time, as self-reported data, reliance on subjective bias. The results may also have been influenced by variability among the participants' lifestyle factors, including the diet and exercise, that weren't controlled.

6. Conclusion

The study concluded that significant improvements in uterine and ovarian sizes observed in the experimental group suggest that Aloe Vera may help address some of the underlying issues associated with this complex disorder. Despite that, Aloe Vera juice appears to be a helpful complementary therapy with respect to

managing PCOD symptoms; however, long term studies are needed to validate this. Lifestyle changes including diet, exercise and judicious use of medical advice should still remain the backbone of PCOD management. However, further clinical trials are warranted to confirm these findings, establish optimal dosages, and elucidate the mechanisms of action of Aloe Vera in the context of PCOS management.

7. Recommendations

Future research is therefore suggested to have more prolonged duration and a larger sample to see what the long term effects of Aloe Vera juice have on PCOD symptoms. To accurately assess its effectiveness, it must also include a control group, and medical imaging and more reliable data, like hormonal assays should be used. It also helps in being able to control lifestyle factors like what you eat and how you exercise so you can isolate the effects of Aloe Vera juice. Its role in managing PCOD will also be further understood through multi center studies, long term monitoring for side effect, and analysis of how symptom improvement happens.

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